THIRTY-THIRD ANNUAL REPORT

OF THE

STATE HORTICULTURAL SOCIETY

OF

MISSOURI

1890

HELD AT CLINTON, MO., DEC. 2, 3 AND 4, 1890.

L. A. GOODMAN,
Secretary, Westport, Mo.

JEFFERSON CITY, MO.:
TRIBUNE PRINTING COMPANY, STATE PRINTERS AND BINDERS.
1891.

MISSOURI STATE HORTICULTURAL SOCIETY.

To His Excellency, DAVID R. FRANCIS:

This report of our society work, of the meetings held, of the moneys expended, and of the local societies and counties reporting for the year 1890, is respectfully submitted.

L. A. GOODMAN, Secretary,
Westport, Mo., 1890.

CITY OF JEFFERSON, NOV. 26, 1890.

To the Commissioners of Public Printing:

I require for use of Horticultural Society 3,000 copies of Report of State Horticultural Society, 1,000 copies bound in cloth, 2,000 in paper, which I desire printed as per accompanying sample.

Respectfully,
L. A. GOODMAN,
State Secretary.

Approved:

A. A. LESUEUR, Secretary of State.
J. M. SEIBERT, State Auditor.
} Commissioners of Public Printing.

OFFICERS FOR THE YEAR 1890.

PRESIDENT,
J. C. EVANS, Harlem.

VICE-PRESIDENT,
N. F. MURRAY, Oregon.

SECRETARY,
L. A. GOODMAN, Westport.

TREASURER,
D. S. HOLMAN, Springfield.

LIST OF HONORARY MEMBERS.

George Hussman	Napa, Cal
T. T. Lyon	South Haven, Mich.
C. W. Murtfeldt	Kirkwood, Mo.
Hon. N. J. Colman	St. Louis, Mo.

LIST OF LIFE MEMBERS.

J. C. Evans	Harlem
L. A. Goodman	Westport
D. M. Dunlap	Fulton

STANDING COMMITTEES.

Orchards.

W. G. GANO, Olden; CHARLES PATTERSON, Kirksville; HENRY SPEER, Butler.

Vineyards.

G. E. MEISSNER, Bushburg; JACOB ROMMEL, Morrison; C. TEUBNER, Lexington.

Small Fruits.

S. MILLER, Bluffton; J. N. MENIFEE, Oregon; HENRY SCHNELL, Glasgow.

Stone Fruits.

G. W. HOPKINS, Springfield; F. A. HUBBARD, Carthage; J. A. LOGAN, Nevada.

Vegetables.

Prof. J. W. CLARK, Columbia; W. A. SMILEY, Boonville; J. A. DURKES, Weston.

Flowers.

H. NIELSON, St. Joseph; R. S. BROWN, Kansas City; IDA CRUME, Butler.

Ornamentals.

Prof. M. G. KERN, St. Louis; Mrs. C. I. ROBARDS, Butler; R. E. BAILEY, Fulton.

Entomology.

Miss M. E. MURTFELDT, Kirkwood; Dr. A. GOSLIN, Oregon; J. G. KINDER, Nevada.

Botany.

Prof. H. W. SPECKING, Boonville; Prof. G. C. BROADHEAD, Pleasant Hill; B. F. BUSH, Independence.

Nomenclature.

T. W. GAUNT, Maryville; J. B. WILD, Sarcoxie; A. AMBROSE, Nevada.

New Fruits.

F. LIONBERGER, Hugo; A. H. GILKESON, Warrensburg; W. P. STARK, Louisiana.

Ornithology.

CLARK IRVINE, Oregon; C. W. MURTFELDT, Kirkwood; W. H. THOMAS, La Grange.

Injurious Fungi.

B. T. GALLOWAY, Washington, D. C.; Prof. W. TRELEASE, St. Louis.

Packing and Marketing Fruits.

E. T. HOLLISTER, St. Louis; C. C. BELL, Boonville; C. THORP, Weston.

CONSTITUTION

OF THE

MISSOURI STATE HORTICULTURAL SOCIETY.

ARTICLE I. This association shall be known as the Missouri State Horticultural Society. Its object shall be the promotion of horticulture in all its branches.

ART. II. Any person may become a member of this society upon the payment of one dollar, and membership shall continue upon the payment of one dollar annually. The payment of ten dollars at any one time shall constitute a person a life member, and honorary members may be elected at any regular meeting of the society. And any lady may become a member by giving her name to the secretary.

ART. III. The officers of this society shall consist of a president, vice-president, a secretary and a treasurer, who shall be elected by ballot at each regular annual meeting, and whose terms of office shall begin on the first day of June following their election.

ART. IV. The elective officers of this society shall constitute an executive committee, at any meeting of which a majority of the members shall have power to transact business. The other duties of the officers shall be such as usually pertain to the same officers of similar organizations.

ART. V. The regular meetings of this society shall be held annually on the first Tuesday in December, except when otherwise ordered by the executive committee. Special meetings of the society may be called by the executive committee, and meetings of the committee by the president and secretary.

ART. VI. As soon after each regular annual meeting as possible, the president shall appoint the following standing committees, and they shall be required to give a report in writing, under their respective heads, at the annual and semi-annual meetings of the society, of what transpires during the year of interest to the society: Orchards, Vineyards, Stone Fruits, Small Fruits, Vegetables, Flowers, Ornamentals, Entomology, Ornithology, Botany, Nomenclature, New Fruits, Injurious Fungi, Packing and Marketing Fruit.

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

LIST OF COUNTY SOCIETIES.

Adair County Horticultural Society—
R. M. Brashear, President, Kirksville.
Chas. Patterson, Secretary, "

Atchison County Horticultural Society—
C. W. Coe, Pres't, Tarkio.
R. Lynn, Sec'y, "

Barry County Horticultural Society—
M. H. Roberts, Pres't, Golden.
G. G. James, Sec'y, Exeter.

Bates County Horticultural Society—
C. I. Robards, Pres't, Butler.
Henry Speer, Sec'y, "

Barton County Horticultral Society—
C. H. Fink, Pres't, Lamar.
D. B. Hayes, Sec'y, "

Buchanan Co. Horticultural Society—
Hans Nielson, Pres't, St. Joseph.
C. McKann, Sec'y, "

Butler County Horticultural Society—
D. C. Kitteridge, Pres't, Poplar Bluff.
E. R. Lentz, Sec'y, "

Camden County Horticultural Society—
J. W. Burhans, Pres't, Stoutland.
J. D. Reagan, Sec'y, "

Cooper County Horticultural Society—
H. M. Myers, Pres't, Boonville.
C. C. Bell, Sec'y, "

Greene County Horticultural Society—
G. W. Hopkins, Pres't, Springfield.
D. S. Holman, Sec'y, "

Henry County Horticultural Society—
M. L. Bonham, Pres't, Clinton.
J. M. Pretzniger, Sec'y, "

Holt County Horticultural Society—
N. F. Murray, Pres't, Elm Grove.
W. R. Laughlin, Sec'y, "

Mound City Horticultural Society—
D. B. Browning, Pres't, Mound City.
J. M. Hasness, Sec'y, "

Howell County Horticultural Society—
———— Pres't, Olden.
Will George, Sec'y, "

Jasper County Horticultural Society—
B. Hall, Pres't, Carthage.
F. A. Hubbard, Sec'y, Carthage.

Tri-county Horticultural Society—
John Harlan, Pres't, Sarcoxie.
J. M. Rice, Sec'y, "

Lafayette Co. Horticultural Society—
Dr. W. A. Gordon, Pres't, Lexington.
C. Teubner, Sec'y, "

Laclede County Horticultural Society—
A. Nelson, Pres't, Lebanon.
E. B. Kellerman, Sec'y, Lebanon.

Linn County Horticultural Society—
Ralph Smith, Pres't, Brookfield.
G. W. Martin, Sec'y, "

Mercer County Horticultural Society—
R. J. Lewis, Pres't, Princeton.
J. A. Kennedy, Sec'y, Ravenna.

Montgomery Co Horticultural Society—
F. Gutmann, Pres't, Hugo.
C. Hausser, Sec'y, "

Pettis County Horticultural Societp—
G. W. Parish, Pres't, Sedalia.
L. T. Kirk, Sec'y, "

Polk County Horticultural Society—
G. W. Williams, Pres't, Humansville.
J. L. Strader, Sec'y, "

Phelps County Horticultural Society—
Robt. Merriwether, Pres't, Rolla.
W. W. Southgate, Sec'y, "

Ripley County Horticultural Society—
J. G. Hancock, Pres't, Doniphan.
T. W. Mabrey, Sec'y, "

Vernon County Horticultural Society—
A Ambrose, Pres't, Nevada.
J. G. Kinder, Sec'y, "

Missouri Valley Horticultural Society—
J. C. Evans, Pres't, Harlem, Mo.
G. E. Rose, Sec'y, Rosedale, Kas.

SUMMER MEETING

OF THE

MISSOURI STATE HORTICULTURAL SOCIETY,

HELD AT POPLAR BLUFF, JUNE 3-4-5, 1890.

TUESDAY, June 3, 8 P. M.

Society called to order by President J. C. Evans.

Opened with prayer by C. W. Murtfeldt.

ADDRESS OF WELCOME.

E. R. LENTZ, Poplar Bluff.

Mr. President and Ladies and Gentlemen:

On behalf of the citizens of the city of Poplar Bluff and Butler county, it is my privilege, as well as my pleasure, to extend to you, the officers and members of the Missouri State Horticultural Society, and to you, gentlemen, who are not members of said society, but who are here as visitors and interested spectators of the proceedings of this body, the earnest and heartfelt welcome of the good people of this city and county. We welcome you to our midst, to our city and to our homes, and it is the earnest wish of every citizen of Poplar Bluff that your stay among us may be both pleasant and profitable; and let me say here, that it will be the aim and desire of our people to make your stay with us, at least pleasant, although we cannot promise you that we will be able to make it profitable to you. Yet we shall do our best, and gather for ourselves whatever there may be of profit from your meeting with us.

This is the first meeting, so far as I am aware, gentlemen, which your society has ever held in Southeast Missouri. And it seems to me peculiarly fitting and appropriate that your society should become more fully and intimately acquainted with the capabilities of this section of the State as a fruit-growing region. And I may say, gentlemen, that its capabilities need only be known to be appreciated.

While it is true that as yet there has been but little done in the way of developing this important branch of the agriculture of the State, yet enough has been done to show the wonderful adaptability of our section of the State to the growing of a very large list of fruits. Probably in no section of the State can so many varieties of fruits be so successfully grown as in that portion lying to the south and east of the Ozark range of mountains.

Here are annually grown some of the finest apples that the country produces, and while it is true that the greater part of the apples raised in this community are inferior in size, quality and flavor, yet the magnificent specimens that we see each year grown in our very midst show what can be done by judicious and thorough cultivation.

And need I say the peach finds here its natural home and attains its greatest perfection. If any of you gentlemen have any doubts on this subject, I would only ask you to take a trip through old Butler, Stoddard, Mississippi, or indeed any of the counties of Southeast Missouri, in the early fall, and behold the magnificent rosy-cheeked peaches that he will everywhere find, and taste the delicious flavor thereof, and I doubt not the most skeptical will be ready to concede that he is in the land where this delicious fruit attains to its greatest perfection.

But it must not be supposed that all the peaches that are grown in Southeast Missouri are of the magnificent qualities and proportions that we have been talking of, for it must be borne in mind that we have a great many careless and indifferent farmers in this part of the State who pay very little attention to the kind of varieties that they plant, and hence much of the fruit grown here is inferior in size, quality and flavor. But in almost every community will be found those who have taken great pains in the selection of varieties, and with them we again see the scriptural saying fulfilled, "By their fruits ye shall know them;" and these have demonstrated beyond the possibility of a doubt that Southeast Missouri will in the near future be second to no country on the face of this broad continent in the growing of this delicious fruit.

Then again, the experiments recently made in the culture of the pear give promise that this section will in the near future be equaled only by California. To a limited extent some varieties of the pear have been cultivated here for many years, and so far as I am aware there has not in twenty years been an entire failure of pear crop nor a single case of blight reported in this section. While in the last few years experiments in the growing of the different varieties of the pear have all been attended with unprecedented success, sufficient to astonish even the most enthusiastic. Within the last three years pears of the Duchess DeAngouleme variety have been raised in this county, and within one mile of this house, measuring 14½ inches in circumference and weighing more than two pounds, perfect and regular in shape and of exquisite flavor. Many other varieties have done equally well.

The plum, the apricot and the nectarine find in our soil, climate and surroundings a congenial home, and sufficient has already been done to assure the success of these fruits in our soil and climate.

In the way of small fruits, also, this country excels. Do you ask whether the blackberry will do well here? I point you to the fact that nearly the whole surface of the lower portion of our county is covered with wild blackberry bushes, and hundreds and thousands of bushels of these berries are annually grown in this region as the natural and spontaneous growth of the virgin soil, and many of these are almost equal in size, quality and flavor to the Kittatinny or the Lawton. This tells the tale and shows that this is the natural home of the blackberry, and where the wild berry grows so luxuriantly and yields such a bountiful harvest, the cultivated varieties must also succeed equally well.

You ask again, will the strawberry do well here? Need I do more than call attention to the magnificent specimens that we have before us to-day? and then say that nowhere in all the broad expanse of the State of Missouri can be found a more inviting field for the raising of this delicious berry than is to be found here in southeast Missouri.

The raspberry, the gooseberry, the grape and the cherry have all done splendidly wherever tried. And indeed it would be hard to name any of the many kinds of fruits and berries that can be successfully grown anywhere in the temperate zone that cannot be successfully grown here.

Now, gentlemen, I will not further weary you with detailing to you the capabilities and possibilities of this much-favored section of our great commonwealth.

But I cannot refrain from an attempt at least to disabuse your minds of the idea that seems to prevail in most parts of the State that there is nothing in Southeast Missouri but hills, rocks and swamps. Time and again have we heard it said, even by men of learning and intelligence, that there is not dry ground enough in all Southeast Missouri to make a decent garden spot, and that the uplands are all flint-rock hills and so utterly destitute of vegetation that a goat would starve to death. And I have even heard of a Methodist preacher over in Ohio, who, in all sincerity and candor, asked of one of our people whether it was really true that the place called Nigger Wool swamp over east of here was so called because they used to kill niggers and throw them in there.

The ignorance and credulity of this man are only equaled by the audacity and utter untruthfulness of the Kansas immigration agent who, while up in Michigan, was asked about Ironton, Missouri, by some one who had heard something about the place, when he replied that it was away out in the swamps of Southeast Missouri, was situated on a little hill and was surrounded by ten feet of water.

These, gentlemen, and many others, are the kind of ideas that very many of the inhabitants of even our own State seem to have about Southeast Missouri; and really the credulity of some of these people is unbounded.

Now what are the facts? We do not pretend to deny that we have some flint-rock hills in this section of the State, and we have some lands that by a forced construction of the word might be called swamp, but that there is nothing else here, or that these lands form even any considerable portion of our section, we deny most emphatically.

Go with me if you please to the splendid farms of Stoddard, Scott and Cape Girardeau counties, which are now decorated with fields of waving grain almost ready for the harvest, to the great melon and corn fields of Mississippi, the rich grain and cotton lands of New Madrid and Dunklin counties, and even the diversified crops of our own county, and behold all these and then ask yourselves whether there is nothing else than rocks and swamps in Southeast Missouri. Go with me again to these counties and see the rapid strides that are being made in the way of clearing and converting into fine farms, and see the magnificent crops of golden grain that are annually grown on the so-called swamps of Southeast Missouri, and I doubt not, gentlemen, that you will be ready to say with us that our section of the State has been grossly and outrageously slandered, and that the mythical swamps, the great bugaboo of intending settlers, exists only in name. In no section of our State does the soil respond more readily to the touch of honest toil. In no section of the State is the sturdy tiller of the soil more sure of a rich reward year after year than here. In no section of the State can the necessaries of life, as well as the comforts, and even the luxuries, be so easily and cheaply obtained as here. In no section of the State does the star of promise shine more brightly than in this. It is destined in future years to be the banner section of Missouri.

Gentlemen, it is to a county such as this, and to a young and prosperous city, peopled with a generous and warm-hearted people, that I welcome you to-day.

RESPONSE BY VICE-PRESIDENT N. F. MURRAY, ELM GROVE.

Ladies and Gentlemen:

On behalf of the State Horticultural society and our honored President, I take pleasure in thanking you for this hearty and enthusiastic welcome to your neat and thrifty little city, couched among the picturesque and fruitful hills of Southeast Missouri, and appropriately named Poplar Bluff.

As a State society we accepted your cordial invitation to hold this meeting here, not so much for the warm welcome which we felt sure we would receive (for we meet no other kind in Missouri), but we desire and aim to hold our meetings where we can accomplish the most for the cause of horticulture. And while our State is all good for the production of fruit, your section seems to be a highly favored one, where all kinds of fruit can be grown in great profusion and perfection.

Last winter a gentleman from Howell county made the best show of apples at our State meeting I ever saw, and carried off nearly all the premiums. Butler county was not represented. If it had been, I have no doubt you would have won your share of the laurels. What you need as fruit-growers is organization and development, and we have come to help you, and I am happy to say to you good people of Poplar Bluff to-night, that we have with us on this occasion not only our scientific members of whom we are all proud, but a goodly number of our wide-awake, hard-working practical horticulturists, representing the different sections of the State, who I trust will be able to interest and instruct you.

Some years ago we adopted the plan of changing from place to place in holding our meetings, in the hope that it would be the means of awakening a more general interest in the pursuit of horticulture, and I am happy to say that the result so far has been very gratifying. Wherever we have gone we have had good meetings, new recruits have been added to our little army, and we have been encouraged to extend our field of labor; and so to-night we find ourselves gathered from distant parts of the State before this intelligent audience, for an exchange of ideas and facts, gathered from practical experience in our calling. Here we meet many of our old friends and co-workers, and form the acquaintance of new ones, and the whole tendency of these meetings is to elevate, refine and strengthen the social ties that will ever bind each trusting heart to heart in friendship and love.

The success of our State society and the work we have undertaken is fraught with much good to the people of Missouri. It means more and better fruit, more abundant crops by holding our insect enemies in check, more and better homes, more sociability, better health, greater happiness, a healthy flow of desirable immigrants to occupy our wild lands, the ornamentation of our public school grounds, cemeteries and parks, a stirring up of the people to a proper realization of the great, rich and munificent blessings that nature and nature's God has in store for all those who will embrace and improve their opportunities, a general movement all along the line, the beginning of one grand triumphal march to subdue the wilds of nature, and cause our land to give up her rich and long-hidden treasures to subserve the highest good of our race. Ladies and gentlemen, are not these objects worthy of your highest consideration? and may we not ask and expect your hearty co-operation in this great and good work?

Notwithstanding the many advantages this great State offers to the fruit-grower, to those of limited capital and the emigrant seeking a home, with her vast rolling prairies, the beautiful and wonderfully productive bluff ranges along her rivers, and her broad, fertile bottom lands, the magnificent and healthy plateau of the Ozarks, located in the geographical center of the Union, her large cities making

a good home market for her fruits, and bounded on the northwest by States and vast Territories, rich and inexhaustible in grazing and mineral wealth, now being rapidly developed and destined in the future to furnish employment for millions of people, that will keep up a constant and growing demand for all her fruit; with a magnificent public school system, the perpetuation of which is amply provided for; with a variety of inexhaustible mineral wealth unexcelled in the world, and with a variety of soil and climate within her borders suited to all tastes and occupations, which if rightly appreciated and properly developed, would make her the wealthiest and most independent spot on the globe; yet in the face of all these facts we have within our borders tens of thousands who barely exist and who know nothing whatever of the beauties and luxuries of life, and for a quarter of a century the great tidal wave of immigration, made up by industrious Europeans and a thrifty class from our Eastern States, have passed through and around this great State and spread out beyond the Missouri to make and build their homes as best they could on the parched and blizzard-stricken plains of the Great American desert.

Shall we longer neglect our duty and allow this state of things to continue? permit emigration to pass by without an effort to secure or retain it? permit our golden treasures to remain hidden in the bosom of Mother Earth and suffer the millions to struggle on, half fed and half clothed, and die in poverty, without a knowledge of the many great and good opportunities we can offer them? I trust not.

We hope in the near future to have at least one good society in every county in our State, so that we may be fully prepared to make such a display of Missouri fruits at the World's Fair in "ninety-two" that will attract the attention and win the admiration of all who see it, and give our State the widest and best advertisement she has ever had.

But with the great push and energy now displayed by horticulturists, will we not soon have an over-production of fruit? This is a natural and proper but to me a very old question, and one to which I in my younger days answered very timidly, no, I think not, for a few years; but as I grew older and saw the supply of fruit increase many fold, and sell at double the price it did in former years, my faith became stronger, and I answered, no, not for a generation; and now, after a careful review of this whole subject, I am fully prepared to answer this old question to-night with an emphatic no, never!

In a careful retrospective view of our country's history, we find many things that become potent arguments to sustain this answer.

In the early years of our republic, we were strictly a nation of agriculturists. Only three per cent of our population lived in cities, manufacturing was struggling for a foothold, railroads were unknown, we had no vast army of consumers, and the masses were content with the most common and ordinary articles of food.

But look and behold the change. Only one-half of our population belongs to the agricultural class, one-fourth of our people live in cities, our manufactories are a thing of national pride, and furnish employment to hundreds of thousands. Our railroads, if spun out into one continuous line, would encircle the globe five times. They penetrate every center of population and connect us with the markets of the world. They employ a million of men, many of them with families, who go to swell our great army of consumers to thirty-five millions, and make for us the best home market for fruit in the world. We have a number of cities that will each consume a train load of fruit daily, and the inventive skill and industry of American genius has given us the improved methods of canning, evaporating and packing our surplus fruits that formerly went to waste, so they can now be shipped at pleasure to the most distant markets.

The Honorable Parker Earl, president of the American Horticultural Society, has well and truly said, "we are not producing too much, but marketing too poorly." And so it is we often find a surplus of fruit in one locality and a meager and insufficient supply in another. A fair and equal distribution of our fruit product among the masses by quicker and cheaper transportation is in the line of our work, and we call upon all lovers of the beautiful and good and all friends of progress to lend a helping hand to promote the cause of horticulture. And last but not least, we wish to recognize that mighty engine of power that has ever been such a potent factor in the world's civilization, the printing press, and thank its representatives for the great and timely succor they have so willingly and earnestly given to our cause.

And now, good people of Poplar Bluff and of Butler county, permit me in conclusion to invite and urge you one and all to join in with us and help make this meeting one long to be remembered. Let us unite our forces and prepare for the work before us, and with new courage and greater zeal, let our march be onward and upward, our step firm and elastic, till we have reached the zenith of our usefulness for the world's greatest good.

"JOHNNY APPLESEED."

BY D. F. EMRY, CARTHAGE.

Mr. President and Members of the Missouri State Horticultural Society:

While Johnny Appleseed is the acknowledged pioneer of horticulture in the West, yet some of our pomological authors we fear were not acquainted with the true character of the man, as we find the following in one of our standard works of to-day:

"On the borders of civilization we sometimes meet with a singular being, more savage than polished, and yet useful in his way. Such was Johnny Appleseed, a simple-hearted being, who loved to roam through the forests in advance of his fellows, consorting now with the red man, now with the white, a sort of connecting link; by his white brethren he was no doubt considered rather a vagabond."

In the month of June, 1816, my father settled in Richland county, Ohio. After having lived there some time a stranger came into the neighborhood and commenced teaching a very strange religious doctrine for that time, and the people became very much excited. Some thought he was crazy, others that he was possessed of a devil, and some of them would not allow the stranger to enter their houses. My father at that time was a member of the Baptist church, had taught school considerable and was considered the best read man in the new settlement, and was liberal in his religious views, and always ready to listen to and investigate anything new or strange. So on his first opportunity he invited the stranger to his home, when he found to his great delight that he was entertaining one of the best posted and most brilliant minded persons that he had ever had the pleasure of meeting; and after this meeting "Johnny Appleseed" always found a welcome stopping place, and would often stay three or four days at a time in his meandering journeys through the wilderness; and from what we could gather from father's interviews with him, his religious views must have been radical and far in advance of that time, and fully abreast with our most progressive religious teachers of today; but when we consider and look back to that time when children were taught by parents, teachers and ministers (with a very few exceptions) that the world was full of witches and evil beings with cloven feet and ponderous horns, roaming through earth and air, seeking whom they might deceive and drag down to perdition; and further, that where superstition and ignorance prevail, and that

class are in the supremacy, it is generally a dangerous place to advance or propagate new doctrines, and those who do so must expect to receive the disapproval of those in authority; hence it is easy to see from whence the author of "American Pomology" drew his inspiration when he wrote the above quotation. Yet no one that ever enjoyed the acquaintance of the late Doctor Warder would for a moment believe that he would knowingly misrepresent any fellow-creature, much less a co-worker in his chosen profession and the admitted pioneer of horticulture in the great West.

But such is the fate of all useful reformers. Prejudice, the bane of all progress and reform, is ever on the alert, and can easily manufacture demi-gods and devils incarnate out of the same material, as the past history of the world abundantly proves; and whilst we find before us the history of such men as Pizzaro, Cortez, DeSoto and kindred spirits, whose inroads amongst an innocent and harmless people were marked by blood and desolation, whose sole object was conquest and booty for self-aggrandizement, it is truly gratifying to us to have the privilege of writing the history, so far as we can, of one whose life was spent in doing good, gathering precious seeds wherever they could be found, and distributing them amongst the new settlers of the far west free of charge, and planting them himself far in advance of the settlements wherever a congenial spot could be found, for the benefit of those that might follow after—a true philanthropist and benefactor in every sense of the word. We have no recollection of ever seeing the man, but have eaten many an apple that grew on trees of his planting. We have often heard father and mother tell what his proper name was and his nationality, but they have passed from our mind, and we have written to the older members of our family and many other places, hoping to find some one who could give us his right name, place of burial and other things connected with his history; but all of no avail so far, and probably will always remain a sealed mystery to the world. And in connection with the foregoing we could call to mind a grand array of noble men and women who have given the best of their lives to the promotion of horticulture in the great West, many of whom have passed to their rewards on the other shore of time, whose names we will not call, lest we may leave out some equally deserving; but could we command the time and means, we would gather from earth's bounteous treasures some fitting emblem to raise a monument in honor of our departed fellow-laborers, whose illustrious names we would inscribe upon its walls, and could we find worthy material to raise the column as tall as the cedars of Lebanon, and its walls be all aglow with sparkling gems of merited worth, yet we would say, let the crowning glory of that grand structure ever be the name of "Johnny Appleseed."

JOHNNY APPLESEED.

The Pioneer Pomologist of the West.

BY MRS. HELEN V. AUSTIN.

From Transactions of Ind. Hort. Society.]

To-day, as your appointed servant, I would speak of the pioneer of pomology in the west; a man of positive individuality, an eccentric genius, a character—Jonathan Chapman, otherwise known as Appleseed Johnny, which finally grew into the familiar name of Johnny Appleseed.

Who was Johnny Appleseed?

The Ohio Horticultural society recently offered a premium for the best essay giving the history of this man; so that, if anyone thinks my subject to-day an in-

significant one. I console myself with the thought that it is a subject of great significance to many.

Who was Johhny Appleseed? A group of children asked that question one day, and were told that he was a queer old man, who went about with seedling apple trees, and wore a mush-pot for a hat.

The children had heard their father talk so much about "grafted fruit," and "seedlings" had been so much discarded, that they concluded that the queer old man in question must have had poor taste, as well as a queer name and still queerer hat, and their mirth only increased. In fact, the children had been playing on the porch and were noisy; they were "cutting up," as they would say; the father, who was reading in the house, laid down his book and rushed to the door to improvise a riot act, but when he came in full view of the scene, he "ahemed" three times, and smiled, looking at the girl who sat in mock solemnity with a sauce-pan upon her head for a hat. "You look like Johnny Appleseed must have looked," he said, and answered the volley of questions that was shot at him as he retreated to his easy chair.

Some years ago, I read somewhere, but cannot remember where, of a discussion among horticulturists on the native fruits of Indiana, and perhaps Ohio, in which one party contended that apples, other than the crab-apple, were indigenous to the soil of Indiana, and as a proof of this strange assertion, told of localities where apple trees that bore good apples had been found growing when certain persons had first come to the country, and before an orchard had been planted. The discussion was ended by some one explaining that there had been a pioneer of apple trees in those places before the settlers had planted orchards. The eccentric Johnny Appleseed had been there, fulfilling his mission. This knowledge of him settled an otherwise unexplainable fact. Still I asked myself, who was Johnny Appleseed, the queer man, who wore a mush-pot for a hat, and believed in seedling apple trees and orchards for the pioneers?

At the meeting of the American Pomological society at Chicago in 1875, at the banquet table, when President Wilder proposed the toast for the Ohio Horticultural society, Dr. John A. Warder responded, saying that he claimed ahtiquity for the Horticultural society of his State on account of the part that the eccentric Johnny Appleseed had played as a pioneer pomologist, and that due credit should be given him.

Said my companion at the table: Who was Johnny Appleseed?

So I made haste to improve the first opportunity to ask Dr. Warder where I could find anything written about Johnny Appleseed (for in vain had I searched the leaves of the Western Annals). Dr. Warder named Howe's History of Ohio as the volume that would impart the knowledge I sought, adding, "you will find that book in any circulating library." But the Morrison library, of Richmond, does not, or did not, contain the volume in question, as it most certainly should, for it is a book which has a fund of information, invaluable almost. But once, in a library of old and excellent books of a friend I found this History of Ohio, or "Historical Collections of Ohio," by Henry Howe, published in Cincinnati in 1848. On page 431, in the history of Richland county, there is a fragment of a sketch of the life of this itinerant:

At an early day there was a very eccentric character who frequently was in this region, well remembered by the early settlers. His name was Jonathan Chapman, but he was usually known as Johnny Appleseed. He was originally from New England.

He had imbibed a remarkable passion for rearing and cultivation of apple trees from the seed. He first made his appearance in western Pennsylvania, and from

there made his way into Ohio, keeping on the outskirts of the settlements and following his favorite pursuits. He was accustomed to clear spots on the loamy lands, plant his seeds, enclose the ground, and then leave the place until the trees had in a measure grown. When the settlers began to flock in and open their "clearings," Johnny was ready for them with his young trees, which he either gave away or sold for some trifle, as an old coat, or any article of which he could make use. Thus he proceeded for many years, until the whole country was in a measure settled and supplied with apple trees, deriving self-satisfaction amounting to delight in the indulgence of his engrossing passion. About twenty years since he removed to the far west, there to enact over again the same career of humble usefulness.

His personal appearance was as singular as his character. He was a small man, quick and restless in his motions and conversation. His beard and hair were long and dark, and his eyes black and sparkling. He lived the roughest life, and often slept in the woods. His clothing was mostly old, being given to him in exchange for apple trees. He went barefooted, and often traveled miles through the snow in that way. In doctrine he was a follower of Swedenburg, leading a moral, blameless life, likening himself to the primitive Christian, literally taking no thought of the morrow. Wherever he went he circulated Swedenborgian works, and if short of them would tear a book in two and give each part to different persons. He was careful not to injure any animal, and thought hunting morally wrong. He was welcome everywhere among the settlers, and treated with great kindness even by the Indians. We give a few anecdotes in illustration of his character and eccentricities:

On one cool Autumn night, while lying by his camp fire in the woods, the mosquitoes flew in the blaze and were burnt. Johnny, who wore on his head a tin utensil, which answered both as a cap and a mush-pot, filled it with water and quenched the fire, and afterward remarked, "God forbid that I should build a fire for my comfort that should be the means of destroying any of his creatures." Another time he made a camp fire at the end of a hollow log in which he intended to pass the night, but finding it occupied by a bear and her cubs, he removed the fire to the other end and slept on the snow in the open air rather than disturb the bear.

An itinerant preacher was once holding forth on the public square in Mansfield, and exclaimed: "Where is the barefooted Christian traveling to heaven?" Johnny, who was lying on his back on some timber, taking the question in its literal sense, raised his bare foot in the air and vociferated, "Here he is!" (Howe's History of Ohio.)

Some years ago there was an illustrated article published in "Harper's Monthly Magazine" concerning him, which many of you recollect. One of the illustrations was the scene in Mansfield just related.

More recently an article appeared in the "Cincinnati Enquirer" purporting to be original, but was simply a reproduction of the article in "Harper's Magazine." And later still, I saw published in a Cincinnati daily a paper on this subject which had been read at the Woodward High school, by Teresa Otten, on Pioneer day.

It is stated in these articles, that it is a pretty well established fact that Jonathan Chapman was born in Boston, Mass., about the year 1775. The first reliable trace of our hero finds him in the Territory of Ohio, in 1801, with a load of apple seeds, which he planted in various places on and about the borders of Licking creek, the first orchard thus originated by him being on the farm of Isaac Stadden, in what is now Licking county, in the State of Ohio. He is lost sight of in that region,

but in 1806 a pioneer settler in Jefferson county, Ohio, on a bright spring day noticed a peculiar craft slowly drifting on the tide down the Ohio river. It was "Appleseed Johnny," with two canoes tied together laden with apple seeds. He procured the seeds at the cider presses of western Pennsylvania, and traveled with them on the Ohio river and its northern tributaries, until he came to suitable spots for his nurseries, carrying the seeds on his back in sacks from his landings to the spots he chose to cultivate.

One of his characteristics was his extreme fondness for children. He was always carrying about little gifts to give to his little friends; trifling in themselves, but remembrances of his love for the recipients, and it is said that many a grandmother carefully cherished scraps of bright colored calico or bits of ribbon that had been a present to her when a little girl from poor old homeless Johnny Appleseed, when he had been a guest at their fireside, and in the old log cabin.

However hungry he might be, he would never partake of food until he was assured that there was enough for every child of the family and until they were served.

He was an evangelist for his faith, and disseminated the doctrines he believed and considered the true explanation of the Holy Scriptures—an evangelist who labored not for this world's riches, but for conscience sake.

It is said that he died in Allen county, Indiana, near Fort Wayne, and that his death was a triumphant passing into glory. He lay gazing at the setting sun, his face radiant with happiness, and gently breathed his last as the sun sank below the horizon.

I have a letter from Dr. Ayres, of Upper Sandusky, Ohio, written in reply to inquiries I made of him on learning from my sister that he had personally known Johnny Appleseed. The letter is from an old infirm gentleman, and highly valued by me, and I am glad to have it to give to you on this occasion:

"UPPER SANDUSKY, Ohio, April 22, 1881.

"DEAR MADAM—I was acquainted with Jonathan Chapman, alias 'Johnny Appleseed,' in Richland county, Ohio, in 1822, when I was yet in my teens. I lost track of him in 1837 or 1838.

"He was a spare, light man of medium height, and would weigh about one hundred and twenty-five pounds. He had fine, dark hair, which he allowed to grow down to his shoulders, and brushed back of his ears. His face was long and slim. His beard was greyish, and clipped with shears—never close. He was always clad very poorly, old slipshod shoes without stockings, the cast-off clothes of some charitable miser. He would not ask for any, and I suppose he never purchased any. He would eat at the table with the family and liked good victuals, but he would also eat scraps which were designed for the slop barrel.

"He slept on the floor on an old blanket. His old slip shoes were untidy looking and he seemed to care very little about his person. I never heard of his being sick.

"He would sit and hold my sister, who was then six or eight years old, as long as he could entertain her. He would embrace her, and seemed happy with children and gave the children many presents. I asked him why he had no wife; he said he would not marry in this world but would have a pure wife in heaven.

"He never had any money that I knew of or ever heard of. He had been hundreds of miles in the wilderness and in the settled country in the West with his trees, but he left it to the people who took his trees to pay for them or not. He said they knew they owed him, and he would not ask them. His sister, Mrs.

Brown, lived near us at Perrysville, Ohio. She was poor in this world's goods, and if he had anything he gave it to her and her family. Mrs. Brown was a small woman, and very smart and bright.

"Johnny traveled with his apple seeds in canoes on the rivers, and then from the streams he packed them on his back into the wilderness, where he would clear his ground and plant the seeds.

"Once, whilst at his brother-in-law's, and was in a small prairie cutting grass with a scythe, he was bitten by a snake. He threw the scythe away and made for the house. My father was called on to see him. He would not be contented until they went to see if, accidentally, he might with the scythe have wounded the poor snake. He supposed if he had not tramped on it, it would not have bitten him.

"He told me that whilst he was lost in the wilderness a bear advanced toward him and raised on his hind feet; the emergency was fearful; he picked up a long dry pole that happened in his reach and commenced the fight, the pole breaking at every stroke until about three or four feet long. By the help of the Lord he slew the bear, had a good supper and carried one quarter and the hide into the settlement.

"He always carried sheets of the New Church writings to leave with the people, and on his return exchanged those he had left for others. The people, as at this day, paid but little attention to the New Church (or Swedenborgian) doctrines; it was not orthodox, neither popular, and old Johnny was ragged.

"I never heard him exclaim against any people but the landlords; he said they extort to charge 12½ cents for a meal of victuals. In those days supper and lodging could be had for 18¾ cents.

"I have only been able to sketch out the above few items (I have been ill); but at any time I will be glad to answer any inquiries you may be pleased to make. What little I have given you has the merit of being only true.

"Yours truly,

"DAVID AYRES."

And thus we gather here and there some passages in the life of a benefactor of mankind. Like the old-fashioned itinerant Methodist preacher, he could say:

"No foot of land do I possess,
No cottage in the wilderness;"

Yet the whole boundless continent was his as far as he chose to venture. He planted, not for himself, but for others. He was the "John in the Wilderness," preparing the way for the future pomology of the West. He planted that the children might gather. Some such thoughts as these must have been singing through his soul as he engaged in his favorite avocation:

"What plant we in the apple tree?
Fruit, that shall swell in sunny June
And redden in the August noon,
And drop, as gentle airs go by
That fan the blue September sky;
And children, wild with noisy glee,
Shall scent their fragrance as they pass,
And search for them the tufted grass
In the shade of the apple tree."

Although homeless, he was welcome everywhere, in the log cabins of the white settlers and in the wigwam of the Indian, and accepted gratefully, as a brother man, that hospitality for which the North American Indian is so justly proverbial. The

little children loved him and the ruder boys never jeered him. How full of love and how peaceful must have been his life—his active, self-denying life! His whole being seemed intensified with one great mission; for it he endured perils in the wilderness, hungerings and cold. He must have possessed in a high degree that fire of the soul, that innate prompting to obey an impulse which conscience approves, which we term enthusiasm; that thing which inspired the song of Miriam when the Red sea was passed; that goaded the Knights of the Holy Cross to possess the Holy Land; that made Columbus successful at last at the court of Spain, and supported his soul during a voyage which without it would have been made in utter despair. It was that which inspired Daniel Boone, and Audubon, and Morse, and Cyrus Field, and lends to thousands of humble lives the strength to do whatsoever the hands find to do with might, and gives some degree of self-approval.

There must have been a purity of soul, a refinement of character, a gentleness of heart, to have made this man of uncouth appearance so welcome among the people and so much beloved by the children; for children intuitively perceive the real character.

I have often thought what grand times he must have had on the streams and in the primeval forest with the grandeur of solitude around him. To be good company to one's self is a great thing. How near he must have lived to the heart of nature and found companionship with the creatures of the wild wood, the most insignificant of which he would not harm.

It is said that his burial was so obscure that now no man knoweth his sepulcher. What matters it, if one has died in sight of heaven, and heard the song of angels in passing, if the sepulcher is unmarked?

"After all, it is the little things in life that are the surest possession. The only deeds worth inscribing on any one's monument are those that would seem too trivial to place there. The work that is unseen, the anonymous influence, the unconcious argument lent by one's life to another's creed, this best stands the test. Here is the crowning satisfaction of the reformer's work, and that which makes even of its little memories an exceeding great reward." Blessed are the

"Hands that pay their way
In coins that time can never rust,
Footsteps that sound another day,
Though feet have turned to dust.

"JOHNNY APPLESEED."

(Dedicated to the American Horticultural Society)

I.

There's a hero worth the singing that no poet's lips have sung,
A prophet of the wilderness whose deeds have found no tongue—
A homely, humble-hearted man--a gentle spirit sent
To cheer the world and plant the newer gospel, as he went—
A specter of the solitudes, whose bare feet, where they pressed,
Prankt with never-dying beauty the dark borders of the West—
A Druid of the Valley, but as wordless as the wave,
Scorning comfort—seeking nothing for the good things that he gave—
A poor old plodding pilgrim of a brave, unselfish breed,
God showed the way, and shod the feet of Johnny Appleseed.

II.

I touch his stainless record with a delicacy due
To the reverence that bows us, when a great soul comes to view:
How pale our petty passions and ambitions, when we scan
The garnered love that glitters from one guileless hearted man;
And such was he to whom we pay the tribute of a tear,
The orchard-planter of the West—our oldest pioneer,
Whose only weapon of defense against a warlike race
Was the glow of childish innocence that gladdened in his face;
And so no knight of any age that ever mounted steed,
Went forth to battle better armed than Johnny Appleseed.

III.

We frame him in our fancy like a figure in a dream,
A specter on a phantom-boat, a-floating down a stream—
A little fat-faced fellow, with a ruddy cheek and chin,
And a funny little "mush-pot" that he poked his round head in—
With hair as black and frowsy as a bat's wing dipped in tar,
And eyes as sharp and sparkling as the twinkling of a star—
With a body plump and pudgy as the picture of a Turk,
And a sprightly Puck-like motion, punctuated with a jerk:
Such seems the meagre outline of the man of whom we read
In the legends handed down to us of Johnny Appleseed.

IV.

So tender was the heart of him, so gentle, and so just,
He would not harm the vilest thing that wriggled in the dust;
He quenched his camp-fire on the hills, for fear the beetles might
Get scorched against the flames of it in their uncertain flight;
'Tis said he even spared the snake whose venomed fangs he felt,
And all the air was soft with love and pity where he dwelt;
The pappoose prattled on his knee—the panther on the limb
Seemed conscious of his harmlessness, and only glared at him;
And thus along the world he went, as destiny decreed,
And happy in the life he led, this Johnny Appleseed.

V.

Thro' every forest where he passed, he scattered germs that grew
To bloomy benedictions, as he drifted on into
The gloomy regions farther west, that swallowed him from sight,
As a cloud absorbs a star-beam, in the silence of the night;
He sank into the solitudes, like some remembered strain
That warmed the heart an instant, and was never heard again;
But when the pippins glimmer in the brown October days,
Ohio's hills and valleys pulse the old apostle's praise,
And the people pushing after him, with lifted voices plead
For purposes as pure as those of Johnny Appleseed.

VI.

A song for Johnny Appleseed! who left a living trail
Of beauty everywhere he went, in mountain and in vale;
Thro' many a vanished summer sang the birds and hummed the bees
Amid the bending blossoms of his broad old apple-trees,
Before the tardy vanguard of the foremost pioneers,
Came to pluck the welcome fruitage in that wilderness of theirs;
A health to Johnny Appleseed! and may his glory be
Regrafted in the years to come, on Life's eternal tree,
And as long as poor humanity stands naked in its need,
God send us souls as white as that of Johnny Appleseed.

James Newton Matthews.

Mason, Ill., Jan. 30, 1890.

FLORICULTURE.

MRS. H. E. JOHNSON, POPLAR BLUFF.

Floriculture is a subject I have always been very much interested in. When a child I always had a small corner in mother's garden where I grew what she called "weeds," but to me they were flowers. After I became a school girl my favorite study was botany, and at that time I could have written a far better essay on that subject than it will be possible to for me to do now; for my other duties in life have, to a great extent, crowded out my flowers, but I think there has never been a time in my life when I did not possess and cultivate a few plants.

I believe the object of this convention is to give and to get what information we can upon all subjects pertaining to agriculture, horticulture and floriculture. I will now try to confine myself more closely to my subject: Floriculture is a subject which should interest every one, and more especially the ladies of our land. I do not think there is any one thing that does more to beautify our homes than flowers, and the cultivation of them gives us both health and pleasure. If you want to make a flower garden, the two things first to be considered are time and expense. First say to yourself, how much time have I to spare for this purpose? and second, how much money can I spend? Your answers will depend largely upon your decision on these two points. The majority of people buy more plants than they can spare time to cultivate properly, and when they make a failure they say: "Oh, I love flowers, but I can't have any luck with them; they won't grow for me."

My own experience is that it is best to choose perennials because after they are once well established, you will aways have some kind of flowers; if they are poorly cultivated, of course you will have poor flowers, but they will bear a great deal of neglect and will bloom. There are so many beautiful perennials now that flowers can be had from them the whole season, beginning with the Snowdrop and Hyacinth in the early spring, and ending with the Chrysanthemum or beautiful Christmas Roses, as they are sometimes called, in December. People who live in crowded cities cannot have these plants, but for them there are a great many flowers that grow in the shade. Fuchsias, Pansies, Forget-me-nots, Violets, Lobelias, Lilly of the Valley, Hollyhocks, Phloxes, and other herbaceous plants, whose native habitation is the shady woods, will do best, but even these languish if denied all direct rays of the sunlight. In situations where there can be no sunlight, the best effect is produced by ornamental leaved plants, whose beauty depends upon their foliage, and not upon their blossoms; among these are the Gold and Silver (variegated-

leaved) Geraniums, Achyranthis, Alternantheras, Begonias, Calladiums, Centaureas, Coleuses, etc., which, if planted so as to bring the various shades in contrast, produce a pleasing effect, which will continue the whole summer if they are given only a little care and a plentiful supply of water.

The cultivator of flowers in rooms should understand the necessity of sunlight to plants that are to flower, and endeavor to get these as close as possible to a window having an eastern or southern aspect. The higher the temperature, the more the plant suffers from want of light. Many plants might remain semi-dormant in a temperature of forty degrees—in a cellar for example—away from direct light for months without material injury; while, if the cellar contained a furnace, keeping a temperature of seventy degrees, they would all die. Such would particularly be the case with plants of a half-hardy nature, such as monthly Roses, Carnations, Fuchsias, Geraniums, etc.

The debilitating effect of want of direct light on plants is well illustrated by taking a healthy, vigorous plant in full foliage and bloom, that has been growing in the direct light of our green-house benches, and placing it under the bench. If the temperature is high, say eighty degrees, in forty-eight hours the sickly sign showing want of light will be apparent to the experienced eye, and in a week its sickly condition will be plain to the most common observer. This goes to prove that unless you have an eastern or southern window, you cannot grow flowers successfully in the house.

When choice can be had the flower-garden should slope toward the south or southeast, and if the garden is sheltered by hills or timber from the north or northwest, many plants and trees can be grown that could not otherwise succeed without that shelter. Such a situation also permits work to be begun earlier in the spring and continued later in the fall, making the season from two to three weeks longer than if the garden faced the north or northwest. The soil in flower-gardening, as in all horticultural operations, is the basis of success, and is even of more importance than aspect or location, and whether it is the man of wealth looking for a site upon which to build and surround his home with a flowery landscape, or the working gardener about to become a florist and venturing his hard earnings in a first essay in business, let him first be certain that "old Mother Earth," in the spot about to be chosen, is in such condition as will reward his labors with success. Soils are so varied that it will be difficult to describe to the inexperienced what the proper character should be. Sandy loam, about ten or twelve inches deep, is best, and if you have such a soil you are pretty certain of success, but if you have a clayey loam you will have to drain it well or failure is almost certain. The soil most to be avoided is the one known as "thin soil." This may be either of sand, gravel or clay, being in many cases little more than subsoil. No process of fertilizing or cultivation can bring such a soil into condition to compete successfully with soil that is naturally good, but if you have a poor soil it must be constantly built up and enriched every season.

After one has the proper soil, the next thing to be thought of is good seed or good plants, whichever the case may be. Always try to have the best; never buy a plant because it is cheap, rather do with fewer plants and less seed and have what you do have of the very best quality. After you once obtain a few good plants, it is an easy matter to increase your stock by propagation, and in a short time have a bountiful supply.

There are a great many things to be learned about the propagation of plants, which is very interesting to anyone particularly interested in floriculture, but to most of my hearers would be very dry and uninteresting; therefore I shall say

nothing about it, but I would like to call your attention particularly to the importance of properly preparing seed-beds. When you undertake to grow plants from seed, in the first place the soil should not be too rich but just good soil, and then it should be thoroughly pulverized; and if the seeds you want to plant are very small it is best to sift the soil before planting your seeds. I found by experience that in planting pansy seeds, and every one knows the size of these that is at all acquainted with seeds, that I got double the amount of plants from a bed where I sifted the soil and one where I did not, and with smaller seeds the gain in plants was even greater.

I have now perhaps written enough, and in conclusion will say to all members of this convention, I live in the north end of this little city, where I have a small green-house and a few plants. I am only an amateur florist. I have only been making a specialty of floriculture for about six months. I claim to know but little, but if there is anyone here especially interested in the culture of flowers, and they will call upon me at my house, I will gladly give them any information I can upon this subject, and to those who are not particularly interested in their cultivation I extend a cordial invitation to come and see my flowers. It may help you to spend a few pleasant minutes in our town.

OUR BEST BEDDING PLANTS.

J. KIRCHGRABER, SPRINGFIELD, MO.

At every returning spring or planting season the question is asked many times: "What are our best bedding plants?" As now there are an endless number of kinds, and the planter can hardly fail in making a good selection, it is rather difficult to say what is the best. In my boyhood days it certainly was more difficult to select bedding plants, as the number was very limited, but now in these days of progress, floriculture has made such rapid strides and improvements that every taste and whim of the planter can have his or her fancy in the arrangement and harmonious blending of shapes and colors.

Of late years the taste and love for bedding plants has kept up with the supply, and every season the wide-awake florist brings out some new or old candidate for bedding purposes. To give a list of what is best would be quite an undertaking, for the multitude of florists' catalogues sent broadcast over our land every spring tell of all sorts of wonderful, rare and beautiful plants adapted to bedding out, but sometimes the novice gets misled by the gorgeous coloring and descriptions of the new and rare things, while sometimes one finds disappointments in the purchase of new and rare plants.

Now I will try and enumerate a few of such plants as are among our best bedding plants.

First and foremost on the list stands the queen of all flowers, the Rose. Few plants if any are more extensively grown than the rose, and when reasonable care is given by cultivation, the plants respond liberally with an abundance of flowers. The Rose is so easily grown and so cheaply got that there should be no garden without at least a small collection of hardy perpetuals, or some of the more free flowering Teas, Noisettes and Bourbons.

Next, the Geranium should be in every flower bed. The various kinds are so numerous that everybody can be pleased. I well remember the time when there were only a few kinds, but now their name is legion—every imaginable shade of coloring from the purest white to the deepest crimson, single flowering and double flowering. Who would have dreamed of such magnificent kinds as Asa Gray or

of the Double General Grant? Truly the genius of Flora has worked wonders. What can be more beautiful than a mass of General Grant Geraniums? In fact the Geranium stands next to the Rose. It will grow anywhere with the least care, but the better in proportion to the care bestowed on them.

The Verbena as a splendid bedder is not to be overlooked. What a mass of bloom a small bed will produce is wonderful, and the variations of shades are almost endless. They are very easily grown and are very cheap, but beautiful for all that, and they can be planted on beds occupied by bulbs such as Tulips and Hyacinths.

The Pansy as a bedder for rather shady situations pays for all the trouble and expense. A bed of them will please without fail. The Lantanas of the various kinds will well repay.

No flower garden is complete without the sweetest of all flowering plants, the lovely Heliotrope. By all means, plant a few plants. And who can but admire the Salvia, with its brilliant scarlet spikes of flowers borne well above the foliage.

The Phlox Drumondii is another good bedder grown from seed. The Cuphea or cigar plant is also admired by many. The Cannas of the various forms are very effective; in some gardens their large and handsome foliage gives the locality a semi-tropical appearance. They flower very freely and are also cheap.

The Petunias, single or double, rank as good bedders and are very effective in masses; their brilliant flowers of endless shading are certainly and justly admired. I would also mention the Tube Rose and Gladiolus as good and deserving. The Feverfew, Mignonette, Sweet Elysiums and the Ageratums, blue and white. The Double Balsam is also greatly admired; especially the White Perfection, although an old and common plant, when well grown, is hardly surpassed by the best of Carnations.

One of our most valuable bedding plants is the Coleus of the different kinds. There can hardly be anything in the floral kingdom that can outrival their beauty. The plants stand the sunniest exposures in the garden, are easy grown, and a few should be in every collection.

The Alternantheras of different sorts for bordering flower-beds or massing are par excellence for lettering on the lawn or carpet bedding; they cannot be surpassed by any other plant in cultivation. A few years ago, one of the grandest sights ever beheld in that line of gardening was seen at Shaw's botanical gardens at St. Louis. One could hardly realize that nature and art were capable of producing such wonderful effects with such a plant as the Alternanthera. They are simply indispensable for that purpose.

I am afraid this list is growing as long as the florist's catalogue, while a number of really good things could be mentioned, but the foregoing gives any one a good collection. Last but not least of bedders, comes the queen of autumn, the lovely and beautiful Chrysanthemum; a goodly number of kinds are indispensable in a well-regulated flower garden, for they give us such an abundance of fine bloom at a time after Jack Frost has destroyed nearly all of the beauties of the gardens that held sway in the warm summer time.

WEDNESDAY, JUNE 5—9 A. M.

Society called to order by the President.

Prayer by D. S. Holman.

The following committees were appointed by the President:

Committee on Finance—S. W. Gilbert, J. A. Durkes, N. F. Murray.
Committee on Fruits—Sam'l Miller, W. C. Freeman, C. Barnard.
Committee on Final Resolutions—C. W. Murtfeldt, J. N. Barnett, H. Weber.
Committee on Transportation—S. A. Bates, N. F. Murray, C. W. Murtfeldt.
Committee on Obituary—D. S. Holman, A. J. Blake, Geo. Lewis.
Committee on Flowers—S. Kaufman, Mrs. H. E. Johnson, Mrs. Bartlett.

The following letters were read:

LEXINGTON, Mo., June 2, 1890.

L. A. GOODMAN, Poplar Bluff, Mo.:

DEAR SIR—We send to you to-day samples of our seedling apple Lafayette, which please exhibit at the meeting.

When we sent you a few specimens April 25, we had twenty-six apples left. Of these only two have rotted to date, and a few have small rotten specks, the others being sound and good yet. The samples we send are average size. Our largest and finest ones are all gone out to different parties. They were kept in a small brick-walled cellar under a tool-shed. It certainly surprises us as a keeper, this being the first test. Yours truly,

TEUBNER & AULL.

ROCHESTER, N. Y., June 2, 1890.

L. A. GOODMAN, Esq., Secretary:

DEAR SIR—I have just this hour received your favor of 26th ult., and have sent by special messenger to express office, for free distribution at the meeting, 200 copies of Horticultural Art Journal, April and May numbers, which I trust will reach you in season and be acceptable. Yours truly,

T. B. JENKINS, Editor.

MASON CITY, IA, June 2, 1890.

L. A. GOODMAN, Poplar Bluff, Mo.:

DEAR SIR—We are trying hard to do a fruit trade here, and will be glad to learn all the fruit men's names we can; also, prospects of a coming crop. Please give us the names of berry-growers in the north part of the State, and growers and dealers in melons in the whole State. Send us the report, as usual, for which find enclosed one dollar. We sold 17,000 barrels of apples last year and hope to do better this year. How are the prospects for a crop? Yours respectfully,

PURDY, MCGRIGOR & Co.,
per D. J. Purdy.

CHARLESTON, Mo., June 2, 1890.

L. A. GOODMAN, Secretary, Poplar Bluff, Mo.:

I very much regret my inability to attend the meeting of the Missouri State Horticultural society at Poplar Bluff, June 3, 4 and 5. Our fruit crop will be an average one. Our melon vines are looking well, and the weather for the past week

has been very fine for them. The yield per acre will be good. The average will be about 65 per cent of the usual plant. Wet weather in the early spring caused a great many acres of land to lie idle. An early shipment is now looked for. The Kolb-Gen is the only variety raised here for shipping purposes. In the year 1888 there were shipped from the melon belt over 2,600 carloads; 1889, about 1,500; this year about the same as last year. Shipping will begin earlier this year than last.

L. W. DANFORTH.

KIRKSVILLE, Mo., June 3, 1890.

Messrs. J. C. EVANS and L. A. GOODMAN:

Dear Sirs—As you may be aware, instead of repealing the vaporizing law, the House of Congress finally amended section 32 so as to tax spirits for vinegar only five cents per gallon. But it appears we have not given up the contest, and will try to restore the repeal in the Senate.

There is not time to get up long petitions, or we could string them all around the capital. But you are known to be familiar with the public sentiment, as well as the needs and benefits to horticulture, and an urgent letter from you to our Senators might help enlist their activity in our behalf. Perhaps you could also enlist a few others whom the Senators look to for information on such subjects.

It is thought that Kansas and Arkansas Senators also need to be urged for the measure, if you have any friends there who could reach them.

Sorry I cannot be with you at Poplar Bluff.

Yours fraternally,

CHAS. PATTERSON.

LOUISIANA, Mo., June 2, 1890.

L. A. GOODMAN, Poplar Bluff, Mo:

Dear Sir—We have missed several Horticultural meetings and fully intended being there this time; especially anxious to see that country, as we enjoy a most liberal trade from the southern part of the State, and we know they are making rapid strides toward the front in horticulture. You men of the Southwest must look to your laurels. However, as the State Society and the American Nurserymen's association conflict as to time of meeting, we feel it our duty to attend the latter, and this fall we hope to be on hand with our paper, and will try and not disappoint you; and we hope that by knowledge gained of new varieties to more than make up for lost time. Our brother, E. W. S., is now in Colorado looking after orchards there, and C. M. S. and myself leave to-night for New York. We wish you a most successful and enjoyable meeting. The field there is certainly a good one.

Regards to all friends.

Yours truly,

W. P. STARK.

ST. CHARLES, Mo., June 1, 1890.

Friend Goodman—I enclose you a paper on Fruit Shipping, the subject the committee saw fit to assign me. Please submit same to meeting for consideration. I am not vain enough to think that my humble effort will elicit much appreciation, yet it may start a discussion and thus bring out valuable information. Fruit-growing is receiving renewed and greater attention in this county, and with our congenial soils and other favorable surroundings, Old St. Charles may yet "loom up" in rank as a fruit county.

Dr. D. W. Ferguson, St. Charles, Mo., is willing to submit a paper on "Spraying," in which he has had some experience, and over the results of which he is gratified.

Too many berries, weeds and bugs to attend the present meeting.

Wishing you all a profitable and happy time, I remain,

Yours truly,

C. MALLINCKRODT.

REPORT ON SMALL FRUITS.

FROM S. MILLER.

STRAWBERRIES.

1. Crescent, as usual, a berry not yet displaced entirely.
2. Schnell's Early, a close competitor, but not earlier with me this season.
3. Jessie, a splendid berry, but not as productive as desirable.
4. Minnesota (Hart's), a large, good productive berry of good quality, and deserves to be retained.
5. Windsor Chief, in all respects a valuable one.
6. Monmouth, of no account here.
7. Perfection (Speece's), a large, handsome, good berry, and productive.
8. Warfield, a splendid one, and will be valuable.
9. Haverland, immensely productive, large and fine looking, but not yet ripe.
10. Cumberland, all right, but not as productive as desirable.
11. Capt. Jack, almost faultless.
12. Miller (from Louisiana), not yet ripe, but looks fine.
13. Cornet, same.
14. Stayman's No. 1, same.
15. One from J. B. Miller and others, same.
16. Gem (Nehring's), a splendid one in all respects.
17. Townsend's No. 3 and No. 7, fine, both large and productive.
18. Mrs. Cleveland, large, productive and superior in quality, but rots easily.
19. Eureka, a beautiful and excellent berry.
20. Ohio Centennial not ripe, but shows up well.
21. Cloud (from Louisiana), a good one.
22. Sucker State, all that is claimed for it, a noble one.
23. Belmont, large and good, but not productive enough.
24. Pet (a new one), ordinary in size and productiveness, of the highest flavor.
25. Venus also promising.
26. James Vick, immensely productive—its one fault.
27. Glendale, a valuable late one, but is not needed, since a better late one is here.
28. Gandy, the most valuable late strawberry I have met with.
29. Wilson, as usual with Missouri, not much account.
30. Bubach No. 5—In this we have all that is needed in a strawberry, except a little more firmness and higher quality, but it is good enough for ordinary tastes.
31. Ladies' Pine, not quite medium in size, handsome in form and color, but by no means productive. It is only a berry to grow for one's own use if the highest quality is desired. There is no other to compare to it in high-toned flavor.

A number from Thompson, Lakewood, Ohio, set out this spring, as also from J. B. Miller, of Anna, Ill., all of which promise to be valuable. Also from a number of others from North, South, East and West, for trial.

Henry Schnell, 3 varieties, one golden-seeded, very fine.

No one can tell much about a strawberry set out late, the fall before or in the spring; hence another season will be required to test them. My intention is to let each plant make a few runners, set them out in a new bed in July, then keep the original plants well cultivated all summer.

CHERRIES.

1. Bauman's May, birds stripped the flesh from every cherry before ripe.
2. Reine Hortense, a moderate crop, not ripe.
3. Napoleon, as usual, very fine.
4. Greenwood, a fair crop. This is, to my taste, of the best quality.
5. Early Richmond, full crop.
6. Delaware Bleeding Heart, good quality, but smaller in size than desirable.

A number of my trees were blown down and much of the fruit damaged by the hail.

Raspberries promise a fair crop, but the Gregg and Schaffer were injured by the winter; the latter, however, is making up for it by sending up shoots now going into bloom.

Blackberries promise a full crop.

Currants, a slim one.

Gooseberries, ordinary.

Plums, so few that they are not worth talking about.

Grapes look well, but mine have been somewhat neglected.

Dwarf Service berry, my trees are full, as they are every year.

In presenting this report, it may as well be stated here that the reason I brought no fruit with me is because if anything is exhibited by me it would be expected to be at least respectable in appearance, which, owing to hail and deluges, mine will not do. When strong plants are washed out to the foundation, and others covered with soil and mulching, dressed up as well as possible, and then the same devastation repeated three days after, there cannot be much expected. And in my situation, and my getting to the meeting place, the berries will be 36 hours old before showing. Discouraging features about the whole affair. Low prices, etc.

Bluffton, Mo., June 2, 1890.

STRAWBERRY CULTURE.

F. LIONBERG, HUGO.

Ladies and Gentlemen:

Seeing that I am billed for a paper on strawberry culture, etc., I will here give my experience on the subject.

I select, if possible, a piece of ground that had been well fertilized and cultivated the year before. I plow it up as late in the fall as I can, and again during the winter, if it can be done. In the spring, as soon as it is dry enough, I haul out a liberal supply of compost, if I have it, or well-rotted manure, and spread it evenly. When I am short of such fertilizers I use ground bone meal at the rate of 400 pounds to the acre. I plow, harrow and drag until I get the ground well pulverized, and get a level surface.

When I get ready to plant, I get a man to dig plants; I dress them and throw out all bad ones; at the same time, I have hands in the field to plant as fast as the plants are dug. In planting I use a line and spades; this way I can get the straightest rows, which is of no little importance. By this mode of planting every plant

has to pass through my hands, and I am sure that no bad ones are put in. If I cannot do it myself, I get some one that I can trust. I have ere this dug a lot of plants ahead and than planted them, but not with as good results. Of course, if I get plants from a distance, I simply plant as soon as I can.

Soon after I get done planting, I loosen up the ground with a Planet Jr. double wheel hoe. After this I use whatever implements I can use to the best advantage—wheel hoes, steel rakes, sharp, clean hoes, etc. My aim simply is to stir up the ground after every rain, or at least once a week. My principal tool however, is, where I can employ horse power; the Planet Jr. horse hoe and cultivator with wheel and lever attachment; this latter is very important, as it enables the operator to open and shut the cultivator at pleasure. I use an extra set of steels 1¼ inch, which I find very useful to stir up the ground with. They do not throw any dirt to speak of.

During June I sometimes apply bone meal; I sow it broadcast and work it in with cultivator. This mode has given me excellent results, but perhaps it would be better if the bone meal was applied at the time of planting.

As to the runners, I have tried to keep them down in various ways. My aim had always been to keep all of them down for a while, and then let two rows run together and those form a bed, but have not always been successful. This year I have purchased the Planet Jr. strawberry vine cutter for the purpose. This is similar to a single wheel hoe, having a small rolling cutter instead of the hoes. It only weighs 20 pounds and does the work in a neat manner. I do not cultivate after the middle of August. After the ground freezes I give a light mulch of clean straw or coarse manure.

As to packing I have but little to say. My mode is to make the boxes far enough ahead so that they are perfectly dry when wanted for use. The crates I make over a form so as to have them all alike and none of them out of shape.

As to varieties of strawberries, C. Jack and Crescent are undoubtedly the most profitable for me. The former is not quite as good a grower as it might be, but if put in rich, ground together with proper culture, will yield as fine a crop as any. It is undoubtedly the firmest berry we have. Warfield No. 2 is doing well with me and is very productive. I shall plant it more extensively. Where one enjoys a good local market, Cumberland is undoubtedly one of the best; it will sell anywhere, but it is a poor shipper with me. Hart's Minnesota is also a fine one, but no better than Cumberland with me. Jessie did well this season, but it blooms so very early there is a great deal of danger from late frosts. Bubach No. 5, very fine and large but has not been tried extensively enough to form an opinion. Piper—I still plant a few on account of its fine quality for home use. Michels' Early—I have bought two lots from two different parties of Judsonia, Ark., and have also received two different varieties under the above name. What I bought last summer I had a chance to fruit this year. It ripened a few days after C. Jack; berries nice, of uniform size and plant a fine grower, altogether different from the ones that I received this spring. Michel's Early (No. 2), of which I got 1,000 plants this spring, I find to be entirely different; plants more of a drooping habit, foliage darker and not quite as vigorous a grower as the former.

For late berries I like Cornelia fertilized with Gandy. Windsor Chief is also fine. Jersey Queen is one of the finest late sorts, but is such a poor grower that it is not at all profitable. Crystal City, Manchester, Daisy, Iron-Clad, James Vick and a number of others I have discarded as unprofitable.

DISCUSSION ON STRAWBERRIES—THE BEST VARIETIES.

Judge Miller—If I was confined to but one, it would be Captain Jack. Good size, very firm when ripe; is a good berry.

Mr. Holman—Is not the best in one place not the best in another place? One grower at Springfield says the Bubach No. 5 is the Ben Davis of the berry.

Mr. Durkes—The Cumberland Triumph is the best for us.

Secretary Goodman—Captain Jack and Cumberland Triumph, the latter will always sell at home market. Saw the latter sell in Kansas City market at $2.50 per crate when others were sacrificed at a nominal price. Bubach and Jessie are in his opinion the coming berries.

Major Evans says his family give their judgment in favor of the Cumberland, because they prefer to pick them, to eat them and grow them.

Judge Miller wanted to imitate Paul that "he might boast of himself." Amos Miller, of Columbus, Ohio, originated the Cumberland, and he the Captain Jack.

C. W. Murtfeldt recommended the Green Prolific as the only berry that will jellify. His neighbor, a successful grower, used only hill cultivation. For home use he would use Cumberland, Sharpless and Downing.

Mr. Barnett has Sharpless and Monarch of the West. Has discarded all others. Only grows for home market, as grown on creek land with clay subsoil.

Mr. Blumer would take Captain Jack and Windsor Chief. Do not ship. Sharpless does well but not so reliable.

NEW VARIETIES.

N. F. Murray sounded a note of warning; has tried more than fifty new varieties; has come down to Crescent Seedling and Captain Jack for Northwest Missouri; has picked 7,000 quarts the second season. Michels' Early from Arkansas bids fair to do well.

Major Evans has seen the Michels' Early fruiting for two years, and is well pleased with it.

Judge Miller had not received as good plants as he expected, and consequently nearly a failure.

Secretary Goodman would not recommend efforts to grow or propagate new varieties, but would recommend that the experimental stations should give attention to the breeding of new varieties.

Judge Miller, in response to an inquiry as to the Haverland, says it bids very fair; others made same report. The Gandy is the best late variety.

Mr. Murtfeldt would call attention to the length of the strawberry season; it may be six weeks if varieties are properly chosen.

CULTIVATION.

N. F. Murray—Would plow deep in fall and use top dressing of wood ashes. Cultivate shallow first summer, throwing the runners to the row. Plant three feet apart and one foot apart in the row. Second year let runners take middle of row and plow up old plants.

Mr. Weber—Would plow deep and cultivate with fine tooth harrow, adjustable in width.

Judge Miller—Deep plowing in the fall is the best thing to do.

MULCHING.

N. F. Murray—For winter mulching would use clean straw after the first freeze, and not too thick, taking the long straw off in the spring. For summer mulching, wood ashes, the very best thing on the earth, to be used in the spring after the straw is taken off, and wood ashes will help to prolong the season of strawberry.

Mr. Weber—Would treat a two-year-old bed by plowing between rows and then cross-harrow thoroughly; there will be enough plants left to fill up a good bed.

MARKETING.

Dr. Bates, of Piedmont, claimed that the rate from his place to St. Louis was actually prohibition; $1.10 per hundred to St. Louis and $1.75 to Sedalia, Kansas City and Chicago, while the rate from same points on beer, ale, soda, etc., is 90c.

Maj. Evans stated what had been done in Southwest Missouri by the organization of the fruit-growers.

N. F. Murray—Never ship in old packages, second-hand packages or barrels, or in anything but standard boxes. Never pick berries wet or mix the varieties; always have your stock and packages in best of style. He called attention to the necessity of organization in the selling of a crop.

RASPBERRIES—MARKET VARIETIES.

Reds.

N. F. Murray had plowed up all his reds; his market would not take them; for home use Shaffer's Colossal is good.

Maj. Evans thinks the Thwack is best.

Mr. Weber—The Marlborough is best.

Mr. —— —— thinks the Cuthbert best.

Judge Miller prefers the Turner, Thwack and Cuthbert to the Black. The Turner must be carefully grown, kept cut back, and not more than three to four canes left. All kinds should be kept pinched back; pinches much lower than in former years.

Blacks.

Maj. Evans named the Hopkins, and Weber would add the Gregg as doing nicely in his locality.

Mr. Durkes states that the Gregg in northwest part of the State does well; also a good report comes from Nevada in favor of the Gregg. The Hopkins was well commended.

Mr. Holman thinks the Bonanza equal to the Hopkins. It originated west of Springfield; is a seedling—a black cap. It is a prolific and extraordinary grower; ripens early; very prolific.

Mr. Freeman, the originator, was called out, and confirmed all that the others had said about the new berry.

Mr. Holman named the Ozark as a hardy variety; it is a seedling of the same locality, and thinks it will help out the time of the Gregg.

Judge Miller said a good word for the Ozark.

PRUNING RASPBERRIES.

Mr. Weber—Cleans out all the wood as soon as the crop is picked; plows up the ground and the young shoots come and tip in the ground; has no trouble with winter-killing since he practiced this.

Judge Miller—Would not clip in the fall, as canes do not winter-kill.

Mr. Holman thinks the old canes have a degree of protection for the young canes, and would not take them out till spring.

THE THREE BEST BLACKBERRIES TO FILL THE SEASON.

Judge Miller names Snyder, Triumph and Erie.

Mr. Weber names Early Harvest, Erie and Snyder.

Mr. Goodman—Snyder, Taylor and Briton.

Mr. Freeman—Snyder, Wallace and Knox.

THE DEWBERRY.

Messrs. Weber, Miller and others had not much success with the Dewberry, and especially the Lucretia.

WEDNESDAY, June 4, 2 P. M.

The Society was called to order, and the subject of orchards was first taken up.

VARIETIES FOR MARKET—AND WHY?

A. NELSON, LEBANON.

Mr. President, Ladies and Gentlemen of the Missouri State Horticultural Society:

The paper assigned me, "Varieties for Market—and Why?" at first thought would seem a simple thing—one easy of getting along with without any trouble. But from my standpoint, living as I do on the Ozark range, the solution of this question assumes a different aspect. Since coming to Missouri, now a little over seven years ago, I have bought and shipped a few car loads of apples grown in our locality, and some of the fruit bought and shipped has been used in what was once the greatest, the grandest and best fruit state in the Union (I refer to my native state, New York.); but to-day she lowers her banner as a fruit state to one of her sisters—much younger, yet much greater in fruit resources. I now refer to Grand New Missouri, greater and grander in her own resources than any other state in the Union. But I am drifting from my subject. All through the eastern fruit belt the question is being asked: "What apples can be substituted for the Old Baldwin, R. I. Greening and Roxbury Russet?" This question has not yet been satisfactorily answered to the horticulturists of the east, and with us and among us in Missouri the question is coming up at nearly all horticultural meetings, "what to plant in place of the Ben Davis (the Baldwin of the East); what to plant in place of Jennetting (The Roxbury Russet of the East) and what in place of Winesap?" A feeling of uneasiness and unrest seems to have taken hold of the horticulturists touching their different varieties of fruits in different localities. There is no doubt in my mind if all parts of Missouri can grow as good-keeping, high-flavored, bright, clear-colored Ben Davis as is grown on the Ozarks, and if the per cent of the Ben Davis orchards planted in the state is as large as has been planted in our locality the past few years, the Ben Davis apple will not be hard to find in the general fruit markets of the country. For within the past few years not less than 450,000 to 500,000 trees have been planted in our locality, and I believe 90 per cent has been Ben Davis; and I say if Ben Davis has been set out at this rate all over the State, no wonder there is a scramble among nurserymen to find an apple as good in every point as is the Ben Davis, and possibly a better dessert apple. But allow me here to say that those of you who have never had the pleasure of eating Ben Davis apples grown on the fruit soils of the Ozark, hardly know what a choice Ben Davis apple is. For the past two winters at our home we have learned to know what they are.

You will all think by this time that I shall put down the Ben Davis apple as first in the list. Well, you have guessed about right, for it is hard to go back on a friend that has helped you to keep your apple account on the right side of the ledger, and this is true of my dealings with this same old Ben Davis apple.

The next apple for a wide scope of our Ozark range, and one that has never failed, and always commands the higest price in the market, is the Maiden Blush, and this is about the only summer or early fall apple that I have handled with any degree of satisfaction.

While the Lowell and the Rambo do well, and some years extra well, still for general trade the Maiden Blush stands at the head of fruits in or near her season.

The Maiden Blush apple should be planted for northern shipments, as it comes in good season. I found this out on my trip to Buffalo, N. Y., and Elmira, N. Y., when I took twenty-five barrels of Blush, Spy and Belleflower to help pay a small part of the expenses. Those apples were picked and packed in regular barrels during terrific hot weather, yet arrived in Buffalo in nearly perfect condition, and sold from the car door at a handsome profit.

I now take up the third standard apple for our country, and an apple that if properly handled will make its mark and reputation for Missouri, as did the celebrated Tompkins County King make a reputation for central and western New York. I refer to the Rome Beauty. This apple, I believe, in suitable localities and due and careful cultivation, will be one of our surest and best. I want you to fully understand I now refer to our especial locality.

Two other varieties, and I will close by recommending planting for test a third one. One of the coming (if not already at hand) apples is the Jonathan. While we on the Ozarks are not as yet fruiting a great many of this apple, still, with us, it is destined to be, as the boys say, "a daisy." Coming, as it does, between the Blush, Lowell, Spy, Bellflower and the Ben Davis, it fills the gap, and dealers can start late in August and commence on Blush and wind up in October with Ben Davis.

But we still have another variety entitled to its meed of praise, as it is a good apple, a good grower, a good seller, and that is what we are after; you may guess, I shall call the Willow Twig.

But to close, I want to say a few words in favor of, to me, a new apple, new only in name, as it is growing in one of our oldest orchards in the county, and while packing fruit last fall the gentleman owning the orchard called my attention to the apple and gave me a good sample to have named at the winter meeting at Lebanon last winter. The apple I refer to is the Clayton—not, perhaps, as handsome an apple as many of our other apples, but one of the finest dessert apples I ever ate, when in its season. The tree is a strong, upright grower, bears every year, no sign of disease or decay, and is now twenty-three years planted in orchard. The owner speaks in highest praise of both tree and fruit, and always puts this fruit away for home use.

To sum up my position, the Ben Davis first as a commercial apple; the Maiden Blush, the Jonathan, Rome Beauty, Willow Twig, and as first stated, would advise planting 500 to 1,000 trees of Clayton to make up a commercial orchard.

And now in conclusion, is it not safe to assert that a new era is dawning, not only to those engaged in horticulture, but in all the avocations of life in Missouri? People from all parts of the Union are writing and looking and coming and already here. We have to-day men with us from Maine to California, and I don't know as I can do better than to use the words of the "Unchained Poet" let loose on one of our Missouri towns on a Saturday when the farmers of the surrounding country go to town for their mail.

The "Unchained Poet," seeing the different classes and nationalities mingling together, asked different ones from whence they came, and got answers like the following: "I am from the Wooden Nutmeg State." "I am from the rocky coasts of Maine." "I am from New Hampshire, known now as the 'Land of Woodchucks,' where there is $700,000 damage done to clover alone each year; can't stand this." "I am from the sandy plains of Kansas," etc., etc.

After our "Unchained Poet" had gone the rounds of the crowd at the post-office he retired and got himself to a shady retreat, and there and then furnished to this Society the following, which I think is good enough to keep:

"THEY ARE COMING TO MISSOURI."

They are coming from the deserts of the dim and dusty East, where to raise a stunted turnip is the prospect of a feast, where the farms are made with gravel and they plow with dynamite, where the festive chattel mortgage sings in dirges day and night; they are coming in their wagon, they are coming on the train; they are coming from the regions where they struggle long in vain; they are coming from the cabin, they are coming from the hall; they're coming to South Missouri, where there's plenty for them all.

Where you needn't dig potatoes with a saber and a dirk, where when rain is badly needed then the rain gets in its work, where the rivers moan and murmur on their journey to the sea, where the breezes tackle corn stalks big as fence posts on the lea, where the savage lately wandered in his search for human hair, where his hoarse and howling war cry floated on the summer air, where a hundred braves would answer to the chieftain's battle call; they are coming to South Missouri, where there's plenty for them all.

Where the savage used to wander, yearning for a crop of hair, now the farmer takes his porker to the nearest county fair; and the corn is daily growing, where the greasy wigwams stood; where he burned the wailing captive, now the poultry scratch for food; and the people who are coming to this pleasantest of climes, show a happy knack of keeping with the progress of the times. They will find a country beaming from the spring-time to the fall, when they land in South Missouri, where there's plenty for them all.

UNCHAINED POET.

——————— places Ben Davis first, and Maiden Blush for northern shipments. For the third he refers to the Rome Beauty; also recommends the Jonathan, coming between the M. Blush and the Ben Davis. Recommends a new apple, the Clayton—fine dessert apple; tree strong, upright grower, good bearer.

N. F. Murray would plant in Northwest Missouri Winesap in place of Rome Beauty; Willow Twig does well in same locality; Black Twig is doing well also. Can grow Jonathans in northwest if planted on rich land and carefully cultivated; would recommend for a summer apple the Summer Pennock; large coarse apple, a good seller.

Mr. Gilbert, of Thayer, spoke of two trees of this and one of Winesap that yielded 137 bushels last year.

Mr. Durkes would pick Jonathan early, picking only the best specimens first; it will give better satisfaction when handled this way.

THE COMING APPLE.

Mr. Freeman thinks they have it in Greene county.

Dr. Bates spoke in favor of the Spitzberger.

MISTAKES IN ORCHARDING.

Dr. Bates has tried many kinds of pears, but has only succeeded with the Bartlett.

N. F. Murray—Bartlett, Seckel and Duchess have done best in Northwest Missouri; sowed an orchard in clover for two years and lost at least $1,000; would cultivate.

Mr. Gilbert would trim for low tops, having tried high tops.

Mr. Durkes—Orchards should have rest; constant and thorough cultivation should be the watchword; we should plant more peaches.

HOW YOUNG A TREE SHOULD I PLANT?

Sec'y Goodman—Plant thrifty one-year-old trees, with good, well-protected top bud; if you can afford to, buy good thrifty two-year-olds, with one good center shoot, and never cut the center shoot; in peaches one year old, cut back heavily.

Weber thinks a strict rule would not apply to different kinds.

N. F. Murray believes in one and two year old trees as preferable.

Piece—Root Grafting—Responded to by L. A. Goodman.

PEARS.

J. A. DURKES, WESTON.

Some of the Best Varieties.

The production of new fruits is a work in which the horticulturist labors with energy and zeal. The art of planting and selecting "best varieties" has gone on and on, till it could be said we had arrived at a period almost of perfection. Still the work goes on. We are constantly renewing and discarding plant and fruit, supplying their place by those that are superior and prove themselves to be better adapted in most respects to the locality of the grower. That all fruits of the temperate zone, and their many varieties, vary greatly in localities of close proximity to one another, is a theory old and well established; the discussions in our horticultural meetings and reports of similar bodies show it; hence, to arrive at a conclusion somewhat satisfactory, every one must experiment and make a fair trial on his own grounds. To illustrate, we will mention a case bearing fully on this point. Some years ago the President of this Society met with great success in a variety of the raspberry. A neighbor living but a short distance away, seeing this, endeavored to do likewise, procured plants from the former and undobtedly treated them as he had done, but failed to meet with that success he was working for. Where the trouble really was 'tis not in place to discuss here, but give this only as an example that falls to the lot in the experience of thousands.

With pears we have not had the opportunity of selecting from native seedlings to as large an extent as we have had in the apple, our selections being confined mostly to those of foreign introduction; therefore, it cannot be surprising why so many failures and drawbacks among the few successes attending the culture of this fruit in America. By much trying and testing from these and our native seedlings, we are now able to present a list that in most respects will be quite satisfactory.

For its extreme earliness, the little Doyenne, etc., commends itself especially for family use.

Clapp's Favorite—A large, handsome pear, succeeds moderately well. Fruit must be gathered a week or more before ripening on the tree.

Margaret—Rather a new variety, has done well wherever planted.

Rostiezer, often called the Summer Seckel, should be in every collection; an annual bearer, tree very free from blight.

Tyson—One of the earliest, of fair size, good bearer.

The Bartlett, for excellence, stands at the head; in fact, it cannot be excelled; it is the most popular market pear we have. With the grower it is a general favorite. Trees very hardy, immensely productive and succeeds everywhere.

Howell, ripening a few days later, a large, beautiful pear, one of the best on the list.

Seckel, the standard for quality in fruit; trees hardy and productive.

As dwarfs, the Duchess and Louise Bonne of Jersey, are too well known to need any further comment here; they succeed wherever planted.

The White Doyenne, an old, almost universally esteemed variety, has always proved to be very productive, one of the best.

The Flemish Beauty succeeds in many localities, a fine pear.

Of the later fall varieties we can recommend with confidence the Sheldon, the Anjou, Clairgeau, Hoosic, Swan's Orange and Kiefer. The Vicar succeeds well in most situations.

The Lawrence, classed as one of the best of our early winter pears, is vigorous and productive.

Winter Nellis—None would be willing to be without this; it is decidedly the best of our winter pears, bears regular, trees quite free from blight, fruit keeping well.

Easter Beurre and Pound are old varieties and tested with varied success, but should not be overlooked.

Of some of the newer kinds we have the Lawson, recommended as ripening early, of good quality, great beauty and fair size.

In the Krull, a seedling of this State, we hope to find a pear possessing the qualities of productiveness; trees vigorous and hardy, fruit fair size, good flavor and a long keeper.

The Idaho, described as possessing every excellent point that could be desired, is the creature of too great a boom at present to say aught for or against it; it should, however, be tried on a moderate scale only, until the prices of the trees come down to the standard of others.

In conclusion, we may add, plant more pear trees, not of a few but many kinds; help to make this fruit more popular, more general. We ought to have pears plentiful; let all plant many varieties; try and test them year after year; the price of the trees is little, the land they may occupy small, where we have farms and estates counting their hundreds of acres, while the benefit may be of untold value to the present and generations to come.

Clapp's Favorite does fairly well; Margaret has done well; Seckel should be in every collection; Tyson good summer; Bartlett cannot be excelled; Howell one of the best; Seckel a standard.

Dwarf White Doyenne is one of the best; Flemish Beauty blights badly; Winter Nellis one of the best winter varieties.

Krull—We hope to find many good things of this pear.

Idaho must be tried yet. Plant more and many kinds, and make them as cheap as apples.

CARTHAGE, MO., June 3, 1890.

Mr. L. A. GOODMAN:

DEAR SIR—I don't know as I can give a very correct account or report of the general fruit crop and conditions, as I haven't had an opportunity to learn much about the conditions and prospects.

Strawberry crop very large as to acreage; some say they have not more than half crop, while others have a full crop.

Raspberries will be a good, full crop.

Blackberries will be a good crop.

Wild Goose plum a failure; all frozen in February; some late blooming varieties full.

Cherries about half crop, some varieties full.

Peaches frozen in February: some early varieties, Amsden and Hale's Early, have some peaches.

Apples bloomed very full. Ben Davis and some other varieties very full; there will probably be a good average crop.

Pears—all early blooming varieties frozen in February, late bloomers considerable fruit.

In the strawberry line I have nothing on my ground but my own seedlings, Speece Perfection, Beauty, Comet and Carthage Queen, all very full and very large and fine. I have had reports from a number of fruit-men in the last two weeks; they all say the Speece Perfection the fullest and largest they have on their grounds. Comet also very full and fine. Mr. Wiggins says the Speece Perfection is the finest he ever saw. Mr. Tucker says he never saw anything like it; thinks it the best thing out. Two or three parties here have the Beauty; they say it is very prolific and large; it is very fine and large on my ground. Only two or three have the Carthage Queen outside of myself, and not fully tested by them. On my ground it is very prolific and large.

You will probably have more full and correct reports from some of my brother fruit-growers than I have given you.

If this will be of any value to you, you can use it, if not; throw it in the waste basket. Very respectfully, your brother fruit-grower,

B. W. SPEECE.

P. S.—I should like to have been with you, but I am in the midst of my strawberry crop, and Souhegan raspberries beginning to ripen.

I wish you a good and interesting meeting. B. W. S.

GLASGOW, MO., June 2, 1890.

Gentlemen—I am too busy picking and shipping berries to be with you in person, so I here send a brief report, as called for by program.

We are picking some of the finest fruit I ever saw, and getting as low prices as I have ever met with in my ten to twelve years' berry-growing. Haviland, Bubach and Jessie lead all others in size and beauty; 25 to 30 berries fill a box—all fancy goods. The older ones, such as Capt. Jack, Windsor Chief, Chas. Downing, Cumberland, Sharpless, etc., are all fine, but will have to give way to the last-named three varieties. Miami is something on the Sharpless order, and it may stand drouth better, but will have to be tested.

Stayman's No. 1 is of the Glendale type, and a dull color, Crescent Seedling size; productive, a peculiar flavor not very good; a firm one to ship—shall go lightly on it here.

Eureka is a fine berry, but no better than the Haviland or Jessie.

Warfield No. 2 does not look healthy in foliage—crimped up; a fine, showy and productive berry; perfect in shape; of rather poor quality.

Gandy's Pride is undoubtedly a late one; no ripe ones yet, and have been picking two weeks now; shows up well.

Logan—large; showy; fairly productive; very soft.

Burt is Captain Jack, or so near like it I am not able to detect any difference.

Gypsy—no good.

Schnell's No. 9—Extra early; cross between Crescent and Hart's Minnesota; perfect bloomer; fair quality; handsome shape; medium to small in size; enormously productive; as early as Michel; have it on trial, and may become valuable for early; gives heavy, extra early pickings, and is the earliest one I had this year; picked at the rate of 50 crates per acre at third picking.

No. 1—Late as Jersey Queen, of which it is a seedling; one-third more productive than Crescent; paler red; one-third larger in size; pistillate; rather soft and acid, but valuable for late.

Would say for my future planting: Haviland, Jessie, Bubach, Gandy, Michel and my two seedlings. Have Lady Rusk growing, but no fruit yet. I cultivate thoroughly and often; hoe and plow shallow; plant in spring mostly; will not let plants get too thick in fruit-bed; raise less acres and better fruit; I mulch with wheat straw, and hand-weed in spring; market in 24-quart Lesslie box; pay one cent per quart for picking, and assort into three grades on a table with domestic stretched over it; Fancy, No. 1 and No. 2 represent the three grades; use checks with numbers on and punch to keep count with pickers; use 4-quart stands; every picker has a number, and every box he picks must bear his number, and every row picked staked with his number. This is the only way one can get good work.

Rasp and blackberries promise well, and everything else points to a bounteous supply of fruit for 1890. Wishing you many pleasant hours at Poplar Bluff, will close my hastily written report.

Respectfully,

HENRY SCHNELL.

WEDNESDAY, June 4, 8 P. M.

Society met, and the report of the Secretary was first taken up.

This report gave a history of the Society work and the needs of Society.

SECRETARY'S REPORT.

Mr. President, Members of the Missouri State Horticultural Society, Ladies and Gentlemen:

This beautiful weather calls to mind such a beautiful poem that I wish to read it here:

A DAY OF JUNE.

I could write such a beautiful poem
About this summer day,
If my pen could catch the beauty
On every leaf and spray,
And the music all about me
Of brook and breeze and birds—
But the greatest poet living
Cannot put them into words.

So I may not write down the poem
As it came from the hand of God
In the wonderful wordless language
He writes on sky and sod—
In words that we tell our thoughts in,
That will make you feel and see
The beautiful, beautiful poem
This day has been to me.

If I might, you would hear all through it
The melody of the breeze,
Like a fine and far-off echo
Of the ocean harmonies:
You would hear the song of the robins
A-swing in the apple tree,
And the voices of running waters
In their search for the great gray sea.

You would breathe the fragrance of clover
In the words of every line,
And incense out of the censers
Of hillside larch and pine;
You would see through the words the roses,
With, deep in their hearts of gold,
The sweets of a thousand summers—
But words are so weak, so cold.

If I only could write the color
Of the lilac's tossing plumes,
And make you feel, in a sentence,
The spell of its sweet perfumes;
If my pen could paint the glory
Of the blue and tender sky,
And the peace that crowns the mountains,
My poem would never die!

Eben E. Rexford in American Garden.

Down on the borders of Southeast Missouri, where a few years since we had no thought of ever going, we meet the members or the State Society and the friends of horticulture. It is a new and strange land to a good many of us, and we are learning more and more every year of the wonderful possibilities of the State. We accomplish a double good in thus meeting about in different parts of the State at our regular meetings. One is, the benefit we ourselves get from knowing and seeing the fruit-growers from the different parts, learning from them of their work, on their plans, of their success, of their failures; getting their views on the different subjects; seeing the different soils and localities; finding new varieties and plans of cultivation, and studying the needs of the special locations.

The other is the help we can be to you in your work; the items you may learn from other members of the society; the benefits of discussing these matters with one another; the unity of feeling such meetings awaken, and the after results of a little enthusiasm which our getting together gives. In other words, one benefit is to our society, the other is to you.

We often make a mistake in thinking that all our work is to be counted by the discussions or the papers read. One-half of the good accomplished is given by our private talks and social meetings, before and after the daily sessions. The time is never lost which we spend in examining the fruits and flowers on the tables and if

discussing their merits. The time is well spent which we use in making one another's acquaintance, and in asking questions. Closer study, more intimate connection with our fruits and flowers, is always time well employed.

Do not be afraid, therefore, to let yourself be known, or to ask questions, or to give your views, or to tell your experience, or to let us know of your successes or failures, or to discuss the subjects as they come up, or to give a theory or produce facts to corroborate them, or to state the character of your soils or location, or bring up any item for information or instruction, either at the recess or at the sessions; for by thus doing, we are learning. So then, meeting here, we want to know more of this great southeast country of our State, and we want the people of other States to know it.

It is our province, not only to learn for ourselves and to try and teach others, but to let the world know what our advantages are, and to induce them to come here and locate. Our province is not only to learn, to teach, to advertise, to ask immigration, but to talk of our markets, our plans of marketing, our packages in which we can market our fruits, our commission men, our evaporators, our canneries, our railroads, express companies, and our rates on them, our fruit-houses, plans for planting, cultivating, pruning, gathering, marketing in the thousand and one different ways, and our greatest bugbear, transportation rates on our railroads and by our express companies.

These are only a very small portion of our work, and yet, in all probability, the most important. These matters are enough to get us interested and keep us busy; but when, added to this, we begin to think that there are a hundred other different ways where we should work, you may understand the magnitude of our cause.

Floriculture, green-house work, window gardening, forest planting, landscape gardening, laying out our parks and planting them, beautifying our homes, planting our nurseries, growing trees and plants of all kinds, vegetable growing, hot-bed work, growing cabbage, tomato, celery, sweet potato plants, raising melons by the thousands of car loads, and how best to do it, planting potatoes by the hundreds of acres, celery by the hundreds of thousands, filling our markets with fresh vegetables from January to January, we begin to understand another phase of our work.

Beautifying our homes, planting our school grounds, covering our court-house yards with fine lawns and trees, laying out our parks and drives, planning our cemeteries, and adorning all our public grounds, you may understand another step of our plans and scope of work.

Studying our insect-life, and the useful as well as destructive ones, knowing them by name and what they are for, studying day by day, watching and waiting and working, always finding the more we learn the more there is to learn, always avenues opening up for investigation or instruction.

Botany and its delightful study, the knowing our plants, shrubs and trees by name, learning the uses and actions of the leaves, roots, branches and bodies, watching the development of root-growth or bud-growth, learning how plants grow, how plants feed, seeking to find, if it be possible, if there be any way to feed plants or trees or fruits so that we can know the results as we know the effects of corn on our hogs and cattle, feeding our strawberries so that the berry shall be firm instead of soft, growing our trees so that they shall be more hardy, and you will still see another opening for study; geology, the knowledge of our soils, knowing where certain varieties will succeed best, seeking out the secrets our soils have so long held; meteorology, our climate and its influence on our plants and trees; study of our rust, mildew, scab, rot, blight, black-knot, smut, the bacteria of our country which causes more loss than all the floods, and fires, and accidents of our land, and you will still see that there is something for us to do.

Would you have me tell you more? Study and thought and brain, and muscle, and work and wait and watch; watch, wait, work, is the all-absorbing idea of the horticulturist; to-day I say that there opens up no broader nor more desirable profession in all this land of ours than this one of horticulture, no better opening for study if you want to study, no better opportunity for investigation than is here offered you, no surer field of work than Pomona or Flora stands ready to pour into your lap, no more delightful scope of thought and beauty of love and intelligence than is placed before you in the decorating our waste places or planting in our parks.

SET OUT TREES.

Set out trees! adorn the homestead,
Make it pleasant all around;
Let the elms, and oaks and maples
With the evergreens abound;
Let the home be so attractive
That the boy that is to-day,
When he shall arrive at manhood
And in foreign lands will stray,
May turn with longing heart and loving
To his home these hills among,
Thinking how the trees are thriving
Which he helped to plant when young.

Set out trees! yes, plant an orchard;
Dear, good farmer, do you know
Of the wealth there is in fruit trees,
For the labor you bestow?
How the apples turn to money,
With the peaches, plums and pears,
And the luscious bright red cherries—
All the fruit the orchard bears?
Little children love the fruit trees;
How they wait, with what delight,
For the coming of their blossoms,
In their robes of pink and white:
Never flowers were half so pretty,
Never such profusion shown,
As Dame Nature gives the fruit trees,
With a glory all their own.

Set out trees upon the common,
Ashes, linden, poplars, birch;
Set them out around the school-house,
Plant them thick about the church.
Have the children's play-ground shaded,
And the public walks as well;
And the joys from these arising
Coming ages glad will tell;
These shall live and grow and gladden,
While we moulder 'neath their leaves;
Let us then improve the present,
Leave behind us the priceless tree.

—*Mrs. Annie G. Marshall.*

BRING FLOWERS.

Bring flowers, bring flowers, the sweetest, the best,
To garland the beds where our braves are at rest;
Bring pansies for thoughts—unforgotten are they;
Bring laurel for glory they won in the fray;

Bring lilacs for youth—many fell ere their prime;
Bring oak wreaths for Liberty, goddess sublime;
Bring chrysanthemums white for the truth they upbore;
Bring lilies for peace—they battle no more;
Bring violets, myrtle and roses for love;
Bring snowballs for thoughts of the Heaven above;
Bring hawthorn for hope which surmounts earthly strife;
Bring amaranth blooms for immortal life.

Bring flowers, bring flowers, the sweetest, the best,
To garland the beds where our braves are at rest.

—*Emma C. Dowd.*

Would you know the secrets of nature? Study the principle of life—what it is, how it comes, what it will produce, how destroyed, how brought to life again, how created, and you will find yourself lost in amazement and in wonder when you learn that the life principle, protoplasm, is such an action of matter that it is impossible for you to tell whether it will produce an animal or vegetable; that the life germ is of such nature that no scientist has been able to discover whether it will produce a tree, a plant, a grain, a flower, a fish, a fowl, an animal or a human being. Is there not enough for us to study and learn?

Did you ever think, in mistreating an animal, that it hurts? Did you ever think that the plants in your house or yard, the fruits in your fields or gardens, the trees in your orchard or lawn, would cry out in anguish and sorrow if they could but speak of your neglect or bad treatment? The sensitive plant will droop when you even touch it, and a plant in South America will weep when bruised, and another will fight with its tendrils when you step on them, by clinging to your legs.

One day in a beautiful orchard among some beautiful peach trees, one of the men, knife in hand, cut off one of the main branches of the tree, and it so hurt me that I had to yell out to him. I have been in a thrifty young orchard when dozens of trees were skinned and bruised by the single-trees when plowing; and what true horticulturist does not feel as if the bark was taken off his shins, or his arms, or his hands?

Work, thought, study, investigation, watch, wait, study, study, study, work, work, think, think, plan, plan—all, all these are the province of the true horticulturist.

So here down in Southeast Missouri there are openings ready for hundreds of our people to come and occupy. You have the soil, the climate, the markets. All that is wanted is for people to know of the advantages you offer them. You want successful fruit farms, to show what can be done in all these different departments of work. If frosts do not settle in these rich bottom lands, you should grow the largest apples in the United States. On these hill-tops you should grow the best in quality in the world. If you have any facts to corroborate these statements, here is the time and place to let your light shine and the word go abroad that fruits can be grown in Southeast Missouri.

The melon interest has grown with wonderful rapidity in some of these counties, until they have become famed all over our country. Earnest, enthusiastic, judicious combination in the fruit-growing business cannot fail of success, and as soon as we can let it be known, the tide of immigration, which has already set Missouri ward, will increase ten-fold.

All over our State are scattered our enthusiastic workers by the thousands; 20,000 farms are devoted to the cause of horticulture in some of its branches; 100,000 people are employed on the farms and places thus owned by horticulturists;

$10,000,000 will not cover the worth of these products to our State, and $10,000,000 more will not give the value and satisfaction to our people for the use of these at their homes.

Now comes the demand to let this be known, and how best to do it is one of the great questions of the day. Meeting together; knowing each other; working in unison; calling for help; reporting our successes; letting the facts be known; sending it out through the papers; making exhibits of our products; calling the attention to our work by the united effort of all our members; sending specimens over the country; showing at our fairs, all of them, every county fair and every district fair; spreading our circulars on every train which passes our town; united, persistent, energetic, enthusiastic work and talk, talk and work, and our success is sure.

The World's fair, and what shall be done there, is a question which should come up for discussion and for suggestions. At that fair for six months we should have a fine collection of fruits in their season, and a grand collection of all the fruits grown in Missouri in fine, large glass jars for continuous exhibit. This should be done, in connection with the other exhibits of the State, in a beautiful building of our own, where all the products of the State can be together; $10,000 will not more than cover the cost of such a display of horticulture as can and should be made.

The State society should take charge of this work, and every specimen and every exhibit should be labeled by whom grown and where grown, so that every portion of the State shall receive its just honor.

Our work for the past six months has been one of growth and advancement. Four new societies have organized, Barry, Atchison, Camden, Christian. We have now as many well-organized societies as almost any other State in the Union, and our work is being done more judiciously and systematically. Only the distance from the well-organized portion and busy season prevents there being a crowd of a hundred or more here as is usual, and the room would be filled with the local attendance.

The past winter has been one of extreme moderation. On January 1 you could see the pink of the peach bloom, and it did seem as if we should see them open out on the warm days, and have ripe peaches in April. In February there were many trees in bloom, especially in South Missouri, and nearly all of them were ready to open. On March 1 the cold wave swept down from the snows of the North, and our hopes were blasted. Since then they have been still further hurt by later frosts, and, like our Kirksville man has said, they have been killed three times and are dead. But a few remain and most of those seedlings. The rains have been extremes; in the southern part of the State there never was known such floods and such heavy rains, while in the northern part there has been no heavy rain since last November; especially is this true in the northwest. But in spite of all these drawbacks, there will be abundant fruits. Berries, grapes, cherries and apples give promise of a bountiful crop.

The last winter some members of our society met with the State Board of Agriculture in different parts of the State to talk horticulture, and I think one of our officers was at this point These institutes are a help to our people in getting them to meet, get acquainted and talk over the matters of agriculture.

Our report, delayed as usual, notwithstanding our manuscript has been ready since January 1; we have now about half the work done, and I hope it may be ready in a few weeks at the farthest. It takes every bit of enthusiasm out of me to have matters thus drag along, but as it cannot be helped we must endure the best we can.

The report of the Texas meeting I have made to the society through the "Rural World," and it will be published in the next report.

Ornamenting public school grounds has been another step in the right direction, and the thousand or more trees planted on the grounds of Drury college at Springfield last spring was a work well done by the society, and next spring we will have another call upon us for another donation and another planting. Our work is continually growing in this direction as in all others, and when we get all our college grounds ornamented we will find something else to do.

The Shaw School of Botany is a grand, growing work inaugurated by Henry Shaw of St. Louis to give many a young man an opportunity to take a special course in the science of botany. A good opening is here ready for all those who will step up and use it. Even scholarships of two or three hundred dollars are ready for a few of our young men if they can get them.

OUR BIRDS—LET US PROTECT THEM, THEY ARE OUR BEST FRIENDS.

Think of your woods and orchards without birds!
  Of empty nests that cling to boughs and beams,
As in an idiot's brain remembered words
  Hang empty 'mid the cobwebs of his dreams!
Will bleat of flocks or bellowing of herds
  Make up for the lost music, when your teams
Drag home the stingy harvest, and no more
The feathered gleaners follow to your door?

What! would you rather see the incessant stir
  Of insects in the windrows of the hay,
And hear the locust and the grasshopper
  Their melancholy hurdy-gurdies pla ?
Is this more pleasant to you than the whir
  Of meadow-lark, and her sweet roundelay,
Or twitter of little field-fares, as you take
Your nooning in the shade of bush and brake?

You call them thieves and pillagers; but know
  They are the winged wardens of your farms,
Who from the corn-fields drive the insidious foe,
  And from your harvest keep a hundred harms;
Even the blackest of them all, the crow,
  Renders good service as your man-at-arms,
Crushing the beetle in his coat-of-mail,
And crying havoc on the slug and snail.

Think, every morning when the sun peeps through
  The dim, leaf-latticed windows of the grove,
How jubilant the happy birds renew
  Their old melodious madrigals of love!
And when you think of this, remember, too,
  'Tis always morning somewhere, and above
The awakening continents, from shore to shore,
Somewhere the birds are singing evermore.

Longfellow.

I quote from my old reports the following as being our views at this time:

"I tell you there is no more noble occupation in all the realms of business and profession in all this broad land of ours than that offered by horticulture. There is no better opening in any line of business than horticulture offers. There is no more

lucrative position offered anywhere than those offered to the entomologist, botanist and horticulturist. Will you tell me there is no chance for growth in knowledge—that the way for study is blocked up for the horticulturist? I say that it presents greater inducements and opportunities than can be found in any other profession.

"Our agricultural colleges are calling to-day all over the land for good botanists, entomologists, landscape gardners, florists, and fruit and vegetable growers, in fact horticulturists, which embraces all of these.

"And so it is with the fruit interests; we want good, intelligent, enthusiastic, systematic, judicious fruit growers, on the cheap, rich, fertile lands of Missouri; men, and women too, who will plant good large commercial orchards all over our State, who will use as much judgment, as much brain, as much money, as do our other business men, as do our cattlemen, horsemen, sheepmen, or merchants even, and then we will see this wonderful State of ours produce more fruit than is now grown by any State of the Union.

"Our Society has been the means of awakening an interest in this work, and has developed more investigation in the last few years by the fruit men of our State than has been accomplished in many years past.

"Some of the work accomplished has been the awakening of a new interest, and of developing new material, or bringing out dormant material, and we trust that the good work has but just begun. We have shown the world that we can grow as good fruits as can be grown anywhere in the United States, and now we want to develop that interest more largely.

"My friends, we of Missouri do not know one hundredth part of the capabilities of our State as yet. It is the aim and purpose of our Society to let the people of other States know some of these capabilities, and then help to develop them.

"In all the realm of labor or professions there is nothing so fascinating as the study of horticulture. There is something so atttactive in the work that very few ever give up the study when once well begun, and then we see every man who has made his thousands in the busy cities look forward to the time when he can enjoy himself on a farm or in the horticultural field. We have then a glorious and widespread field open before us, one which needs investigation and study; one which presents the grandest opportunities for the student to enter; one which is just entering on the threshold of science; one which has few known laws and many chances for experiment.

"The fact is simply that we are stepping upon a higher plane of horticulture year by year; we are learning new facts day by day; we are grasping some of the wonderful opportunities which are opening to our view; we are realizing the wonderful possibilities of our loved profession; we are beginning to see the magnitude of this fruit business; we see before us a field as broad as our land—avenues opening in all directions for the young men and women, and positions ready and waiting with no one to fill them.

"Our State is getting to be a wonder to the eastern people in the amount of fruit it produces, and it is going to be a still greater wonder. Not one-tenth of the fruit is grown that we will be in the future. The great possibilities of our State are just beginning to be known. I believe that I am right when I say that our State will be the greatest fruit-producing State in the Union. I believe it possesses the soil and the climate for this very end.

"The Ozark mountains and the southern slopes are to be a vast field for the orchardist. Here we have the mild climate, the height above the sea, the protection of the pine trees and the higher points of the mountains from the north winds;

the protection of the woods from the southwest 'hot winds;' the best of water, the best of soil, the best of fruits, and consequently the best of health. The central has the river bluffs, the fine prairies, the rich bottoms, plenty of timber, plenty of prairie, to satisfy the most exacting agriculturist. Here the apple is a success, and the peculiar limestone formation gives us the brightest colors to our fruits. The northern has much of the warm soil and the climate just suited to produce many of those northern apples that are justly celebrated all over the world."

TREASURER'S REPORT.

D. S. HOLMAN, Treasurer,
In account with Missouri Horticultural Society.

To balance on December settlement	$980 13	
Draft from State Auditor	1,250 00	
Total	2,230 13	
Cr.		
By amount paid warrant 142		$103 07
For expenses, P. O. bills, express charges, printing, etc.		
By amount paid warrant 143, Dec. 19, 1889		213 50
For premiums and expense of winter meeting.		
By amount paid warrant 144, Jan 2, 1890		108 66
For Secretary salary for December	66 65	
P. O. bill	28 81	
Trip to Jefferson City	9 55	
Express charges	3 65	
By amount paid warrant 145, Feb. 3, 1890		88 63
Secretary salary for January	66 66	
Express	1 35	
P. O. bill	6 00	
Printing	4 25	
Expenses to Farmers' Institutes	13 50	
P. O. bill	15 87	
By amount paid warrant 146, March 5		46 90
Expense N. F. Murray to Farmers' Institutes	25 00	
" Henry Speers "	21 90	
By amount paid warrant 147, March 5		50 00
For entomological work.		
By amount paid warrant 148, March 5		143 16
Expenses to Austin	76 50	
Secretary salary, February	66 66	
By amount paid warrant 149, April 30		239 87
Express	9 60	
Expenses to Springfield	13 20	
" Marshall	14 30	
Printing	18 87	
P. O. bill	49 57	
Secretary salary for March and April	133 33	
By amount paid warrant 151		99 72
Secretary salary and expenses for May (bill 16).		
By amount paid warrant 152 (bill 17)		104 00
For premiums and expenses paid at Poplar Bluff summer meeting.		
By amount paid warrant 154		43 30
Printing	18 75	
Postage	24 55	
Balance account		989 32
Total		2,230 13

Your Committee on Finance beg leave to report that they have examined Treasurer's report, warrants, receipts and itemized list of same, and find them to be correct as reported.

S. W. GILBERT,
J. A. DURKES,
N. F. MURRAY.

Adopted.

REPORT OF COMMITTEE ON FRUITS.

STRAWBERRIES.

J. C. Evans, Harlem, first premium $3 00
(Cumberland, Warfield, Jessie and Bubach No. 5.)

G. E. Davis, Springfield, second premium 2 00
(Cumberland, Bubach, Miner and Jewell.)

S. W. Gilbert, Thayer, third premium 1 00
(Chas. Downing, Crescent and Captain Jack.)

Five Lawver apples, A. Zeitinger 50
Five Lafayette apples, Tuebner & Aull 50
One box cherries, Mr. Murtfeldt 50
One box Napoleon, Reine Hortense and Elton, S. Miller 50
Five jars of fruits, E. E. Easdale 1 00

A collection of apples, by Conrad Hartzell, of St. Joseph, Mo., of 1889, 1888 and 1887, all in a fair state of preservation, those of the last two years as fresh apparently as when gathered; premium, $5.00.

SAMUEL MILLER,
W. C. FREEMAN,
C. BARNARD.

REPORT OF COMMITTEE ON FLOWERS.

Best basket roses—
Mrs. D. S. Holman, Springfield, first premium $2 00
Best collection cut roses—
C. W. Murtfeldt, Kirkwood, first premium 1 00
Best collection cut flowers—
Mrs. H. E. Johnson, Poplar Bluff, first premium 2 00

SAMUEL KAUFMAN,
MRS. G. T. BARTLETT.

The essays were interspersed with recitations and songs, which made the evening program both valuable and interesting.

SECRETARY.

CONTRAST OF THE TIMES THIRTY YEARS AGO AND NOW.

C. W. MURTFELDT, KIRKWOOD, MO.

When, on a certain occasion during our late unpleasantness and family jar, Lieutenat Dash excused himself to General Mitchell, the astronomer and prince of lecturers, for being five minutes late, he said: "General, I am very sorry that I have kept you waiting." "Sir," said the General, "five minutes is a long time; I have been in the habit of dividing seconds into thousandths." "A second is a long

time," said a watch-maker to me, "if I had acted promptly my child would not have fallen; I missed to catch it by a second." We read in the record of races either one-half or three-fourths of a second. If now we consider these facts, let me say to you that

THIRTY YEARS

is really a very long time. When Bro. Goodman, or some other good man, suggested that I should on this occasion, for your entertainment, contrast thirty years ago and the present, I concluded that he or they were intent that I should thus publicly proclaim myself an old man. I am certain that the friends present, and especially the ladies, will say, as with one voice, "he does not look so very old, now does he?" Let the verdict be what it may, the fact remains that, according to the American standard of majority, I was old enough to vote thirty years ago. Strange as it may seem to you, I could tell of more things, and with clearer ideas, that happened prior to 1860, than of those that occurred since that date. Men of years live in the past, and remember more clearly events of their youth and early manhood than those of more recent years.

I think it would be unwise to say a word of the early sixties. These embrace the most momentous events in the history of the United States since the declaration of their independence from the mother country. And as a nation we never made history faster or more interesting to the student of to-day than at that time. We are all happy now, and let us trust, thankful, also, for our present prosperous and peaceful condition as a nation. There is no nation on this round earth of ours that occupies a more respected or exalted plane than these United States of America. The star-spangled banner is respected in every land and on every sea. While the most civilized nations can only keep their respective positions by having immense standing armies, which can be mobilized and started into almost instant activity and bloody war by the firing of a single cannon at the pleasure, or the command, rather, of a single man, with or without cause, we Americans are persuaded that even our army of twenty-five thousand men is too large, and might be reduced without danger from foes within or without. The American people do not believe in war, but in arbitation. Our aim is not so much to be feared as to be honored and respected. "Let us have peace," is our watch-word. And peace will be ours so long as we remember that "Righteousness alone exalteth a nation, and sin is a reproach to any people!"

Mr. President, there is not time enough at present to refer, if ever so briefly, to the immense strides which have been made during the last thirty years in the realm of science, of inventions of labor-saving machinery, and in every department of mechanics. Why, sir, we have even harnessed lighting, not only to carry our messages over all lands and underneath the great ocean, but we make her draw our street cars, and ere long our freight trains also. All this might with profit, and perhaps with interest also, be embodied in a contrast of thirty years ago and now.

Mr. President and friends, if what I have said thus far appears seemingly irrelevant on an occasion like the present, please pardon me, and I promise to confine myself to agricultural and horticultural matters, hardly knowing where to begin and how to end. Allow me to say that the Missouri State Horticultural society was an infant scarcely out of long clothes in 1860, being (if my information is correct) only three years of age. There was no State Agricultural society, nor yet a State Board of Agriculture at that time. Neither had Missouri a State Agricultural college, and no Agricultural Experiment station. The State Horticultural society had among its members many "Suckers"—beg pardon, I ought to have said

Illinoisans—hailing from Alton and vicinity. They liked to come to St. Louis once in a while. These were men of experience as well as brains. Why, sir, I myself was present on one occasion as the representative of the "Prairie Farmer."

For many years Hon. Henry T. Mudd was president. The society generally met in one of the court-rooms in St. Louis; the most interesting committee was the one on wines. The array of bottles in one of the ante-rooms was very formidable, and the names on the labels were what is most forcibly expressed as "jaw-breakers." Do you ask: "Were you a member of said committee?" Certainly. Am not I a German? That seems to have been the sole reason for my selection, because I knew nothing of wines, nor yet of their manufacture. My native country is too cold to grow grapes for wine. But I could handle a Faber No. 2. and the other members tested or rather drank the wine. "But," says the queerist, "do you wish to be understood that you never tested the wine yourself?" Certainly not. Nevertheless, I was a poor committeeman. And after I drew out from one of the wine growers the fact that when nature did not put the sugar into the grapes, Belcher's sugar refinery could furnish that necessary ingredient, and the Missouri flowing right by Hermann could furnish all the water to establish the proper balance, "Othello's occupation was gone."

I am not sorry that for many years now the Missouri State Horticultural Society has not appointed and not needed a committee on wines. Notwithstanding, I am very fond of good grapes; they are a delicious and wholesome fruit, and we can never raise too many. So long as California and Kelley's Island fill our home markets with this fruit, it will pay for us to plant more vines, and of the best table varieties; supply our own markets and save the cost of transportation. Missouri can raise better and sweeter grapes than the Concords and Catawbas grown on Kelley's Island, and so long as bagging grapes is a sure preventive against the rot, the cultivation of the grape, and in greater variety, should be the aim of every horticulturist.

I stated a moment ago that this Society usually met in St. Louis. Members from a distance were entertained at the Planters' house (then the leading hotel), at greatly reduced rates. I am decidedly in favor of the present itinerancy, and more pleased with the making of new friends than all hotel style. I have been highly favored in this respect, and the friends of long ago are fast friends still, almost without exception, not in Missouri only, but in Kansas also. In this method there is so much more chance of horticultural missionary work. Let those who prefer the freedom of the hotel patronize these very useful and necessary institutions. I hope it will not be in my time when the hotel will be anything but the dernier resort. Let me not be misunderstood—I do appreciate a good hotel—and are they not all good? But unless you bring your company with you, you will be lonesome in the midst of a crowd at a hotel.

This brings me down to the most important point of contrast between to-day and thirty years ago. There is an old proverb, viz.: "If the mountain will not come to Mohammed, Mohammed must go to the mountain." We could scarcely expect a hundred or even fifty farmers and horticulturists of this county to make a journey of 200 or more of miles to meet this Association either at St. Louis, or Jefferson City or Kansas City. A half dozen of ladies and gentlemen interested in horticulture from Poplar Bluff would be a crowd, and esteemed quite a turn-out, and if every county of the 114 of this State should send that number, we, of course, would have 684 members, if all joined. Our membership for this great and grow-

ing State ought to reach up into the thousands; and it would also, if all who are making a living by farming and horticulture knew and appreciated all that can be learned at these meetings.

Now, allow me to take a step backward. You can readily figure out that it is less expensive for a few, besides the officers, to visit you, than that many of you should leave home and work, especially in the busy season of the year; we ought not to expect it. Yet many more than are here present can or could leave for a day or two of recreation, and let me say instruction also. The men of experience and skill, who know whereof they affirm, and what they are talking about, when speaking the gospel of horticulture—remember, please, that gospel means glad tidings—have a message, and unlike the fortunate miner, who is secretive and unwilling that others should learn where the gold can be found, they are more than willing that others should not only share but profit by their experience. Nay more, they are willing to speak of their own mistakes and failures, that others may escape loss and trouble.

All the matter which has been presented to you on this occasion has been well prepared and mentally digested, with a special view to interest and instruct you. Besides, these papers will be edited by our accomplished Secretary and preserved in a bound volume at the State's expense, one of which comes to every member, and will be in such shape by index and arrangement that it can be consulted upon occasion in the future. The membership fee is very light, and as already stated, this association deserves and ought to have at least five thousand (5,000) members. (Mr. President, when that happy day shall come, I, if there, will vote to reconsider the entertainment qustion.) Another thing I wish to say in brackets: that at one annual meeting held in Jefferson City, under the presidency of Gov. Colman and in the room of the United States court, every dollar received for membership fees was given the janitor, and even he did not think the compensation extremely liberal. The time to sneer at "book-farming" is long since past. If the horticulturist of the present day is not abreast with the times, if he is so wise that he cannot be taught anything, if he does not read agricultural papers, or books on horticulture and correlated science, or a political journal that has a well-regulated and edited agricultural department, he is justly entitled to be called an "old fogy," and it needs no prophet nor the son of a prophet to predict that his influence and his bank account will always be exceedingly small.

THURSDAY, June 5, 9 A. M.

Society was called to order by the President, and the first paper read was on pear culture.

WILL PEARS SUCCEED ON THE OZARKS?

L. T. GROVER, CUBA, MO.

This subject having been assigned to one for a reply, I fear will not have the justice done it that otherwise would have had, had it been assigned to some one who has had more experience and observation than myself. If by giving my slight experience and observation I can give the least information, I shall feel that my effort is not in vain.

My experience has been more as an amateur than practical growing.

The planting and growing of fruit throughout this region at present is confined wholly to the winter apple for commercial purposes. Therefore, no one to my knowledge has ever attempted to grow pears only for family use. The opinion is prevalent with planters that the pear will not grow here. But from many inquiries, I learn that they bought their trees from some agent; do not know the variety they bought, nor do not know whether they bought standards or dwarfs. I almost invariably learn they were planted in their gardens only to grow for a short time, and die with blight without producing a single specimen. Fifteen years ago I planted fifty dwarfs of Vicar, Bartlett, Louise Bonne, Belle Lucrative, Duchess, Lawrence and B. De Anjou, in a stiff, red clay soil. They grew very vigorously, and before fruiting they all died with blight, excepting one Bartlett, one B. De Anjou and one Belle Lucrative.

The Bartlett and Belle Lucrative have borne very regular and heavily, and the trees still remain small but healthy.

The B. De Anjou was planted over an eight foot drain, that drains my cellar. This one has never borne heavy, but is now a large, healthy tree.

Query—Are the health and vigor of this one tree caused by the under-drain? I leave this to be answered.

I have some dwarf Bartlett, Duchess, Clapp's Favorite and B. De Anjou growing in a stiff, red clay set to clover and red top, that have produced three heavy crops of very fine fruit, and the trees, with the exception of the Duchess, are looking very healthy.

I have seen standard pears planted that grew finely, produced one crop of fine fruit and the next year blight and die, excepting the Seckel and Winter Nellis; they are still looking healthy.

By way of experiment, I have tried the budding of pears on their own roots where the seed had been planted to remain, to try to ascertain the influence and undisturbed tap-root would have on the life of a tree; they are all gone by blight. As yet with me, the pear has never been troubled with destructive insects as much as the apple. The borers, both round and flat-head, so troublesome to apple trees, I have never as yet found in pear trees.

The greatest enemy I have found to contend with is the blight.

From what I have seen and can learn of the success and failure of pear growing in this section, I am led to the opinion that the dwarfs are preferable to the standards; that a later variety like the B. De Anjou, in the hands of an observing cultivator, grown and shipped in car load lots like apples, will prove profitable; that the pear will prove only of a short duration, I have no doubt.

Secretary Goodman did not agree with the paper.

Judge Miller reported that the blight or late frost of last year was more severe than all his troubles in the past forty years. Will only plant dwarf hereafter.

A. A. Blumer of Fredericktown has never seen the blight, and has never missed a crop until this year. The pear does as well in Southeast Missouri as anywhere in the world; has never seen any blight; has lived there twelve years.

Major Evans says the pear is doing well on the red lands of the Ozarks, as he knows by actual observation.

Mr. Kaufman of Oregon says that in that county the pear bears every year, and have been bearing ten to twenty years.

Mr. Gilbert knows a pear tree over forty years old and it has never missed a crop.

Dr. Bates of Piedmont has four old common pear trees; has never had blight on the common trees. Bartlett has done best; uses wood ashes as a fertilizer; other new kinds blight with him.

Mr. Murray thinks pears can be successfully raised in Northwest Missouri.

E. R. Lentz has not heard of any blight in this county and no entire failure.

Mr. Lewis of Greene county has seen pears doing well about Springfield, and believes they will do well on the Ozarks.

N. F. Murray grafts the pear on the apple roots; has done so for many years; they give out pear roots and the apple root withers away.

The Le Conte pear was relegated to its native locality.

Secretary Goodman emphasized the plan of grafting the pear on the apple root; had done so for years; the pear will get on its own roots.

HINDRANCES IN FRUIT GROWING.

A. A. BLUMER, FREDERICKTOWN, MO.

Gentlemen of the State Horticultural Society:

Ignorance of how to do it seems to be the main point.

I cannot conceive why, in a State so well favored by climate, soil, near markets and cheapness of land, in the great State of Missouri, a man owning a few acres, even a few rods of ground, can be indifferent to the enjoyment found in setting out a few strawberry plants, a few currants, gooseberries, grapevines and fruit trees, particularly apple, pear and plum, which seldom fail to reward his abor. Yet every human being, old and young, rich or poor, loves to eat fruit!

Trees and plants are very cheap, the requisite labor easy and delightful. What can the hindrance be?

Let us go over the fictitious life of cities, whose surface is polished for hiding its filth. We cannot dissemble that a chaos still exists, even in rural districts, wherein fruit-growing is thought to require particular skill and knowledge to succeed, whereas it is as simple as planting beans, peas or potatoes.

To illustrate: Years ago while hard at work setting grape-vines in Pike county the following colloquy took place: How do you do, Mr. B——? my name is A—— and my farm is about — miles from here. Happy to make your acquaintance Mr. A——; will you permit me to continue my work? Certainly, sir; what are you planting? Grape-vines, sir. Grape-vines! will they grow in this country? Time will show, sir. When will they bear? On the third year. Three years; how will you live then? By eating and drinking. Yet, some are tempted to try; make a little hole, pack in the tree with close roots and next day go to look at it if it has any fruit.

They forget that our bed must be soft and large enough to display our members for finding rest, and that a tree requires the same conditions to spread its roots

and thrive. Some say: When fruit is plenty it cannot be sold; when trees do not bear they are useless.

Many years ago Mrs. S. B ——had ordered 100 apple trees for $30. They were brought to her husband, who told the man he did not want any such stuff on his land. "But your wife ordered them, sir, and must be paid." Come to the house. Sarah, did you order this stuff from this man? I did, and I want them properly set. Well, then, you will have to pay for them; I won't give a farthing for the stuff. Don't worry yourself. I'll pay for the trees; I have saved that much by weaving carpets and selling eggs. Darn it, that money would buy ten pigs. Seven years thereafter, while the field crops almost failed, Mrs. S. B—— sold $98 worth of apples, and Mr. B —— not only converted his disposable acres into orchards, but became an enthusiastic fruit-grower.

Many say the vicissitudes of climate, changes of weather, drouth, insects, birds and fungi render fruit-growing precarious and cause failures.

It is true sometimes there are partial failures in fruit-growing, as there are in wheat and corn. If there be a man who can show me a business exempt from drawbacks and failures, I will show him a white fly. I cannot believe that a rural man is indifferent and insensible to the charms of the creative power God has given him of converting a barren, unproducing soil into an Eden, except through ignorance, the main hindrance in fruit-growing. Have we any means to dispel this ignorance? None, except the missionary work of the State Horticultural society and the apostolic works of the county horticultural societies.

In Germany budding and grafting is taught at school; France has her ecoles-agricoles et colleges-viticoles; Italy has her collegi d' agricultura e di viticultura. We have nothing to awaken in our boys and girls a laudable spirit of horticulture but one agricultural college at Columbia; no fostering care by the State, but a beggarly allowance to help in printing your report.

There is another hindrance in raising that most noble fruit, the grape. While some counties have combined, spent money for pamphlets, maps and other documents to attract immigration, sumptuary laws are promulgated to prevent its effect. No immigrant will ever settle where such laws exist, nor devote his time and money in dressing our inviting hills with vineyards, because he cannot dispose of his surplus fruit. You say, we want no drunkards here; I say, amen; but wine and whisky are two different things. One glass of the former (for our stomach's sake and infirmities) renders a man wise, while one glass of the latter renders a man crazy and equalizes him to a quadruped, with the only difference that one goes on four legs, the other on two. In France, Germany and Italy every human being, old and young, rich or poor, use wine or beer; yet Paris, Berlin and Rome taken together do not show so many inebriates in a day as a single American city.

A stroke of the pen cannot reform a people; vice will ever be connected with ignorance.

If man was taught how to uphold his own dignity this ignorance would disappear. Men of ideas, yours is the task. Let it be: *Post tenebras lux.*

Are tree peddlers a promotion or a hindrance in fruit-growing?

I hold that an honest man offering to sell honest trees is a benefactor, and as such I venerate him; but to find such a man among the tramping charlatans that infest the country, we need the lanterr of a Diogenes. The disappointments and failures often experienced by the credulous purchaser in trees and plants, at exorbitant prices, is communicated to his friends and neighbors, who attribute them to soil, climate and other erroneous local reasons. Certainly this is a hindrance to growing fruit. But the tree vender is only an agent; on the head of his employer should fall the odium of his actions.

Reliable nurseries have no need of such men and do not employ them. However, some nurseries need them; if you look at the end of their advertisement you will find these words: "Agents wanted. No previous experience needed." They ought to add: "But a slick tongue."

I say, let those itinerant adventurers alone; purchase your trees from your nearest nursery, in whose owner's reputation you can rely, and go back on him should failures ensue. Such greedy nurseries, wanting to gobble the trade of the whole land, remind us of that Quaker's advice to his son: "Make money any how;" and of that epitaph—

"Here lies old thirty-three per cent;
The more he got the more he lent;
The more he had, the more he craved,
Good God! can such a soul be saved?"

COST OF STARTING A FRUIT FARM IN SOUTH MISSOURI, AND HOW BEST TO DO IT.

S. W. GILBERT, THAYER, MO.

The subject assigned me is a hard one to solve, unless some special fruits are named as a basis to figure on.

Taking it for granted that our honorable Secretary wishes me to make figures on what my own little fruit farm has cost me, I will do best I can to give facts.

I bought my farm, 60 acres, four years ago for $600. There was about 15 acres cleared, with a badly neglected orchard of 200 trees—log house and barn. I made no improvements worth mentioning for two years. But at the June meeting of our State Society at West Plains, I became very much interested in fruit-growing, and returned home full of bright hopes for my future career as a horticulturist. Not being blessed with a full purse, have had to make my labor do the work. Have since that time cleared 25 acres, giving me now 40 acres in cultivation.

In the spring of 1889, I set out 1,070 peach, 1,000 apple, 50 pear, 50 cherry, 50 apricot and 10,000 apple grafts, nursery stock; spring of 1890, 150 plums, at a total cost, including freight boxes, hired help, etc., of $447.70; adding to this amount for tools, blacksmithing and other expenses $152.30, I have $600; the cost of my planting 1889 and 1890. This amount includes 5,000 raspberry plants, and enough strawberry plants to set one acre.

As to cost of cultivation, I prefer to rent. One tenant I give all he can make for three years, to save me cost of breaking new ground. The lease compels him to give all trees first-class care, cultivating thoroughly and sprouting as often as necessary, holding him responsible for any trees he may damage or ruin—the value of each tree being placed at one dollar per year's growth from time of setting.

My other tenant, a practical gardner, I furnish teams, tools, seed and feed, and get one-half marketed. This tenant makes a specialty of vegetables for home market—sweet potatoes, small fruits and melons. I reserve all peaches and apples.

Our new ground is usually quite hard and tedious to break on account of so many stumps and rocks. For first breaking I prefer to use the home-made plow that I have named "The Gumsucker." It is made from a forked tree, using the main body of tree for the beam and the fork for a brace to rest a bar of steel 36 inches long, 3 inches wide and 1½ or 2 inches thick, which runs through the beam at such an angle that it will rest on the fork. We put three horses to this and break our ground 18 or 20 inches deep both ways; then take a 20-inch plow and turn it just like old ground and as deep as we can. Of course the "Gumsucker" turns no

furrow, but breaks roots, tears out small stumps and roots up all the rock and loosens everything so that it can be plowed. The beauty of this plow is that one man can not keep it out of the ground, no matter how rocky or hard. Cost $3.50. We use Planet Junior for cultivating small fruits, vegetables and sweet potatoes.

My tenants claim that it costs something besides money to start a fruit farm here. They tell me of backaches, heartaches, sore shoulders, heavy shoe bills, insects and seed-ticks. After all, they have cause to rejoice over the bountiful returns for their labor. From the one acre of strawberries set one year ago we have picked, up to and including June 2, 200 crates of strawberries. We have practically lost 11 cases through the glutted market at Kansas City, have put up six cases for family use and the balance has brought us at home $387.22, and we are not through picking yet. Monday, June 2, was the thirtieth picking, and we got 14 cases. I have some specimens on the tables here out of the thirtieth picking. You can draw your own conclusions as to the adaptability of our soil to strawberry culture. My ground never has been manured, with the exception of a very small portion, and this part had a heavy, rank growth of vines and few berries. Our raspberries are doing nicely.

I would like to impress upon you the value of sweet potatoes in apple orchards. Sweet potatoes, when properly cultivated, leave the ground in fine tilth at the end of the first year, and the second and succeeding years the ground is like an ash-heap. We raise at rate of 100 to 200 bushels sweet potatoes per acre in our old orchard, on land badly worn and washed, after having been in constant cultivation for thirty years. I now have Missouri pippin trees, and plenty of them, too, that were set one year ago this spring, that have all the way from 3 and 4 to 15 and 20 apples on them, where sweet potatoes and vegetables were growing last year.

Now, then, to go back and sum up the cost of starting my fruit farm, we have:

Cost of farm	$600 00
Total cost of improvements	600 00
Total	$1,200 00

I have sold at least $300 worth of apples from the old orchard; strawberry sales this year from one acre $387.22—to say nothing of money received for sweet potatoes and vegetables for last two years. If our berries (including raspberries) turn out as well next year as this, I will have a balance on credit side of ledger for No. 1, together with a nice, thrifty young orchard coming into bearing. Really, after considering these facts, we can sum it all up and say it costs nothing to start a fruit farm in South Missouri, but that our grand country pays you for starting, providing you do it right. And now, how best to do it: First, attend every horticultural meeting you possibly can; second, take Colman's Rural World and Fruit-Growers' Journal and read, re-read, and then very carefully read and remember what is contained in our State Society's reports; third, roll up your sleeves and go to work. Be sure you are right and then go ahead, pushing your work with all the vigor you possess.

I will just add that land can be had in our county at from cost of homesteading up to $50 per acre. By watching for a man to get sick of the country after failing in cotton, you can buy improved farms that are models for fruit culture for less than it would cost you to make the improvements.

ADVANTAGES OF ORGANIZATION.

B. F. HOLBROOK, DONIPHAN.

Those of us who are acquainted with the climate and soil of Ripley county know well that it cannot be surpassed for the quality and the quantity of fruit that can be grown on those hills and in those valleys of our county.

What we need to make fruit-growing more profitable in Ripley county is an associated effort on the part of our farmers in fruit-growing and marketing. Without this associated effort the possibilities of developing the fruit-culture in Ripley county cannot be done to any extent. The Rural World speaks volumes when it says: "The more fruit we have to market, and the nearer our orchards or fruit farms are together, the better it will be for the individual grower. This associated effort is a working power which develops enterprise and honest effort."

Now if a number of farmers, we will say ten or more, each will put out one acre of strawberries, and thereby demonstrate to others the profitableness of fruit-growing, the more timid and conservative ones will follow, and the whole country will be converted into fruit-farms, and the financial condition of the farmers will be improved.

2d. We want a better and perhaps more practical knowledge in fruit-culture, and also the demands of the markets at home and abroad. The lack of knowledge and interest of our people in fruit-culture is due, perhaps, to the neglect of reading some reliable work on horticulture; they do not take the trouble to inform themselves about the profitableness of fruit-raising, and therefore are always discovering a lion in the way. Ask them if they read the State Horticultural Society's report; no, never saw it, don't know what it is. Their ignorance of it reminds me of an incident in the debate in the Representative hall two years ago: on the question (or bill) appropriating money for the State Horticultural Society, a Representative in his speech against the bill, held up the Society's report, and said: "What is this book but an advertising medium for our nurserymen?" When our representative men manifest such ignorance, what can we expect of those who look to them and are ready to follow them? Leaders of the blind, be assured they will at last be ditched.

I wish I could so impress my brother farmers with the money value in fruit-growing that they would have an abiding faith in what our horticultural societies are doing in advancing the interest of every individual, financially, socially and morally. We cannot afford to neglect the opportunities which horticulture offers us to make our homes lovely and attractive.

When I see our young men coming onto the stage of action having had none of those influences which come from homes surrounded with the choicest works of nature, then I know their lives are liable to be void of every trait that is attractive. They are more apt to be given over to sordid appetites and base passions. Let me tell you, parents of Ripley county, under the influence of horticulture the home becomes surrounded and made beautiful and attractive to our children, are drawn into a closer relationship with their surroundings, and their silent influence upon their young life has a refining power, so that "vice and everything unlovely and inharmonious becomes hateful to a mind so educated."

PEACHES—CULTIVATION AND PRUNING.

Mr. L. A. Goodman would cultivate the ground continually after planting until first or middle of August.

Pruning just as necessary as cultivation; plant yearlings and cut off all side limbs the first year; second year cut top back, and each year cut back about one-third; don't fear cutting. This leaves a tree branching close to the ground and well rounded up. Keep the fruit well thinned out and you will have good sound fruit, plenty of it and of the finest size and quality.

CHERRIES.

Judge Miller regards the Gov. Wood as the best quality and good bearer.

A. A. Blumer thinks each county society can determine the best variety for local planting. The Early Richmond the best commercial cherry.

Secretary Goodman recommends the English Morello. Cherries and the Russian Mulberry should be planted together; the latter for the birds.

PLUMS.

The Wild Goose considered very reliable. Dr. Bates thinks the Weaver superior.

Judge Miller regards the Louisa superior to the Wild Goose. He spoke highly of the Yellow Prune, supposed to be a cross between the native and wild Plums.

Judge Miller thinks the Golden Beauty is nearly if not quite curculio proof; it is a native of Texas.

WHAT WOULD BE MISSOURI'S CHOICE FOR A NATIONAL FLOWER?

N. F. Murray and J. A. Durkes favor the Apple Blossom.

Dr. Bates wants the Sunflower.

A. A. Blumer likes both Apple Blossom and Sunflower.

Judge Miller would count the favor of the ladies and pronounce in favor of the Rose.

Secretary Goodman spoke of the beauties of the Pansy or Violet for wide range of growth.

Mrs. H. E. Johnson would not be in favor of the Rose because of its use in England, but was in favor of the Golden Rod.

Miss. Murray in favor of the same.

Rev. Boggs in favor of the corn tassel and the tobacco blossom combined—as combining beauty and utility.

Dr. —— would choose the Moss Rose.

Hartzell of St. Joseph, in favor of the Rose.

D. S. Holman was in favor of the Rose, although England claimed it as their flower.

The subject was allowed to pass for future consideration.

PROSPECTS OF ORCHARDING IN NORTHWEST MISSOURI—WHAT ARE THEY?

N. F. MURRAY, ELM GROVE.

In this peculiar season of drouth and killing frosts, with our peach orchards almost wiped out of existence by a succession of extreme hard winters, and the fruit buds on the few left entirely killed with the severe cold of the past winter, with strawberries and grapes badly killed in the valleys, and other fruits more or less damaged by severe frosts during the early part of May, and what is left being already injured by drouth, and having yet to run the gauntlet with insect pests, the answer in general from the average individual would be not very bright at best; but let us not be too hasty or severe in our verdict, but let us take a good look over the entire field and see what is left; let us calmly view the situation from every stand-point, and in every phase of cause and effect.

First, we frankly admit that much is irrecoverably lost, which is very discouraging indeed, especially so to the few who have made a specialty of peach-growing, and many of our friends on the low lands who have lost a portion or all of their strawberry and grape crops have met with a real and severe loss, which they will no doubt feel very keenly, and they all have our deepest and heartfelt sympathy in their day of adversity.

Yet notwithstanding the dark picture outlined, we have much left in Northwest Missouri to be thankful for. First, we have a soil that will by far excel that of most any and all other countries in its power to resist drouth. We have our high bluffs and river hills on which fruit is seldom if ever hurt by frost, and has not been to any extent worthy of notice this season. Much of the fruit in the Missouri bottom has escaped through the protection of heavy fog, and in all these favored sections we will have an abundant crop of apples and a fair crop of berries, grapes and cherries, also a partial crop of pears and plums. The present indications are that all kinds of fruit will meet with quick sale in our home and Northwestern markets at good prices. Our market has had a very light and insufficient supply of fresh fruits for some months, and the people are getting hungry for the product of our orchards and berry patches. Apples sold early in April in St. Joseph at $2 a bushel, and are now selling at $2.50 a bushel. The loss of our peach crop and the shortage of berry crop will in a great measure be made up to the growers in high prices for what is left.

The very rapid growth of the large cities of the Missouri valley, and the rapid filling up of our Northwestern States and Territories, has always given us an excellent market for all our fruit product, and of late years the demand for Northwest Missouri fruit has been in excess of the supply. This condition is in a measure due to the fact that Missouri fruit is becoming more popular, and is preferred and called for by a great many in preference to that from any other State. This healthy and thrifty condition of our fruit market, aided by our horticultural societies, has given a new impetus to the growing of fruit in the last few years. Many new and large orchards, mainly apple, have been planted. More interest is being taken in pear culture, which, we think, will continue to increase, as we have but little blight. The fruit sells at $1.50 to $3.00 a bushel, and trees seldom fail to bear a crop. More berry patches are being planted each year, and better care is given to the whole business than ever before. Quite a number now spray their orchards with arsenical preparations to destroy the codling moth. Our orchards look much more healthy than they did two years ago. So on the whole, the pros-

pects for orcharding in Northwest Missouri begin to loom up in defiance of all obstacles, and will compare favorably with those of any other section of our State or of the world, for every section has its own peculiar drawbacks.

And now, fellow-members, permit me to inquire of you, what our prospects for orcharding in Northwest Missouri and elsewhere would be, had we no difficulties to surmount, no enemies to conquer. Suppose we had no killing frosts, no failures, and all our fruits were permitted to grow in great profusion and perfection, without intelligent selection, care and culture, what would be the result? From a commercial stand-point, it seems clear our occupation would be gone. True, we might have our fruits, but would we appreciate them as we do now? I think not. We would doubtless soon realize the truth of the poet's thought, when he penned this sentence:

> They who never tire nev-r rest,
> And they who never hunger, no feast enjoy.

Shall we forget that there is neither value nor excellence without labor, when applied to man's condition and surroundings in this life? and may we not become stronger and better for being engaged in honest, pleasant labor, and even grow brighter and happier because of the clouds and storms of adversity that sweep down over us to purify our whole moral nature, and make us more social and useful among our fellow-men? Then let us be thankful to the Great Giver of all good for every prospect that pleases, and recognize in the dark clouds of our adversity the hand of Him who doeth all things well.

REPORT OF COMMITTEE ON OBITUARIES.

Your Committee on Obituaries have before them the names of two late members of this society who, since our last meeting, have been called from their labors among us to the quiet sleep and rest of the grave.

The first was a lady member, the companion and wife of our esteemed friend and brother, Dr. Goslin, of Oregon, Mo. We are not influenced in this case by custom, which commends the virtues of the dead and praises all when gone. In justice to the memory of this "Elect lady," no praise is wanted from this committee by any who knew her life; but to others we may be allowed to speak of her life as full of intellectual Christian works, beautiful in themselves, and in value to her associates above price. The very light of her home, she was happiness itself to a good husband there. In the church of her choice she was a helpmate with the pious in doing good work. In our society of horticultural work she was an intelligent, ardent admirer of the beautiful, and often edified and cheered us with her finely written essays—a delightful work, in which she excelled. Her Christian life of faith was beautiful—her death triumphant and peaceful.

Resolved, That in the death of Mrs. Dr. Goslin this society loses a valuable lady member, whose presence is already and will long be missed in our meetings.

Resolved, We are in sympathy with the doctor bereaved, and all her friends who mourn her demise.

Since writing the above resolutions, your committee have learned that in the same community and town Mrs. Judge O'Fallon has also been called to her reward. Our hearts are moved afresh, and what we have said of Mrs. Goslin may be said of Mrs. O'Fallon, only she was young—had hope of a long and happy life. How almost cruel is Death, to spare not even the young and happy, and to take from us so often the best, who are needed most!

Resolved, That we tender our sympathies to the bereaved husband, and her good friends who knew her best and loved her most.

Again, at Nevada, our friend and fellow-laborer, Henry Shepley, a member of this society, has also passed away. He was a horticulturist and member of the Vernon county society, who respected him in life as a worthy friend and brother, and miss him now that he is gone, as evinced by the expressions of the membership of his society in resolutions befitting the occasion.

Resolved, That we, with whom he has met and worked on occasions like this, will miss him, and regret the loss of a good man and faithful fellow-worker of our society.

BLAKE,
LEWIS,
HOLMAN.

REPORT OF COMMITTEE ON FINAL RESOLUTIONS.

We beg leave to report:

1. That the thanks of this Association are due and are hereby gratefully tendered to the various railroad companies of the State of Missouri for the excursion rates tendered to its members; and in this connection would say our membership should be greatly increased in order that fruits may be more abundant, and that the growers can obtain reasonable rates for the transportation of all horticultural products.

2. That the State Horticultural Society tenders its most heartfelt thanks for the cordial welcome and cheerful disposition manifested by the citizens of Poplar Bluff in the entertainment of its members. The Society also expresses the hope that the citizens of Butler county will after this take a deeper interest in all branches of horticulture, and thus utilize the blessings which Providence has so lavishly bestowed upon their rich soil and favored climate.

Your committee would also embrace thanks to the officers of our State Horticultural Society for their discriminating and courteous conduct in furthering the influence and usefulness of our Association, and to all those who have helped us in carrying out our programme. All of which is respectfully submitted.

CHAS. W. MURTFELDT, Chairman.
J. N. BARNETT,
H. J. WEBER,
Committee.

Adopted.

FAULTS IN ORCHARDING.

HENRY SPEER.

Your officers in making a program for this meeting, have assigned me a subject upon which they ask me to prepare a paper, viz., "Faults in Orcharding."

And I shall comply with their request in a very brief manner—not that the subject will not bear extended remarks, but rather for want of ability and lack of time. It is an old and true saying that there are many wrong ways of doing a thing, and but one right way. Of nothing is this more true than of orcharding. First comes the selection of a site for the orchard. A fault here is irreparable, as no after care or culture can fully overcome it. How many dilapidated orchards do we find in the west that, when looking for the cause, we find hard-pan as impenetrable as a jug within a few inches of the surface. To be a success, the roots of an apple tree must have a chance to penetrate to some depth in a porous sub soil.

The next fault, taken in regular order, is in the selection of varieties. Most planters, myself among the number, have planted too many varieties, many of them unsuited to our climate, and while they may have been fine apples in father's orchard, somewhere east and north of our present location, they are worthless with us. Consult the reports of the Missouri State Horticultural society. See what they recommend; visit the orchards in your own neighborhood; see what pays your neighbors and plant accordingly, mostly of a few standard varieties, and you will avoid this mistake. The next mistake which is common is in purchasing the trees. How many of us have found when too late that we have paid some slick-tongued agent twice the price of good stock and got second rate or worse. Buy of responsible nurseries, and the nearer home the better, and avoid this mistake. The next mistake I shall notice is planting. When the tree is received from the nursery in good condition, and no others should be received, do not expose it to drying winds or chuck it down in a mud-hole, but plant it in good soil, in proper condition for working. If not in condition when you receive your trees, heel them in well till it is; pack the soil firmly around and over the roots and they will grow.

Now comes one of the most serious mistakes, because common; lack of cultivation. Few men are foolish enough to plant a field of corn and expect a crop without cultivation; but how many are there who think a tree, when once planted, should take care of itself, or they act as though they thought so, whether such is the case or not. If you would avoid this mistake, do not cease to cultivate while the orchard lasts. Mistakes are frequently made in pruning, some too much, some too little, or not at all. The happy mean which gives a fine-shaped tree, without scars where great limbs have been removed which should never have been allowed to grow, is what we should all strive to attain to; this requires constant care and attention, which he who plants an orchard should be willing to bestow.

One more mistake I wish to call attention to, and then I am done. That is, in handling the fruit. How many of our farmers handle their apples as though they were indestructible as corn in the ear, to be thrown around with the scoop-shovel. When a grower has fine apples, and fails to handle them carefully, and properly assort them, he makes a mistake which destroys half and frequently all the value of the product.

FRUIT-SHIPPING.

C. T. MALLINCKRODT.

Finding mself down on program to say something on fruit-shipping, before proceeding, let me state that I have had but little experience on the subject; yet after being assigned a task, I consider it my duty to comply as far and as well as in my power.

For want of time I must be brief, and will only touch upon some of the principal points bearing on the matter, and humbly beg that you will forbear with my evident short-comings.

Success in shipping fruits has and will always depend upon what we have, how we pack, and unavailable shipping facilities; thus to be successful we must first of all things raise good, sound fruit. How to do this can and will be learned by the diligent attendant at the deliberations of our society, as also by careful study of its annual reports, but above all by close observation and constant watchfulness. The days when a "go-happy-go-lucky" kind of person can produce even good, let alone the best and only paying crops of fruits, have forever gone. Only the wide-awake man can be a successful fruit-grower or shipper.

Much of success in shipping fruits depends upon the manner in which it is handled and packed. To begin, use only neat and clean vessels, which should be as light as is consistent with safety in handling; heads on barrels, covers on baskets and boxes should be well secured, and above all things let them be of full size; if quarts, if gallons, if bushels if barrels, they should hold full pretended measure.

Another important point in this regard is, and it has time and again been urged, nevertheless is now and probably always will be in place, the grading and sorting fruits for shipment. Be the crops ever so fine, there will always be different sized and more or less colored or developed specimens. It has been my experience that careful sorting or separating such is the most profitable. But, even if both grades are sent to market (separate, of course), the labor of sorting will be well repaid by the greater prices obtained for all than when unassorted.

Is it necesear to mention that all fruits should be carefully handled during all manipulations while preparing it for shipment? I think not.

Transportation enters largely into the balance of the shipper of fruits, and is one of the problems concerning profitable horticulture. Unless we have good facilities and can have reasonable freight and express rates, there is but little encouragement to fruit shipping, and the charges for transportation often exceed the proceeds of the product.

It is gratifying to the lover of horticulture to note the success in recent years of the endeavors of our society to obviate this cause of obstruction by obtaining better facilities and lower freight rates from all fruit centers or places from where larger quantities of fruit are shipped. Let us hope that this good work may still proceed, and a still greater impulse be given to the horticultural interests of our noble State.

To be successful in shipping fruits, the following points must necessarily be observed: Careful sorting, packing, handling, and honest measure. If these are observed in all cases, and with requisite transportation facilities, combined with ordinary judgment as to the commercial part of our transactions, success will be the rule, failure the exception.

HUGO, MONTGOMERY COUNTY, MO., January 1.

President and Members of the Missouri State Horticultural Society:

I am glad and happy to inform you that our local horticultural society is in a healthy and promising condition. We have now eighteen members, who all engage more or less in planting fruit trees, and show much interest in this most profitable and pleasurable enterprise.

We meet on every first Saturday of each month, and also once a week during the strawberry season.

Since the organization of our society by Mr. Fred. Lionberger, I am happy to state that our neighborhood has greatly profited since. I may say that we have profited more than any of us expected to.

At the time of our organization as a horticultural society, there were hardly one hundred fruit trees in my neighborhood. No one had seemed to have any idea that it would ever pay to plant fruit trees or to enter into that kind of work. But since Mr. Loniberger has helped us and encouraged more tree planting among us, the number has increased to at least six thousand trees, and the prospect is good to increase this number double in the next two years:

Four years ago there were scarcely any strawberries in this neighborhood, and now there are several towns north and west of here which are supplied with all the strawberries they need from this neighborhood.

The horticultural society, as well as Mr. Lionberger, has been the means of doing much good in this vicinity.

The members of our local horticultural society are all Germans, and our meetings are conducted in the German language. Yours truly,

CHRIST. HOUSER.

FROM NATT STEVENS.

FORNEY, TEXAS, May 25, 1890.

By the kindness of your secretary, L. A. Goodman, I am in possession of the admirable program of your meeting, and were it not that this is my busiest time I would be with you. It being held so near me this time, I regret that I cannot come now to visit the once home of my adoption—the city and "home of the Starks"—and also the "Quaker city of my youth;" for by the recollection of those primitive days come our first enjoyments, and the present is its matured extension of pleasures, and not to meet you now, after meeting many of you in convention in California, and last in Texas, deprives me of my best enjoyments. I wish you success and a happy meeting, with all the pleasures it affords.

In Texas we have passed through the most trying winter of all that we have had in fifteen years. The first frosts and light freeze occurred the last of November. December, January and most all of February was exceedingly warm. A few days in each of those months the thermometer rose to above 80 degrees of heat. Some peaches, apples, pears and mulberries blossomed in each of those months, set fruit and were all sizes up to a hen's egg when the last of February freeze struck them, the thermometer going down to 16 above zero and continuing quite cold for a week or two, thus killing or at least checking the growth of all trees, and there is not one fruit tree that was not affected by the freeze. Mine is but a fair sample as to what its effects were here, and my orchard is thirteen years old.

The first varieties of pears to blossom were the Leconte, Keiffer and Garber. Some few leaves were killed (turned black) and the fruit (set) dropped to the ground one by one, chilled or dead. I cut the dead leaves all off, and as a rule new leaves soon took their places. The trees soon took a new, vigorous growth, and on this new growth of wood the blossom came again, and has set a new crop. Now this is the only pear on these varieties of trees. The freeze did not kill nor poison the new winter's growth of these trees. The European pear species (Bartlett, Williams, Duchess) and others not so far advanced, had some leaves and blossoms killed but not much fruit; it poisoned the sap so much that the limbs began to wither, dry and turn black, but by commencing soon to cut the ends off the affected limbs the disease is stopped, and our rich, strong soils soon give new life and vigor to the tree and a rich color to the foliage of these pear trees. Upon the sandy loam soils these last trees are more affected than mine, which is on black, waxy soils. My Downing mulberry trees were in full leaf and blossom, and they were killed dead to the ground, roots, and all.

Of the Chinese strain of peaches, the Pentoo (flat peach) blossomed the first of December and continued to grow, and was killed to the ground both root and branch; the trees were thirteen years old and they had borne six good crops—no trees now.

The Honey, Thurber and Chinese Cling, and others of that strain, the fruit was killed but not the trees. The Spanish (our Southern) strain of peaches are the least affected by the freeze, and are now the only trees that have peaches on them. The Old Early, Haines' Early and its later progeny, all are either dead or ready to die; four varieties of them died from the effects of the freeze both root and branch,

while of several other varieties of the same the limbs are more than half dead, some only having a live bud here and there on the trees; these had not yet swelled a single bit at the time of the freeze; cutting open a bud three weeks afterward, they appeared alive and green, but so firmly bound and cemented was its covering that the buds died, most of them from strangulation; all of the earliest ripening peach trees are the worst affected of all; at least one-half of my peach trees I shall have to cut down this year.

Apricots, Nectarines and Almonds show about one-half as bad as peaches, with but little fruit on them this year. My fig trees on two years' growth were killed back one year's growth, starting out at one year's growth again with a prospect of at least one-half crop. About one-half of my out-door orange trees are dead from the freeze; the others dropped their leaves, but have since put out new ones again—they are of the dwarf species. Of Japan Persimmon trees some are dead, but the most of them are alive and doing well. My olive trees all stand the freeze well, and are doing well. The Guava and the Pomegranate need more protection than I can afford to give it, so I discard them.

Plums of the Chickasaw varieties are at home here, but the European species and their descendants are too tender and short-lived here; sometimes bear well, but drop off too much. The Hicks, Russian and White (for shade), is a success. Quinces are only a partial success. Strawberries and blackberries are a success wherever tried. Apple trees stood the freeze well, but lost their fruit (the most of it) by the freeze. Its biggest enemy is the tree borer; have raised apples for the last eight years, this year none. In grapes, my first trials here were failures of over thirty varieties, and in but few were I successful with them, and as fast as one variety failed, its space was given to something else; this year we have but a small crop of grapes, and man's uncontrollable appetite and his inhumanity to man and the tendency of the age to prohibit both the manufacture and sale of wine, and put its users under a guardianship of doctors by law, without distinction as to abuse of natural rights, is detrimental to the grape-growing industry, so that I am discouraged from planting more vines.

HOLT COUNTY HORTICULTURAL SOCIETY.

BY W. R. LAUGHLIN, SECRETARY.

The Holt County Horticultural society reports itself to be in reasonable health, in good spirits, and by somewhat of industry doing a fair amount of good work for itself and for the people.

Circumstances gave us several months during last summer that we held no meetings, but when we came together again the Society found itself still alive and as earnest as ever.

The season had been one of abundant fruits, and though at times prices had been low, the heart of the horticulturist was encouraged and they talked with each other gladly. Since then our meetings have been nearly regular once a month.

The "Holt County Sentinel," the only paper now published at our county seat, makes a specialty of aiding our good cause, and thereby increases the number of its subscribers, and earns the good will of the people.

Some of the papers read before our Society are printed in our local papers. These and others in manuscript are sent to the Secretary of our State society, to be dealt with as he sees fit. Some of them find their way into the State report, and often we see quotations from them in the newspapers.

The good effects of the efforts of the State Society, the local societies, the agricultural and horticultural papers to educate the people to a higher taste in planting

for ornament, and to a better judgment in planting for money, are easily seen all over this region. Year by year shows a gain in the number of orchards being planted, in the amount of small fruits set for family use and for market, and in the trees, shrubs and flowers to be seen placed around the homes of the people. Notwithstanding the existing financial depression of all agricultural matters, more of nursery stuff was sold in Holt county this spring than ever before.

PEACH TREES

Made a great growth last season, but went into the winter too soft. The trees were not injured, but the blossom buds were all killed by one cold pinch. So no peaches this year- -but they may come another year.

THE APPLE CROP

Was perhaps never in better shape at the same stage than now. The trees had grown well last year, and a heavy load of bloom opened out in good style. The weather was barely warm enough; just enough moisture was in the air; there was no violent wind; the breezes, the insects and the bees joined in the work of bringing the well-matured pollen to the waiting flowers, and that item of the strangest, finest of nature's workings whereby individuals are developed and species continued, went well on. The apples for 1890 were started, and now, these first days of June, the little fellows are holding well to the twigs and growing in the best of ways. A slight frost on the morning of the 14th, and one a little heavier on the 16th, did some damage to farm crops in places; but the tender embryos on the trees were not hurt, and again another fact was added to the evidence that there is no crop that is raised surer than the apple crop.

An unusual pinch of spring drouth has just passed away from us. The small grain, the meadows and the pastures have been cut short for this by a heavy per cent, but the apples and the trees grew right on. In nurseries, or in orchards old or young, few things are so little liable to injury by flood or by drouth as the apple tree and its fruit.

Is there a surer crop for profit than the apple? Is there, anywhere, a better place whereon to plant apple orchards as a business than in the loess deposit of the region within a circle 200 miles in diameter, and whose center is the city of St. Joseph?

THE PEAR

Has awakened a new interest in its cultivation. All along for many years men have planted now and then a few pear trees. To be sure, blight has swept the vast majority of all these out of existence. Still an occasional tree has stood, some of them for thirty years or more, without being harmed, or perhaps only a little injured. Many of these have had the habit of bearing, some of them fair crops of fine fruit. Men have compared facts as to pear trees and their fruit, and the interest has been slowly growing for a few years. Last fall at the New Era exposition, at St. Joseph, the showing of pears was so extensive and so fine as to attract the particular attention of fruit men from all over the Union.

This spring at one of our county society meetings, Mr. G. T. Luckhardt, of our county seat, gave, in a paper, the results of more than thirty years of extensive, intelligent and careful experimenting with a large number of varieties. The trees of a few of his varieties are as yet uninjured, and have borne, on the average,

good crops. The pear grown on this soil is in color and in flavor as superior as is the apple. Far more pear trees were planted this spring than ever before, and unless there shall come some backset, the interest is but begun.

PLUMS

Bore well last year. The problem in plum raising is mainly as to impregnation—what varieties shall be planted near each other. The curculio and the gouger can be managed.

RASPBERRIES

Cut some queer capers since January 1. The bushes last fall appeared to be in good condition, the winter was a mild one, and yet some varieties are now well nigh wiped out, while few if any are unimpaired.

BLACKBERRIES.

The condition is stated by saying that they are all right.

STRAWBERRIES.

On low ground were injured by the frosts of May 14 and 16. On high ground, where they were slightly covered last winter, and the covering was used as a mulch this spring, the berries are of good size and the crop is heavy. Where not so treated the berries are small and the crop quite light.

Moral—If properly treated, the strawberry can be raised successfully almost without regard to the season.

THE NEW ERA EXPOSITION

At St. Joseph last Fall, among its attractions, called together for exhibition a sum total of about 3,500 plates of fruit. In one of its buildings was the exhibit from Andrew county, made by its citizens and in charge of Mr. McGonigle and Mr. Williams; also the exhibit from Holt county, made by Mr. N. F. Murray. Only a narrow aisle was between these two exhibits. All the cultivated fruits of both counties were to be seen there. Being in the employ of the Exposition during every day of its existence, my duty brought me, more than any other man on the grounds, in contact with the visitors, particularly with the more intelligent of them. I talked with more or less of people from 23 of the states, and from every territory but Alaska. Last year was not the best season for producing fruits of the largest size, of the finest color, nor yet of the highest flavor; but that exhibit excited the wonder, the surprise and the admiration of the visitors from every one of these states and territories. Few of them claimed that their states could or ever had made any better showing than was there made by these two counties.

Massachusetts men gazed upon the Seckel and said, "It is one third larger than we have in our State."

New York and Ohio men, and the men from Michigan, saw our Bartlett and Duchess and said, "We can't beat them at home."

California men said, "Oh, we raise bigger pears," but would admit that the Missouri pears equaled those of California for flavor, and had more and finer color.

Michigan men only claimed that some varieties of apples grew larger or better than in Missouri.

THE YEAR 1893

Is coming. For that year Chicago will be the gathering-place of the peoples of the whole earth—the place where every nation, every tribe will meet to show, to see

and to learn. Let us hope that no evil may come upon our orchards; that that season will be such an one as to give into our hands as fine specimens as Missouri has ever produced; that our Legislature and county courts will aid us; that all over the State earnest men and women will assist with zeal, and with energy, so that at the gathering-place of the states of our own nation, and of the nations of the earth, the Missouri State Horticultural Society shall be able to make a more extensive, a finer and a better show of the fruits of the Temperate zone than has ever yet been made upon the Planet.

REPORT FROM BUTLER COUNTY.

Truth is mighty and will prevail. Emanating as it does from the throne of Almighty power, it is an omnipotent foil before which error will always fall.

Butler county is a broad subject, and happily is just now beginning to brighten with the burnished truth of her fruitful fields of productive soil. But much the more as the boundless exaggeration of its deadly miasm which diffused with the winds of heaven the seeds of every malady which has a name in our language, is dispelled with the published truth of the comparative healthfulness of the climate.

Butler has become innocently famed in other parts of the State as the abode of every amphibious animal and deadly reptile, as well as the favorite home of unsparing pestilence.

Butler county, in respect of the native wealth of its soil, is scarcely surpassed in Missouri, and as to the value of the incumbent timber, stands unrivaled throughout our great commonwealth. Of our salubrious climate, it will suffice to say that in general healthfulness it is not excelled by any of the more favored counties of the higher latitudes in the State.

Butler county, in short, may be described, as every other county in the State with very few exceptions, as good, bad and indifferent.

But the stranger, passing over our territory with only a profile perspective, can get but a false impression, which a general view alone may correct.

We have here elevated plateaus of gently undulating table-land, which unfold many charms to the enraptured vision of the practical farmer or ranchman.

It is not in profile, but a periscopic view, our county must be seen to be fully appreciated. It has its rough side, but the law of compensations, which never fails in the distribution of the benefits of nature, covers it with a charming verdure, which entices to the absolute abandon which always prevails where the provision for the support of animal life is without limit.

This rough side, as it is presented from the plastic hand of nature, is suggestive of the irresistible internal forces which in periods of volcanic upheaval have lifted to the surface not only acres but miles of stone. This feature, without investigation, would condemn all this portion of our territory to the hopeless condition of an absolute desert waste. But what a mistake. The closest rock-ribbed hill there is in all this boundary, in the lofty forest of sturdy oak, together with the almost unbroken carpet of luxuriant grass, consisting not only of nutritious grass, but a profuse growth of provine in all the untamed varieties, forever forbid the conclusion of a sterile waste. In the midst of our best cultivated districts in the most advanced counties there is no other comparison but the cultured clover field.

But to show up the country in terms of easy comprehension, we would head the procession in the march of progress in our great State with Saline county in the van in the honorable avocation of agriculture. Accepting her annual products

per acre as the standard of comparison, Chariton, Carroll and Platte stand second in the rank in their claim of the laurel wreath.

But Butler county, in some of its parts, with similar features of surface soil, with a distinctive forest growth of timber as contrasted with the dwarfed growth of Platte, produces with singular uniformity fifty bushels of corn and one and a half to two tons per acre of timothy or herd grass.

In testimony will introduce one man's experience through a period of eighteen years. He is not of the questionable sort as to veracity.

Fifty measured bushels of corn was his ordinary crop—never less, but often overrunning that measure. We will keep the same witness on the stand as to the hay sold last year from ten measured acres of grass. At $16 per ton he netted the not undesirable sum of $340 on the crop.

Sustained with necessary energy, the intelligent tillage of the soil would prove invariably profitable here to every man engaged in this honorable calling.

As we do not wish to be tedious, we will vary the aspect of the subject by considering briefly the adaptation of the county to the valuable grasses. Here is the stockman's home par excellence. Run an extended line of comparison from the extreme northwest of Washington Territory, dropping down to the lower latitudes in a southeasterly direction through Oregon, Idaho, Dakota and Wyoming to Colorado, not forgetting to pay our passing compliment to Nebraska and Kansas, we will journey on through the Indian Territory into northwest Texas, where the ranchman holds undisputed sway.

Right here in Butler we find everything thrown together with a rich profusion nowhere else to be met with from nature's bountiful hand—every material element conducive to the wealth of the stockman: a beneficent climate, pure water beyond exhaustion from hill and valley, and a great variety of nutritious grasses, supplemented by uncounted toothsome plants, rich in nitrogenous and carbonaceous properties united liberally with the phosphate of lime to induce the rapid production of bone and muscle and the steady accumulation of fat.

As to the question of the variety of our native grasses, it is not necessary to invite the attention of such as have had practical experience of their value.

From the northwest all the way down south to the westward of the 100th meridian there is no other grass of special merit but the buffalo grass. Eastward of that meridian, in Nebraska and Kansas, the list soon begins to increase in variety. From that latitude south we are greeted with the more valuable of the prairie grasses, including the far-famed blue-stem, or broad-blade, the best fattening grass there is—the greatest boon given to man where nature has so lavishly scattered her treasures of wealth.

But after so swift and extended flight upon the wings of thought, occupying but a few minutes of time, accomplishing hundreds of miles in distance, we will fold her pinions and settle down at home to contemplate the prospect around us.

Butler county has more miles of unfenced grass, a greater variety and better grass, in more luxuriant growth, than any other county in the State. Besides that, this wide expanse of unkempt pasture land is subdivided by the season into summer and winter range.

After the sun's return to this part of the world from his long annual journey across the middle line, and with the warm beams of his smiling face loosens the icy bonds of winter, wooing vegetation back to life and luxuriance again, the forest soon takes on full leaf and covers with its arborescent shadows the face of the earth, which invites not in vain to its balmy protection against the fierce rays of the noonday sun after the summer solstice comes. After these life-giving influences are

responded to in a full growth of grass, and the many plants which delight in the munificent soil of this part of the earth, cattle and sheep find here indeed a most felicitous home.

As to the number of valuable grasses here to be found, no one but a thorough botanist can answer. In Kansas it is claimed they count one hundred and more different varieties. No doubt, including with our numerous kinds all the nutritious plants which our sheep and cattle find profitable, the list may be indefinitely extended. All the teeming millions of wealth now going to waste may in time be utilized and carried to market in the carcass of the fat bullock and mutton.

This rich pasture is to be had here all the year round, by shifting to the low ground during the winter, without the loss or the knowledge of any of the conditions previously enumerated—grass, water or shelter.

The immense advantage of distance afforded by our proximity to market over other points more remote, is in itself worth millions to this part of the country.

I shall not in this place speak of syndicates in connection with the demand for beef in the great markets of the States, further than to remark, there is an impression in some quarters of a tendency to disintegration. This tendency may contribute materially to the promotion of the growth of the best breeds for the butcher's block, in conjunction with the system of mixed husbandry now generally prevalent in the land.

Finally, there is no tenable reason known why our capital town, with a little effort at a small outlay of money, may not become the nucleus of an extensive creamery. Here an adopted home for all the best milk breeds can be had at less cost than anywhere else in all the broad expanse of the States, with every comfort in abundance to create the very elysium of animal life.

If the Almighty Creator of man, his constant benefactor and best friend, has ever contemplated the provision on the part of man of an earthly paradise for the cow and her progeny, it can be obtained here.

REPORT ON THE LANDS OF BUTLER COUNTY.

Mr. Chairman:—The subject now presented is new in our consideration, but its novelty does not withhold anything from its value. The extent of our forests of post-oak or of our so-called crawfish land in the valleys which form so large a feature in the surface appearance of the county, is not definitely known; but the amount of either does not particularly concern us now, but the productive quality is the subject of special consideration at present. In the hill land of the county, post-oak, in larger or smaller forests, witnesses the existence of a peculiar soil in nearly every measured section. Perhaps in the more elevated plateau it is there predominant, as to the soil it is in heavier or lighter strata, but always intensely active in its power of productiveness. As a consequence, under severe tillage from year to year, it might the more readily exhaust or fall into a non-productive state; but here, as in the general management of farm operations, the wakeful skill of the farmer is called to the rescue. At this point our further discussion of the subject should be prefaced with the inquiry as to its peculiar adaptation. It does not lie in the circumference of the cereals, but in that of the valuable grasses—not of the meadow varieties, but such as enter into the active support of pastural life, yielding always up to its full capacity in quantity and of unequal quality; with its ready assimilation of all animal and vegetable fertilizers, as the home of cattle and sheep at large; its susceptibility of an increased productiveness is unsurpassed and without end. Here and there, in my limited knowledge of the country, are some wide districts of this particular timber always grown from a singularly character-

ized soil in that, that its native grasses of whatever variety are of the finest texture and replete with such natritive power as is rapidly and profitably appropriated to the full in laying on of flesh, the sweetest and most savory of its kind, whether beef or mutton found in the shambles of our city market. In these particular localities could be founded the finest sheep walks, greeted by the cheering smiles of Heaven's bright sun, rewarded with the highest possible profit obtained from that honorable pursuit. So used, old Father Time himself will not live beyond the end of the increased fertility of that class of our soil.

But of our crawfish land, let us submit and reflect some facts pertaining to its essential nature, consisting as it does of calcareous lime, blended sparsely with sand, but liberally with vegetable and animal matter in every stage of decay. It is productive beyond the ken of the inexperienced farmer, of all the valuable grains and grasses successfully grown in our latitude. Like that of the post-oak the soil has not an unlimited adaptation; but in the production of corn is only second to our best dry loam of the valleys, and in the growth of valuable meadow grass, herdsgrass and timothy is without a rival. In the production of these two most valuable grasses, transported in a dry state to meet the demand of the city market, this soil is without a peer in the whole realm of nature.

The world's laboratory, of which light, air and water are ever sleepless agents, constantly active in replacing the constituents withdrawn from the soil in support of the husbandman's crops—to himself and the world the everlasting source of both food and raiment. Nature has not in any quarter of the earth been so lavish in the creation of soil as to place it beyond the reach of exhaustion, not even in the world wide famed valley of the Nile, for the soil there in each returning year is repaid for last year's loss by the heavy soil drift which comes down with the annual overflow of the river Nile from the mountains of Nubia and Abysinia. But the universal law of compensation is always in full force. Our crawfish land is not an exception to its benificent operations. The air we breathe by its action of evolving gaseous vapors from the animal and vegetable debris in the soil reacting on the lime contained will keep up for a period but not forever its active capabilities. Hence the demand, to counteract the exhaustion, of the liberal supply of fertilizing agents in the form of carbonates, phosphates and nitrates to liberate the latent elements contained in the earth, to bring them into an active and available state for the continued and possibly the increased growth of valuable vegetable production.

From the views here presented it would seem almost unnecessary to repeat in precise terms that the soil now under consideration is not prolific in valuable production until after acknowledging the reactionary force of such life-giving principles as convert its dormant properties into a productive plant-bed. It will so continue during a period of exposure to their vitalizing influence. But later on, when signs of partial exhaustion are made manifest, it can be successfully renewed by the provident intervention of man, with the full assurance that love's labor is not lost, but that he shall receive in full measure the merited reward of his labor.

MISCELLANEOUS PAPERS.

SOME OF OUR INSECT FRIENDS AND THE WAYS IN WHICH THEY BEFRIEND US.

[An essay read at the State Horticultural Society's Meeting.]

MARY E. MURTFELDT.

The human habit of regarding all classes of the lower animals from a narrowly subjective point of view, leads not only to great injustice to beings in which we can trace the rudiments of nearly all our most boasted attributes, but leads also to a misconception of the purposes of an all-wise and beneficent Creator. So complicated and inter-dependent are the relations of all organic beings, that for us to pronounce any creature an unmitigated evil, is the height of presumptive ignorance. No matter how much we may suffer in our relations with some of these animals, nor how malignant and useless they may seem to us, we may be sure, not only that they are necessary links in the chain of being, but that it is within the limits of the human mind, some day, to discover their place and importance. In regard to the insect world this is especially true. Very little attention, comparatively, has been given to the subject of the benefits which we, directly or indirectly, derive from them, while we are constantly reminded of the personal injuries they do us and the losses they occasion us.

It seems only fair that we should occasionally take the other side and endeavor to recognize our insect friends. That these are far more numerous than people generally are aware, and that they are more potent for good than we can easily believe, it will be the aim of these notes, in some measure, to show. Nor do I here intend to expatiate upon those conspicuously beneficial species to which we are indebted for the most exquisite of our textile fabrics, the most luscious of our sweets, the most brilliant of our dyes, and the most burning of our blisters. It is true, I might enlarge even this list considerably, were I to include all the insects that contribute to foods, medicine and the arts, but I will limit my references to the less plainly evident ways in which other members of this class serve our interests.

As one phase of their usefulness, we must remember that in a general way insects are busy from morning till night, and from night till morning, fertilizing and cross-fertilizing our grains and fruits, by carrying the pollen from the anthers of one plant to the stigmas of another of the same kind, thus insuring vigor to the germ and perfection to the fruit. Indeed, naturalists have discovered, within the last quarter of a century, so great a measure of mutual dependence between plants and insects, that should the entire class of the latter be exterminated the whole face of nature would speedily be changed. Many of our most valuable vegetable products would disappear, and a reversion to the undeveloped, though gigantic plant forms of the carboniferous age would be manifested, and with the disappearance of bread grains and succulent fruits, man and the higher animals would probably perish.

Among the most interesting of recent botanical discoveries is the absolute dependence of that singular and lovely class of plants—the Orchids—upon the good offices of insects to enable them to produce seed. And nothing in nature is more wonderful than the contrivances of delicate tissues, forms and colors by which self-fertilization is rendered impossible, while at the same time the attractions for insects are so conspicuous and so irresistible, and the mechanical contrivances so ingenious by which their visits are utilized, that in their native habitat, or where they have become thoroughly naturalized, the orchids seldom fail to perfect an abundance of seed.

It is true that these and other ornamental plants are not, in themselves, among the necessaries of life. But they are every year in increasing demand as a luxury of the rich, and it will be seen that when the importer of a novelty, or its first propagator, receives hundreds, even thousands of dollars for a single plant, that these *per se* useless curiosities may be converted into much bread and butter and fine raiment, and are, therefore, not to be scorned by even the strictest utilitarian. But to enlarge upon what has already been referred to, it is not only in the case of these exotics or rare native plants that insect agency, in the matter of distributing pollen, is of importance to us. Our orchards, our vineyards, our berry beds, are all more productive for the swarms of bees, flies, beetles and butterflies that flit from one fragrant flower cluster to another, collecting and scattering the fructifying germs and taking toll of pearly nectar and golden pollen as a marriage fee. The crimson clover fields, glowing like sunset clouds upon our rolling prairies, loading the summer breezes with sweetest incense, would be banished from our landscapes with the extermination of such common insects as the humble-bees; and in the nectar glands of the numerous

other important plants which possess them, we recognize a bid for the assistance of insects, without which perfection and perpetuation would be impossible.

But this is only one of many phases of our indebtedness to that class of animals, usually spoken of in contemptuous generalization as *bugs*. Another, which should not be entirely overlooked, is that they are the chief food supply of the great majority of birds and food fishes. Neither should their office as land and water scavengers be undervalued, and we can scarcely realize the aid they afford in the reduction of decaying animal and vegetable substances to their original innoxious elements.

It is, however, to those species, which by their cannibalistic and parasitic habits assist so immeasurably in keeping in check other species, which in their superabundance are undeniably injurious to us, that I desire more particularly to call attention, and to emphasize the importance of a sufficient knowledge of their forms to enable us to distinguish our friends from our foes. How often have I had brought to me as a culprit, charged with committing the most extensive depredations, the larva of lace-wing fly, or lady-bird beetle, that was rendering the most important service possible, by devouring the myriads of tiny aphids or scale insects that were sapping the life of the plant. I know it is not possible for all agriculturists to be so well acquainted with insect forms that they can in all cases distinguish a destructive from a beneficial species. But it would not be a very severe tax on the memory and observation to make one's self familiar with about a dozen of the most prominent and valuable. The trouble is that we must be able to recognize each species under two or three forms. The handsome, though very malodorous, lace-wing flies, for instance, are easily recognized and respected, but because their larvæ are fierce-looking alligator-shaped grubs, they are more likely than not to be executed by Lynch law process and have their trial afterward. It may almost be set down as a rule that the ugliest and most ferocious looking of insect larvæ are the ones in all cases to preserve. And it may also be said that the grace and beauty of the perfect insect is, with many species, in exact ratio to the fierce ungainliness of their immature forms. This is especially true of the cannibal beetles, which are distinguished by a peculiar elegance of form and motion, and usually exhibit brilliant metallic colors, while their young, which burrow in the earth, are many of them really hideous. The tiger beetles, which the most inattentive observer can scarcely have failed to notice along our roadways and garden paths in the spring, running with the most extreme lightness and agility and rising readily on the wing when

frightened, are great hunters, while their larvæ, which rest at the bottom of a perpendicular hole in the ground five or six inches deep, and of the diameter of an ordinary lead pencil, are genuine trappers, climbing to the top of their burrows and opening their jaws to take in any unwary insect that may stray into them, and hundreds of bugs, ants, flies and worms are required to nourish a single tiger beetle larva to the stage of maturity. The larger ground beetles also hunt on the surface of the earth, while their larvæ follow the same practice beneath, burrowing in all directions in search of curculio and other larvæ that enter the ground to transform. The preying mantis or devil's horse *(Mantis Carolina)* is another very valuable, though uncanny looking insect. Its presence should always be encouraged in orchard and vineyard, and its singular egg masses, which so much resemble what geologists call a "trilobite," should by no means be destroyed. While it is no respecter of species, beneficial or injurious, it devours far more of the latter than of the former. The short-winged females, which are incapable of flight, are especially ferocious, and the ultimate fate of many of the longer winged but less robust males is to furnish their conjugal partners with a dinner.

Among the species of cannibal beetles which merit our highest regard are the so-called lady-birds *(Coccinellidae)*. The pretty beetles themselves are among the few insects that enjoy a measure of popular favor—no one seeming to regard them with aversion. Children play with them, and the superstitious divine certain coming events by their movements. We have native to this country fifty or sixty species, but not more than twelve or fifteen of this number are abundant and widely distributed. There are also a few notable imported species to which I will refer later. They are all of small size, the largest not exceeding one-third of an inch in length. The form is rounded, oval or hemispherical, and in coloring, various shades of red, with black dots, prevail. The larvæ are elongate, dark colored, often spiny grubs, with six long, sprangly legs, and present a rather repulsive appearance. When ready to change they attach themselves by the tail and either push the larvæ skin backward or split it open on top, but remain within it until the beetle is ready to appear. The especial function in nature which these insects were apparently designed to fulfil, is to keep in check the myriads of plant lice and bark lice that multiply, at such an incredible rate that no human agency is sufficient to cope with them. Indeed, against such species as the grain plant louse *(Siphonophora Aphis arenæ)* these lady-birds and other predaceous and cannibalistic species are our only hope of deliverance. It is manifestly impracticable to spray our extensive fields with tobacco infusions or kerosene

emulsions, or to dust them with powders, but simultaneously with the appearance of the aphids come several species of these beetles, two or three lace-wing flies and syrphus flies, and a large number of big and little parasitic species, and while the plant lice extract the sap of the plants with their innumerable little beaks, the larger insects seize them in their jaws and drain them of their vital fluids or puncture their plump bodies to lay their eggs, which hatch into tiny grubs within the bodies of their victims, and within a few hours destroy their appetites for plant nectar, and soon convert them into a mere house and larder for the gnawing worms within. All these predaceous species develop with great rapidity, and soon so reduce the ranks of the vegetable feeders that the grain crop is rescued from destruction.

Among the lady-birds that have earned great distinction by clearing trees of bark lice, is an Australian species recently imported into this country, at the cost of much labor and expense, but which has already made ample compensation. As its introduction and its beneficent work is one of the most notable of recent entomological events, and illustrates the value of painstaking research in tracing out the native home and habits of a species, I beg permission to give here a little resume of its history. It is well known that the orange and lemon-growing industry of California is one of its chief horticultural interests. For a few years after its inauguration the citrus orchards prospered and planters increased in numbers and wealth. But about ten years ago the trees began to decay, crops diminished and many of the largest growers became discouraged. The United States entomologist was summoned and found that the unthriftiness of the trees was mainly due to the presence in prodigious numbers of two or three species of bark-lice or scale insects, the most destructive of which was the cottony cushion scale or fluted scale *(Icerya pruchasi Maskell)*. The next step was to devise a remedy which should kill the scale without injury to the tree, and without an expense that would too greatly deduct from the value of the crop. Several gaseous and liquid preparations were used with measurable success, but the impossibility of securing a concert of action in fighting the pest prevented its general extermination, and orange-growing on the Pacific coast was threatened with failure. Prof. Riley, who has long been at the head of the Division of Entomology in the Department of Agriculture, gave this matter much serious consideration and established two agents in California to supervise and devise experiments on the coccid. With his usual thoroughness he traced the introduction of the pest to its importation a few years before on some Australian acacias, and found that it had been conveyed in the same, or in a similar way, to South Africa and to New

Zealand, where it had also proved very destructive. By means of persevering correspondence he learned that in its native home, Australia, it did comparatively little damage, and that no artificial measures had ever been found necessary to prevent its increase. From this fact he made the deduction that it was kept in check by natural enemies, and as soon as possible made arrangements for sending two competent entomologists to that antipodal country, to ascertain what these natural enemies were, and, if possible, to send and bring a supply to this country. This mission, undertaken by Prof. Webster, of Indiana, and Mr. Albert Kœbele, of California, was after much arduous search and careful observation, entirely successful. A large number of predaceous and parasitic insects were safely landed in California, and committed to the care of Mr. Coquillett, in the autumn and winter of '88-'89. They were placed on trees covered with the scale, which were inclosed under tight muslin tents. Among these species one lady-bird beetle soon became conspicuous by its rapid increase, and by the thoroughness with which it cleared the scale from the trees. This was a small, black and red form, which had received the scientific name of *Vedalia cardinalis*, which soon came to be regarded as the chief hope of the orange grower. Under Mr. Coquillett's management, numbers of orchards were soon cleared of the scale, and thousands of beetles had been bred and were ready for distribution in other parts of the State. By midsummer of last year many distributing stations were established, and by both public and private means the precious beetles were disseminated throughout the orange-growing region.

Prof. W. A. Henry, a special agent sent by the Secretary of Agriculture to examine into the condition of agriculture in the Pacific States, thus reports a visit to one of these *Vedalia* distributing stations:

In studying this insect we first visited the place of Mr. William Niles, of Los Angeles, where the "lady-bug" (*Vedalia cardinalis*) was being propagated by the county insect commission for dissemination among the orange groves infested with the cottony cushion or white scale. We found five orange trees standing about eighteen feet high inclosed by walls of cheap muslin, supported by light framework of wood. The orange trees inside this canvas had been originally covered with the white scale, but the *Vedalia*, both larvæ and adults, were rapidly consuming the last of the pests. Entering one of these canvas houses, we found the *Vedalia* busily at work, and here and there on the canvas were the beetles endeavoring to escape to other trees. These insectaries were in charge of Mr. Kircheval, one of the county insect commissioners, who kept a record of the distribution of the beetle. It was indeed a most interesting sight to see the people come, singly and in groups, with pill boxes, spool boxes or some sort of receptacle in which to place the *Vedalias*. On application they were allowed within the insectaries, and each was permitted to help himself to the beetles, which were carried away to be placed on infested trees and vines at their homes. Mr. Kircheval kept a record of the parties and the number of beetles carried off. The number coming for the *Vedalia* was surprisingly large—scores in a day—and each secured at least a few of the helpful beetles.

That the supply should hold out under such a drain was remarkable, and speaks better than words the rapidity with which the *Vedalia* multiplies, when there are scale insects enough to nurture its young. "This miracle in Entomology," as it has been enthusiastically termed, has restored to vigor hundreds of orchards which had become unprofitable and had been neglected to the verge of extinction. The wonderful success of this discovery, and the investigations and deductive ability that led to it, is justly considered one of the most signal triumphs of entomological science, and has added new luster to the world-wide fame of Prof. Riley and his talented and indefatigable assistants. Would that *we* could find some insect that would as happily serve us in the case of the codling moth and the plum curculio!

Having given so much time to the consideration of this one distinguished "friend" of the fruit-grower, I shall have to limit my references to the remaining classes of beneficial insects to the briefest possible introduction. The parasitic species are, with very rare exceptions, either two-winged or four-winged flies. They lay their eggs on the surface of the body of their victim, glueing them fast until the grub shall hatch, or by means of various ingeniously-shaped ovipositors, they puncture the skin and leave their eggs in the fatty tissue beneath. The grubs, upon hatching, feed all around underneath the skin of the poor caterpillar or worm, and do not penetrate to the vital parts until they are grown, and have no further use for their host, except as a shelter while they are in the pupa state. They then devour the remaining organs and spin their cocoons sometimes within, sometimes upon the surface of the infested larvæ. An example of the latter that will be familiar to most of you is the small parasite of the tomoto worm, which often covers the surface of the still living larva with little white cocoons standing on end, which have very much the appearance of grains of rice. In cases of the larger parasites like *Ophion* and its allies, but a single one infests a larva and these generally transform inside the body of their victim.

I must not omit to mention that the tree crickets, which have so long been classed with injurious species because of the punctures they make in grape vines and raspberry canes, in the process of oviposition, are, according to my own observation, far more beneficial than pernicious. This is especially the case with the broad-winged species *(Œcanthus Latipennis)*. Having carefully reared it for two successive years in a rearing cage, I am prepared to class it as one of the most efficient aids that we have in reducing the numbers of the plant lice and other small insects that attack our fruit trees, vineyards and berry

patches. And if it does occasionally kill a twig in preparing a safe nidus for its eggs, it certainly makes ample compensation.

In conclusion, I will say, that while entomologists have long realized the value of predaceous and parasitic species, but few attempts have been made to increase the numbers of the latter or to introduce them from one country or region to another.

The European parasites of the cabbage butterfly have been imported into some sections of the Eastern States, and are doing good service in the market gardens near some of our large cities.

Another scheme of this kind that was recently proposed was the artificial propagation of dragon flies, with a view to their introduction in greater numbers in the lakes and ponds in which mosquitoes and other stinging gnats breed in such swarms. Very considerable prizes have been offered for the best essays on this subject, and I believe the committee to which they were referred are at present considering their merits and the practicability of the suggestions offered.

The equalization of the forces of nature would keep every species within its legitimate bounds, and as man affords unnatural facilities for the increase of vegetable feeding species, by covering such vast areas with certain kinds of grains and fruits, it would be but reasonable for him to devote some attention to the recognition and protection of their natural enemies.

"When Greek meets Greek, then comes the tug of war," and when the armies of cannibal insect, meet the armies of the vegetable feeders in anything like an adequate proportion, we shall be able to close up our Paris green and London purple factories, and convert our spraying machines into improved water appliances and leave our fields and orchards to their natural protectors.

Kirkwood, Mo.

GENERAL OBSERVATIONS.

Report of Miss M. E. Murtfeldt, Kirkwood, Mo.

Early vegetables, strawberries and other herbaceous plants suffered considerably from the attacks of cut-worms, among which the larvæ of *Agrotis saucid, A. subgothica* and *A. telifera* were conspicuous. The climbing species, *Agrotis alternata, A. scandens (?)* and *Homohadena badistriga* also did considerable damage in cutting the foliage and blossom buds of fruit trees and grape and honeysuckle vines. We found that bits of old carpet or gunny sacks, crumpled or folded, made the

most inviting traps for these worms, and an examination of these during the day-time seldom failed to reveal a considerable number of the worms enjoying the treacherous hiding places. This kind of trapping is no more trouble than and is much preferable to the application of poisons to or around the plants attacked.

Flea-beetles *(Phyllotreta vittata* and *P. zimmermanni)* were in this locality conspicuous for their scarcity during the entire season. This immunity is probably to be attributed in part to the extreme drouth and consequent baking of the soil of the previous year, and, in the case of the last-named species, to the eradication of the weeds *Lepidium* and *Arabis*, which are the favorite food plants of its leaf-mining larvæ.

The plum curculio did comparatively little damage during the present season, although stone fruits abounded more than they had done for five years. The later peaches suffered most, principally from their punctures for food.

The codling moth did no appreciable damage throughout the State, so far as I can learn, and within my personal observation certainly not more than five per cent of an unusually full crop was "wormy." A few enterprising orchardists of my acquaintance were at the expense of procuring spraying apparatus and arsenic or Paris green. These were used liberally, in some cases disastrously for the orchards, and the owners were chagrined to learn, later on, that neighboring orchards, not treated, enjoyed an equal immunity from the apple worm.

The army-worm *(Leucania unipuncta)* made its appearance in many parts of the State, and did considerable injury to grass and small grains. So far as I have been informed, it mostly developed in the fields where first observed and did not migrate in companies. In Montgomery county, however, some ditching was done to check its incursions. In St. Louis county it was quite destructive in the spring, not only on farms but in suburban gardens, cutting off the earlier plantings of sweet corn, and dwarfing the small plats of rye, oats and sorghum sown for pasturage and chicken feed. A large proportion of the worms I collected were parasited by *Tachinæ* and *Ichneumonidæ*. The succeeding broods of these worms did not attract any attention. The moth is "always with us', and is more commonly taken during autumn than at any other season.

Leaf-cutting bees *(Megachile)*, which have been for a few years past such depredators on the beauty of our more delicately colored flowers as to rank them among first-class pests, were much less numerous the present season. I can only account for this on the theory

that the frequent and heavy midsummer showers drowned the larvæ and probably to some extent the mature bees, since, with us, they had acquired the habit of using tunnels in the ground for their nests. I have frequently seen them carrying their floral filchings into these holes, but whether they themselves dig them (which does not seem probable, scarcely possible, indeed), or merely make use of the excavations of some other insect or spider, I have not been able to ascertain.

Grapta interrogationis, which with us feeds principally on the elm, this summer attacked the hop vines in and around Kirkwood to a ruinous degree. It also fed largely on the hackberry *(Celtis.)*

A Plague of Psylla lice.—For some years we have been greatly annoyed during the months of September and October by swarms of these insects *(Pachypsylla c. vesiculum,)* bred from small, blister-like galls on the leaves of a fine hackberry tree, distant about fifteen feet from the house. In their search for winter quarters they invaded kitchen and dining-room, hall and chambers, settling on table linen and food and on the beds, even making their way between the sheets, causing much discomfort and disgust. They are so small that wire screens were no barrier to their ingress. Recently the nuisance became insupportable, and with much reluctance the tree was condemned to the ax.

Chloridea rhexia on Geraniums.—The handsome larva of this handsome moth usually shows a preference for feeding in concealment, and until this year I had only reared it from the fruit of *Physalis viscosa,* the inflated calyx of which afforded it the requisite protection. This summer accounts were brought to me by several neighbors of certain "red worms" that were eating the blossoms of their geraniums. I presently obtained some, and was much interested in observing the colorational adaptation to the part of the plant on which they preferred to feed. Indeed, so brilliant were their colors that I failed to recognize them, and took a description and preserved specimens in alcohol (which have lost their color, however, to a great extent), under the impression that I had something new. When the moths emerged about three weeks later I was surprised to recognize in them a species with which I had long been familiar. The only remedy employed was to pick them by hand from the infested flower trusses, and the eye required some practice before they were readily distinguished.

The Seventeen-year Cicada.—Passing across northern Illinois from Chicago westward, about the middle of August, the work of the cicadas on the forest trees and orchards of that section of the State was so conspicuous as to occasion much remark from travelers. Many small trees, both oak and apple, were killed outright, and entire groves had

the appearance of having been severely scorched by fire. The insects seemed to be more numerous, judging by their effects, than they were in 1871, when I remember making similar observations at the same time of that year.

THE CABBAGE CURCULIO.

(Ceutorhynchus napi.)

During the latter part of April Mr. Henry Schnell, of the Glasgow (Mo.) small fruits and vegetable farms, wrote me concerning an insect that was proving very destructive to cabbage plants in his hot-beds. Specimens of the affected plants were inclosed, which were found to be punctured and fretted in the crown and along the principal veins, a large proportion of the plants being killed by these attacks.

A few days later I received from Mr. Schnell several specimens of a small, dark gray curculio, with the information that it was "the same insect that had destroyed a considerable number of his plants in the field, later in the season of the previous year." A package of young cabbage plants was also inclosed, almost every one of which was found to be punctured in the center or at the side of the crown, and contained a small white grub, which was boring downward into the root, its soft castings filling the tunnel in its rear and being often forced out through the entering fissure. Mr. Schnell wrote: "They have already ruined over one-half of 40,000 plants in my hot-beds, and I should like to be prepared to check their depredations another year. How would a good salt dressing do for the beds, after taking out the plants, to kill the larvæ that might be in the ground?"

In answer to the query I advised a thorough drenching with hot water instead of the salt application, which might prevent the growth of other plants, for which the beds would be needed after the cabbage was removed. Many of Mr. Schnell's first settings of plants in the field also wilted and died, as it was impossible always to select such as had not been stung. However, by destroying as far as possible all that showed signs of injury, and by thoroughly scalding the hot-beds, as he informed me later, he so reduced the numbers of the pest as to escape serious loss in his later plantings, and by the 1st of June both beetles and larvæ had completely disappeared.

The experience of my correspondent with this insect would seem to be unique, as it has not heretofore, so far as I can learn, committed any depredations to entitle it to a place in American works on economic

entomology. It is to be hoped that this instance was, so to speak, a "sporadic" development, and not a "first appearance" of what is destined to become a general pest.

Although unnamed in my collection until kindly determined for me last spring by Professor Riley, the species was not entirely unknown to me, as I had bred it several years before from larvæ boring the stalks of the wild pepper grass (*Lepidium virginicum*) early in the spring.

A NEW APPLE-TWIG BORER.

(Elaphidion ocellata, Hald.)

Early in September of last year (1887) a correspondent, who is a large orchardist in southern Missouri, sent me a lot of apple twigs containing the larvæ of a longicorn borer, which he informed me was proving very destructive to the recent growth of his young apple trees. My first impression was that the insect was *Elaphidion villosum*, or *parellelum*, if there is really any difference between these two. A critical examination, however, revealed characters clearly distinguishing it from these species. The larvæ varied in length from 12 to 16 millimeters, those most nearly mature being 3 millimeters in diameter across thoracic segments. The segments were narrow, somewhat angulated, much wrinkled, with papillate elevations on dorsum and venter bearing interrupted corneous ridges; incisions very deep. Color, bright golden yellow. Head rather small, dark brown, and much like that of *E. villosum*. The most characteristic feature is the shield-shaped corneous plate, resembling that of the larvæ of *Oncideres cingulatus,* arising obliquely from the head and covering the entire dorsum of the first thoracic segment. The apex of this plate is roughened with dark brown stippling, presenting the appearance, to the eye but not to the touch, of a small, spongy pad. The stigmata are inconspicuous. Legs and prolegs entirely undeveloped.

These larvæ, having completely hollowed out the twigs in which they were working when received, were successfully transferred to fresh ones, into which they at once entered and began to bore hungrily. They devour not only the pith but the woody fibre, ejecting the granulated frass through pin-like holes cut through the bark at irregular intervals.

When winter set in, fearing that these larvæ might not be able to complete their transformations in the dry air of the house, I put the twigs containing them in a wire-cloth box and fastened it near the ground to a shrub in the garden.

Early in April I examined into their condition and found them healthy and unchanged. Not considering it probable that they would transform very early, if at all this season, I did not pay any further attention to them for three or four weeks, and was much surprised, on May 8, to find that all the beetles, three in number, were perfected, the pupal period being apparently very short.

The species proved to be, as I had anticipated, one not previously reported as injurious, and was kindly determined for me by Prof. Riley as the one named at the head of these notes.

The beetle is of slender form, somewhat smaller than *E. villosum*, with bluish-black, densely punctate elytra, which are slightly but gradually constricted in the middle and notched at the tips. Thorax dull red, with a conspicuous black spot on each side of the median line. Head black, antennæ nearly equaling the length of the body, and under legs yale reddish brown.

In July of the present year I received from Mr. Elliott a second consignment of twigs containing this borer in various stages of growth, with the information that it was more abundant than last year, notwithstanding his care at the time to cut and burn all twigs observed to be infested. As his orchards are very extensive, it is not surprising that a sufficient number of beetles escaped last autumn to more than keep up the succession.

I have not been able to ascertain whether any account of the habits of this species accompanied the original descriptions, but as the orchards from which it was reported to me are located in the Ozark mountains, so called, it probably migrated from some tree or shrub indigenous to the forests of that region. It is undoubtedly annually brooded, and there is occasion to fear that it will become a more pernicious pest than its congeners, *E. villosum*, or *Oncideres cingulatus*. The only remedy seems to be persistent pruning of the twigs betraying its presence. It is possible that spraying the foliage with Paris green during the month of May would tend to keep the beetle from the trees, but the experiment has not yet been made.

INSECTICIDES.

(Report by Prof. Cook, of Michigan.)

THE ARSENITES.

As I treated this subject so fully in Bulletin No. 53, I will only state conclusions at this time. As London purple is much cheaper than Paris green, costing only 15 cents per pound, and is just as effective in practical use, it should always be used when it can be had, unless on very tender foliage, like that of the peach, when only Paris green should be made use of. It is still a question if the arsenites should be used on the peach.

London purple may be used either dry, mixed with land plaster—one pound of the poison to eighty or one hundred of the plaster, or, mixed with water, one pound to two hundred gallons of water.

It is not the strength of the mixture, but the force and thoroughness with which it is applied, that secures success. The water mixture, which will usually be most satisfactory, should be kept well stirred, that the heavy mineral poison may not settle. Should never be applied to fruit trees till the blossoms fall from the trees. Should be applied to apple trees but once, except in case of very heavy rains, when it should be repeated two or three weeks after the first application; should be used two or three times at intervals of ten days or two weeks on the plums, and after every heavy rain; may be used to defend against the potato beetle, and all leaf or bud-eating insects that defoliate our fruit trees early in the season, and on our shade trees for such insects at any time. Force pumps (see Bulletins 39 and 53) are excellent to apply the water mixture to potato vines and to fruit and shade trees. By use of a barrel or tank mounted high on a wagon, we can treat potato vines and low shrubs, etc., by aid of gravity, very easily and cheaply. It is too bad that our fruit trees are so high that we cannot treat them in the same way. Our experiments last season (See Bulletin 53) prove conclusively that if the arsenites are properly applied there is no danger of pasturing under fruit trees at once. That is, if we use one pound of the poison to two hundred gallons of water.

In the apple orchard the use of London purple is so valuable that no one can afford to neglect its practice. Used just after the blossoms of the latest blooming varieties, like the Northern Spy, have fallen, this substance destroys the codling moth, tent caterpillar, canker worm,

and several minute leaf-rollers; all of which are serious pests, and often do great damage. Here, then, is a case where the orchardist can kill several birds with a single stone.

THE BORDEAUX MIXTURE.

This valuable fungicide is prepared as follows: Six pounds of sulphate of copper are dissolved in six gallons of hot water; in another vessel four pounds of fresh lime are slaked in six gallons of cold water. After the latter solution has cooled, slowly turn it into the other solution and add ten gallons of water. This, when all is thoroughly mixed, is ready for use.

Prof. C. M. Weed, of the Ohio experiment station, has shown that when this is used to spray plum trees, the plum rot is wholly kept in check. Prof. Weed recommends that in spraying for the curculio, we use this Bordeaux mixture, instead of water, that is, we add one pound of London purple to two hundred gallons of the Bordeaux mixture. Thus we may not only defend against the curculio, but the rot as well. Those troubled with the plum rot may well act upon this suggestion.

BUHACH, OR CALIFORNIA PYRETHRUM.

This much-named powder is the home-grown and home-manufactured "pyrethrum," "insect powder," "Persian insect powder," "Dalmatian insect powder," etc., etc. Buhach is the trade name of the California or home-produced product. It is better to use this buhach, as we thus patronize our own manufactures; and besides, the active principle, as shown by Dr. Hilgard of California, is a volatile substance. So, if the powder is not reasonably fresh, it is likely to be worthless. It is well to encourage our druggists to get the buhach, and to purchase in rather small quantities, so that it shall be used soon after it is produced. If kept, it should be in air-tight jars. This insecticide is simply the powdered flowers and stems of certain species of the genus of plants known as pyrethrum. Like the arsenites, this may be used as a powder, sifting it onto the plants, or mixed with water, a heaping table-spoonful to two gallons of the liquid. I have usually found the liquid more effective than the powder, only I think, as by dashing it onto the plants, it strikes more of the insects. This insecticide also kills by contact, and not by being eaten. This powder is to be recommended in that it is entirely non-poisonous to man and the higher animals. It is to be regretted that it is not always fatal to all insects. Thus I have found that many bugs and beetles are entirely uninjured, to all appearances, by its use. I know of nothing better for the cabbage caterpillar—"worm"—the green larva which has become so

destructive in our gardens. I have been surprised at our success with this powder in ridding our cabbages of these caterpillars. I have found that I could destroy more of the insects by use of the liquid mixture than by use of the powder. Of course there is no danger in its use. This insecticide is also excellent to kill house-flies. We tempt the flies to the kitchen as far as possible, in the late afternoon, close this room as tightly as possible in the evening, and by use of a cheap, small hand bellows throw a little of the dust into the room. Early in the morning the flies now prostrate on the floor should be swept up and cremated in the kitchen stove, else some of them may come to life again.

This powder will kill the pear and cherry tree slugs, the rose slug, etc. Mr. E. Carman, of the Rural New Yorker, says that it will exterminate, if used thoroughly and frequently, that most abominable insect pest, the "rose chafer" or "rose bug." Buhach can also be used with success to destroy plant lice, and the parasitic lice that infest poultry and other domestic animals; but for the former the kerosene emulsion is more satisfactory, and for the latter I think there is a better substance, as will appear.

TOBACCO DECOCTION.

The use of tobacco smoke in closed rooms, like forcing houses and conservatories, is too well known to need remark. That a decoction is also very valuable is perhaps not so well known. For this purpose even the stems, or refuse powder, which can be got very cheaply in tobacco factories, will answer well. A pound of the tobacco to two or three gallons of water makes a very effective decoction. I turn the boiling water onto the tobacco, and when cool strain out the tobacco, and the decoction is ready for use. Last summer I found this very effective against the striped flea beetle, and the cucumber flea beetle, both of which insects are often very troublesome to the gardner. If further use confirms this property of the tobacco decoction, we have in it a very valuable insecticide, and may hope by further experiment to greatly extend its use. This, too, I think the best substance to use in the destruction of lice on cattle, horses, and for ticks on lambs. True the kerosene emulsion will kill such lice, but it does not destroy the lice so entirely, and does not leave the hair of the animal looking so well. I have used both and prefer the tobacco. In cold weather, after thoroughly washing the animal to be treated, it should be warmly blanketed and kept in a warm place until dry.

The work of washing an animal is not great. I have, unaided, washed a large cow in ten minutes, and I did it well. Neither is it a

disagreeable task. I presume a force pump might be used in this case, but it would take more of the decoction, and I prefer to roll up my sleeves and do the washing by hand; then I know it is thoroughly done.

PRESERVATIVE FLUIDS FOR FRESH FRUITS.

University of California—Bulletin No. 86. E. W. Hilgard, Dir., Berkeley, Cal.

As the fruit season approaches there is a constant inquiry for some mode of preserving fruit samples for exhibition at the several fairs. As a general answer to inquiries of this kind that have already come dropping in, I give the following data in regard to the more successful preservatives that are within reach of the practice of any intelligent farmer. I preface them with an explanation of the demands made upon such preservative methods, for the benefit of those to whom the subject may be new, in order that they may better adapt their practice to circumstances.

1. The preservatives must prevent all fermentation, molding or other fungous attacks. This, of course, means that the outside of the fruit, and the air or liquid around it, shall be "sterilized" in some way compatible with the preservation of the form, at least, of the fruit or vegetable. We are practically reduced to the use of antiseptics, acting at the ordinary temperature.

2. The preservative should be a liquid. This liquid, besides being an efficient antiseptic, should not exert any solvent or softening action upon the skin of the fruit. This condition excludes from the outset all *alkaline* solutions (such as *e. g.*, cyanide of potassium, silicate of soda, etc.) and all of the stronger acids including acetic acid or vinegar.

3. The antiseptic fluid should not extract or change the color of the fruit. This is one of the most difficult conditions to fulfill, and yet one of the most essential. It excludes at once so excellent a preservative as alcohol, and many others that would otherwise be available, among others, common salt.

4. The preservative fluid should neither cause the fruit to swell, so as to increase its size, and sometimes burst it, nor should it have the opposite effect of causing it to shrink. This implies that in the exchange that will unavoidably occur between the juice inside and the fluid outside, the two shall pass through the skin with about equal rapidity.

The use of sugar to bring up the density of the antiseptic solution to that of the fruit juice naturally suggests itself, and with some fruits very good results may be obtained in that way. Still, sugar being itself easily fermentable and liable to change tint when not very pure, it is preferable to use *glycerine*, which can now be obtained so cheaply as to render it available to all, and which is for practical purposes unchangeable when so used. According to actual trial, commercial "pure" glycerine will act very satisfactorily when used per cent for per cent in place of sugar. To do this by *liquid measure*, use 4-5 per cent of glycerine as equal to 1 per cent of sugar.

Like alcohol, however, glycerine exerts a slight solvent action upon many fruit colors; *e. g.*, that of cherries, blackberries, etc.

Common salt has the disadvantage of darkening all vegetable colors after a comparatively short time; and Glauber's salt, alum and other commonly available salts exert a not inconsiderable solvent action upon colors, which renders their use inadvisable.

Of antiseptics the following are the most available: *Salicylic acid; boracic acid; sulphurous acid*, and its compound, *bisulphite of soda* (and of lime); last but not least, *bichloride of mercury* or corrosive sublimate.

Salicylic acid, or its compound with soda, both obtainable in commerce, is one of the best and most energetic antiseptics. Its use in spirituous fluids is but too well known; in watery solution it is not so much used on account of some difficulty in making it dissolve, particularly when the water is cold. An ounce of the acid dissolves in a little less than five gallons of water at the ordinary temperature; but when it is simply thrown *on* the water it may float there a long time, being very light, and most persons will think that it will not dissolve in that proportion. In hot or boiling water there is no difficulty, and the solution is made very easily by the addition of a little carbonate of soda (salsoda) even without heating. But when making use of the soda *it is absolutely necessary to avoid an excess*, as the uncombined soda exerts a very injurious influence upon the preservation of fruits.

A solution of one ounce of salicylic acid to five gallons of water, to which as much glycerine has been added as corresponds to the density of the fruit juice, constitutes a preservative fluid which has been used with very satisfactory results heretofore. Trouble has arisen from the use of too much soda in making the acid dissolve; as already stated, with patience or heating, the water alone will dissolve the acid, and soda need not be used at all.

Boracic acid, while an excellent preservative so far as the mere prevention of decay or fermentation goes, is more liable than the sali-

cylic to soften the skin and alter the colors of fruit, acting in that respect, in some cases, like alkaline solution. It is therefore not well adapted to long conservation of samples in their natural aspect, but will do well for a few weeks with most fruits. Use the solution as strong as water will make it, which is about five ounces per gallon.

Sulphurous acid, the same substance of which the use is so much abused in fruit-drying, and in the treatment of wines, can also be employed in solution for the preservation of fruits. This solution may be made directly from the gas of burning sulphur, by an operation sufficiently familiar to cellarmen and described below. It is, however, more convenient and just as good to use its combination with soda, viz., the "bisulphite" of soda (not that of lime, used in bleaching saccharine juices, as it will form deposits upon most fruits), heretofore sold under the fanciful name of "California fruit salt," and recommended for use in canning fruit for human consumption. Those whose digestion is better than necessary, and who do not object to the sulphurous flavor of the fruit so preserved, may choose to so use the preparation. Its merits as an antiseptic are unquestioned; its bleaching effects are equally so, and as in sulphuring wines, the natural colors will suffer more or less from its use, as well as from that of the acid solution. Use 5 to 8 ounces per gallon.

The following mode of preparing a preservative fluid with sulphurous gas, obligingly communicated by Manager J. Q. Brown, has been very successfully used at the rooms of the State Board of Trade at San Francisco:

"Put 30 gallons of water into a 40-gallon barrel; float on top of the water a tin pan, in which put a portion of 25 cents' worth of sulphur. Set the sulphur on fire and cover tightly until the fire goes out; renew the sulphur until the whole is consumed, opening the barrel for renewal of air between the doses."

While this mode of proceeding is somewhat wasteful of sulphur and could be improved upon by a cellarman, yet it is so simple, and sulphur is so cheap, that it may well be recommended for use on the farm.

Quite lately the use of *mercuric bichloride* or *corrosive sublimate* for this purpose has been brought prominently forward by Prof. P. Pichi, of the laboratory for botany and vegetable pathology in the Royal Viticultural School of Conegliano, Italy. In an article published in April number of the official journal of that school, Prof. Pichi discusses the requirements for the preservation especially of collections of grapes, probably the most difficult of all. He states that after experimental trials of all the usual preservative solutions, such as alcohol of various

strengths, and of watery solutions of salicylic, boracic and other acids, and salts of copper, he finally made trials with solutions of corrosive sublimate ranging from 1 to 4 *pro mille* in strength.

The final conclusions are stated as follows :

From all that has been here reported, I believe the conclusion to be justified that grape bunches can be best preserved for collections by keeping them immersed in a solution of corrosive sublimate, taking special care to wash them thoroughly beforehand. The best strength for this solution appears to be 4 *pro mille;* it will probably be advantageous to renew the solution at the end of the first two years, and perhaps subsequently at similar intervals; but we shall thus have assured the preservation of the grapes, with all their exterior natural characters, and with but a trifling expense, for a number of years.

The author finally calls attention to the poisonous nature of the preserving fluid, which is, however, the same used in pathological laboratories for the disinfection of hands and instruments after use in anatomical dissections.

The strength above referred to as the best is equal to half an ounce of corrosive sublimate to a gallon of water.

THE SULPHURING OF DRIED FRUITS.

E. W. Hilgard, Berkeley, Cal.

The writer's views on the above subject have been so often expressed before meetings of fruit-growers, and in print before the general public, that it might seem uncalled-for to reiterate their formal expression in this place. Yet the frequent requests, both written and verbal, for such expressions, seem to render it the briefest mode of disposing of the subject—the more as the only radical solution of the question lies in its being more and more fully understood by consumers (to whom these presents are equally addressed), who now sacrifice good flavor and healthfulness to mere appearance.

The sulphuring of dried fruit has two chief objects. One, and that most generally kept in view, is the brightening of the color, which always darkens, particularly in sliced fruit, in whatever way it may be dried—the change of color being due to the action of the air (oxygen) upon certain easily changeable substances contained in all fruits. This darkening (mostly to a light brown) is a practically inevitable result of drying any fruit in contact with air, whether in sunshine or by artificial heat, and should be looked for by every consumer, as the natural mark of an honest, unmanipulated article.

The second object sought to be attained by sulphuring is to render the fruit secure from the attacks of insects, whether by rendering its surface unpalatable before the eggs are laid, or by killing eggs laid during sun-drying, that might subsequently hatch in the packages. The latter object involves, of course, the sulphuring of the dried fruit, the former is to a greater or less extent attained by sulphuring before drying.

The effects of sulphurous acid (the gas—not the visible fumes—given off from burning sulphur) as a disinfectant and bleaching agent, are generally understood. The gas is absorbed by the moisture of the fruit, to an extent depending upon the time of exposure, its fresh or dried condition, and the amount of sulphur used.

When freshly sliced fruit is sulphured for a short time, the gas penetrates only "skin-deep;" and when the fruit is afterward dried whether in the sun or drier, most of the gas escapes, and few persons would note the difference in taste produced thereby. Insects, nevertheless, are to a very material extent deterred from touching such fruit.

But when the latter is dried and then thoroughly sulphured, as is too commonly done, the effect is much more serious. The gas then penetrates the entire spongy mass, bleaching it, so that carelessly dried fruit, too dark to be marketable, can thus be made to appear more or less inviting to the eye—not, however, to the nostrils or to the taste, for with the color, the flavor has also suffered correspondingly; and upon opening a package of such fruit, instead of the natural aroma, there appears the flavor familiar to those who visit a chemical laboratory, or acid manufactory.

The consumer then has reason to object to dry-sulphured fruit on two counts, either of which is sufficient to condemn the practice. One is that dirty, ill-prepared or damaged fruit may thus be imposed upon him for good quality; the other, that the natural flavor of the fruit is either seriously impaired or sometimes almost completely destroyed, and (as will be shown) its acidity greatly increased.

There is another and very serious count in the indictment, namely, that such fruit is unhealthy because containing an antiseptic that impedes digestion, and while the fruit is relatively fresh, causes headaches just as will sulphured wine.

In addition to rendering the fruit unpalatably acid, it had been rendered obnoxious both to the digestive organs and to the teeth. No one could habitually consume such fruit without feeling the effects of such an amount of mineral acid, introduced into his food purely for the gratification of the eye with an unnatural tint.

But so long as the public, and its agents the dealers, continue willing to pay from 30 to 50 per cent more for the whitened sepulchres offered them in the shape of sulphered fruit than for that which retains, with its natural flavor and sweetness, the natural tint of dried fruit, and with it the marks of careful or careless treatment, so long will the producer continue to supply the demand for the doctored article—unless, indeed, the law should intervene, as has been done in most European countries. There the sale of sulphured fruit is simply forbidden as injurious to public health, and as coming under suspicion of having been "doctored up" from an inferior article with fraudulent intent.

When, therefore, it is asked what I think is the proper policy to be pursued in this respect by a region which this year will for the first time come into the dried fruit market, I reply that I think the time has come to make a step forward and try to put upon the market a first-class article of "unsulphured dried fruit," with the express statement and claim that it is unsulphured and retains the natural sweetness and flavor of California fruit, instead of being reduced to a common level with the worst products of any other country. For it is certain that the whitish-green dried apples and pears now sold at high prices in our grocery stores might just as well have been grown anywhere from Norway to the Mediterranean for aught they teach of the quality of our fruits.

The following suggestions are offered to those who are willing to practice sulphuring to a moderate degree only, and with some regard to the conservation of the fruits' palatableness:

Large quantities of sulphur introduced at once into the drier or sulphuring-box will tend to cause a deposit of sulphur, in substance, on the outside of the fruit, adding its flavor to that of the acid, which alone is useful. The less sulphur is put in at one time, and the more air admitted, the less there will be of the visible fumes that carry the sulphur up into the fruit. It is best to let the sulphur catch fire all over before putting it into the box at all.

Let whatever sulphuring you must do be done before drying, as in that case not only will the drying process itself drive off a great deal of the superfluous acid and prevent it from penetrating the whole, but the flavor of the interior will penetrate outward and measurably do away with the laboratory odor that will otherwise pervade the fruit package.

A very sightly and appetizing cinnamon-brown tint for sliced apples and pears may be secured by dipping, for a few minutes, the freshly made slices, contained in a properly shaped basket (of galvanized wire

if desired), into a solution of salt containing not less than two ounces in five gallons of water. This prevents any spotting where the fruit has been touched. Instead of the salt, a similar solution of the bisulphites of soda or lime may be used, which effect a slight external bleaching without injury to the flavor of the fruit.

Last, but not least, let us try to gradually educate the public taste up to the point of prefering in this matter the substance to the shadow, and accepting healthy, brown, high-flavored dried fruit to the sickly-tinted, chemical-tainted product of the sulphur box.

SPRING AND SUMMER REMEDIES

Recommended by the State Inspector of Fruit Pests of California.

FOR CODLING MOTH.

The most successful remedy last season proved to be the arsenical mixtures. Of the three, Paris green, London purple, white arsenic, wherever used in the coast counties, where more or less damp nights prevail, the two latter did some damage to the foliage, and for this reason and that its effect is most lasting, the Paris green seems to be preferable.

STRENGTH TO BE USED.

Of five samples analyzed last year by the University of California, four had above 54 per cent arsenic, one going 38 per cent. In accordance with this we would recommend early ripening apples and pears to be sprayed once with one pound of Paris green to 180 gallons of water, when just out of bloom. For fall and winter apples it may be advisable to spray ten days later with an application of one pound to 200 gallons, while the blossom end of the apples is still turned upward. This (two treatments), according to my own experience, seemed safe on White Winter Pearmain and Yellow Newtown Pippin, while it proved unsafe on Bellflowers. Therefore, the behavior of other varieties should be noted.

We recommend to use the Paris green without any additions, simply stirring the liquid continually; also, straining it before using.

Use a fine nozzle, Cyclone, Crofton or Imperial.

SULPHIDE OF SODA AND WHALE OIL SOAP

Is worthy of further trial, and especially for a third spraying about a month after the last spraying (in case of winter varieties.)

For manner of preparation, see under head of summer washes for scale insects.

We propose to test both London purple and white arsenic. Eastern growers contend that one pound of arsenic to 600 gallons of water is sufficient; at present I cannot recommend it.

We believe that in isolated places probably one spraying of Paris green will suffice; however, when the orchard is surrounded with infested orchards not treated, the full course of spraying, first with Paris green twice, and followed with sulphide and soap, seem to be necessary.

POSSIBLE DANGER OF USING THE ARSENITES.

While the greatest care should be taken in handling the arsenic mixture, avoiding getting any in cuts on the hands, also preventing either human beings or animals from eating the young fruit (stock should be excluded from the orchard for at lest six weeks), we believe that if no application is made after the fruit has commenced to turn downward, there is really no danger to be apprehended. The fact seems to be that, in case of an overdose being used on a tree, the foliage is affected to such an extent that the leaves on the fruit trees will fall, and with them the fruit. This is the experience in the coast climate.

BAND SYSTEM.

As an additional help of decreasing the last broods of codlin moth, the banding system is certainly worth following; but, besides putting burlap bands around the tree, say one foot from the ground, on larger trees it will be necessary to put rags in the crotches of the trees, and examine these, as well as the band, once a week.

FOR PLUM APHIS AND WOOLLY APHIS, ABOVE GROUND.

Four pounds of resin; three pounds of sal-soda: water to make 4½ gallons. Dissolve the sal-soda in a few pints of water; when thoroughly dissolved, add the resin. Heat until dissolved, and add water finally. Use 1½ pints of solution to the gallon of water. Use a temperature of about 100° Fahrenheit.

DESTRUCTION OF THE SPARROW.

There are a number of ways to destroy the sparrow. Trapping by means of a bird net is practiced by experts, but the sparrow, considering their numbers, is the most difficult of all birds to catch. The gun is the more ready weapon. In city limits, where sparrows are the thickest, this cannot be used except by persons having authority to make this their special business. Probably the most successful method is to use poison. Wheat soaked in a solution of strychnine, in a portion of one drachm to a quart of water, is one of the most efficient poisons. However, experience shows that this compound is too rapid in its results, as some of the birds begin to be affected before all present have taken a fatal dose, and when once scared away by the dying agony of poisoned birds, the others never return. Arsenic mixed with corn or oat meal in the proportion of one part of arsenic to ten or fifteen parts of meal, by weight, makes a less expensive poison and is more slow in its action, thus giving all birds ample time to get away from the feed before they become affected. In order to obtain the best results the birds should be fed for a few days at first, pure grain of the same kind that is to be poisoned.

MANURE.

Report of California Experiment Station.

The subjoined table* gives some insight into the amounts removed from the soil by some of the chief fruit crops, of nitrogen, potash, phosphoric acid and lime—these being, according to all experience, the only ones of which the replacement need ordinarily be considered in fertilization. These amounts are expressed both with reference to 1,000 pounds of fresh fruit, and to what, according to our best information, may be assumed to be a "fair crop" per acre. The latter figure is, of course, liable to great variations and differences of opinion; but

* The analyses of ashes here given are mostly those of European chemists, generally accepted as representing averages. California-grown fruits will be investigated at this Station the coming season for this purpose.

by the aid of a little arithmetic each one can calculate for himself the data suitable to his own case or views. The crop assumed in the case of oranges is 335 boxes per acre of 15-year-old trees; that of grapes is intended to represent a mean between uplands and lowlands.

QUANTITIES OF SOIL INGREDIENTS WITHDRAWN BY VARIOUS FRUIT CROPS.

Fresh fruit.	Total ash, lbs.	Potash, lbs.	Phos. acid, lbs.	Nitrogen, lbs.
Grapes, 1,000 lbs	8.8	5.0	1.52	1.70
Crop of 10,000 lbs. per acre	.....	50.0	15.20	17.00
Oranges (seedless), 1,000 pounds	6.07	2.78	.67	2.69
Crop of 20,000 lbs. per acre	.....	55.60	13.40	53.80
Pears, 1,000 lbs	3.3	1.8	.5	.6
Crop of 20,000 lbs. per acre	.....	36.—	10.—	12.—
Plums, 1,000 lbs	2.9	1.72	.44	4.2
Crop of 30,000 lbs. per acre	.....	51.60	13.20	167.7
Apples, 1,000 lbs	2.2	.80	.03	.6
Crop of 20,000 lbs. per acre	.....	16.00	6.00	12.0

It will be seen that for equal weights of these fruits, grapes take from the soil by far the largest amount of mineral matter, of which nearly five-ninths is potash; they also carry off the largest amount of phosphoric acid. For seedless grapes the latter item would, however, be considerably smaller.

Next in the drain of total mineral matter from the soil stands the orange; it also draws heavily on the potash, and also upon the nitrogen of the soil, but less than the grape upon phosphoric acid. This independently of the seeds, the analysis having been referred to seedless fruit; seed-bearing (seedling) fruit would draw more heavily both on phosphoric acid and nitrogen.

Pears come next as regards total mineral matter, but draw quite ightly on nitrogen.

Plums (including prunes) are conspicuous chiefly for their heavy draught on the nitrogen of the soil, greatly exceeding in that respect the orange for equal weights, and enormously for an (assumed) average crop.

The difference between apples and pears in respect to soil exhaustion for an equal weight of fruit is quite striking, the amount of potash in apples being less than half; the phosphoric acid only a trifle over half as much as in the pear; while nitrogen is equal in both, and quite

low as compared to the orange, which has over four times as much and must therefore be accounted relatively much more nourishing to man, as well as more exhausting to the soil.

UTILITY PLUS BEAUTY.

L. A. GOODMAN, WESTPORT.

The first thought of man in his life-work is utility. It matters not where he is, what he is doing, how he is thinking, what he is seeing, where he is feeling his way, his first thought is the useful.

A poor old cripple, watching his wife eke out their scanty living with her needle, watching her day and night, his heart full of love for her and full of sorrow for their lot, as he sits there watching, a sewing machine is made in his mind to do this work. The thought of the useful uppermost in his mind brought out gradually a rough, crude machine that was able to do the work. No thought of the beautiful filled the mind of Elias Howe as his first machine grew under his hands, but only the thought of the useful.

It was not until years after the successful working of this same machine that it entered the heads of men to make them beautiful, and now we have them in all shapes and sizes, in boxes, cabinets, desks, etc., etc.

It never entered the mind of Robert Fulton to make a beautiful boat when he first formed the steamboat on the Hudson. His only motive, his prevailing thought, was to make a boat which would run against wind and tide, and so we have the rude, cumbersome, awkward and yet useful boat which succeeded in doing what its maker intended it to do. Now, years after, we have perfect palaces of steamboats, where are embodied the main thoughts of their builders to have a beautiful as well as useful boat.

In all the realm of thought and knowledge, the useful is the first and prevailing idea.

The old farmer used the forked stick for his plow with the only thought of utility. The old cast-iron plow had only this for its goal, and it never occurred to man until after he had developed this, useful to his needs, that beauty should have anything to do with it. Beauty and knowledge then go hand in hand, and we may be sure that as you find a nation increase in knowledge and learning, you will see them

increase in the love for the beautiful and the useful, and not the useful without the beautiful. Utility plus beauty therefore is one of the facts which determine in our minds the civilization of a people.

You may take the rude huts of the barbarians, the log cabins of our fathers, the caves of the cliff-dwellers, or the wigwam of the Indians, and the first thought, in fact the only thought, which seems to enter their mind is the thought of utility, and so we have the low log houses, the rude cabins of our forefathers, built with the idea of the useful. Gradually as they grow older the thought of the beautiful enters with the useful, and we have some of them building anew, while many of the others who never can have the idea of the useful and the beautiful in their minds together, move their location to points where they can only think of the useful. So, many of our first settlers cannot look upon the beautifying of their country, and so go to a newer again.

The useful and the beautiful are the moving factors in all our business transactions. To those who think of the useful, in our day and age, the beautiful is the attractive quality. If it be nothing more than a mop, the thought of attractiveness is in your mind. The farmer thinks of this when he buys his plow, harness, wagon, horses, cows, hogs and sheep. Beauty is what attracts the eye. In fact, let the two be just as useful in this day and age, yet the idea of beauty will settle the idea of utility, and ofttimes overbalance it. If you wish a piece of cloth or a suit of clothes, it never occurs to you to take the useful when you can get the useful and beautiful together. The lady in search of the dress goods, after the first thought of utility, next looks to the beautiful, and ofttimes lets the latter run away with the former.

Yet for these ideas we know that the first thought of man in his work is the useful, and the great moving power of the world is the useful.

To-day we have thousands upon thousands of persons working with this as their moving power; we have thousands who are using their brains for the furtherance of this idea; thousands who are inventing, day after day, the useful.

Scarcely a paper do we pick up but we see the list of patents, all more or less useful; and when these are perfected, then the thought of the inventor or some other is to make it beautiful, and the two must grow together as we grow.

So the first thought of man, I say, is to the useful, and the second thought is to the useful and the beautiful, and the last thought is to the beautiful alone.

This has been the growth in the line of horticulture as well. First a few apple, peach, cherry, pear—perhaps some berries, if there are no wild ones; utility, and that alone, is the thought of too many of our pioneers. They will cut down trees and shrubs, which in after years they would give thousands to have, and years of time to replace. I have known men to go into the evergreen forests and cut down every specimen within reach of the house and yard, and in ten years begin planting them to beautify The only thought of too many of us is the useful, and that alone, and it is a grand mistake. We need at all times to unite the two and keep them in close union in order to get the most satisfaction out of this life.

The home is useful, but useful only as we make it perfect, and we cannot make it perfect unless we make it beautiful. Perfection is only reached by the close union of the two. The home is beautiful and yet not less useful because it is beautiful, when we have the landscape, the grass plots, the shrubs, the flower beds, the shade trees, the evergreens, all nicely blended for use and beauty.

One-half of our lives is a waste if we do not unite these two in all our work; one is as necessary as the other to the full development of manhood and womanhood, and to a full appreciation of life and its duties. "All work and no play makes Jack a dull boy" is still true, and the opposite is also true.

This is simply another way of putting the subject of this paper. All work makes a drudge, all utility makes dull feelings, slow appreciation, weak sentiments—a drudge also.

We want something higher and better, and so we look to the beautiful. It is only by the union of the two that the perfect development of character is shown.

Let us look over our own work in the same light: Did you ever go into an orchard when every tree was perfect in form and symmetry and have it do your heart good to just see the trees, to look at them in their beauty? When, therefore, behind all this there is the fact of value in their products, then the appreciation of mind and body is filled to its satisfaction. So, in the beautiful yard and surroundings, it does the mind good to dwell on its grand trees, lovely lawn, handsome building, and all. Add to this, therefore, the fact of the utility it can all be put to, and you have the acme of perfection.

I plead, therefore, in this race for the useful, we neglect not the thought of the beautiful, as the one should go hand in hand with the other.

Let us not fail to use the useful and to beautify the beautiful if we want the most perfect life we are capable of enjoying.

The following extracts taken from a lecture of David Swing:

The beautiful comes first in the order of nature. Many of our young persons suppose that the beautiful is the culmination of life; but just the opposite is true. The useful is the culmination of human thought and human effort. The child in his cradle will reach out after the decoration, after the boquet of flowers, or a brilliant ribbon, The savages in the west are all ornamenting themselves, but they are not seeking nor finding the paths of utility.

The sentiment originating with the human race and extending as the human race went forward and blossomed out into five great arts—architecture, music, painting, sculpture and literature, and in some one or all of these various forms it held the world subject for thousands of years.

Greece was ruined by the exclusive study of beauty. Greece omitted utility. It never grasped the great ends of politics or religion or social life, but failing to see these, studied the architecture, sculpture, painting, music and the gracefulness of the human form. When Xerxes was approaching Greece with his army, the great men of that nation were standing around on the Olympian field. There were before their eyes chariot races, the foot-race, the shooting-match. A messenger came in saying that Xerxes was just over the mountains; and those Greek philosophers and statesmen resolved not to suspend the games on that account. What was worse than that, only 300 men went to the pass at Thermopylæ to repel Xerxes, and yet still worse, when Leonidas was defending the pass, Xerxes discovered another pass through which he flung a hundred thousand men, of which mountain pass the great Greek statesmen knew nothing of the existence. There was more statesmanship in the mind of Abraham Lincoln in his brief life than in all the statesmen of Greece for five hundred years.

But passing to the great period in which the beautiful reached its culminating point, we come to the time of Michael Angelo. Next to Shakspeare, Michael Angelo's was perhaps the greatest intellect ever born in the world, and since we do not now know who Shakspeare was, whether he was Shakspeare only, or Shakspeare and Lord Bacon, Michael Angelo was the greatest intellect the world has produced. But he was born in a period when only two forms of thought occupied the human mind; one was theological thought—abstruse theological thought—and the other was that ornamental thought that decorated theology. Michael Angelo struck the world when the world asked for two things—either the abstruse theology or the external temple, the church, the cathedral, the basilic, and the paintings and statuary of the decorated church. Had Michael Angelo been born in New York in 1860, he would see before him perhaps twenty different professions. The pulpit would allure him, the lawyer's profession would allure him, the editorial chair would allure him, the military pursuit would offer its charms, the railroad interest invite his genius; or, if all of these things failed, there remained the lightning-rod agency and the sewing machine industry and the book-canvasser's vocation; and if, in none of these, did he find sufficient allurement, then some philosopher would say to him, "Go west, young man, go west." But in Michael Angelo's day only two voices sounded in his ear. One was, "Michael, either study theology of the church or decorate this theology;" and Angelo chose the art of decoration. And, furthermore, the women of that period were all in favor of the decorative arts. Every woman of note in Florence and Rome cultivated the fine arts. Each morning, instead of taking a carriage and driving to the dry-goods store to purchase a few yards of ribbon, they would walk to where some sculptor was carving in marble, or an architect was rearing a temple, or a Raphael was painting a picture. There were not many of these women, but they were the inspira-

tion of the age. In Angelo's day there were women who could recite all of Virgil or all of Homer from memory. Sometimes the artist would be in love with some one of these conspicuous women, and was thus inspired by that sentiment; and to be in love with some noble woman in those days was as natural as it is for us to be a Democrat or a Republican or even a Mugwump.

At the beginning of the sixteenth century there sprung up a development of the useful. The difference between the beautiful and the useful is this: The beautiful is a sentiment; the useful is a thought. The useful is the discovery of the great end and of the good way of arriving at it—the great end of the individual life or the nation's life. This definition places it beyond the reach of the infant, the Indian and the savage, and makes the useful depend wholly upon the method of thought. It requires thought to devise the good end and the discovery of a good way of reaching it. The railway which lies near your city is a good way for carrying around men, but that does not make it useful. It must also carry men on good errands or to a good destination. If your railroad were to undertake to-morrow to carry men to a prize-fight it would be utterly worthless, because men going to a prize-fight would be wicked. Men going to a prize-fight ought to walk through deep mud. Men going to a prize-fight should all die on the road.

So the useful consists in a good way of reaching a good end. This makes it necessary that the useful be attained only by an age full of thought. Lord Bacon heralded the useful just about as Washington heralded liberty. Bacon did not create the useful, but stood in the midst of it and developed it. He became its speaker, its poet, its prophet. Previous to Lord Bacon the scholars of Europe were all engaged in abstract thought about themes that had no application to human life. Lecky says that sometimes in Europe there were five thousand scholars gathered together in woods and camps for discussion and thought upon themes that had no application to human life. One of their favorite themes was the nature of the human spirit, and as to how many spirits could probably dance upon the point of a needle; and they would also inquire what kind of a club Cain killed Abel with—whether it was hickory, oak or sassafras; and one of those philosophers wrote twenty essays on the probable height of the Virgin Mary, the probable size of her hand or foot, and the probable color of her hair. They thought it disgraceful to come down to the common affairs of life.

And while the men were doing this kind of thinking the women were slaves, doing the drudgery; and this reaches over the pagan and Christian world up to the sixteenth century. Xenophon thought the duty of the wife lay in keeping her husband's clothes mended and clean. Up to the sixteenth century the woman plowed the ground with a crooked stick, the men being far above the consideration of doing the plowing. The woman cut the grain with a kind of case-knife; she threshed the grain with a club; she ground the grain with a couple of rocks; she baked the bread in ashes. And the great man in the meanwhile was busy about the definition of spirit or the origin of the human race, or about the nature of the Deity or the nature of the devil. Into that world came Lord Bacon, simply to turn the attention of men to what are called the common laws of human life.

But neither the Greek nor the scholastic would ever come near human life. Bacon looks at that scene, and for the first time in the history of human thought he confesses the existence of the cart and the wagon road, the horse and the harness and the cabbages, and he says, "O, foolish human race, why do you not let the angels alone and make a good wagon road?" He says, "Why not feed that horse? The collar is made out of straw, the harness is tied together with strings. The Queen of England has just found her chariot mired in the mud, and has stood in the fence corner while her courtiers pry it out. Why not make a good road?"

This is the Baconian philosophy—the study of the phenomena of the difficulty, and the educement from the phenomena of general laws. After Bacon had unfolded this philosophy man began to leave the upper air alone and study the surface of the earth, and out of this philosophy came wooden rails, on which cars were drawn out of the coal mines. They found that one mule could draw four or five cars with wooden rails. Reason made them substitute iron rails. Further thought finally made them substitute the locomotive. The steamship began to cross the sea, the spinning-jenny sprung up, the reaping-machine came, the sewing-machine came. Long before this the printing-press had come. The telegraph came. But these were feeble modifications of the useful compared with the unfolding of liberty. Liberty is that form of utility which distributes happiness to the millions. Happiness was once supposed to be for the king and the royal family. They discovered that happiness and property were to be for the millions. Then came general education—education handed over to the millions; and out of this Baconian philosophy there rolled the great volume of progress on in the seventeenth, eighteenth and nineteenth centuries.

I congratulate you all upon having reached an age in which the beautiful remains as only an ornament of life, and not the whole of life. That, as the vine can ornament the cottage, but cannot keep it up, cannot be a wall or rafter to it, so beauty may ornament life, but can never be the great columns nor foundations upon which life rests.

SOME SUGGESTIONS FOR THE WORLD'S FAIR.

J. C. EVANS, HARLEM.

(At Chicago Meeting.)

To arrange for and carry out to a successful end such an exhibition of horticultural products as should be made at the coming Chicago fair in 1893 will involve a vast amount of combined brain work, as well as hard labor, and will require the united and harmonious efforts of the entire horticultural interests of the whole country. There should be no sectional feelings, no selfish motives. All should strive to attain the one grand object—a successful showing of the products of our whole country to the world.

To do this it is important that no mistakes be made in laying the plans and getting the proper foundation to build on. This I understand is the object of this convention, and as I cannot be present, I give herewith a few thoughts in the hope that I may in a small way aid in laying the plans for the most grand exhibition of horticultural products ever seen.

The Exposition management should provide a building amply commodious and especially adapted to the exhibition of all horticultural products.

Each State Legislature should, at its next session, appropriate an amount sufficient to meet all the expense of making an exhibition, and at the same time appoint one or more competent and responsible parties to take the lead and make all necessary arrangements for the exhibition of the products of their respective states.

The Exposition management should not be called on to offer any premiums in this department; let the public who visit the fair decide as between states, and let the competition be between the counties or districts of the states, as each may elect, and the premiums be offered by the management of each state and paid out of the state appropriation; a sufficient amount should be provided for and offered in premiums to insure a large and continual display of all horticultural products, and the premiums should be so arranged, say, 1st, 2d, 3d, and so on up to 10th, 15th or 20th, that a large number of counties would stand a chance of getting something and be encouraged to make a good display. Of course each state management would have their own idea of a premium list.

I think premiums should be offered, first, on a general display by a county or district, then on the various articles (duplicates) separately.

The respective state exhibits should be so arranged as to be readily distinguished one from the other, and bear the name in a conspicuous place in reasonably large letters, in a neat form; the county exhibits should be arranged in like manner; while no two of either state or county should be expected to look exactly alike, a certain amount of uniformity should be observed to make the whole harmonize. This, as well as nearly all else, will devolve on the superintendent of the department, and the heads of the respective state exhibits.

Now this whole scheme is based on the action of the Legislatures of the various states.

The object of all exhibitions is to advertise the state or particular section from where the exhibition is made; and what better opportunity will any state or county ever have to make known to the world their resources and capabilities than will be afforded at the coming great Columbian World's Fair in 1893?

Is there, in this great galaxy of forty-four states, one that does not want to be known? Is there one whose Legislature will refuse to make ample appropriations to meet all necessary expenses in showing to the world what she is? I think not.

In any event, "whatever exhibits are made must depend on aid from the state, county or district from where made," so that all this convention can do is to formulate all necessary plans for a grand show

of products" and trust to the business foresight and liberal spirit of of the Legislatures of the various states to provide for the expenses, and I believe they will all do it.

FARMING IN PALESTINE.

FRANK G. CARPENTER.

The land of milk and honey has sadly deteriorated since the days when the Israelites took possession of it. The cattle upon a thousand hills have dwindled to scanty herds, and the hills themselves, which, once terraced like the choicest lands of Italy, yielded skins of wine and tons of fruit, have been denuded of their earth by centuries of rain. Such milk as is sold in Jerusalem and in the various villages of the Holy Land is made up of a mixture from camels, goats and cows, and there are probably more cattle on the Western Reserve in Ohio than in all Palestine.

Compared with the rich countries of the nineteenth century, Palestine was never a very fertile land. The Israelites, coming out of the desert, exaggerated its virtues, and described the beauties of the country with all the exuberance of oriental imagery. It seemed to them a little world in itself, and still Palestine is not much bigger than some Texas counties. The whole land, including that possessed by the Philistines and the Israelites, is not more than fifty miles wide, and, standing on the Mount of Olives, you can see the Mediterranean on one side and the silvery Jordan on the other. A good, fast railroad train could cross it in an hour, and if there were a railroad running from the north to the south it would not take more than three hours to traverse its entire length. From Dan to Beersheba is no further than from New York to Washington, and the long journey which David made from Jerusalem to the banks of the Jordan is only fourteen miles. The Mount of Olives is only 2,700 feet high by actual measurement. You can walk up it in half an hour, or a donkey will carry you to its top in twenty minutes. I crossed the plains of Sharon in coming from Jaffa to Jerusalem, and I found these garden-spots only twenty miles wide. I drove in a carriage from Jerusalem over the fields where the shepherds lay and watched the star which marked the coming of Christ to Bethlehem, and the distance was only seven miles. I

saw shepherds attending their flocks on the spot where little David killed big Goliah with his sling, and, as I looked on my rocky surroundings, it did not seem to me that the land was worth the fight. Mizpah, the little town upon the spot where the prophet anointed the farmer-boy Saul king, when he was out hunting his father's asses, would not bring a hundred dollars at auction in America, and all the donkeys and asses I saw in the country were so shabby and shaggy that it would take a second miracle to give them the strength to open their mouths and speak, or even bray, at the turbaned Balaams who rode them.

The Palestine of to-day, however, is nothing like that of the past. For centuries the land has been stripped of its best men to fill the armies of the Sultan, and for ages its farmers have been ground down to the earth by tyranny, corruption and taxation. The farmer of Palestine pays taxes upon everything. If he plants a fruit tree, he is taxed from the day the sprout shoots through the surface, and the taxes of a vineyard often amount to more than the crop. The rule is that one-tenth of the whole crop has to be given to the Sultan; but this tenth is estimated while the seed is in the ground, and the collection of it is farmed out to corrupt tax-gatherers, who get from twenty to thirty per cent of the crop instead of ten. The farmers of Palestine live in villages, and the sheik or ruler of the village often acts as judge and tax-gatherer. He is responsible to the Sultan for the well-doing and the revenues of his subjects. Just outside of many of the villages there is a threshing floor, where the grain is trodden out or flailed out as it was threshed in the days of the Scriptures. The farmer dares not take away his grain from the floor until the tax-gatherer has come and picked out the Sultan's tenth, and after him the banker or the rich man who has loaned to the farmer has the right to take his debt and interest before the farmer can get the results of his toil. The people of Palestine are in many cases so poor that they have to borrow money to put in their crops. The rates charged are from ten to fifteen per cent, and the usurers of to-day are quite as bad as those of Bible times. In some cases the crops are put in upon shares, and the rich man who owns the land furnishes the seed and the animals to till the crop. The farmer gives his labor and his skill, and receives one-fourth of the crop, the owner of the land getting the other three-fourths and paying the taxes. The farmers pay a military tax also. They pay taxes on their donkeys and other animals, and there are import and export taxes. In my wanderings about Jerusalem I found a couple of Turkish soldiers at each gate, and I noted that every chicken and every head of lettuce that was carried into the city for sale paid a tax before it passed within the walls. I saw a farmer go in one day with a little donkey not bigger

than a Newfoundland dog, loaded with about a bushel of gnarled olive roots. These were for fuel, and he expected to sell them for twenty-five cents in the market near David's tower. He was stopped and charged three cents duty before he was permitted to pass. Thus it is with everything salable.

The Philistines had, by all odds, the best lands in Palestine. The plains of Sharon have been worked ever since the days of Abraham, and they produce the richest of crops to-day. The soil is a deep brown loam, and I found the farmers plowing when I visited it in May. The implements used were the same as those of the time of Christ. There was the wooden plow, with its point shod with iron and with its single handle, which the plowman held with one hand while he walked behind his donkey or ox. He had a long goad in the other hand, to stir up the beast, and the words of the Scripture about the man putting his hand to the plow are applicable to this. In one of the fields I saw a camel hitched to a plow, and the great, ungainly beast shambled up and down the field with a sullen air.

Nowhere did I see any improved machinery, and I am told that there is not a threshing-machine in Palestine, though the advanced farmer who owns the lands further up in Syria, where Abraham farmed, has a mower and reaper in active operation.

There are no big bank-barns in Palestine. The grain is either kept in the houses, and in some districts stowed away in tombs and caves, or packed down into boxes made of mud and dung. The hills of Palestine are full of caves, and the houses of the people are little better than holes cut into the rock. Many of the villages are built against the sides of a hill, so that the hill forms one side of the house, and the cattle and sheep are often kept in the same room in which the people sleep.

The food of the people is of the cheapest variety. Whole families live on from fifty to seventy-five dollars a year, and the clothing of a village would not exhaust the stock of a country dry goods store. Only one man in twenty wears shoes, and the most common garment among the peasants is a woolen blanket of black and white stripes, made at home, and of full Turkish trousers and vest under this. The women, to a large extent, wear the blue denim, night-gown-like costume which you see in Egyt, except they do not veil their faces, unless they be Mohammedans.

Some of them are very beautiful. I found the women of Bethlehem among the most beautiful in the world. They seemed to be better off than those of other parts of Palestine, and their faces were as rosy and fresh as those of the girls of Ireland. They had beautiful eyes,

and Raphael might have found a model for the Sistine Madonna in the land where Mary gave birth to the Christ. The shepherds of Bethlehem are fine-looking men, and sheep are tended on the plains about the city to-day as they were eighteen centuries ago. Many of these shepherds wear sheepskin coats. They have their staves in their hands, and they drive the sheep into the folds near the villages now as they did when Christ was born. The sheep of Palestine are of the fat-tailed variety. Some of the tails, I am told, weigh as much as thirty-five pounds. Palestine sheep are worth from three to five dollars apiece, and a great quantity of wool is shipped from Syria and Palestine to the United States. In the Valley of the Jordan and along the Dead Sea there are many fine pastures, and about three-fourths of a million pounds of wool is shipped annually from Syria. I was in Palestine just before the shearing-time, and I noted that the fleeces were heavy. The most of the wool is exported unwashed, and the bulk of it goes to the United States. The wool is sometimes washed after it is cut from the sheep. The washing is done by women, who are paid from eight to ten cents a day for it. Wages are low all over Palestine. You can get a farm-hand for twenty-five cents a day, and he will not plead the eight-hour law, nor want a threshing-day dinner thrown in.

The plains of Sharon grow very fine wheat. If Palestine and Syria were under a proper government, and furnished with good means of transportation, they might export a great deal of grain. As it is, the cost of bringing the crops to the seaboard from the interior is immense. Everything has to be carried upon camels, which are big eaters. Three bushels make a load, and for a distance of a few hundred miles the camel will eat one bushel, and it will take another bushel to pay his driver, so that the shipper has only a third for his profits, to say nothing of the cost of raising the three. There is now a splendid road from Jaffa, the seaport of Palestine, to Jerusalem, and there is talk of building a railroad between these two points. The distance is only forty miles, and the twenty miles across the plains of Sharon are almost level.

After you have passed this land of the Philistines you begin to ascend the hills of Judea, and you keep going up until, twenty miles farther, you reach Jerusalem. The city covers about the space of a 320-acre farm. Walls about twenty-five feet high surround it, and there are about fifty thousand people packed inside of these walls. In going up to the city, I was struck with the evidences of the splendid agricultural condition of Palestine in the past. Every hill was once terraced, and there is no doubt but once the whole land was a garden. Even now there are many olive groves dotting the hills, and the flowers bloom in every crevice. I shall never forget the poppies of Sharon.

They were as red as blood and as big around as the bottom of a tin cup. There were millions of them and they carpeted the plains for miles. They bloomed upon the mountains, and I picked them out of the holes in the walls upon the Via Dolorosa along which Christ was dragged to his crucifixion. The flowers, which are seen everywhere, are the evidences of the great possibilities of this land under proper cultivation and freed from taxation. If any other people than the Turks could own it, the terraces would gradually creep back to the hills, and the land would again bloom as it did when little David kicked up his heels in the farm-house of his father Jesse. It is a wonderful fruit-growing county. There are no finer oranges in the world than those which grow about Jaffa. Great quantities of these are exported to Europe.

Palestine exports a great deal of olive oil, and the Mount of Olives has its sides to-day covered with these silvery green trees. The trees grow to a great age, and are gnarled and knotty. A great deal of the wood is brought into Jerusalem and made into collection-plates for churches, paper-knives and other souvenirs, which are sold to tourists, and also exported in large quantities. The olive-picking is done at the same time all over the country. The people shake the trees or pick them. They sort the crop, using the best for eating, and making oil of the poorest. In some parts of the country this oil is used for lighting, and the probability is that the lamps of the wise and foolish virgins were lighted with olive oil. The making of the oil is of the rudest description. I visited an oil mill in Jerusalem. It consisted of a cave cut out of a rock, in which a very tall camel and a very small donkey went round and round in a circle, operating a mill like that which grinds the bark in a tannery. This ground the olives to a pulp. In another part of the cave there was a stone ledge about as high as a table, and into this a hole had been cut, and one of the dirtiest Arabs I have ever seen stood here with his clothes tight up about his waist, and tramped the oil out of the olive mush with his bare feet. He was perspiring profusely, and there was nothing but a linen cloth between him and the mush. As this cloth got wet he would pull it up, and, standing on the olives, would wring out the oil into a can on the ledge. From this it was poured out into pots, to be strained for the market. The refuse of the oil is made into a sort of cake, and used to feed camels and cattle. It it said to be very healthful, and the animals grow fat on it.

Palestine is slowly improving in character. The Jews are coming back to the land from Europe and other parts of the world, and the strongest colony is that known as the Gadites, supposed to be one of

the lost tribes who hail from southern Arabia. These people are engaging in agriculture, and I am told they make good farmers. The Israelitish Alliance, consisting of the Rothschilds and other wealthy Jews, have established a number of agricultural colonies in different parts of Palestine. They have model farms in the Holy Land. One of these is on the plains of Sharon. It contains tens of thousands of vines and olive trees, and it consists of 28,000 acres. The Turks do not like to sell land to the Jews, and are averse to the improvement of the country. The Sultan fears that he will lose Palestine if it becomes valuable, and he would rather see it a desert than a garden. The Germans have several agricultural colonies in Palestine. There is one near Jaffa, which is doing well. The German colonists believe it is their mission to bring Palestine back to its former state by cultivation, and they are trying to colonize the country. They have already shown that it has great possibilities, and the prospects of the Holy Land have not been so bright for years as they are now. If the land could be owned by Christians, and cultivated under Christian laws and Christian taxes, it might again become a Land of Milk and Honey.

NEW VARIETIES OF FRUITS.

Mr. H. E. Van Deman, pomologist of the department of agriculture, delivered an informal address upon this topic, from which we make some extracts:

Many good varieties of Plums had come, he said, from *Prunus Americana*, which extends all through our north and northwest regions. Among the newer varieties the Hawkeye, from Iowa, is the best. It is the largest and most beautiful, although it is late, ripening six weeks after the ordinary plum season. Cheney, from Minnesota, is another plum of medium size, very early, of a deep crimson color, but not so good as the Hawkeye when it is cooked. Ludlow is flat in shape, large, productive and of very pleasant flavor. Rollingstone is small, of a purplish red color, handsome and well-flavored. Leduc is a very pretty, small, yellow plum, originating in Minnesota. It is very productive and sweet, and will be valuable for a dessert fruit. Hopp is of medium size, dark, solid and very sweet. Clyman is a variety of *Prunus domestica*, and is as early as the Wild Goose, six weeks earlier than the ordinary plums of this class. It sets full of fruit, and will probably be hardy in the middle States.

Among the Japanese plums, Botan is said to be hardy enough to ripen as far north as Connecticut. In shape it resembles the Kelsey. Ogon is yellow, nearly round, and as large as the Wild Goose. Kelsey is very large, three inches in diameter, purplish, heart-shaped; but it will not fruit north of Tennessee. Burbank is of medium size, crimson-purple in color, exceedingly beautiful, rich in flavor, and it will perhaps prove hardy in the middle States. Satsuma is smaller than Kelsey, but as large as the common plums. It is round, with dark red flesh and small stone. One disadvantage of all Japanese plums is that they bloom so early their blossoms are liable to be caught by the frost, as in the case of the apricot. They all hold their foliage well, and this fits them to the vicissitudes of our very trying climate.

Of the newer pears, the Krull, originating in Missouri, seems to be the best of winter pears. It surpasses the Lawrence in quality and color. The Idaho has not been overrated as to quality, but as yet we have no warrant for believing that it is superior in hardiness to many others.

Among apples, the Garfield, originating in northern Illinois, seems to be hardy in that trying region. It is not so large as Ben Davis. It has a brilliant crimson stripe on a yellow ground, rich and handsome in appearance, and fair in quality. Lacon is of about the same quality, yellowish, and its hardiness would seem to warrant trying it in the northwest. Shirk originated in Indiana. It is very sweet and of a high color The tree is a fine grower, and it is an excellent fall sweet apple, and hangs well on the tree. Bullman has been widely advertised, but it seems to be a synonym for the Red Canada. The Peffer is a seedling of Pewaukee, and is very promising. It is of medium size, red, white-fleshed, a natural seedling, and is very hardy. The Foundling is an old variety of New England origin, which has been strangely overlooked until late years. It is quite hardy in the northern part of New England; very pretty, with red stripes on a yellow ground, and keeps late into the winter.

Of strawberries the only new variety spoken of was Pearl, which is said to be one of the best, with berries of good size, and held well above the ground on strong stems. It seems adapted to different kinds of soils.

Among nuts mention was made of many good varieties of our wild chestnut, some of which are of excellent quality. One named Dupont, from Delaware, is very large. A rich tree often yielded nuts to the value of $30 and $50 a year.

The Paragon, which has been sent out by Engle & Son, of Marietta, Penn., is larger yet, four or five times as large as the ordinary chest-

nut. It bears enormously and at an early age. It is not quite so well flavored as the finest of the small chestnuts, but it is of purely native origin, and well worthy of cultivation.

Of the newer grapes, the Lyon, originating in Michigan, was reported of fine quality. The vine is very vigorous; the clusters are of the Catawba shape, although the berries are smaller. Colrain, which is probably a seedling of the Concord, is a variety larger in bunch and berry than Martha, and earlier. The vine is stronger and as healthy as the Concord.

Mr. Campbell, in reply to the inquiry as to whether its skin was too tender for shipment, stated that it was no more tender than that of the Worden. The Woodruff Red has proved itself a rampant grower and very productive. It is not of the finest quality, and has a rather thick skin, but it is an excellent popular market variety. Green Mountain is a strong vine, very fruitful, and is probably the earliest white grape of good quality. It is rather small in berry, however.

The Crandall currant is a variety of the Missouri currant, and the largest of the wild varieties. It originated in Kansas, and has the merit of being proof against the attacks of the currant-worm. Nor do the leaves fall, as they do from many other varieties of currant, from some unknown fungus growth.—*Garden and Forest.*

(From the Rural World.)

THE MISSOURI VALLEY HORTICULTURAL SOCIETY

Met at Merriam park. The day was perfect for a picnic, and those present seemed to enjoy themselves thoroughly. After dinner the Society was called to order by the President, J. C. Evans. The following committees presented reports:

ORCHARDS.

Mr. Campbell, of Merriam, reported that for his orchard, although sadly neglected last year bore half a crop and this year will have more than half a crop. He recommended light pruning, especially for old trees, and then all on the north side.

J. C. Evans thought that the members of the society ought to be glad to talk about their orchards this year, as the trees are full of fruit and further free from gouger and codling moth, something that has not occurred for years.

Major Holsinger thought that it was too soon to congratulate ourselves on being rid of the apple pests, as he found plenty in his orchard, especially on the early fruit.

Mr. Campbell thought that the codling moth this year has almost entirely confined itself to the Early Harvests.

L. A. Goodman has found less signs of the moth this year than ever before.

STONE FRUITS.

Mr. Hughes, of Argentine, spoke of a new black cherry he has, which ripens at the same time as the Early Richmond. Its flesh is firm, and the tree very prolific.

Messrs. Espenlaub and Holsinger spoke a good word for the Lieb cherry, it being not quite so sour as the Morello.

SMALL FRUIT.

Mr. Rees stated that he finds Mammoth Cluster, Gregg and Hopkins raspberry all profitable. Some years are in favor of one variety and some years another. His vines are in a ten-year-old orchard, and are well cultivated. He stated that his vines have been out sixteen years and he has never lost a crop.

VINEYARDS.

Mr. Espenlaub reported grapes looking first rate; no mildew nor rot. On the Concord the grapes on the bunches are somewhat scattering, but the increased size will probably make up for that.

FLOWERS.

Mr. Goodman reported the Hybrid Perpetual roses of all kinds doing well this year, but thought that none of the new varieties could take the place of some of the old varieties.

ORNITHOLOGY.

Birds were reported more destructive to cherries this year than ever before, especially the cedar bird or wax wing. Major Holsinger wished to add the Baltimore oriole.

ENTOMOLOGY.

Major Holsinger made a report on the experiments he has been making with the mole. He finds that the mole is exclusively an insec-

tivorous animal; it never touches vegetable matter. He regards the mole beneficial to the farmer and gardener. Several members vigorously took the other side of the question.

ESSAYS.

An essay written on the subject, "Flowers," by Mrs. J. A. Durkes, was read by Mrs. Fannie Holsinger.

MISCELLANEOUS.

Messrs. Goodman, Campbell and Key were appointed a committee to declare premiums on the fruit and flowers on the table.

They made the following report:

Best black raspberry, Harvey Hughs, 50 cents.
Best red raspberry, G. F. Espenlaub, 50 cents.
Best Houghton, Mrs. Hughs, 50 cents.
Best Downing (Smiths), Mr. Hughs, 50 cents.
Box currants, Mrs. Hughs, 50 cents.
Best sweet cherry, Mr. Hughs, 50 cents.
Best sour cherry (Osthrine), Mr. Hughs, 50 cents.
Best hand boquet, Mrs. Goodman, 50 cents.
Best table boquet, Mrs. Hughs, 50 cents.

An obituary committee, consisting of Messrs. Holsinger, Gano and White, were appointed, to report at next meeting, resolutions on the death of Col. Parks, first president of the Missouri Valley Horticultural Society.

The Society adjourned to meet at the residence of Major Holsinger, in Rosedale, on the third Saturday of July.

GEO. E. ROSE, Secretary.

MY GREENHOUSE PLANTS.

Read before the Missouri Valley Horticultural Society at their June meeting at Merriam Park, Kan.

MRS. J. A. DURKES.

'Tis said that "the noblest study of mankind is man," but from this I differ. The lover of nature can find much more of interest to occupy and elevate his mind in the observation and care of the fruits and flowers planted and cared for by his own hand. The green-house, kept for our own amusement, comes, perhaps, closer to the heart than any

other form of occupation. When the icy blast sweeps down from the north, we can shut ourselves in our little bower of greenery and forget the world without, for there each plant is a friend, each new leaf and bud a joy. One plant sent by a friend who has since passed over to the land of "ever-blooming flowers," another from one who has gone to a distant home—the associations connected with many of them place their value above price.

We are often told that a few plants well grown are better than many neglected. This is very true, but the person who grows the few plants well will not neglect the many. Diversity of form is the charm of a collection. Variegated and ornamental-leaved plants should be used freely to relieve the monotony of appearance when flowers are scarce; ivy geraniums, begonias, euonymus, palms and ferns of some kinds are easily grown.

Geraniums are especially monotonous in appearance, but we must grow a number of them for summer bedding. For winter blooming, Rev. A. Atkinson (dark red) and Queen of Belgians (pure white) have done best, one plant of the latter bearing eighteen trusses of flowers at once. Prince Bismarck is a good, fancy-leaved variety, the new foliage being as ornamental as a flower. A variegated ivy geranium covering a trellis four feet high is much admired, the white variegation frequently turning pink in warm weather. Geraniums are easily propagated. I let the cuttings lie until well calloused, before setting.

In roses the old Agrippina does best for me. One small plant bore eight flowers and buds at the same time. It is a dark red. Duchess of Brabant is a good pink. Roses can be bought too cheaply to trouble oneself propagating them.

Bouvardias are winter bloomers, and not troubled by insects of any kind. They may be had red, white and pink, single and double. Numbotti is different in form from the others; they are propagated from root cuttings. I take them from the pots, shake the soil from the upper part of the root and set away where they will keep moist. In a week or two the buds will have started, when the roots can be cut accordingly and planted in the open ground, to be lifted and potted in the fall.

Fuchsias are one of our most beautiful plants, easily grown and certain bloomers; the single is the natural and most pleasing form of the flower, and possesses an airy, pendulous grace, which is lost in the double varieties. When growing they should be well pinched in; they then start from every joint, and produce a greater abundance of flowers. They should also be well cut back after blooming, to strengthen the main stem so that it can sustain the weight of flowers and foliage

without any other support. Fuchsias require a great amount of water when growing, to get them to their best. Speriosa is an old plant, but cannot be excelled.

For those who have room, the oleander makes a grand show. Lilian Henderson, with its great trusses of white, heliotrope scented flowers, is a lovely plant.

The peerless calla gives a tropical effect to a collection. It is a water plant, and should, when not at rest, have all the water it can absorb; it should be set in a saucer, which must be constantly filled. In summer it may be bedded out; it will rest sufficiently without completely drying up. Amaryllis is easily cared for and showy, though of short duration. After blooming, keep them in a state of growth until the leaves are fully developed, then dry off gradually and set away under the bench. Amaryllis Johnsoni is probably the best for the amateur. Tritelia is a lily-like flower and blooms for a long while; several can be planted in a pot.

Yellow flowers brighten the house like sunshine, and should not be forgotten. Coronilla glauca is a good, yellow flower, and but little known. Jasmine revolutum, Linum flavum and yellow oxalis are all different in appearance and free bloomers; the oxalis is a good basket plant.

Chrysanthemums for cutting, a few of the best velvety pansies, and some violets for perfume, must all have a place.

Novelties are mostly a poor investment, being propagated to their utmost limits; the plants are always small and feeble, and frequently old kinds under a new name, the introducers going on the principle that if a rose does not smell any sweeter by another name, it will sell a great deal better.

The chief trouble in caring for a green-house lies in that name so useful to a woman and abhorred by the entomologist—"bugs." Thrifty growth and plenty of water is half the battle. A tablespoonful of liquid ammonia to a gallon of water is a good wash for green fly. With red spider I have had no trouble; a moist atmosphere and water will prevent their appearance.

Tobacco is the universal remedy for green-house pests, and is the best place for it; let the fire smoke it. My especial dependence for keeping plants clean and thrifty lies in soap-soads. On the weekly wash-day everything gets a good shower and soaking. Never waste any soap-suds; if you have more than you need for your flower garden, pour them around your rose-bushes and shrubs; in winter, on the ground you use for flower beds; you get the value of the soap twice over.

For those who cannot obtain sand for propagating, I would recommend old chip manure. If there are any bits of wood remaining in the soil sift them out, cutting root much quicker and grow faster when struck, if they have rich food within reach, than when struck in sand and depending on an uncertain quantity of water; the chips must be well decomposed. Two years since I took a boxful where the sawdust from the ice house had been thrown; the cuttings nearly all died off. I took some up and found them hung with minute white worms. This year it could not be equaled for growing seedlings. For forcing cucumbers, melons, etc., in the green-house, I make boxes of thick brown paper or thin pasteboard, about two inches across, fill a flat wooden box with these (match boxes are just right), fill the boxes with this sort of soil and plant two seeds to a box; when ready to plant, lift each paste-board box with a garden trowel and set in the ground; there is no disturbance of the roots and no set-back in the growth, as in pot-grown plants.

The contents of an old hot-bed allowed to lie make good potting material. Plants require richer soil in pots than in the open ground, for the reason that the roots are compressed in a small space and have not the same amount to draw sustenance from. Water and heat cannot make a strong plant, which is the reason that so many green-house plants when bought appear vigorous, but when bedded out come to a stand-still. If possible, have a little green-house; keep the plants out of the heat and dust of the living-room. A few blooming plants can be brought in and carried back to give place to others, and the satisfaction of having your own bedding plants and knowing they are well seasoned will pay you for your trouble.

BIRDS OF SOUTH AMERICA.

Paper read before the Missouri Valley Horticultural society, by Dr. Edwin R. Heath, Kansas City, Kas.

As one enters South America everything appears new and strange. Our orchards dwindle into *huertas* of a few orange, lemon, mango, alligator pear, fraile plum, date palm, olive trees. An article on birds, to be read before a horticultural society, ought to have some reference to the matter under consideration. As there are no orchardists there as here, there can necessarily be no ground for considering the birds of that country in connection with the fruit interests, as with us. In

tropical Ecuador, Venezuela, the Guianas, Brazil and Bolivia, the parrots eat a few bananas, but not enough to annoy any one. The rice fields of Peru being flooded during most of the early life of the rice plant, birds can do little or no damage. During the rice harvest the little they take is not felt. Sometimes the pigeons annoy the Chilian wheat farmer. There are extensive vineyards in Peru, Bolivia and Chile (there is no such place as Chili), but the birds do not seem to do any damage. On the contrary, they destroy the worms and bugs that otherwise would injure the vines. There are some birds familiar to us —the pigeon, mourning dove, heron, bittern, whippoorwill, pelican, kingfisher, gull, snipe, crane, duck, and many others. The swan has a white body and black neck. None but a naturalist would recognize the bluejay in his new dress of dark brown back and red breast, but would suppose it to be the robin. The nightingale whistles; the meadow-lark is silent as it soars to meet the sun in the morning.

The birds on the mountains differ from those on the plains. The goat-sucker family have several varieties. The whippoorwill seeks higher altitudes than the other three species that articulate sentences. The most common of the three sits near your door, and flies and alights three or four yards before you as you walk along the road or path, crying "Who-are-you, who-who-who-are-you." Another bids you "Work-away, work-work-work-away." A third cries mournfully "Willie-come-go, Willie-Willie-Willie-come-go." They are found near herds of cattle, and perform the same offices for the herds at night that the cow blackbird does by day. Except for the cow blackbird and the goat-sucker, cattle would soon become extinct, eaten up by the grub of the œstrus fly.

There are many varieties of blackbird; one jet black, a very fine singer, is a common pet; another with yellow markings, the *tordo-curichi* of the natives, or marsh blackbird, is also a fine singer and domesticated. The woodpecker is known as the "carpenter." Besides the two bright-colored woodpeckers, there is one with plumage of a mottled-gray, only found in Peru.

On the Andes, from Peru to Chile, there are a few grouse. On the Chilian Andes there is a mountain duck called *Pato de la Cordillera.* It frequents streams that have many rapids and falls, and you can hear them far off. Their play is to ride down the falls and rapids and then hurry back as fast as possible, as children do in sliding down hill, and their deafening clatter could easily be understood as talk and laughter over their fun. So intent do they become in their play, sailing down falls ten or fifteen feet high and returning for another plunge, that they can easily be approached.

There is a beautiful little wren found on the west coast from Peru to Chile, called the "seven color"—*Regulus omnicolor*. Its crest projects behind the head and is formed of three layers of feathers; the lower one is yellow; the middle one brown; upon this, at the back part, is a layer of bright red. The sides of the head and neck are blue, throat white, the back golden like the golden hues of the humming-bird; the breast, under surface and sides of the body are yellow, except under the wings, where a double line of brown marks it, as mountains are represented on maps; the tail quill-feathers are dark brown above and white beneath; the small feathers at the junction of the tail with the body are red beneath and golden green above; the quill wing-feathers are a dark brown; where the quill and wing covers join is a band of yellow, and the under surface of the wing is also yellow; the edge of the wing has alternate white and dark-brown feathers. The nest, built on the side of a rush stalk, is as pretty as the bird. The rail and water-hen are its companions. One variety of water-hen has the part of the body behind the legs and the thighs spotted white.

In Chile there is a duck that looks as if it had been evoluted from a rail, a water-hen and a duck; its toes have flat projections, but are not joined by the web; its color is a bluish-black, the outer quill-feathers white.

Occasionally one finds on the west coast a little bird with two very long, slim, delicate tail feathers. Some are white, others gray. The body is about one-fifth the length of the tail, and its name is about as long as the tail—*Sylviorthorhynchus desmurii*. There is a small red-breasted bird, with female dark brown on the back, that has a geographical range from Mexico to Chile. It is believed by the natives to be unfaithful to its marital vows, and is called *Putilla* (little prostitute). The "roues" of that country wear charms, of which the ashes of this little bird form an ingredient. A little cross, a wish-bone, a bit of magnetic stone and some red medicinal beans carried in a little sack on the breast "form a charm that virtue cannot resist."

While at a rubber camp on the Madeira river in Brazil we heard the Indians speak of an "organ bird." They said its song imitated well the tones of an organ. One day while hunting for birds we heard, just at our elbow, the natural scale run downward from C to C. Every note was clear, distinct and very musical. We watched carefully for the bird, it seemed so near. The foliage there is dense, and while parting the branches where we had heard the bird, it had hopped away a little distance. Keeping quiet a moment, its song was again heard a little further away, and then a small bird, grayish in color, flew out of the bush. When we told the Indians what we had heard and seen,

they said it was the organ bird. Often afterward we heard the sweet, organ tones, but did not succeed in getting a specimen of the bird.

As you walk in the forests of the Amazon, admiring the begonias, the calas, the leaf-cut, the flitting here and there of the large blue butterfly, you find yourself mentally exclaiming, how beautiful! A little bird, as if placed there to guard these beauties, and a true interpreter of your thoughts, keeps singing *si pues, si pues* (Spanish for "certainly.") Of all the birds that articulate sentences or send forth notes similar to what we hear from other sources, the *Campanero*, or bell bird, is the most wonderful. It is found in Brazil and the Guianas. It is as white as snow, and about the size of our bluejay. On its forehead rises a spiral tube nearly three inches long; this tube is jet black, dotted all over with small white feathers; it has a communication with the palate, and when filled with air looks like a spire, when empty it is pendulous. Its note is clear and loud, like the sound of a bell, and may be heard a distance of three miles. The naturalist, Waterton, speaking of this bird, says: "In the midst of extensive wilds, generally on the dried top of an aged mora, almost out of gun reach, you will see the campanero. No sound or song from any of the winged inhabitants of the forest, not even the clearly pronounced "Whip-poor-will" of the goat-sucker, causes such astonishment as the toll of the bell-bird. With many of the feathered race, it pays a common tribute of a morning and evening song; and even when the meridian sun has shut in silence the mouths of the whole animated nature, the campanero still cheers the forest. You hear his toll, then a pause of a minute, then another toll, and then a pause again, and then a toll, and again a pause; then he is silent six or eight minutes, and the toll is repeated. Orpheus himself would drop his lute to listen to him, so sweet, so novel and romantic is the toll of the snow-white campanero." It belongs to the cotingas, of which there are several varieties. The scarlet cotinga has a crown of flaming red; to this abruptly succeeds a dark shining brown, reaching half way down the back; the remainder of the back, the rump and tail—the extremity of which is edged with black—are a lively red; the belly is a somewhat lighter red; the breast reddish black; the wings are brown. There is a purple cotinga with brown markings, and a pompadour cotinga, entirely purple, except its wings, which are white, their first four feathers tipped with brown; the great coverts of the wings are stiff, narrow and pointed, being shaped quite different from those of any other bird. When this bird is betwixt you and the sun in his flight, he appears uncommonly brilliant.

On the plains of Brazil and Bolivia the beautiful cardinal bird is common. It is easily domesticated, and when an extra fine singer is

valued at from $25 to $100. While in Bolivia we had six cardinal, nine tordocurichis, eighteen jet blackbirds, a green talking parrot, two blue parrots, a night-bird that slept all day, two macaws, a number of paroquets and "love-birds," and a hump-backed jacamar, called corcovado, or midnight bird, as it is prompt with its cry at midnight. All these were captured near the little town of Reges, where we resided a year and a half. They were not caged long, being easily tamed. The macaws were jealous of any attention paid to the other birds or pets. When we lay in our hammock or sat outdoors, the birds would perch on our shoulders, our lap, our head and beard. Then the macaws would scold and hurry to drive them away. The corcovado is shaped like a Guinea hen, and is the size of a small turkey. It is very rapid in its run, seldom flying. Its home is in the dense forests of the Amazon valley, together with several varieties of mutuns, or wild turkeys. Our corcovado was quite tame, and would come up to have its head scratched, but would resent any greater familiarity. Its cry was a whoop-whoop-whoop-whoop, made by drawing in its breath. When the lungs were inflated the air was let out with a burr-r-r-r. When the church bells called the faithful to mass, he would start on a run, pass up and take his stand before the pulpit, and stand there quietly perched on one foot, apparently in deep devotion or asleep. As soon as the priest would begin services, the corcovado would respond whoop-whoop-whoop, burr-r-r. He also would make responses to the chants of the choir. When mass was over he would walk out solemnly, like any other good Christian.

On the marshy plains of Bolivia and other parts of the Amazon basin, immense numbers of white cranes, snipes, curlews, spoon-bills, scarlet flamingos and ducks are found. The radial wing-bone furnishes the material for the Indian flutes. In the forests the wild turkeys, where man and his gun have not frightened them. are as tame as barnyard fowls. On the sand-bars are flocks of gulls. Perching on the branches overhanging the streams are flocks of ciganas; they are a species of kingfisher and the size of a Guinea hen. In the forests of the Amazon basin the parrot tribe, from the macaw to the love-bird, in many colors and sizes, abounds. On the higher plains of Ecuador the humming-bird is found in its greatest variety and abundance. The beautiful scarlet-crested "cock of the rock" and golden pheasant frequent the mountain regions about the equator.

Nature sometimes appears to create monstrosities. A bird with a bill as long as its body and nearly as large, called the toucan, is a good representative of this class. Upon the trees where the hanging nests are numerous you will see the toucan. You will see it alight on a

branch near a nest, dip down into it, pick up an egg, toss it in the air, catch it in its throat as it falls, while the owners of the nest fly about scolding and lamenting. At one time we had a tame one and fed it on eggs and bananas. All its food was tossed in the air and caught as it fell.

Upon the plains of Bolivia and the Argentine republic the rhea, or South American ostrich, makes its home. Near Mendoza, in the Argentine republic, are several ostrich farms. In Reges there was a tame one that went about at will. The children played with it. Daily it came for food to the places where it was fed. We used to amuse ourselves seeing whole bananas pass down its long neck. It stood five feet from crown of head to the ground. The eggs are used for food, but are not as agreeable as other kinds, being strong in taste.

The condor, or "king of the vultures," is a bird of South America, and a veritable monarch among the feathered tribe and its species. When he approaches, the buzzards retire. While he dines they form a circle around him at respectful distance and await his permission to join the feast. They attain a spread of wing of fifteen and eighteen feet. Their home is among the mountains, but they keep a close supervision over the plains. One accustomed to look for them can see them almost any time, a mere speck in the sky, only recognizable by its moving. At an elevation of 10,000 and 18,000 feet you still see him above, around and below you. On the passes of the Andes, where cattle are smuggled from the Argentine plains into Chile, they sit on nearly every crag about the dangerous places, where the heaps of bones tell how often he has fed on the unfortunate victims of misplaced footsteps. They are great gluttons, and gorge themselves when they can. Rising heavily, they have to make a run or a series of springs to gain momentum in order to rise in the air. They are easily lassoed or killed with a club by building a stockade about the carcass placed for bait. They cannot rise, and so are often taken alive. They will not attack until the prey is either dead or helpless.

In 1870 one of the carriers of mail between Chile and the Argentine republic slipped and injured his legs so that he could not walk. He had not lain in the place he fell many hours ere he had a circle of condors about him, and outside of them a second circle of buzzards. While awake the condors would walk about, apparently conversing with each other over the best means to dispatch the unfortunate one. When exhausted by long vigil or quiet a moment, one would step up and give him a nip which would arouse him, and by a good use of his staff they would retire. What must have been his thoughts as he kept his lonely watch for four days and nights! When found, he was wanting an eye,

part of a cheek, a finger, and had many bruises. Not always are they as fortunate as he. It needs no words to tell the horror of such a scene.

Sometimes the naturalist meets with annoyances. One day, returning with a goodly number of birds, we sat down to skin them. The lady of the house also sat down beside us, and we kept up a lively and pleasant conversation, which she broke with the remark: "There, now, I have helped you so much." And so she had. She had plucked them of every feather and pin-feather as clean as the most fastidious housewife could have wished a fowl plucked for cooking.

HOW BEST TO MARKET FRUITS.

Captain E. T. Hollister, of St. Louis, Mo., in a paper on "How Can Fruit Growers Best Maintain Prices of their Products," read before the Alton Southern Illinois Horticultural Society, at Upper Alton, recently, said:

When you have gone through the process of planting and cultivating, and the reward of your labor is seen in the bountiful crop, then comes the problem of how to pack and where to send to best maintain prices. If in the first instance it is absolutely necessary to produce the best grade of fruit, much more so now to secure the best results. After the long and constant care to secure some of your crops (seven years for peaches), neglect, inattention, or

WANT OF SKILL IN PACKING,

Is fatal to both man and fruit. Some knowing person has said a good thing which all may not have heard, "Honesty is the best policy." As a codicil I will repeat another wise one's saying, "If you can't be honest, be as honest as you can." I know that much unjust criticism has been passed on the fruit-grower, and more than often a single box of strawberries has become the text for insult. Would it do any good for the critic to become producer? It is a self-evident fact that the fruit and packing should be of the best character. Your product comes in competition, not only with your neighbors, but from many points South and elsewhere, and, as a matter of course, the best finds the ready sale and best price. Some years since I had occasion to ask a fruit-grower, why his peaches showed so much and good color? They were packed in third-bushel boxes. He said in packing he was only following nature; that he found the best and highest colored fruit around on the outside

of the tree. There were no windfalls or trash inside, however, as in another instance, which, upon inspection, proved to be so outrageously packed, the owner never called for his money. Not one in a hundred can bring fruit, such as berries, in a wagon without springs, yet I have known one to do so many times, and his fruit was in good shape, and reached market uniformly and in the best condition. It is needless for me to say anything as regards

THE PACKAGE TO USE.

So far as small fruits are concerned, the sixteen-quart case has been most extensively used with satisfaction. The one fault common is the scantiness of tacks in putting the quarts together, and so with the usual rough handling in transportation, the upper tier is apt to break down. An extra tack or two will remedy this, and go far to make good sales. Of course your cases and quarts will be new, bright and clean, and the top never be fastened with light or temporary nails. Should you be so fortunate as to have good local markets, your fruits should be fairly and evenly ripened; if for a distant shipment, strawberries colored in part are firmer and will color in transit.

My experience has made me set the highest value on the Duchess pear packed in barrels. In planting more I would not take them on the quince stock, only so as to secure earlier bearing and to plant alternately with standards. My reason is that in a few years' growth they become top-heavy and are frequently blown and broken off at the root; while the pear stocks keep them firmly in their places and eventually carry more fruit. I suggest to the pear-grower the "Keiffer" as one that, properly handled, will be profitable to plant. It ripens, or rather is well colored, and ready to take after all other pears in this section are gone. And here, a word to the wise:

FINDING A MARKET.

The question now will be where to find such a market as will best maintain prices. With this comes the problem of transportation, which must be taken into account. The individual shipper is at the mercy of the railroad and express companies, who, without fear, favor or affection, for a ten to twelve hours' transit, take not less than twenty cases out of one hundred of berries for their portion, while the commission man takes ten more. You can then see what is left for you to pay for packages, picking and cultivation. The fruit-grower has no subsidy to relieve him, no protection from the extortionate freight charges, and often no relief for damage while in their charge. Can the fruit-growers here combine in their shipments to secure lowest rates? California

has long practiced this; without it they could not live. Cobden growers and others have operated on the plan with satisfactory results. I simply make the suggestion that some practical plan may be discussed and adopted. I think the times are ripe for some such movement. We have a great river at our door; there are good boats running on schedule time, which may reach some markets in thirty-six hours. My experience in this was most satisfactory. My berries would arrive in that length of time in better condition than by rail in twelve hours. I always patronized the boats freely; never had but one detention of consequence. The free circulation of air, with the smoothness of motion, makes the advantages of this route self-apparent.

STYLE OF CUSTOMERS.

It will be well for the shipper to occasionally follow his fruit, note its condition on arrival, and see what and how others are sending. Such an object lesson will prove well worth the time and expense. Another point he will make by such a trip is to see the market and style of customers at the different places. Some will take one grade or class of fruit, another a different, perhaps better grade; such personal knowledge will be of great benefit, and is essential to success in this business. By knowing the character of your market, you can discriminate as to quality, not daring to send to the one what would readily move in the other. I always have two grades to ship, and one I reject, which may in part find use in the family.

This personal observation at the end of the route will go far to explain some of the reports of the commission men. Occasionally I have been made ashamed to see some of my apples, knowing my instructions as to the packing had been positive and to select close. I have about come to the conclusion that human nature has fallen below what it was, and instructions to help now need more than the simple "go and he goeth, do this and he doeth it." In order to know how the packing of fruit has been done, I adopted the plan of marking each package with a number or initial, keeping a record and notifying consignee.

The fruit-grower has at times some fancy berries, peaches, etc.; these have found highest prices in the large cities, such as Chicago or Kansas City. My best price on such was one dollar per basket for peaches in the latter place, and early in the season as good prices there on asparagus as at Chicago. For your shipment select good commission men in a few markets, keep in constant communication with them, use the wire freely, send them the best and in the best shape, and they will have your fruit to arrive in good condition.

To dispose of our products in local and near markets, without the middle-man, or if buyers could be induced to come, these methods would prove very satisfactory. We cannot wait for the buyers to come, nor will local and near markets take all our fruit; the alternative is to trust your fruit to the tender mercies of the railroad and the commission man; in fact much of it is all trust and little or no pay. That there are dishonest commission men we all know by experience; this should make us wiser and stick to the true and tried ones. The producer is at the bottom of the ladder; his efforts to ascend are met step by step with difficulties, unfavorable weather in planting, growing or harvesting, insect enemies, predaceous birds, high and often exorbitant freights, with many other hindrances, too numerous to mention. There is no royal road here, yet success lies at the top of the ladder. There will be found fruit of the very best quality, the packing will be beyond criticism, and the reward (which may not be of large money value) satisfaction born of success and a desire to accomplish better results in the future. The good time is coming if we work for it. Right alongside of personal work, and often dear-bought experience, is the best information to be had by becoming a member of this and the State Society. The proceedings are published near the beginning of each year. The last volume is full of horticultural knowledge and is itself a library.

A VISIT TO JUDGE SAMUEL MILLER.

EDITOR RURAL WORLD—About the middle of June I had a week's leisure time for recreation and pleasure. I availed myself of a kind invitation to visit Judge Samuel Miller and family, of Bluffton, Mo. As St. Charles and that place are both on the Missouri river, I boarded the staunch steamer Helena and landed twenty-four hours later at destination, where I was most cordially received by the Judge and his most estimable wife and their family. I owe them all sincerest thanks for kind hospitality and friendship extended during my three days' stay among them. To the Judge I am under lasting obligations for advanced and many new ideas appertaining to horticulture, derived from conversation and practical demonstration. Any person who feels the least

interest in these matters can spend no time in the company of friend Miller without being benefited and without increasing his knowledge regarding them; knowledge gained by him during a long life devoted to his calling, much through the costly school of experience, is by him generously imparted to all for the asking. No "hiding of light" here. Let all men emulate Mr. Miller for the benefit of mankind.

To properly mention all I saw during my visit would occupy far too much of your valuable space, hence will mention only a few objects. The strawberry seems to be friend Miller's favorite fruit, and his collection is certainly extensive and very interesting. I had the pleasure of seeing and tasting quite a number of new and old sorts. Of the former I will name the "Ladies' Pine," of which a few straggling specimens were yet on the vines and the flavor of which was exquisite. It seemed to fill every crevice of the mouth with its delicate scent and perfume. While it would hardly pay to grow this berry for the money that is in it, it is highly worthy a place for the merit that it contains. Among the newer sorts I was favorably impressed with "Schnell's Late," a variety produced by Mr. Henry Schnell, of Glasgow, Mo. The vine and fruit closely resemble the Crescent; it also appears as productive, while its season of maturity is very late, filling, I think, the gap that usually occurs between the last picking of this fruit and the raspberry.

An interesting feature is a long row of new kinds, mostly sent the Judge for trial; every few feet another kind, with sufficient space between to prevent mixing, some with no fruit remaining, others with a few straggling berries, again others just in their prime, still another just turning color, while one is just in full blossom, promising berries at their best on July 4th and later. The report on these will be interesting reading indeed when the Judge gets ready to make it.

The soil of Bluffton appears specially adapted to the development of the strawberry. I noticed no unusual culture or care bestowed on the beds, and notwithstanding only the tailings of the crop remained, all the berries were perfect in shape and no button-shaped nubbins, so common at that period of the season. I saw Capt. Jacks on plants which I sent in April last as perfect in shape, color and flavor, if not fully the size, as I ever met on beds in their full prime. Where such "Jacks" grow, there is no need to look for better to take their place while they last. Well may the Judge be proud to be the first to introduce this sort; it fully justifies all he ever said of it when first brought out.

The assortment of apples, pears, peaches, cherries, plums, grapes, raspberries, etc., old and new sorts, is very large and interesting. But to speak of all would lead beyond allowance; will, however, mention

one item. I had frequently wondered that friend Miller should recommend Schaeffer's Colossal as the best red raspberry. With me and wherever else I met with this kind it was rank in growth, beyond control almost, hardly productive or firm enough for market purposes, and not nearly the equal in quality of fruit of most others. After seeing his hedge, which showed nice (not overgrown) growth, with canes loaded down with large, perfect berries, some just turning color, while some were blooming, I don't wonder any more. Of the quality attained by this berry at Bluffton I could not judge, they not being ripe.

Another item or two and I'll quit for fear of the W. B. On a mountain just east of friend Miller's place, five hundred feet above the river, lives his eldest son Robert. A most beautiful place it is, affording a view of the picturesque county for miles away. Here were growing in luxuriant health and vigor, besides apple, pear and peach trees, grape-vines, etc., a number of Mazard cherry trees, loaded wonderfully with fruit, some trees earlier, some just ripe, others beginning to ripen, some jet black, others deep purplish red, and another light red in color. The flavor was sweet, with a very pleasant spicy twinge. In my estimation this cherry is preferable to our black Murello, and the trees as seen here were certainly as hardy and more productive. Seldom, if ever, have I met this cherry of the size and quality like here. If these are new kinds, why not propagate and introduce them, friend Miller?

In climbing the hills around this place I admire the agility and "springiness" of a man of three score and ten, but in another way has the Judge retained the vivacity or capacity of youth. I do believe he enjoys a mess of ripe fruit as much as any youth in his teens. To see the old man sit down in the shade of a tree with a dish of cherries before him, and notice the enjoyment he gets out of it, is a feast in itself. Verily the pleasures offered man by Pomona do not grow old with those who worship at her shrine.

I must not close, however, without mention of the excellent and extensive collection of roses and chrysanthemums which I saw in the nicely arranged and neatly kept flower garden near the house. The former show their charms to some extent, and were beautiful, indeed. The latter were not yet in bloom, but the list of varieties was assurance of a grand display when their time comes. This department I understood was under immediate care of the charming and accomplished daughters who grace the household of our esteemed friend.

Respectfully,

C. T. MALLINCKRODT.

St. Charles, Mo., July 29, 1890.

HORTICULTURAL MEETING.

From the Rural World.

Greene County Horticultural Society held their July meeting at the house of their secretary, Mr. Holman. The day was fair and the attendance good.

After dinner upon the lawn, President Hopkins called the society to order and proceeded to interview the standing committees, who reported

ORCHARDS

In good healthy growth, and showing better outlook for a crop than reported at last meeting. As the apples grow the quantity is better in sight and more satisfactory, Ben Davis showing most fruit. A few large, red-cheek peaches were picked from trees near the table, but as a rule that delicious fruit failed in our county this year. Pears are also scarce.

VINEYARDS.

Most varieties in use set fruit freely. Concord and a few others are rather thin in the cluster, but growing nicely, with very little rot; promise good size in berry. Committee recommends early bagging as only surety against fungus, bees and birds.

SMALL FRUITS.

Mr. Tullis said after a few years' experience with small fruits, he now wishes he had planted more blackberries; he had not made strawberries pay him.

Mr. Wade, of Republic, had grown this year more strawberries than he could market at remunerative prices, and though he and his brother had left 100 bushels unpicked upon their grounds because of low prices that would not pay, he was yet hopeful of profit from strawberry growing in the future; thought growers needed organization to procure better rates in transportation, and practice more system in both harvesting and marketing.

Messrs. Hopkins and Davis had done fairly well, but had not realized as satisfactorily as last year. The varieties most in favor with growers at present are, in strawberries, Bubach No. 5, Cumberland T., and Windsor Chief; Hopkins raspberry, and of blackberries, Western Triumph, Missouri Mammoth and Kittatinny.

FLOWERS

Had been abundant and beautiful, but hot dry weather had caused a rest to the roses especially, and rain was wanted to revive even best bloomers. Old, tried H. P. S. were still in favor, and so with monthlies. Some of the old are as good as the best.

VEGETABLES.

Early vegetables maturing before dry weather came had succeeded well. Potatoes not so large as usual, but of excellent quality.

PREMIUMS.

Awarding committee give premium on best collection blackberries, seven varieties, shown by Hopkins & Davis, $2.

For best quart Kittatinny, G. W. Hopkins, 25 cents.

For best quart dewberry, G. E. Davis, 25 cents.

For best quart red raspberry, G. E. Davis, 25 cents.

For best basket cut flowers, Miss Emma Kirchgraber, 50 cents.

For best collection balsams, Miss Blanchie Lair, 50 cents.

Committee make special mention of fine cabbage head by V. P. Kirchgraber; sample fruit, wood and foliage of Bonanza B. C. raspberry, by W. C. Freeman.

A new and interesting blackberry found upon the grounds of D. S. Holman; it is of fair size, sweet and unlike all others in color—pinkish, or nearly red—worthy of watching.

Upon invitation the Society decide to meet the second Saturday in August upon the Drury college campus.

Bill of $1.40 was presented by Springfield Daily Republican for publishing notice of this meeting, which was allowed and ordered paid.

The president, by request, promised for next meeting a paper upon the "Press in Horticulture."

WHAT CAN WOMEN DO IN HORTICULTURE?

BY MISS EMMA LINDSEY, SPRINGFIELD.

What can women do in horticulture? Why, do as they have done in the three hundred and forty other occupations into which they have fought their way through prejudice and universal manly sneers—make a success of it, of course. Not that all women succeed in business, but given the same opportunities, she is a little more certain to make a success of it than a man, simply because no woman ever leaves the shelter of her home and goes out to fight life's battles unless compelled thereto by the needs of herself and family, and feeling that

need, she works with a more determined will, with more vim and energy. The average woman works as though she was putting out fire. A man goes along leisurely and takes his ease, often spending more time getting ready to do a thing than a woman would in doing it. I don't say it is the best way, but it is woman's way. If she has anything to do, she flies at it and does it—not because she likes to work, for the average woman don't, but from a sense of duty.

There is a vast amount of trash afloat about women considering men out of their places, but the men have no call to be uneasy. Let them retaliate. There are the bakery and laundry; they are welcome to both, but we want the professions, horticulture, flower raising and kindred trades.

But as this society wants facts, and not sentiment, I will try to show you a few things she has accomplished. A woman forty-three years of age, living in South Carolina, has followed the plow and engaged in all other farm labor for thirty years. She has dug one well, built five chimneys, and frequently split one hundred rails a day. She has a good home, enjoys excellent health, is sending her children to school regularly, and keeps a husband simply for ornament and entertainment.

One of the largest land-owners in the world is Mrs. Emma E. Forsyth. She has a plantation of 150,000 acres on an island near New Guinea, and employs over five hundred people on it. Mrs. Miller, a widow living near Fort Niobrara, Nebraska, has a claim on which she raised with her own hands in one year, three hundred bushels of potatoes, fifty bushels of corn, three hundred heads of cabbage, twenty bushels of turnips, fifteen bushels of beets, five bushels of peas and two barrels of sorghum, besides fattening two hogs and feeding her large family of small children from the products of her land.

A stock company known as the Englewood & Los Angeles Floral company, composed entirely of women, has been organized at Los Angeles, Cal., for the cultivation and sale of flowers, ornamental trees, shrubs, ferns and plants. The capital stock is $50,000, divided into 10,000 shares of $5.00 each.

Mrs. Ingalls, of San Jose, Cal., owns a fruit farm of 12 acres. She has the sole management of it and gives her trees the most careful cultivation. Her crop has sometimes yielded her as much as $4,000 a year.

Mrs. Alzewth produced near Manatee, in Florida, the first coffee ever grown in the United States. She has 26 trees on her plantation, and has successfully demonstrated that under proper cultivation, coffee may be grown in the latitude of Florida.

Jennie June, in her trip to California, speaks of a woman who owns a fruit farm of several hundred acres, and says the other day she wrote: "We are just now trying to decide on the colors of the fine new wagon which is to carry our fruit to market. Shall it be gray and crimson, or brown and canary? The beautiful fruit must have a beautiful medium of transfer."

"Just like a woman," I hear the men say, but be still, my brothers, and listen to this. There are sixty-two thousand women in America engaged in the cultivation of fruit, and among them are some of the most successful orchardists of the nation.

The story of the New Jersey mother who sent two boys to college with the receipts of her strawberry bed is too well known to be reported. But a woman in New York bears off the palm for one summer's work. She was left a widow with a small farm heavily mortgaged. The land was badly run down, but she observed that the only thing that thrived was raspberry bushes. She took Nature's hint and planted out five acres with choice cuttings. The second summer they were laden with fruit. She hired women and girls to pick the fruit, used great care to pack it in an attractive way and sent it to market the same day. At the close of the season she found her poor sandy farm had netted her $1,500.

Miss Austin, the owner of Hedgewood vineyard, was the first to start raisin culture in California. She was formerly a school teacher, now the proprietress of a thriving fruit farm. Her raisins are produced from sweet muscats, and she markets about 50,000 pounds annually.

California raisins are now considered the best in the market, and the industry is growing rapidly. In the year 1880 there were shipped 860,000 boxes, in 1889, 1,640,000 boxes, representing nearly 33,000,000 pounds. It is estimated that the average returns amount to $264 per acre.

When first assigned this subject I thought it rather a knotty problem, for the most of woman's work in horticulture is by the very nature of the case, never counted. The many hours she toils in fruit house or berry patch while her husband is off selling his fruit, is as a general thing a minus quantity. The business is Mr. Smith's, he being "one of the foremost" horticulturists in the county, and she, albeit she works just as hard, is only a helper. But in the case of old maids and widows, there is some chance of being counted what you are worth.

Judging by the reports of the State society, one would think there were no women engaged in horticulture in this State. With the exception of an occasional essay or committee on flowers, they are almost entirely ignored.

If the horticultural society of Missouri wishes to prosper and fill the honored position in this magnificent State that it is entitled to, they must wake up and advance all along the line. It is no use, my brothers, to try to longer hold woman in the little, narrow sphere in which prejudice and ignorance have placed her.

Miss Willard says, "Woman is surely coming to her kingdom," and Miss Willard knows, for she lives upon the watch-tower and can see the beckoning hand of fate calling to the daughters of this nation to arise and occupy their half of the land.

I paid a dollar once to become a member of the State society, and for several months I laid the "flattering unction to my soul," that though only a poor country girl, I was, nevertheless, a member of the Horticultural society of the great State of Missouri. Imagine my feelings, when one day meeting your good Secretary, he handed me a dollar, saying women could not join by the payment of the regular fee. I went home and read the constitution and felt that it said, if not in word, at least in spirit, "no woman need apply."

SOME STRANGE PLANTS.

The Government has been going quite extensively of late into the propagation of whisky shops and lager-beer saloons. Its laboratory employed for this purpose is the National Botanical garden here; for the lager-beer saloons and whisky-shops referred to are purely of a vegetable nature. They are, in fact, nothing more nor less than plants of a very extraordinary description, which devote their attention exclusively to the manufacture and sale of intoxicants. A reporter learned that attention is being given to an investigation of their manner of doing business and to analyses of the liquor they dispense, which is expected to have very important and useful results, opening up a line of inquiry in an altogether new direction.

The vegetable whisky-shop is perhaps the most astonishing plant in existence. A number of members of its family are represented in the green-houses of the botanical garden. Each one does business on its own hook, and most of them sell different brands of liquor, that supplied to customers at one shop being unlike what is offered at another. This does not appear surprising when it is considered that every vegetable whisky-shop does its own distilling.

GENEROUS BARS.

You would be struck at once with the curious appearance of one of these vegetable whisky-shops if you saw it standing in a big flower-pot, carrying on the end of each of its long green leaves a pitcher-shaped receptable. If the plant is open for business you can look into the pitchers and find them to contain quite a quantity of watery-looking liquor. This is the intoxicant which is offered to customers, each one being permitted to help himself to as much as he likes for the stipulated and invariable price. Maybe you will find the pitchers all shut up, for each pitcher has a cover that shuts down whenever any rain or dew is falling to prevent the liquor from becoming diluted.

Now, the customers spoken of are insects of all sorts—such as blue-bottle flies, mosquitoes, cock roaches, red ants and so on. There is not a bug of any sort, apparently, that has not a weakness for the liquor supplied by the vegetable whisky shop. The insect walks out on one of the long leaves until he comes to the end of it, and finding here a quantity of delicious drink in the pitcher, he crawls in and swigs and swigs at it until he dies, as is supposed, of alcoholism. At all events he pays for his drink with his life, and leaves his corpse in the pitcher to sustain by its absorption the healthful existence of the plant. And it is just for this object—to entrap customers for food—that the plant prepares and places on sale its liquor. What the said liquor is composed of, chemically speaking, attempts are now being made to find out by analyses. So far it is only known that it is a powerful and palatable intoxicant. How much the insects enjoy it you can perceive by looking into the pitchers, where you will often find in each receptacle hundreds of bugs of all descriptions. Another form of the vegetable whisky shop has long, perpendicular, trumpet-shaped receptacles for the liquor, with the wide end of the trumpets at the top, where the bugs are expected to crawl in. And when you tear open one of these trumpets —it may be a foot or more in length—after it has survived its usefulness and dried up, you will usually find it filled from one end to the other with flies and ants and such things.

VARIETY OF DRINKS AND PATRONS.

It has recently been discovered—and herein lies the expected usefulness of the investigation now going on regarding these plants—that different vegetable whisky-shops, like their prototypes on the city streets, have different classes of customers. One kind of these shops is frequented almost exclusively by cock-roaches, for whose reception unusually large pitchers are provided—the plant carrying them looking as if it had suspended from the ends of its strong leaves a lot of small

bath-tubs. Another kind, with pitchers that resemble in appearance great big beans, is frequented only by red ants; and still another kind is patronized by slugs, and has the rims of its pitchers armed with teeth to delay guests who might wish to depart. So it would appear that these whisky-shops could be propagated for use in destroying such enemies of the household and the garden, and it is proposed to find out how far such a thing may be practicable. There is no difficulty, certainly, in rearing and maintaining the plants, which are not tropical exotics but natives of this very region about Washington, and readily to be cultivated in any temperate climate.

THE BEER SALOON.

Quite as interesting in its way as the whisky-shop is the vegetable lager-beer saloon referred to at the beginning of this article. In general appearance it resembles the whisky-shop strongly, but its pitchers are wider at the mouths and have no tops to them. Thus the liquor dispensed by the lager-beer saloon is diluted more or less by the dews and rains, so that it is not very intoxicating. However, the drink is intended to attract the insect customers and not to poison them. Patrons, crawling into the pitchers, take a drink, and, without feeling it go to their heads very much, start to walk out again. But, unfortunately, the whole inside of the pitcher is lined with strong, hairy projections, all pointing downward toward the liquor and away from the brim. It was easy enough to walk downward, but when the victim attempts to go upward and out again, the hairs obstruct his progress so effectually that he finally tumbles back into the drink and is miserably drowned. That is the way the vegetable lager-beer saloon captures its customers—by drowning.

THE BUTCHER.

Another fascinating plant now being propagated at the botanical garden is the "butcher," which kills the insects and such things that it feeds upon by crushing them alive, afterward consuming them at its leisure. This is considered to be of all vegetables the one exhibiting an intelligence most nearly approaching that which animals possess. Its appearance is not impressive save for its peculiarity. Growing along the ground, it has for leaves little green things shaped like open clam-shells, the biggest of them half an inch long, with a row of little spikes around each edge. As you observe the plant most of the clam-shells will be open, waiting for food, each of them a greedy mouth ready to devour anything that may crawl in. Here comes an ant. Perhaps he will walk into one of these pairs of yawning jaws. Yes, there

he goes into the big one, attracted by the sugary excretion on the inside of the miniature clam-shell, which serves for a bait. The victim reaches the middle point between the jaws and comes in contact with six microscopic hairs that grow inside the clam-shell leaf and serve the plant as feelers. Immediately the jaws close with a snap, the two rows of spikes folding over the shut edge of the clam-shell, so as to give the prey no chance of escape. If the insect were much bigger and stronger than an ant he would be quickly crushed to death. It may be some hours before the jaws will open again, the clam-shell leaf being occupied meanwhile in digesting the food captured. All the leaves of the plant being engaged continually in waiting for prey, catching it and digesting it, it makes a very good living indeed where bugs are plentiful. In the green-houses there are comparatively few insects, however, and so the head gardener feeds his butcher plant from day to day with such delicacies as finely chopped or scraped beefsteak and earth-worms cut up, which are devoured with relish. The butcher plant is found in North Carolina, and nowhere else in the world. Fears are entertained that it will pass out of existence before long, for there is very little of it existing in a wild state, and attempts to raise it from seed have not thus far been very successful. A curious thing about it is that it will have regular fits of dyspepsia if such indigestibles as salt pork or the heads of blue-bottle flies are fed to it. The clam-shell leaves will turn black and die after consuming that sort of food. One evidence of the intelligence of the plant is afforded by the judgment it exhibits in its diet. If a piece of paper just the size of a fly is introduced between a pair of the little jaws they will close greedily upon it, but will immediately open again, the discovery having evidently been made that the capture was not edible.—*Washington Star.*

PRINCIPLES OF LAWN PLANTING AND MANAGEMENT.

Nature never fails to be pleasing in her informal ways and arrangements, and to attract the eye in her endless variations. Where her suggestions are followed in the laying out of the home grounds, the effect must always be more satisfactory than where the artificial touches are too plainly visible. The more natural and simple a lawn, large or small, says Josiah Hoopes, in Weekly Tribune, the more attractive to refined taste. The grading should not be regular and formal, unless the area is very contracted. An undulating surface pleases the eye, recalling the natural scenery of fields and woods. In addition, it im-

parts an air of greater extent to the enclosure than if the surface be dead level, or uniform, even slope. Permit a portion of the lawn to remain open; nothing can be prettier than an expanse of rich-green, close-shaven turf.

The grouping system is always more pleasing than the hap-hazard manner of dotting trees and shrubs all over the place. Around the outer boundary, and especially fronting north, is generally a good position for forming belts of mixed trees, but should these obstruct a cherished view, an opening may be made for a glimpse of the desired object. These belts or clumps should present an easy flowing outline, similar to many outer edges of our woods, and all pretense of formality in arrangement must be scrupulously avoided. Even the few trees placed for shade in reasonable distances of the dwelling may be so disposed as to assume a natural aspect. A little group of two or three specimens will frequently break up the monotony of an inartistic disposition of the trees. Have few walks, the fewer the better; they are expensive to construct properly, are not handsome at best, and require constant attention to keep in condition.

Above all, avoid the vases and statues that some people place over their grounds. The idea of mixing such artificial appliances with pure natural objects like beautiful trees and shrubs must be repugnant to any person of discernment in home surroundings. When this mania for pottery of a low degree shall die out, and the unadorned, attractive garden spots, as of old, regain their popularity, a great point will have been reached in American gardening; not until then will our work prove creditable.

The face of the lawn is of paramount importance. No matter how handsome our trees and walks, neglect of the turf spoils the general effect. To reach perfection and emulate the proverbial green turf of England and Ireland, it is necessary for us to constantly apply top-dressing of some rich fertilizer that will stimulate growth and replace in a manner the constant drain upon its vitality caused by long-continued cutting.

Frequent use of lawn mower encourages growth for a greater or less period, but a reaction will take place should the soil be neglected. We cannot, if we would, remove every particle of cut grass from the lawn.—*Popular Gardening.*

JUDGE MILLER ON TENDER ROSES.

Marechal Niel, which has no superior among the yellows, taking all things into account, I have had off and on since its first introduction, and up to this time never had anything like a respectable show when grown on its own roots. But when budded into strong stocks, it has always done its prettiest. Never yet has one on its own roots given me a single flower, even with the best of care, although laid down in the fall and covered. During the summer they make a feeble growth, and in the spring invariably are dead.

Not so, however, where budded on a strong stem of some hardy variety, which, if budded a few feet from the ground, is so easily bent over and an inverted sod laid on the tender part. Just now two such trees, as I may call them, are near me on the lawn full of buds that will be in bloom in a few weeks, while the two plants in the garden that were better all last summer and never gave a flower, are both dead.

Not a rod from this is an Etoil de Lyon, in my opinion the next best yellow, that was budded six inches from the ground three years ago, with a head three feet high full of buds and foliage is a picture to look at.

This could not be laid down last fall, so I took a common flour barrel with both heads out and set it over the bush, filled in among the branches with forest leaves, and tied a piece of burlap around the top that was above the barrel. In the garden is a plant of Pearle de Jardins that grew well last season, and which was well covered, dead down to the ground, and is only now showing a feeble shoot. The budded tree will have roses a month sooner than the latter probably will have.

Whenever I get a new one and wish to see the flowers soon, it is taxed as soon as a twig is fit to furnish buds. I insert them into strong stocks, of which there are always some on hand. As soon as the buds have taken, the stock is headed back and cemented. It is seldom that two months pass until I have roses. Quite recently a delicate little new one came to hand, that had one tiny branch broken, which my daughter claimed, and put into sand as a cutting. A few days after it struck me that I could improve on that, and asked for it, inserted it in a stock out-doors, and now a week later it looks fresh and promises to grow.

Roses are now sold so cheap that thousands are bought that never come to bloom. They are little delicate things taken from under glass, that if set out in the open ground, stand five chances out of six to perish at once.

When such are received they should be potted, and kept in a warm place with plenty of light but not much sunshine for a few days; then to be gradually hardened by exposure to sun and air until they have made a good start. In this way they may nearly all be saved.

Of the thousands of different flowers in cultivation none are equal to the rose. My collection is but small, but am adding to it every year. If some one could raise a hardy yellow rose equal to Marechal Niel in other respects, he would have a fortune in it. When grown under glass it may do well on its own roots, but not out-doors with me.—*Popular Gardening.*

DON'TS FOR AMATEURS.

Don't plant seeds as small as the eye of a needle, such as petunia and portulaca, under an inch of soil. They should be merely covered, and that with soil as fine as you can make it.

Don't pour water on plants or flower beds out of a pail, or a dipper, or anything else; use a sprinkler or a hose with a fine spray.

Don't let any one make you believe that luck has anything to do with success in cultivating flowers. It has not; unfailing watchfulness and industry, with a mixture of common sense, is worth all the luck in the world in flower gardening, as in other things.

Don't begin with high-priced novelties, or failure will most likely attend your best endeavors. Select for your first venture kinds and varieties of flowers and plants most easily grown. Any friend who grows flowers can tell you what these are.

Don't fuss too much over your plants; they like to be let alone when they are doing their best, and so do you.

Don't follow everybody's advice. Select some good authority on plants and be guided by it. Above all, don't "try everything" to make your plants grow. Nothing will kill them sooner than persecution of this kind.

Don't let failure dismay or discourage you. One must serve a sort of an apprenticeship in flower-growing as in other occupations. Study your climate, your soil, the location of your flower-beds, and the kinds of plants particularly adapted to your locality.

Don't do as the lady did who said that she watered her plants regularly every Wednesday and every Saturday, whether they needed it or not, because she believed in having "a regular system for everything." Water your plants when they need water, and at no other time.

Don't be too eager to buy seeds and plants where you can get them the cheapest. The best is always the cheapest, and you cannot get the best for nothing or for half price. I once had a bare, ragged, sickly-looking flower-garden all summer, as the result of an experiment with cheap seeds and plants.

Don't think you can't have flowers because you haven't half an acre of garden. Wonders can be done on ten square feet of ground, and I once saw a flower-garden in an old wash-tub, that was a thing of beauty from June until October.

Don't be stingy with your flowers after they have come. Give them to the poor, the sick, and even to those who love flowers but cannot have them because of living in blocks of flats, or boarding.—*Vick's Magazine for July.*

BONANZA RASPBERRY.

EDITOR RURAL WORLD—This is a new black-cap of Greene county, Mo., growing upon the grounds of W. C. Freeman, and introduced at the late meeting of the Missouri Horticultural society at Poplar Bluff, as probably "the coming Black Raspberry." Parties making statements then had, as they believed, good reasons for the favorable opinion expressed. Since that time additional evidence of its value has been gathered from its third fruiting, in which it fully justifies the originator's claim for it, of being very prolific, early and long in use, and of its quality there is no further doubt. The very best proof is in the eating. It begins to come to the table first week in June. Early in June Mr. Freeman brought it to us, this time requesting fair trial at table with cream and sugar in comparison with other varieties. This was done with pleasure. We found it juicy and every way excellent, and in its peculiar aromatic flavor it differs from all others. On the 7th of July (Monday) Mr. Freeman picked for us again a sample quart of his Bonanza, but in bringing in his load of blackberries he forgot to bring me the Bonanza, and brought it Wednesday the 9th, in such acceptable shape as warrants the opinion that it will be a good shipper. There had been hot, dry weather, and we expected to find the berries dry and poor, but they were yet juicy and delicious. Picked sixty hours before they were used—it is surely a good keeper. From close observation and frequent comparison with other varieties in hardiness of cane and foliage in both cold and hot seasons, and in fruitfulness, earliness and

fine quality of fruit, I believe it will be a valuable acquisition to our list of Black Raspberries, and that in several points it will head the list.

SEC. GREENE CO. HOR. SOC.

OUR EXPERIENCE.

Essay read by H. T. Burris at a recent meeting of the Henry County Horticultural Society.

Mr. President and Members of the Henry County Horticultural Society:

Not being a practical horticulturist and less practical in writing essays will surely excuse me from attempting to lead you into any of the scientific principles, or into any of the shady bowers to feast you upon the beauties, perfumes and nectars of the golden and crimson fruits of the well-cultivated vine and tree.

We are all aware of the fact that hunger, pain and disappointment are experienced by all mankind, and conscious, too, that by labor—"by the sweat of the brow"—hunger will disappear, pain be eased and disappointment lessened. Not one day's labor, or one planting, will suffice. Hunger comes again with increased activity; decay and insects are at work upon the seed, plant and tree, both above and beneath the ground.

We live to-day enjoying the profit and pleasure of our labor and fatigue of yesterday; to-morrow will bring increased demands for more and better results, and this knowledge, with that of knowing we are bettering ourselves, our families, neighborhood and county, causing substantial and perpetual good in assisting a kind Providence in building and preparing rest-places along the pathway of life, surely should cause us to renew our interest and diligence.

All cannot build large mansions and surround them with the rarest and choicest flowers, fruits and shrubbery; but it is the privilege and should be the pleasure, to say nothing of the duty, of every family to have a home of their own where should be planted and cultivated fruits, vines and flowers—home attractions and comforts—and though it may not appear grand and stately viewed by the outside world, yet to the possessors, to the goers-in and comers-out, a home, a protection, a retreat and refuge from the storms and cares of the outside world and a blessing to our whole country.

Spring, with sunshine and showers, brings vegetable life into activity and with mature plans of what, when and how we will plant. Looking back over the weak and withered plants, vines and trees of our past planting, and knowing the cause of many failures, and too knowing the kind and condition of the plant and soil as well as cultivations that proved such splendid and hardy growers, such beauty and flavor, such quality and quantity of fruit that has been a profit and a pleasure to all who have partaken of its life-giving and life-sustaining properties, is an incentive that prompts us to more mental and mechanical activity.

We have many things to learn that it will be profitable for us to know. And where can we better learn useful and practical lessons than by meeting around at our respective homes, bringing our experience, comparing condition, results, etc.? In this day of wonderful developments in horticulture (as well as other pursuits), where new kinds, better quality, new modes, better conditions, new devices and appliances, and too when new insect life and germs are making unceasing war and death upon every seed, plant, vine and tree we plant, makes it a necessity that we be posted and ready for every flank movement of the enemy, and be benefited by the "manna" when it falls; and if I mistake not it falls most when we labor intelligently and are willing to help ourselves and one another.

No one of us can investigate and gain all the knowledge desired by staying at home digging, thinking and watching. We are largely gleaners of each other's experience and observation, and at every meeting we gain some knowledge that we might never dig out by ourselves unaided.

At our meetings in the country (at our homes if you please), seeing the different varieties and kinds, the location, soil and conditions which produce the results as we see them, and seeing the conveniences, appliances and devices, and feeling the comforts and warm-heartedness of our brother and family, are object-lessons which impress all that it is good to be there.

Yes, we have met together, have ate and drank together, have counseled and advised together, our hearts have been made happy, and we rejoiced in so good a heritage. Others better than I can tell of the great success, pleasure and profit of these meetings, made so in a great measure by the devotion and ability of our worthy and highly appreciated lady members, who have led us by word and thought and deed through yards, lawns and gardens, fragrant and beautiful with roses and flowers, made so by their skill, making their homes beautiful and dear to them and inspiring a noble ambition within each of us to make our individual homes more attractive and dear. They, too, have

met with us in groves and orchards, bringing with them good words, arranging flowers, fruits, and a bountiful and most delicious dinner, each active in making all happy and better—there, under the foliage, "a shade so deep, so darkly green that morning sends her shafts of gold in vain, to pierce its leafy screen," which has been cultivated, trained and trimmed by the skilled hand of our brother, and made great, glorious and magnificent by a kind Providence, is a day passed making us more neighborly, kind-hearted and better citizens.

We, too, have met with a warm welcome in the large, comfortable and conveniently-arranged homes of our neighbors where all within and around speaks of life and happiness, and to a great extent forgetting our weariness from the vigorous shaking of our plum trees and diligent search for the curculio that has caused bitterness of fruit and sorrrow to our souls; our back-ache from digging after the tree-borers that have made great holes in our trees and pierced their hearts and caused death; our short-sightedness after anatomizing the myriads of insects which have been weaving webs, depositing eggs, puncturing the bark, poisoning the sap, and in many ways destroying our shrubs, plants, trees and fruits; our weariness of limbs from running down several rabbits that have girdled our choicest trees, eaten off our highest-prized plants and that have no fear for dogs and guns, but laugh at our loss and disappointment and come again to try our Job-like patience; our discordant hearing from the "Pharaoh" war-whoop of the locust that perches itself upon every branch and twig, and spiking itself firmly, turns bedlam loose; our sore throats from singing trying to keep courage up; and withal our amiable disposition after having been visited by a royal personage, a tree peddler, who, having the high-colored plates of fruits and flowers known in the science of color and art, the glibbest tongue ever let loose on deluded man, sets out to walk us into his parlor and paradise. He says the plants, fruits and flowers which he wants to make us the possessor of and us alone, cannot have justice done them by color or his tongue. "They have come to him by a special providence, and to us alone will he give the grand opportunity of eating and drinking of the nectars and spices delighted in by the gods, feasting our eyes upon the delights and beauties of paradise and making us an untold fortune. The plants, vines and trees are of such superior hardiness that no winter storm or cold can chill their warm hearts, beutiful buds, flowers and fruits; no hot summer sun or wind dry up their foliage; no tree-borers penetrate their barks; no rabbits can eat them, and having been grown on strictly scientific principles, will adjust and properly balance their own tops, will bear fruit when others fail, will shed tears when we die, and last, that the George Washington hatchet cannot destroy it."

Thus, having willingly been carried from the scenes of labor and disappointment to ease and contentment, from the discord of insects to the melody of birds, from blight and disease to vigor and perpetual life, from uncertainty to certainty, from scarcity to abundance, from sour and bitter to sweets and spices, makes us an honored member of the society, and our lady friends give us the easiest chair, and there we listen to our poor (?) horticulturist brothers and sisters who are less favored than we, give their sad experience of toil, disappointment and discouragement.

Did you ever meditate? I wish I hadn't; but hearing these bothers, trials and up-set calculations got me dizzy, and I begin to feel the paradise planted by the tree-peddler sinking from me and my head in a whirl. I fall. In my descent I grasp for something to stay my downward course; am caught, scratched and bruised by the prickly pear tree; bounding off, am lacerated and all puckered up by the bitter crab-apple tree; rolled into a thorn bush called a plum tree; grasped for a trellis by a sour grape-vine and held in a bed of dog-fennel called daisies, and finally lose consciousness, filled with prickly, stinging nettles called heliotrope. Thus we are found, and the ladies, whose sympathy in our misfortune is equal to their love for our greatness, set about to bring us back to consciousness, and with music so sweet and charming, with thought so fluently and eloquently expressed, with fruits more delicious and abundant than Mother Eve presented to Father Adam, and too, with subjects more willing to be banqueted than he, and with all things made ready and prepared by them for us—hungry and weary mortals, we are again led, not into thorns, briars and disappointments, but into the dining room where our thoughtful and skilled wives and daughters have prepared a feast of beauty and bounty, full of perfumes, nectars and spices; stately in its appearance, royal in its elements, delicate in its character and substantial in its effects for us much-imposed-upon horticulturists. By this homeopathic treatment heroically administered, we are restored, and in a short time will be ready to combat with tree-peddlers, insects, etc., though we again fall—in the sympathy and hands of our lady friends—in the midst of such a feast.

"Breathes there a man with soul so dead" who would not be a horticulturist?

H. T. BURRIS.

THE CODLIN MOTH.

At a horticultural meeting held in Michigan recently, L. A. Lilly gave the following interesting talk on the above-named enemy of the fruit grower:

"Almost everything we grow has its enemies, which must be guarded against and destroyed in order to obtain anything like reasonable results. There are many obstacles in the way of successful fruit-growing, which must be understood to enable us to meet and overcome them, one of which is the Codlin Moth, which, perhaps, is the worst enemy of the apple, becoming more serious each year. Its natural history and habit is perhaps the first thing to be considered. We will commence with its first appearance in the spring, which occurs about the time apple trees are ready to blossom, in the form of a small gray moth. As soon as the blossoms fall and the apple is formed, this moth deposits eggs in the calyx or blossom end of the apple, which at this time is always upright and remains so until the fruit grows to such size and weight as to cause them to turn downward, hanging to the stem just the reverse of the position they occupied when first formed. It is during the time that the blossom end is up that the egg is deposited in the calyx. In about eight to ten days these eggs hatch into tiny worms, which begin to eat into the apple and soon find their way into the core. Then the apple drops from the tree, carrying the worm with it. The worm soon eats its way out of the apple and conceals itself under the bark of the tree or some other convenient hiding place, winds itself in a cocoon, from which in it comes out a moth, the same as that which deposited the egg. The second crop of moths are now ready to deposit more eggs, somewhere on the apple, and those eggs soon hatch into tiny worms, the same as those in the spring, which eat their way into the apple as before, and after some time eat their way out at any part of the apple. It is this second crop of worms that causes wormy apples in the fall. Some of these worms remain in the apples and only eat their way out during the winter, when they wind themselves into a cocoon and hatch into moths in the spring; and this is the point where we commenced with them.

Any one can see that if we can destroy the first eggs we can prevent the apples from dropping, and also prevent the second crop of worms later in the summer, and by that means save the apple from the ravages of this second crop, as they are the cause of wormy apples in the fall. As has already been stated, at the time the eggs are deposited the blossom end stands up, and any poisonous matter thrown on the apple falls into these cups, and there remains until the newly hatched

worms eat and die. By the use of spraying pumps a solution of one pound of London purple or Paris green to 300 gallons of water can be thrown on the trees so as to reach the apples. This will naturally fall into these cups. This spraying should be done within ten days after the blossoms drop. Six days would be better, then repeat the operation ten days later. This is the most effectual remedy known."

Mr. Lilly might also have mentioned the destruction of the apples which drop prematurely from the trees from the effects of the first brood of worms. Even after spraying some worms will still live, and after going through the stages above described, fall with the apples to the ground. If several hogs were turned into the orchard they would eat these apples as fast as they fall, and would give the worm no time to get out of the apple and spin itself a cocoon in which to pupate. He might also have mentioned the fact that in nearly, if not quite, all cases Paris green is preferable to London purple for spraying purposes.

TWO SIDES TO THE SPRAYING QUESTION.

A Mercer county (N. J.) correspondent of the "Rural New Yorker" says that there are two sides to the question of spraying trees to preserve the fruit. It is as yet something of an experiment. While the advocates of the practice can give examples of apparently great benefits derived from it, its opponents can point to failures of sprayed trees to bear well and to great crops where no insecticide had been used. There can be no doubt that all leaf-eating enemies of our fruit trees can be destroyed by spraying if it is effectually done. The number of applications will necessarily depend very much upon the amount of rainfall and the kind of insects one may wish to kill, and also on the thoroughness of the spraying and the immediate surroundings. For instance, if we spray for the tent caterpillar, but neglect the wild cherry and some other trees, we must expect to have to spray often and not always quite satisfactorily. For the curculio we must spray almost before the leaves start in the spring, and if it rains the work will have to be repeated. The codlin moth is at work very soon after the blossoms fall, or before, and continues busy for some days. Spraying for the scab is a long and somewhat expensive operation for late varieties, and in summers like the past here, to make the work thorough, it should be done about every ten days. It is hard to get it done, as the majority of farm-hands and fruit-growers look upon it as a humbug, and think it will make no difference how much it may be slighted. It took some time to teach farmers how to kill the potato beetle. The success of

spraying for the apple and pear scab is not so obvious as that of spraying for the potato beetle. It may not be deemed a mark of much courage to practice what one's neighbors laugh at, but it takes some nerve. There is no doubt that the codlin moth can be killed, and it is to be hoped that the curculio can also, by the use of arsenical poisons. There is reason for thinking that the copper solution is beneficial in preventing the scab, and also that the destruction of the cedar balls is a preventive of rust. The main reason why orchardists do not spray is that, as a rule, they raise grain, and when spring comes help, from some cause or other, is not plentiful. Oats have to be sowed and corn planted; rainy days come, and horses are scarce; and attention to the fruit trees is put off from one day to another, and finally they are given over as among the things that must be neglected. Spraying, therefore, will be left undone almost always unless especial provision has been made for the work. The injury is not apparent until it is too late to prevent it. In fact, the years in which the work pays best are those in which the fruit-grower thinks he has no fruit to spray. I would advise all orchardists to get an inexpensive force-pump before spring opens, along with some London purple, carbonate of copper and ammonia, and spray all the trees which time will permit, and keep spraying for the scab after every heavy rain until the fruit is fit for gathering, or, in case of most trees, until August 1. Last spring we failed to order our ammonia early enough, and after we had sent for it we didn't get it for a week, and the delay started our orchards on the way to failure.

IOWA STATION.

PLUM CURCULIO AND PLUM GOUGER, C. P. GILLETTE, M. S. (pp. 370–388).

Plum curculio (Conotrachelus nenuphar).—Observations by the author in 1889 with reference to the breeding of this insect in Iowa are reported. The results agree with those of other observers in showing that "the curculio is not double brooded in Iowa, but the eggs deposited late in July and August are from belated females. A tabulated record is given of the fruit injured by the curculio on trees of four imported and seven native varieties of plums. The per cent of fruits injured in the case of the imported varieties varied from 14 to 66, and averaged 46.8; for the native varieties it varied from 2.5 to 25.8 and averaged 6.6. Analyses of specimens of five varieties of plums, made by the station chemist, are recorded, which show percentages of water varying from

75.3 to 85.5. In connection with the observations on the curculio, these analyses indicate that "the succulent, quick-growing plums are not less attacked than slow-growing varieties."

Observations of the action of the curculio on the Duchess apple are also reported, and the curculio parasite *(Sigalphus curculionis)* is illustrated and briefly described.

Records of two applications of London purple (May 4 and 11) indicate that "although not made at the times best suited to destroy the curculio, they apparently gave a protection of 44 per cent against the ravages of this insect."

Plum gouger (Coccotorus prunicida, Walsh).—This includes a brief illustrated description of this insect and an account of its life history, with special reference to observations by the author; a record of experiments with London purple for this insect; and brief notes on *Sigalphus canadensis*, a parasite which was observed to prey on the gouger. The following summary is taken from the bulletin:

(1) The gouger appears upon the trees much earlier in the spring than does the curculio.

(2) The gouger is much more injurious than the curculio to native plums on the grounds of the Iowa Agricultural college.

(3) The gouger very much prefers the native to the domestic varieties.

(4) The examination of over twenty-four thousand native plums, from not less than eighteen different trees of many varieties, showed a little over 27 per cent of their fruit to be injured by the gouger.

(5) The gougers take no food in the fall after emerging from the plums.

(6) The gouger has at least one parasite that preys upon it while in the pupa state. The parasite is *Sigalphus canadensis.*

(7) The season's experiments indicate that London purple, as recommended for the destruction of the curculio, is of little value for the destruction of the gouger.

(8) The gouger is not able to come to maturity in fruit that falls from the trees before the middle of July.

(9) Fruit infested by the gouger does not ripen or fall prematurely.

(10) About 26 per cent of the punctures of the gouger result in the production of a beetle.

(11) Jarring the trrees, collecting the beetles, and gathering stung fruit from the trees before the 1st of August, are the best remedies at present known for the gouger.

London purple for plum trees.—As the result of his experiments the author holds that 1 pound of London purple to 240 gallons of water makes a solution sufficiently strong as an insecticide and safe to use on plum trees.

MASSACHUSETTS HATCH STATION, BULLETIN NO. 8, APRIL, 1890 (pp. 24).

GREEN-HOUSE HEATING—STEAM VERSUS HOT WATER, S. T. MAYNARD, B. S. (pp. 3–5).—A careful repetition of the experiments reported in Bulletins Nos. 4 and 6 of this station (see Experiment Station record, Vol. I, pp. 82 and 225) confirmed the results previously obtained in favor of the hot-water system. The two green-houses are alike except that one is heated by hot water and the other by steam. From December 1, 1889, to March 18, 1890, for the hot-water boiler 6,598 pounds of coal were consumed to maintain an average temperature of 49.74° Fah.; for the steam-boiler 9,784 pounds of coal were consumed to maintain an average temperature of 48.39° Fah. Objections to the experiments are considered and the correctness of the conclusions is maintained. Thermometric observations of "sun temperatures" in the two houses are cited.

OBSERVATIONS ON PEACH YELLOWS, S. T. MAYNARD, B. S. (pp. 6–12, illustrated.)—In New England peach trees do not generally maintain healthy growth beyond the age of six to ten years. The chief difficulties are cold, and the disease called "yellows." Whether this disease is due to a specific germ or microbe is not settled. It may be of a similar nature to pear blight and other kindred diseases, and perhaps the same as that which often destroys the wild cherry, wild plum and sweet birch. There is no evidence that it is contagious. The symptoms of this disease are briefly stated, and reference is made to previously reported experiments in a small peach orchard on the college grounds by Professors Goessman and Penhallow and the author. The conditions favorable to this disease are believed by the author to be improper food supply, and injuries by cold, by the peach borer (*Ægeria exitiosa*), and by any accident which reduces the vigor of the tree.

(1) *Food supply*—"In almost every case investigated where the trees are neglected and the food supply is small, the trees soon die, many of them showing unmistakable signs of the yellows, while where the food supply is abundant and of a kind suited to perfect development, the growth is vigorous and healthy, and the trees often live for fifteen to twenty years.

"Too large an amount of nitrogenous manure, especially if applied so that the trees do not get the benefit of it early in the season, results in a late, immature growth of wood, that is often seriously injured by cold during the winters, and this is followed next season by signs of the yellows.

"The fertilizers recommended are equal quantities of muriate of potash and nitrate of soda, with about four times the weight of fine ground bone, applied in March or April, from 5 to 10 pounds to the tree, according to size. Wood ashes 5 pounds, ground bone 2 pounds, with from one-half to one pound of nitrate of soda to each medium-sized tree, will also prove very satisfactory. If the land is poor, containing little organic matter, a liberal dressing of stable manure may be applied in the fall; but if the land is not *very poor*, chemical manures will give better results. All manures or chemical fertilizers should be applied so that the trees may get the benefit of them early in the season. If very soluble, they should be put on in March or April, but stable manure or ground bone should be put on in the fall."

(2) *Injury by cold, borers and accident*—When a late growth of the trees occurs from any cause, as from too much nitrogenous manure applied late in the season, or from a warm, late fall, the action of frost during the winter often breaks the tissues in such a manner that they cannot be repaired during the next season's growth, and dead places are often found on the trunk and main branches. These conditions are very common in trees from eight to ten years old in most orchards of New England. Injuries of a very similar appearance more frequently occur as results of a decay of the tissues about the holes made by the peach-borer. The question is suggested whether these and other injuries result in the yellows, and observations are cited which imply that they do.

NOTES FROM PURDUE UNIVERSITY.

The following brief paragraphs, 22 in number, bring out the more important points in bulletin No. 33 of the Purdue university agricultural experiment station.

C. S. PLUMB, Vice-Director.

1. Soil for strawberries should be deep, firm, rich and somewhat moist, but not strictly wet.

2. The five most productive strawberries for this region are, Bubach, Enhance, Hampden, Jessie and Park Beauty.

3. The five varieties of strawberries of best quality are, Black Defiance, Crawford, Gandy, Henderson and Sharpless.

4. Brandywine and Cuthbert raspberries are two of the best red varieties, the latter for late. Tyler is superior to all cap raspberries.

5. The currants, Fay, Moore's Ruby, Wilder, Ruby Castle, Red Dutch, White Dutch, Lee's Prolific, Crandall and Black Naples, are recommended in the order named.

6. For farmers, Early Orange and Downing gooseberries are recommended.

7. To prevent black rot of grapes, dissolve two pounds sulphate of copper in two gallons hot water. In another vessel dissolve two and one-half pounds soda carbonate, and mix the two solutions. After chemical action is over, add one and one-half pints of ammonia, and thin the whole to 22 gallons. Spray this on the vines from time to time with a force pump, from the time the berries are the size of small peas, until all danger of rot is over.

8. For family use, the following grapes are recommended for quality and productiveness: Concord, Delaware, Gœthe, Martha, Moore's Early, Wilder, Worden.

9. The variety of plum whose blooming season covers the greatest period of time, will best withstand the work of the curculio. This rule holds good among both apples and plums.

10. The planting of plum trees in the apple orchard will not protect the latter, and *vice versa*.

11. If anything is to be gained by using another fruit to draw off the curculio and protect the plum, the nectarine will probably serve as well as the apple.

12. Adult curculio beetles eat the pulp of apples.

13. Curculios will deposit their eggs in fruit hanging over the water.

14. The indications are that the strawberry crown borer lays its eggs during March and April, in the plants near the surface of the ground.

15. Burning strawberry plants after fruit picking may destroy the crown borer.

16. The common field cricket will eat strawberries.

17. A new strawberry insect, a close relative of the Grape-vine flea-beetle, attacks the foliage in Florida and Indiana, and the grape in Arizona.

18. Soils absorb the decomposed products of animal and vegetable matter.

19. Soils draw off and hold certain portions of minerals from their solutions.

20. When a solution containing a salt of an alkali (potash or ammonia) is placed in contact with common soil, a change takes place, the

soil receiving something from the solution, and usually replacing this by some of its own parts.

21. The best time to apply a nitrate is in the growing season.

22. Soils absorb from solutions, phosphoric acid.

MISSOURI ORCHARDS.

Those who have never seen a Missouri orchard in full bearing have yet to behold a very pleasant sight, says "Ozark," in the Cincinnati Enquirer.

The soil of Sonth Missouri is not the conglomerate mixture formed in the region over which the glaciers expended their grinding and mixing forces, but it is composed of earth formed by the slow disintegrating process of changing the upper layers of rock to soil, supplemented by the results of centuries of grazing by vast herds of wild animals, and annual fires that consumed the vegetation which grew up in spite of the roaming herds.

The same condition of soil extends to the Arkansas river; and, as a matter of course, the apples and other fruits flourish there equally as well as in South Missouri.

The elevation in this part of the Ozark region is from 1,200 to 1,600 feet above the sea-level, with some peaks and ridges running up to 1,800 feet or more.

This affords a cool atmosphere at night, with heavy dews in summer and autumn, and the bright, warm sunshine gives a beautiful color to the fruit, particularly to peaches and deep-red apples, like Winesap, and other similar varieties. Iron enters into the composition of many of the rocks, and furnishes a good element in fruit soil.

This region was for a great many years the home of the buffalo and the Indian, and every year the prairie grass was burned off, and the soil supplied with an abundance of potash, of which element about 57 per cent of the ash of the solid matter of the apple is composed.

The combination of elements in the soil here, thus formed, is well suited to the production of fruit, and it is seldom that a failure in the crop occurs; and this year is no exception, for there is a good supply. If we enter an orchard and look around us, we shall find the trees are in good condition. The limbs branch out some four feet from the ground, the lower ones bending to the earth, and all are covered, even to the topmost twig, with tempting fruit; and the question at once suggests itself, "Was the original Garden of Eden located in south

Missouri?" The trees are fairly shingled over, and present the appearance of a complete pyramid of apples; and the sight is indeed a pleasing one, for it has the effect to almost bewilder the beholder because of the great abunance; and this is a yearly occurrence if the orchard has a reasonable share of attention.

When South Missouri has an entire failure of the apple crop, there will hardly be apples enough in the other portions of the country to make one good apple pie, but the fact is, this region of country never has a complete failure in fruit, and every year large orchards are planted, and the time is near when the whole country can be supplied with apples from the Ozark region.

As a sample of the success of apple-growing here this season, one farmer will pocket $13,000 for the apples on his trees, just as they are, while others will get as much for their apple crop as they asked for their farms six months ago.

Springfield, Mo., Oct. 6.

FRUITS WITHOUT SEEDS.

Seedless apples were known to the ancients, and since then many mentions have been made of the same fact. Within the last century not only seedless fruits, but those preceded by no blossoms, have been occasionally met with. Thus the "no-blow" variety was without apparent blossom and bore no seed. Other examples of the same peculiarity have appeared under different names. In the common cherry the kernel or embryo of the seed is frequently abortive, and therefore useless for germination. The second bloom of pears and of strawberries is often doubled. Pistillate varieties of the latter fruit will sometimes produce berries, but without seeds. The banana is one of the best illustrations of the seedless fruit. There are many varieties of this tropical fruit, and it is probably true that the wild plants were seed-bearing. The so-called "dried currants" are seedless grapes from Corinth. In California this grape produces seeds, and attempts to raise the standard article have failed. On the other hand, the Sultana grape of California is seedless, as are also some vines of the Black Hamburg. Among citrous fruits the orange and lemon are promiuent for lack of seeds in some sorts. Cross-breeding seems to have developed this sterile condition; for example, in the "Washington navel" or "Riverside" orange, and the Mediterranean Sweet, are but few seeds. The "Eureka" variety of lemons bears but few seeds, and one of the best of lime fruits is one without seeds. In the gourd family there are

many varieties with few seeds. Thus forced cucumbers under glass have a solid flesh and are not considered good if seed-bearing. Melons of the highest quality are not "seedy," and fine varieties of garden pumpkins are propagated by slips in the south.

Dr. E. L. Sturtevant, who has made an extensive study of seedless fruits, in a recent paper upon the subject states that "The better varieties of the apple usually contain some abortive seeds, and they are sometimes individually to be found seedless. As a rule, when there is a tendency to abortive seeds, the larger and finer the apple the greater the number of abortive seeds." There seems to be a correlation existing between seedlessness and quality, or perhaps better, tenderness of the edible portion. If this be a law it is one that all improvers of fruit should know, that they may work with, and not against it. While this generalization is in mind, it should also be remembered that unless the development of seedless varieties is correlated with the increased ability to propagate by suckers, offshoots, grafts, or cuttings, the lack of seeds must, in the end, bring about the destruction of the improved variety. In short, there is a possibility of improving our fruits toward seedlessness until that improvement becomes suicidal.

NEW SEEDLING GRAPES.

We have just returned from a visit to Mr. John Burr's place at Leavenworth, Kansas, to see his seedling grapes, which surpass any purely native seedlings that we have ever seen.

His Jewel, which was the first to ripen in July, was still hanging on the vines on the 20th of September in perfect condition, and fully equal to the Delaware in quality. The Ideal is the most delicious red grape we have ever tasted. Bunch and berry are very nearly, if not altogether, as large as Concord. It is a strong, hardy, healthy grower, and very productive. It is better in quality than the Delaware or Brighton. It is as pure as a European grape and is a seedling of Delaware. His Paragon is without doubt the best hardy black grape known. We have it with others by our side, while writing this, for comparison. It is fully as large in bunch as the Concord, more compact, and larger in berry; about ten days later in ripening. It is juicy, vinous and sprightly, of the very best quality, and without a trace of foxiness. A strong, healthy grower, free from rot or mildew. It is a very valuable grape for table, wine or market. Eclipse is a white

grape, and considered of higher quality than either of the above. The berry is fully as large as Niagara or Moore's Diamond, and of very much better quality. The bunch is as large as Concord, but not quite so compact. It is a very vigorous grower, and as delicate and pure as any European grape. Standard is a black grape of about the same size in bunch and berry as the Concord, and ripens about the same time, but it is much better in quality. It makes a white wine which, to my taste, is equal to Catawba, if not better. It is a hardy, strong grower, and appears healthy.

Mr. Burr has a number of other seedlings not yet named, of extra quality. It is a wonder to every one who visits his place how he has obtained so many pure native seedlings of such large size and high quality with so few poor grapes. They are neither crosses nor hybrids of European blood, yet many are as pure as if they really were. It demonstrates the fact that where native grapes are grown under high cultivation in a congenial place, free from all inferior varieties, the seedlings of those make vast improvement, and when this is not the case, the reverse is likely to be true.

We also visited Stayman and Black's place to see their new varieties. Their White Beauty is a most superb grape, ripening about with the last of Concords this season. Bunch large, compact, often shouldered, being about the size of Ives, skin firm, pulp tender, juicy, vinous, of very fine quality, free from foxiness; will hang on the vines long after ripe without bursting or dropping—a very fine, rich grape, free from rot or mildew, vine vigorous, hardy and healthy. White Imperial is identical in growth and vine with White Beauty; the bunch as large, but the berry smaller, and ripens with Moore's Early, but will hang on the vine as long as the other, and is considered of better quality by many. Leavenworth is the best white grape of the pure Labruska type that we have yet seen, about as early as Moore's Early, with a bunch and berry like Concord; a grape that pleases the taste of every one. Ozark is a wonder among black grapes, the strongest and most rampant grower we have ever seen, with heavy foliage, very hardy and productive, of the Norton type. The bunch and berry are very nearly as large as Concord; about the same time as Herman, and hangs on the vine until after frost. This is a very valuable late market grape, free from foxiness; never drops from the vine, and as free from rot and mildew as Norton. Eureka is simply a monstrous Delaware, and fully equal to it in quality. Perfection is a large red grape, unsurpassed in quality and beauty. They have a number of others not yet named, one a very late white grape, and another a very late black grape, both healthy and promising. Their Jewel grapes

were done, yet we found a few bunches still hanging on the vines in perfect condition, and as good as the best. None of the above seedling grapes but Jewel are yet on the market.—*J. Stayman in Orchard and Garden.*

THE APPLE IS KING.

I sing not the fruitage of old Yucatan,
The Citrus of Spain, or the Plums of Japan;
The Florida Orange may grow in the South,
The Peach of New Jersey may melt in your mouth;
The broad-breasted Quince has a heavenly smell,
And I love California Apricots well;
Bananas of Nassau and Malaga Grapes,
In clustering richness and lavishing shapes,—
They're beautiful all, but bepraise them who will,
A ruddy old monarch outranks them all still:
A fruit universal, coeval with man:
'Tis the blessed old APPLE; gainsay it who can?

—*Good Housekeeping.*

"Poverty is not a mystery, but a means selected from the infinite resource to make the most of me."

"It has been the fashion to separate hand-work from head-work, but we are gradually learning that their harmonious union is the only means of perfection of either. The mass of society is made up of morbid thinkers and miserable workers. It is only by labor that thought can be made healthy, and only by thought that labor can be made happy, and the two cannot be separated with impunity."—*Rural New Yorker.*

Some of our great men have been mistaken. In the days of Geo. Stephenson, the perfector of the locomotive engine, the great men proved conclusively that a railway train could never be driven by steam power. Machinests and navigators proved conclusively that a steamer could never cross the Atlantic Ocean. There went up a guffaw of wise laughter from the learned men at Morse, when he announced to the world that by the aid of electricity he could convey intelligence from point to point by the use of a wire. The learned M. D's. knew the component parts of milk; it would produce fever and

was strictly forbidden to be used by their patients; to-day the patients get milk, and freely, if they desire it. Was it a student that brought about the change? Let's see. A boy lying at the point of death, in a moment when left alone, got up, went to the cupboard, drank what milk he wanted before he was discovered, was at once carried to his couch and the attending physician called; found the boy sleeping, looked wise and patiently awaited developments. Of course he knew there was no hope for the boy's recovery. After a refreshing sleep the boy awoke and called for more milk.—*Rural New Yorker.*

A PAPER ON ORCHARDS.

Read by Robert Lynn, before the first meeting of the Atchison County Horticultural Society in Tarkio, Mo., Wednesday, June 11, 1890.

We are happily met here to-day to talk of a happy subject familiar to our first parents in their perfectly happy state before the fall, when they were allotted the "Garden of Eden" with orders "to dress it and to keep it;" and the subject will be equally familiar to those of our race who attain perfect happiness along the margin of the river of the water of life, whose trees bear twelve manner of fruit. In thinking of the primal garden in Eden, or of the ultimate garden by the interminable river of life, we always think of trees and the fruit of trees. There are avenues and glades and vistas seen in our fancy, but always bordered or interspersed with trees. The shady walks, real or poetic, of literature are never shaded with the Gothic arch or silken canopy, but always with the emerald foliage or luscious fruit.

We may think of a lodge or a temporary tent or shanty standing on a bare plain, but we never think of a home without trees, and some of these bearing fruit. This idea of making a home beautiful and comfortable should be sufficient to induce every owner of a piece of land to lose no time in planting at least a good garden of fruit trees, and a neat lawn of shade and ornamental trees. Many are doing this with more or less judgment, but many who would like to have and who admire a neat and cozy home do not decide to give it the time or attention necessary to make a success of it.

But there is another, although a lower view of orchard-growing that is very important, viz.: the financial aspect of it! There is beauty and comfort, tending to love and joy, in a neat little orchard home.

There is money in a large orchard if—if what? If it is selected, planted, cultivated and pruned on business principles. There is money in feeding cattle and hogs if it is done with good judgment and with close attention every day to all the details in buying, driving, getting slowly on full feed, salting, watering, sheltering, trough-cleaning, marketing, etc.; and a feeder makes money just in proportion to the close attention he pays to all these details. A good stock-feeder knows just how much he has invested in stock and corn, how long it has been invested, what interest has accrued; and after deducting interest he knows just what his profits are.

I have never met a man who asserted that it didn't pay to raise apples, who could tell just what it cost to raise them. Nor have I ever met a man who applied business principles to fruit-raising for a number of years who pronounced it a failure. No man should think that he can secure a fortune by setting out 10 or 100 acres of orchard and give it hap-hazard attention, or no attention at all. What would we think of a mechanic who had laid up $5,000, and resolves to become a merchant and proceeds as follows: He buys or rents a store. Soon a smart, oily-tongued drummer comes along and tells him what he should buy, and he buys and signs an order for everything that the drummer shows him a picture of, or tells him he needs. He knows nothing of the wholesale house represented, nor of the responsibility of the drummer. Neither does he know anything about rebates and discounts, nor whether the goods are salable in his town. He simply knows that merchants have a good time, dress well, and smart men like himself get rich. He had learned a trade, and had laid by $5,000 because he had learned the trade. He lost his capital because he thought anybody could be a merchant if he had money. If a man wants to be a good lawyer he must read law; if he wants to be a doctor he must study physiology, anatomy and medicine, and if he wants to make a success of fruit-growing he must be thoroughly posted in pomology and horticulture.

I dwell on the importance of learning to grow fruit because so many who plant orchards are ignorant of its elements. I saw two young orchards last week representing success and failure respectively. One orchard of two acres contained only four sorts of apples: Ben Davis, Winesap, Janet and Jonathan, all planted six years ago. Nearly every tree is perfect, and three-fourths of them are full of apples. It has been cultivated every year. I found the owner pruning and his man cultivating it. At the end of twelve years this orchard will have paid an annual rent of at least $30 per acre from the time of planting, if the present owner keeps it. The other orchard is large and the owner evidently

intended to do well, for it is surrounded with a protection of forest trees. The apple trees are all sizes, and look as if each chose its own location and the kind it would bear if it ever had a chance. A large number of the trees are absent, and the clover and grass with which the ground is set scarcely miss their meagre shade. This orchard, I presume, is grown on the guess plan. The owner will not be able to tell anything about the profits of his land per acre except in grass crop.

I had no possible means of knowing what sort of apple trees to plant in my first orchard in this county 21 years ago, and of course, many of my trees are worthless except to give me a few specimens of about 50 varieties of very fine apples. I kept adding to the old orchard, however, such sorts as gave good promise, and 14 years ago I planted a new orchard with a few approved sorts. This orchard has paid nearly double the profits of the old per acre. The cash receipts for the last six years on both old and new together average $40.56 per acre per annum. The cash returns for apples alone from the time of planting the trees until the present is $17.38 per acre each year; this year's crop sold for $125 per acre, which brings up the average to $52.62 per acre; and from this same land I have raised during this time about $16,000 worth of nursery stock, small fruits, etc. So there is absolutely no cultivation to be charged to the apple crop. These figures take no account of second-class apples made into vinegar, fed to stock, or otherwise disposed of. Small or wormy apples have no value whatever. I intend to begin sprinkling the trees with poisoned water by means of a force pump, by which I hope to add much to the profits of the orchard. Two years ago I lost over 1,000 bushels of apples by the codling moth. I am sorry to have to confess that I have neglected to cultivate as I should have done since the trees occupy all the ground. I had "too many irons in the fire;" otherwise I could make a much better showing than the above figures. But as it is, it is far ahead of anything that can be shown of a like quantity of land devoted to corn crop or any ordinary farming—and the orchard is there yet, and worth at least $250 per acre, while if it had been run to corn these 20 years it would hardly be worth $40.

Apple-growing, like corn-growing, cannot be overdone. I mean marketable, winter apples. They are thrown on the markets of the world and there is a limitless demand. The extension of the knowledge of physiology and hygienics makes a constantly-increasing demand for fruit on the tables of all civilized people; and the increasing demand for fruit is in line with the greatest moral movement of this or any age. It is becoming known that the nations who use little or no fruit have the greatest craving for intoxicants, and naturally take to

drunkenness, while the free use of acid fruit is the best physical cure for the appetite craving alcohol.

Regarding how to make and take care of an orchard, I will only take time to give a few items in regard to necessary things: (1) Plant anywhere that best suits the general plan of your farm, except in a slough. The late frosts may nip the bloom sometimes in the valleys, but the valley gives the finest crop. (2) Plow the land at least once as deeply as possible before planting. (3) Plant only a few of the most approved and best known varieties, mostly three or four sorts. (4) Get only No. 1 trees of a responsible nurseryman. (5) Plant the natural depth. (6) Plant when the buds begin to push, about the middle of April. (7) Cultivate well around each tree when young every ten days until July. (8) Hill up each tree every fall for five years and remove the hill in the spring. (9) Keep the rabbits from eating the bark by wrapping, or tying corn-stalks up around each tree in winter. (10) Prune the young trees to just the frame you want the tree to have when it is grown up, and prune young trees in June for the first five or six years. It is better to prune too much than too little. Cut suckers off at any time and check any branch which rivals the leader. (11) Be careful to destroy all gophers which get into your young orchard, and all webs of caterpillars in May or August. (12) If you plant corn in a young orchard, plant it very late. (13) Never turn stock into a young orchard for the sake of economizing a bite of fodder. To do so is to be "penny wise and pound foolish." (14) Put all the ashes and refuse from the house under the trees. Any manure will be useful after the trees begin bearing. (15) If the orchard, young or old, is going to weeds mow, and leave them on the ground before they bear seed. (16) Pick apples before they are quite ripe. (17) Never try to sell poor apples at full price. Better feed all poor or wormy apples to the hogs. It will help the hogs and kill the worms. (18) Get "Barry's Fruit Garden," "Warder's Pomology" or some other good work on fruit-growing. (19) Mark what the successful fruit-grower excels in and do likewise. (20) Be content with what God gives, and don't "count your chickens before they are hatched."

SOME CHRYSANTHEMUM LORE.

One hundred years ago, the plant now so fashionable the floral world over first came to the notice of the European plant-lover from China, where it had been a historic plant ages before. It is only within the past dozen years or so that the plant has received any great amount of attention in this country, and only since half that time has the chrysanthemum sprung into the very first rank as an exhibition plant in the popular demand, and this a new seedling-producing country. The past summer has seen an extraordinary activity in England as the centennial year of its introduction, and much literature pertaining to its history and culture has been the result. Shirley Hibberd—almost at the very time of writing this name the following sad notice was read to the writer from the daily telegraphic notices from London: "Shirley Hibberd, a man of letters, and editor of the London Gardeners' Magazine, died at Kew to-day, November 16, 1890." We were about to say that a chrysanthemum number of his magazine of date November 1, 1890, with one issued last year, contains the plant's full history for the last one hundred years, and—what is of extraordinary interest to us—he has this to say of our old townsman of Chicago, whom a few of the older florists will still recollect as the very first florist in Chicago:

"In this year's gallery we add three more portraits to the lengthy series of representatives of our flower who have passed from the scenes of their earthly labors, but their works do follow them. Two of these are well remembered by many who read these notes; they are Mr. George Glenny and Mr. James Butcher. The third, Mr. Samuel Brooks, is perhaps remembered least of any, although we have felt compelled to speak of him as the 'father of the chrysanthemum.' We place him at the head of the list, both because of his position as a founder, and because the waves have gone over him. The living may follow the dead—they cannot precede them. The portrait of Brooks should surprise anyone who knows the man, for it was taken twenty-six years after his death, and is a veritable photograph of the man when living. This is like an enigma, but it is a serious matter of fact."

[This enigma has evidence of error—twenty-six years would bring it to 1901. There is plainly an error of ten years, and on a visit to Mr. Brooks' son the writer finds that the only photo in existence is an old *carte de visite* from which the photogravure was evidently taken.]

"THE FATHER OF THE CHRYSANTHEMUM."

"In the third chapter of Mr. C. Harman Payne's History of the Chrysanthemum, published in our last chrysanthemum number, occurs a notice of Messrs. Barr and Brooks, of Balls Pond, who were growers of the flower as early as 1817, and indeed earlier, for it was in that year they obtained the superb White from China. Mr. Brooks was a member of the Council of the London Horticultural Society, and a man of much spirit and enterprise, as may be judged by the fact that he sent a traveler named Poole to China, who returned in 1819, having secured some new varieties, amongst which were the Tasseled White, the Quilled Salmon and the Yellow Single. Mr. Brooks subsequently immigrated to America and died at Chicago." Then follows an obituary notice of our old friend by the writer of this, which was substantially given in the columns of the "Prairie Farmer" at the time of his death, on September 5, 1875, and in the "American Florist" with portrait February 1, 1886. We also have given other notes on the same matter from time to time during the past year or two, which need not be here repeated.

Botanically, the plant is known as chrysanthemum, although Koempfer called it a Matricaria in 1812, in his accounts of the plants of Japan. The former is derived from two Greek words, meaning "The Gold Flower." In the wild state all our wonderful varieties have sprung from *C. Sinense*, wild in China, and *C. Indicum* from India. In England and this country they are known among the trade as "mums," and the lovers of the plant "mummers." In a play on the word and its derivation outside of the use for this plant, poor Shirley Hibberd says, "The rose is an emblem of silence, and words spoken 'under the rose' are not to be repeated. Henceforth, when the rose goes out of flower, and the babblers are looking for a new age of clack, we will bring forward the chrysanthemum and cry 'mum.'" In Japan the plant is the national flower, and is called "Hiku." In Mandarin, China, "Chu" is the name for short. By some it is "Chryssie." The French go one better and call it Madame Chrysantheme. "The Queen of Autumn" has long been its proud cognomen. Gold flower was once applied to it, and was far more appropriate than it is now.

CARE IN SELECTING THE SEEDS OF TREES.

To the Editor of Garden and Forest:

Sir—I have been much interested in reading the editorial on the "Improvement of Trees," which appeared in your issue of October 29. The theory you illustrate by the case of the eastern and western Douglas Spruces, if lived up to and generally adopted, would save many disappointments. About the time the seed of the Colorado Douglas Spruce was planted in Massachusetts, I received seeds of this tree collected in Colorado by the late Dr. C. C. Parry. At the same time Burnet Landreth & Sons sent me several pounds of the seed of this tree, gathered on the Pacific side of the continent, to grow for them, as they intended to use the Douglas Fir in their forest-planting in Virginia. The seedlings of both were carefully covered in the autumn of the first year with coarse prairie hay. The seedlings from the Pacific coast seed were at this time much larger than the others. Both lots grew well the second year; they were planted in the same soil, the Pacific coast seedlings being in the autumn of the second year still much larger than the others. Each lot of seedlings had the same covering the second winter. When they were uncovered the following spring the Colorado seedlings were as fresh as Norway Spruce or Scottish Pine seedlings of the same age, having wintered perfectly. The Pacific coast seedlings turned brown wherever they penetrated through the covering of hay, although they were green where they had been well covered. When the time came for them, however, to commence their new growth they all died.

The Douglas Spruce is by no means an exception. I have met with several other cases as marked as the one I have related. Many years ago there was a great demand for Red Cedars for ornamental planting in the west. Many people liked them for hedges. We collected our seeds from native trees growing on the bluffs here. These trees did not, however, produce enough seed to supply the demand, and we ordered five bushels of it from Western Tennessee and the same quantity from Southern Illinois. We had the same experience as with the Douglas Spruce. The seeds collected here produced hardy trees; the others produced tender trees. At another time Black Walnuts did not fruit well in our county. We gathered what we could find and ordered a large quantity of nuts from Southern Illinois. The plants raised from these southern plants made a much larger growth

than ours during the first season. The following spring ours were all alive with terminal buds, while the southern plants were killed to the ground and went to the brush-pile. I could cite many other instances as marked, but these ought to be enough to convince any reasonable man that it is necessary to select seeds of trees with reference to the locality where the seedlings are to grow.

R. DOUGLAS.

Waukegan, Illinois.

HORTICULTURAL SOCIETY OF NORTHERN ILLINOIS.

From the Farmer's Review, Chicago, Ill.

Prof. Forbes, of Champaign, State Entomologist, read a very exhaustive and valuable paper on "Spraying Fruit Trees," which should be given in full to appreciate its value. We will only attempt in this brief report to give a few of the main points.

The material mostly used in the spraying of fruit trees is Paris Green and London Purple. London Purple is essentially composed of arsenic and lime, and Paris Green of arsenic and copper oxide. In the former the arsenic ranges from 40 to 45 per cent, and in the Paris Green from 55 to 60 per cent. These compounds are recommended as being the best for spraying apple trees to destroy the codling moth. They may be applied either dry or wet. They are much more cheaply applied and quickly prepared with water than with any dry diluent. Flour is the most satisfactory diluent for dry poisons, which may profitably be mixed with one-third wood ashes. This will lessen the expense. The proportion of Paris Green to the dry diluent varies from one in 20 to one in 25. About one in 30 is recommended as efficient. Of London Purple about one pound in 45. The proportion of the diluents would be 15 pounds of wood ashes and 30 of flour, with a little less than two pounds of some adhesive substance. For the apple, cherry and pear one pound of London Purple to 300 gallons of water is recommended by Prof. Cook, but he says this would be too strong for the peach. If the application is repeated, use one pound to 300 gallons of water. For plums Paris Green is recommended, one pound to 200 or 300 gallons of water. For the peach only Paris Green is applicable, and this in strength no greater than one pound to 300 gallons of water. Several different apparatus for use in spraying trees are recommended. Among them a brass hand force-pump, sold for $2, by J. K. Compton, Leslie, Mich.; too small for

orchards, but serves very well for a few trees or garden use. For a large orchard the Victor Field force-pump, a geared machine running by horse-power, and capable of being attached to the hind wheel of any wagon, is recommended. It can be had for $30, and is made by the Field Force Company, Lockport, N. Y. They also make a small pump, "The Perfection," selling for $12. Both these pumps keep the mixture stirred automatically by pumping back a small stream into the barrel through a separate tube. The Nixon nozzle is especially recommended, and also the graduating spraying nozzle sold with the Field force pump. The Nixon pumps are also recommended. The Victor pump does excellent work by horse power for extensive operation. It will spray one side of a row of trees as fast as a horse can walk. The Nixon field machine is similarly serviceable for work on a large scale. Their barrel-machine is considered one of the best for spraying large gardens and orchards of medium size. It is recommended that the spraying be deferred until after the blossoms have fallen. May is considered better than June and July. As regards apples, if no heavy rain follows, one application should be sufficient; but if it does, especially if the trees bear sparingly, it will often pay well to spray a second time, two weeks after the first. The time of day for applying the dry poison is early in the morning, when the plants are still wet with dew. The wet poisons may best be distributed in the afternoon, or at least after the dew has disappeared, dry weather being the most favorable.

No new observations have been made with respect to the effect of these poisons upon the apple worm itself. The habits of the insect make it certain that it can be poisoned only in the young larvæ state before it has penetrated the apple. Numerous experiments with the plum curculio showed that the beetle feeds freely on the various parts of the blossom of the peach, the leaves and fruit; also on rose blossoms, flowers of the snowball, honeysuckle, etc. Poisons applied to beetles, in confinement, demonstrated that leaves sprayed but once with Paris Green or London Purple would kill practically all the beetles feeding upon them within ten days. The practice of spraying the apple is a most important and valuable method, especially in the protection of early maturing fruit. Its value for the late fruit is lessened by the appearance of a second brood of the larvæ. Even with the most careful and thorough work with the spraying engine the practices of daily gathering the fallen fruit and destroying the larvæ and moths must still be made use of, and not only by the orchardist himself, but also by his neighbors. Experiments have shown that plum trees

sprayed four times with London Purple were almost free from curculio injury. Spraying of cherry trees has proved to be equally as successful.

The deadly poisons here discussed must be used with certain caution. The spray or powder should always be thrown with the wind, and it is well to handle the apparatus with gloves. The experiments made by different parties go to show that there is very little to be feared of any bad results coming from the poisoning of the fruit of the pasturage beneath the orchard trees.

The so-called Bordeaux mixture, essentially blue vitriol and lime suspended in water, has come into prominence as a fungicide, and has been used in a spray upon trees to prevent a formation of the scab of the apple and rot of the plum. Its effect to check mildew of grape is well known to horticulturists.

Mr. J. V. Cotta read a paper on "Orchard Culture." If one should read all the valuable information that is printed and written by men of experience on orchard culture, he would probably make a failure unless he had access to practical information obtainable only from those who have wrestled with this problem right where he wished to plant the orchard. Twenty years is the age, it is claimed, at which apple trees cease to be profitable, and at this age they should be dug up and new orchards, previously planted, should take the place of the old ones. No one who has had any experience with top-working such varieties as are not perfectly hardy in this climate, will have failed to notice the remarkable improvement in the capacity of trees thus grown to resist the injurious effects of hard winters, over those grown by the common modes of root-grafting. It is my honest opinion that apple orchards can be successfully grown with most of our old favorite varieties by this means.

An essential adjunct to an orchard is a good wind-break on the south and west, partly to protect the trees against excessively cold wind storms, and to prevent the fruit being blown off by the strong southwest winds. Norway Spruce and White Pine are the best, planted in single or double rows, eight to twelve feet apart, between the rows and in the rows, setting the trees in break-joint style. Belts of trees on the north and east side would do more harm than good. For the orchard site select some elevated and naturally well-drained location. Avoid barren hill-sides. Any good corn land will answer. If not naturally well drained, tile to the depth of at least four feet. A northern slope is preferable to a southern one.

Plow and harrow the ground thoroughly. Level land should, by repeated plowings, be thrown into ridges, upon which plant the trees two rods apart, in the spring of the year. In digging, trees lose a portion of their roots. This should be balanced by judicious pruning of the top. Cut away all forked and close-growing branches, leaving one upright shoot for the leader, and cut the ends of all the branches back a few inches. Make all cuts close and smooth. Never leave any stubs, and cut all bruised and broken roots back to sound wood. Plant in holes large enough to permit each root being straightened out in natural position, setting the tree about two inches deeper than it formerly stood and leaning about 15 degrees toward the southwest. Cultivate corn among the young trees for five or six years. Then seed to clover and let it remain on the ground as a mulch, never permitting a dense grass sod to take possession of your orchard. Protect your trees against rabbits, mice and borers by wrapping the stems with burlap, wire screen or something of the sort. Keep up the fertility of the soil by an occasional top dressing of well-rotted barnyard manure. Keep your trees free from worthless branches and dead twigs. Prune them out during mild weather from November to March.

D. J. Piper read a paper on "The Best New Apple" and first outlined the best way to propagate and grow it. "I root-grafted different varieties of the apple with fair success for a number of years, until '85 and '86. Then came the first drawback, when I lost some of my root-grafted trees by freezing. Then I set wind-breaks of willow, Lombardy poplar and locust, which are good for the summer season, but they did not prevent my apple trees from freezing in the winter time. I lost both old and young trees, except of the Whitney and Duchess varieties. These two had passed through two trying winters and had come out bright in the spring. I then began to top work on the Duchess and Whitney No. 20, and had I taken Mr. Whitney's advice in the first place and planted all No. 20, and then top worked them with the varieties I wanted, such as the Saloame, Wythe, etc., I would be much farther ahead with my orchard to-day. I have some Saloame worked on the Whitney stock and they are as fine young trees as can be found. I do not fear their freezing to death. I claim the Saloame to be our best new apple. It is ready for use in November, and will keep a whole year. The Wythe comes next as a first-class apple. Mr. Hathaway, the originator of the Saloame, says he kept this variety through the second winter in a common cellar, in good condition. Work the Saloame on the Whitney and there will be no trouble in growing fine apples."

POISON IN FOOD PLANTS.

Some of the most valuable productions, like the White potato, the tomato and the egg-plant, are the results of development in a family which produces the tobacco, the Jamestown weed and the deadly nightshade; and still more singular is it that edible innocence in a product may be intimately associated with a poisonous element in the plant. Starch-yielding tubers may even be in themselves an association of simplicity and venom, and we find both in the cassava, from which tapioca is obtained—the soluble elements of the timber being poisonous, and the insoluble starch edible. In the White potato we have a solanum which has poisonous sprouts and fruit, with a valuable and innocent tuber or subterranean root-stock. The poison, solania, is found in the white sprouts of the tuber and in the green seed-ball or fruit, but not in the tuber as prepared by boiling or roasting. Solania is not a powerful poison, and one of very uncertain strength. The tomato plant contains solania, while the fruit, which has the same unpleasant odor, is free from it. Three deadly poisons, among the most potent of all active vegetable principles, are obtained from some of the Solanacea—namely, nicotia, from tobacco; dataria, from stamonium, and atropia, from belladonna. One drop of pure nicotia will kill a large dog in a few minutes, and the other two are fatal in minute quantities.—*Dr. Harris, before Penn. Hort. Society.*

MISSOURI'S APPLE CROP.

When the statement was published five or six months ago that the fruit crop of the State for 1890 was worth ten million dollars, and although coming from such a reliable and close observer as Mr. L. A. Goodman, the Secretary of the State Horticultural society, it was regarded with a great deal of doubt by many of our best posted men. The figures looked decidedly extravagant at the time, and may appear so to-day to a good portion of the producers, yet, in the light of the information coming to the surface daily, in view of what a few leading points have done in the way of shipping and selling, we are bound to admit that the figures given form, not only a modest estimate, but actually fall short of the correct value of the crop. We might go further and say that the apple crop alone was worth ten millions, and a

compilation of the facts, which, by the way, might be easily gathered by the fruit-growers of the State for their annual meeting next month, will show that sum constitutes but a reasonable estimate. The dried and evaporated fruits of themselves would in the aggregate bring a million dollars. Car after car came to this market over every road, each car bringing from $1,500 to $3,000. Other markets too were liberally patronized, Kansas City and Chicago securing a good deal of it. With more than double the usual price prevailing, a car of dried fruit amounted to something.

An official of the C. & A. R. R., a part of whose labor lay along that branch of the company's line penetrating Missouri, and a fine apple region, took special pains to keep track of the movement of apples, for his road took hundreds of cars out of the State, possibly handling as many as any other railroad in the State during the season. This gentleman has not only compiled figures of shipments made over his road from Missouri, but has also secured figures showing largely what the rival roads had been doing, and he has placed the crop of the State at 5,000,000 barrels. However, granting that his estimate was too liberal, it cannot be placed at less than 4,000,000 barrels, which must have averaged at least $2.50 per barrel, and here we see are the $10,000,000 as the value of the apple crop of the State, without any reference at all to the dried and evaporated output.

A few additional facts in this connection might be added here. Marshall, Mo., shipped 162 cars; Boonville, 150 cars; Lexington, California, Nevada, Independence, Columbia, Centralia, Salisbury, Warrensburg, Louisiana, and a hundred other leading shipping points, forwarded a great number of cars, and almost every market in the country was represented. A dozen cities were often represented in the same town. It was a great season for speculators, because the markets advanced without interruption from the start, and prices are still going up, and few if any cars went out that did not make money for the owner. C. C. Bell, of Boonville, has been undoubtedly the apple king of the State for 1890. He handled the 150 cars that left Boonville, and his rivals at other points figure his profits on the season's work at no less than $30,000, as he had fewer rivals to fight than any other speculator in the State, being especially favored by the merchants as well as the orchardists in that section while he was buying and shipping.

As showing the profits in apples and how money was made during the season just closing, a case at Marshall, Mo., might be cited. A gentleman named Rogers, from St. Louis, was about the first buyer on the ground, appearing early in September at Marshall. He soon

purchased a very fine orchard for $250, one of the first sales made in that section. A Buffalo man came along soon afterward and paid the St. Louis man $1,250 for the orchard. Several weeks later Earle Bros., of Chicago, who had by this time acquired a good appetite for apples, offered the Buffalo man $3,000 for the fruit picked at the foot of the trees loose. The first buyer cleared $1,000 without lifting his hands, while the next man cleared much more, and outside of a small deposit, no expenditure of time, money or labor was involved or expended by either lucky investor.—*Colman's Rural World.*

"THE RURAL NEW YORKER POTATO NO. 2."

We have received the following instructive and interesting letter from a subscriber:

The small potato sent me by the "The Rural" two years ago was planted and yielded me 16 pounds of fine potatoes. They kept well and I planted them the 9th of May. I prepared a plot of gravelly ground, 60 by 21 feet, by plowing under one load of stable manure, and harrowing until it was thoroughly pulverized. I furrowed out according to "The Rural" trench system, making the rows 3½ feet apart. In the four-inch deep trenches I scattered and thoroughly mixed with the soil 'Stockbridge's potato manure' and a little sulphur. The potatoes, which I cut into one-eye pieces, I placed in the trenches, flesh side down, 18 inches apart, covering them two inches deep. In 10 days they were up nicely; now I scattered on more fertilizer and filled up the trenches. After another 10 days I sowed broadcast between the rows more fertilizer, thus using it at the rate of 1,000 pounds per acre. I kept the ground free from weeds and frequently cultivated until the vines covering the ground made it impossible without injuring them. The potatoes were dug September 4, yielding 15 bushels, or at the rate of 564 bushels per acre. There were very few among them as small as the one I received from "The R. N. Y." Many large ones weighed nearly two pounds each. They were shapely and free from scab. As they laid on the ground, an old farmer passing by said it was the greatest sight he ever saw.

C. H. FLETCHER,

Chautauqua county, N. Y.

THE MISSION OF THE COUNTRY BOY.

This country boy of Nazareth came forth to atone for the sins of the world and to correct the follies of the world, and to stamp out the cruelties of the world and to illumine the darkness of the world, and to transfigure the hemisphere, spoke Dr. Talmage in a recent sermon. So it has been the mission of the country boys in all ages to transform and inspire and rescue. They come into our merchandise and our court-rooms and our healing art and our studios and our theology. They lived in Nazareth before they entered Jerusalem. And but for that annual influx, our cities would have enervated and sickened and slain the race. Late hours and hurtful apparel and overtaxed digestive organs and crowded environments of city life would have halted the world, but the valleys and mountains of Nazareth have given a fresh supply of health and moral invigoration to Jerusalem, and the country saves the town. From the hills of New Hampshire and the hills of Virginia and the hills of Georgia come into our national eloquence the Websters and the Clays and the Henry W. Gradys. From the plain homes of Massachusetts and Maryland come into our national charities the George Peabodys and the William Corcorans. From the cabins of the lonely country regions come into our national destinies the Andrew Jacksons and the Abraham Lincolns. From the plowboy's furrow and village counter and blacksmith's forge come most of our city giants.

NEW OR LITTLE KNOWN PLANTS.

THE PELICAN FLOWER (*Aristolochia grandiflora.*)

The remarkable flower, one of the very largest known, reproduced in the illustrations of the present issue, was grown at Bordentown, New Jersey, by Mr. E. D. Sturtevant, who communicates the following note with regard to it:

"About a year ago a wealthy amateur residing on the Hudson River sent me some vines under the name of the 'Duck-plant,' or 'Aristolochia Pelican.' It was said to be new, and I was unable to find any description of it in the Gardeners' Dictionary or in the catalogue of any nurseryman. Upon inquiry at Kew I was informed that it was not in cultivation there, but that it had been described and

figured in the Botanical Magazine under the name of *Aristolochia grandiflora* or Pelican flower. This plant has proved easy of cultivation and rapid in growth with me. In December of last year a young plant was placed in a good-sized box of rich soil in a warm green house. This plant in June had made a growth of twenty feet, and began flowering. Many buds are now (October 1st) well developed and one is open. At first sight the plant reminds one of a large Morning-Glory vine. The flower-buds, hanging pendant in different stages of growth, form certainly one of the most remarkable sights in the vegetable world, and cannot fail to cause exclamations of wonder from persons seeing them for the first time. The resemblance to the form of a duck or pelican is very close, the head, bill, neck and body being plainly outlined. The fully developed bud measures fifteen to eighteen inches in length, and is as large as a good-sized duck. This is exclusive of the long tail-like appendage. One flower fully expanded last June measured twelve by eighteen inches, with forty-two inches of tail, making the total length sixty inches. At the time the bud opens the tail assumes a spiral form, and appears to be intended as a ladder for the use of insects seeking to reach the flower. The center of the flower appears like purple velvet, the inside of the throat being lined with hairs turned downward, and intended, apparently, to prevent the return of the insects caught within. The open flower, unfortunately, emits a fetid and very disagreeable odor, but this is not perceptible before it expands. I find that this plant flourishes in good loam mixed with old manure or other fertilizers. It may be planted out in a warm green-house or grown in a tub which can be kept in the open air during the summer, and taken in before frost."—*Garden and Forest.*

THE STRANGER ON THE SILL.

Between broad fields of wheat and corn
Is the lowly home where I was born;
The peach tree leans against the wall
And the woodbine wanders over all;
There is the shaded doorway still,
But a stranger's foot has crossed the sill.

There is the barn, and, as of yore,
I can smell the hay from the open door,
And see the busy swallows throng
And hear the pewee's mournful song;
But the stranger comes—oh! painful proof—
His sheaves are piled to the heated roof.

There is the orchard—the very trees
Where my childhood knew long hours of ease,
And watched the shadowy moments run
Till my life imbibed more shade than sun:
The swing from the bough still sweeps the air,
But the stranger's children are swinging there.

There bubbles the shady spring below,
With its bulrush brook where the hazels grow;
'Twas there I found the calamus root,
And watch the minnows poise and shoot,
And heard the robin lave its wing,
But the stranger's bucket is at the spring.

O ye, who daily cross the sill,
Step lightly, for I love it still;
And when you crowd the old barn eaves,
Then think what countless harvest sheaves
Have passed within that scented door
To gladden eyes that are no more!

Deal kindly with these orchard trees,
And when your children crowd their knees,
Their sweetest fruit they shall impart,
As if old memories stirred their heart;
To youthful sports still leave the swing,
And in sweet reverence hold the spring.

The barn, the trees, the brook, the birds,
The meadows, with their lowing herds,
The woodbine on the cottage wall—
My heart still lingers with then all;
Ye strangers on my native sill,
Step lightly, for I love it still!

—*Thomas Buchanan Read.*

LIQUID MANURE FOR POTTED PLANTS.

House-plants do not, as a rule, flower freely until their pots are filled with roots, or, as it is usually termed, they are "pot-bound." When this is the case, the soil soon becomes exhausted, and the plant has nothing to feed upon. In such cases, recourse must be had to repotting with fresh soil, or applications of liquid manure. The latter is decidedly to be preferred, as, in repotting, the plants are liable to receive a check, either from root disturbance, or from a new growth consequent upon the new conditions in the supply of plant food. When a plant is ready to bloom, all that is necessary is to furnish food suffi-

cient to develop the flowers. At this period the plant resents disturbance, and requires sustenance. This can in no way be so well applied as by liquid manures. All free-flowering plants, such as geraniums, petunias, callas and oxalis, are greatly benefited by this treatment.

It may be urged that, in the use of liquid manure for house-plants, a disagreeable odor may arise. But, if applied in weather that will permit of free ventilation by opening the windows, this will very soon pass off. In extreme cold weather, commercial fertilizers can be used. In this case a tablespoonful to a pail of water will be amply sufficient. This should be prepared at least a day in advance, as some of the chemicals used are not readily dissolved in water—simply held in suspension—and to be used by the plants as required. From the use of liquid manures, in some form, satisfactory results are sure to follow.

Fresh fruits should be cooked with boiling water. As sugar is rendered no more soluble, palatable, digestible or nutritious by cooking, and is, in the presence of some acids, changed to glucose by the heat, consequently is much less sweet, it should be added only long enough to dissolve nicely, before removing the fruit from the fire. Dried fruit should be washed and then soaked in cold water until no longer wrinkled in appearance, but until it has imbibed sufficient water to give the original rounded form, then cooked slowly in the water in which it was soaked. If cooked rapidly in boiling water without first being soaked, the cells are hardened by the heat and lose the power of imbibing water, and the fruit comes to the table unsightly, unpalatable and indigestible.

ONLY A ROSE.

The following little story from the "Youth's Companion" is so full of pathos and truth and the lesson to be learned is so good, that we publish it for the benefit of those who have been blessed with plenty, but have never learned the true road to happiness: "A few years ago a lady living in the city returned one evening from the country, where she had been spending the day, with a large basket of roses. As she approached her own house a ragged, dirty boy followed her with such wistful eyes that she gave him a rose. Before her door was opened he was beside her again with two other grimy boys. "Ef you

plaze, mem, ye'll not be havin' one to spare for them?" pointing to his companions. "If they had been hungry and asking for bread," she said afterward, "they could not have watched me with more eagerness. When I handed them the roses they all gave a shout and darted away. In fifteen minutes the steps were almost filled with children, pale, ragged, starved little creatures. I do not know where they came from; they seemed to swarm out of the earth. I gave them the roses and all the flowers in my little garden, ashamed to think how many I had and how little I had valued them, while they were such priceless treasures to these children. Most of the children ran 'home' with their flowers as if it had been rare jewels. Later in the evening another poor little waif rang the bell to know 'if this was the house where they gave away flowers.' I determined then that, with God's help, it always should be." Out of this chance gift of a rose grew the flower mission of one of our great cities. No one, who has not carried flowers or growing plants into the slums of our cities, can know the delight which a common field daisy or a bunch of clover can give to their wretched inmates.

A little incident which occurred this summer has a certain significant pathos of its own. A young girl one day bought from an old negro on the sidewalk a bunch of purple water-flags. Going into a small trimming shop, she observed that the saleswoman eyed them intently. "What are those flowers, miss?" she asked. "I never saw them before, but I think they must be the flags my mother talks about that grew on the creek near her old home in Delaware. She's never seen any since." "Give them to her," said the customer, kindly. The woman tried to thank her, but the words choked her. "She's old and very sick," she said at last. "She won't be here long." A month later the young girl went into the same shop again. The shop girl, dressed in shabby black, came to her. "She kept those flowers by her for ten days—as long as she lived," she whispered. "She thought they came from her old home. When I put her in her coffin I laid them by her. There was a little color in them yet. They had given her so much pleasure, I thought I'd like to have them go with her still." It is not necessary to belong to a club or organization to join in this beautiful charity. Any child who lives in the country can send a box of wild flowers to her friend in town, and these, if taken into the nearest court or alley, will become a missionary charged with God's message of good will and love. Flowers are his free gift to man. Food, clothes, even knowledge, we must work for and buy, but flowers grow for the beggar on the wayside. Shall we not carry His gift to our poor brother imprisoned in city walls, who has not received it?"

We have just received a sketch of the life and services to American horticulture of the late Peter Henderson, which was read before the New York Florists' club by Mr. A. D. Cowan. One of the interesting facts brought out in this paper is that when "Gardening for Profit" was prepared, Mr. Henderson was occupied with his business for sixteen hours a day, and the book was written in the short noon intervals and in the small night hours. The author wrote lying on his back with his head bolstered up to rest his body while his active mind kept at work. We quote this not so much to show Mr. Henderson's industry and energy as to call attention to the fact that this most successful of all his books, and probably the most useful work on market gardening ever published, was written directly from the author's personal and daily experience. Perhaps this will help to account for its high practical value.—*Garden and Forest.*

TREE LABELS.

Sir Joshua Reynolds, when asked how he would paint a picture of folly, said he would represent a boy climbing over a high and difficult fence, with an open gate close at his side. We are reminded of this by the frequent directions often given, in English as well as American journals, for the construction of costly and elaborate wired tree-labels, while the simple, cheap and durable zinc labels have been repeatedly described during past years. A small strip cut from scrap sheet zinc, the name near one end, and the other end coiled once around a side branch, will remain perfect many years. The name is written on the slightly rusted zinc with a common lead pencil, and will last exposed to the weather half a century.—*Country Gentleman.*

Shall we throw away the seed ends of potatoes? References to files of the R. N. Y. will show the results of our own experiments to solve this much-mooted question. Mr. Taft, the horticulturist of the Michigan station, cut his tubers transversely into stems, middles and end pieces. The conclusion is arrived at that the seed end is as valuable for planting as any other portion of the tuber.

Whole potatoes used for seed yielded 293 bushels per acre, halves 317, quarters 254, eighths 221, single eyes 178.

Mr. Taft, for whole tuber seeding, used nearly 42 bushels to the acre; for half-potato seed, 20⅓; for quarter-seeding, 10 bushels. Tubers cut into eighths required 5 bushels 44 pounds; single eyes, 4 bushels 10 pounds. The seed was dropped 1 by 3½ feet apart.

The half of a large potato, or a medium sized whole one of the same weight as the half—which is best for seed?

Here is Mr. Taft's report:

	Quality of seed.	Yield per acre.
Whole tubers weighing 4⅓ oz.	60 bushels	370 bushels.
Whole tubers weighing 3½ oz.	44 "	361 "
Half tubers weighing 1¾ oz.	22 "	433 "
Whole tubers weighing 1¾ oz.	22 "	349⅓ "
Half tubers weighing ⅞ oz.	11 "	305½ "
Single eye, cut deep		173½ "

THE MERITS OF WOOD ASHES.

In an essay read before the American Horticultural society at the Cleveland (Ohio) meeting a few years ago, Mr. J. M. Smith gave an account of the means employed for the prevention of the evil effects of a prolonged drouth. Among these means a free use of wood ashes was named as one of the simplest and most effective.

Recently Mr. Smith has made a comparative test of the effects of wood ashes and barn-yard manure on a scale large enough to show results that are more than an "indication." Two acres lying side by side were treated exactly alike in every respect, except that one was manured with unleached wood ashes and the other with stable manure. Mr. Smith reports the results of the trial to the "Prairie Farmer" as follows:

The acre fertilized with ashes yielded 51 bushels the most, and if there was any difference in quality it was in favor of those that had the ashes. Now, the fair inference would be that the ashes were much the best manure for potatoes. Let us look a little further: The last half of May and the first half of June were wet and cold, and so far the two acres seemed to keep just about even. After June 15 the weather became very dry, and there was little rain upon the plants until they were ripe. Very soon after the ground began to get dry, it could be plainly seen that those manured from the compost-heap were suffering from want of rain, while those manured with ashes were growing very rapidly. This continued until they were ripe.

The simple fact is, potatoes or strawberries manured with ashes stand drouth that would be ruinous to crops fertilized with any manure I have ever tried. To this fact I attribute the failure of the compost-heap acre to hold its own with the acre upon which ashes were used. I have tried the experiment many times, always with precisely the same result, provided we had a dry season during the growth of the crop. I do not know but the rule will hold good with all farm and garden crops, but with the above-named there is no doubt. I do not underrate ashes as manure. I have used them in preference to any fertilizer I could get for potatoes, many years.—*Popular Gardening.*

PLANTAIN-IVY POISON.

At this timely season the "Rural New Yorker" wants information as to ivy poison and the "cures" for it. I am a good subject to experiment on, for I get poisoned if I look at it, and I get it "bad." I was laid up for nine weeks, all told, with it last summer. Now for cures: First a doctor treated me with sugar of lead; it worked "beautifully," the lead and ivy worked like a team, and it took me six weeks to get well. Then lobelia was tried; it felt really nice, but as far as any effect went, I could feel none. I was advised next time to slake some lime, and when the stuff got cold, soak my hand in it. I did so, and so far as effect was concerned, it was like the lobelia. The next doctor was more "advanced." He said: "Use iodine freely." I did—very freely, and the skin came clean off in about twelve hours. It was then only a burn, and that healed in a week, while the ivy undisturbed usually took three. Here was progress, but it was severe treatment, and quite painful, so next time I decided to do as a friend advised, and try St. Jacob's oil. If used freely and promptly, I found that it killed much of the trouble; but the worst spots went through their regular course. This brings me to the latter part of last summer. Both my hands were badly poisoned when I met two boys on the road, who kindly told me I was a fool to stand that pain when it could be cured in a day. I allowed them to "doctor" one hand, so that I could make comparison. They took a small bunch of the leaves of the common plantain, that grows everywhere; grated the bunch on a stone until the sap flowed freely, then rubbed my left hand with it until it was green with sap. I was told to wash it next morning, and if it needed it, rub the stuff on again. It did not need it, for the hand was practi-

cally well. Still I did put some on one or two places where it had been very bad, and that "fixed" them. At the same time I rubbed the sap on my right hand, and in twenty-four hours I could use it freely. I have been poisoned twice since then, and this remedy has given instant relief and speedy cure.

THE PLANE TREE.

The Platanus is indeed a most eccentric and extraordinary tree, as one sees it in Persia. It enjoys water-courses and shady valleys, and it grows in the desert far from water with equal satisfaction apparently and with equal grandeur. It is by far the noblest tree of Central and Western Asia in its form and dimensions. The Plane tree under which Godfrey of Bouillon encamped by the Bosphorus, is still standing, a most venerable and gigantic patriarch. Not many years ago a similar tree was standing in Asia Minor, which was reputed to be the tree which Xerxes decorated on his way to Greece.—*Garden and Forest.*

A LIVING INSECT TRAP.

Not a single creeping, crawling or hopping thing is to be seen in our tomato hot-bed of four sashes, except one toad, which in reality is nothing else than a wandering (hopping) insect trap, and gobbles up every hapless small creature that gets into it. Of course we make a pet of our living insecticide, and have almost learned to admire its handsome color, and its intelligent eye. Sometimes we give it an especially dainty morsel, such as a large May beetle, or even a potato beetle, a centipede, etc. Our guest takes them all with equal gratitude and appetite. There can be no doubt that toads may be colonized and put to good use in cucumber, melon and squash patches. At any rate we intend to assign to them the duty and responsiblity of keeping the vines free from bugs this year, and it will be safer to trust to their watchfulness than to depend on poisonous applications.

Following are lists of some of the more pleasing flowering trees, shrubs and plants, classified according to their season of bloom:

EARLIEST FLOWERING, USUALLY BEFORE MAY.—*Shrubs*—Mezeron Pink, Forsythia or Golden Bell. *Plants*—Winter Aconite, Hellebore, Snowdrops, Crocus, Pansies in frames.

MAY AND JUNE BLOOMERS.—*Trees*—Magnolias, Red Bud or Judas Tree, White Dogwood, Horse Chestnut, Yellow Wood or Cladastris, Snowy Mespilus, Bird Cherry, Locusts, Thorns, Flowering fruit trees. *Shrubs*—Currant, Azaleas, Bush Honeysuckle, Japan Quince, Lilacs, Flowering Plum and Almond, Early Spiræs, Viburnums, Tamarisk, Calycanthus, Deutzia, Mock Orange or Syringia, Roses, Weigelas, Clematis. *Plants*—Tulips, Hyacinths, Narcissus, Peonies, Columbines, Lily of the Valley, Garden Pinks, Hepatica, Creeping Phloxes, Herbaceous Spiræs, Violets, Crown Imperials, Bleeding Heart, Oriental Poppies, Lychnis, Periwinkle.

SUMMER AND EARLY AUTUMN BLOOMERS.—*Trees*—Chestnut, Kolreuteria, Sumachs. *Shrubs*—Althea or Rose of Sharon, Clethra, Japan Corchorus, Panicle-flowered Hydrangeas, Late Spiræs, Smoke Bush, Trumpet Vine. *Plants*—Monkshood, Milfoil, Japan Anemones, Golden-spurred Columbine, Campanulas, Sweet Williams, Plantain Lily, Day Lily, True Lilies in variety, Hollyhocks, Spiderwerts, Sun-flowers, Annuals, Tender Plants.

ATTRACTION IN FALL AND WINTER.—*Trees*—Evergreens, White-barked Birches. *Shrubs*—Box and other Dwarf Evergreens, Burning Bush, Barberry, Waxberry, Witch Hazel. *Plants*—Chrysanthemums, Hellebores.

EARLY THINNING OF FRUIT ESSENTIAL.

The horticulturist of the Missouri Experiment station has made some analyses of apples during the different periods of their growth, which show that much the greater proportion of the ash is stored up in the early part of the growth of the fruit. This is urged as an additional reason for thinning as soon as the wormy and imperfect specimens of the fruit can be distinguished. A barrel of large and perfect apples takes a smaller amount of mineral plant food from the soil than a barrel of small inferior fruit. The apples on an acre of ground where the trees stand thirty feet apart and yield ten bushels of fruit to the tree, take from the soil more than 43 pounds of potash. This suggests the use of ashes, or of the potash salts, as a dressing for orchards.—*Popular Gardening.*

There are no roses that are likely to prove of more value to those florists who need plants to flower outside during the summer months than the old varieties Malmaison and Duchess de Brabant. Good plants of these from 4-inch pots planted outside in May will astonish many by the profusion and quality of the flowers that they will pro-

duce. Attend to them, and they will well repay the labor and care expended upon them. Duchess de Brabant is of particular value as a plant for spring sales in pots. There is no rose that can surpass it in this respect, very few that can equal it.—*Alfred E. Whittle in American Florist.*

Pruning the bushes is a part of rose culture in which many growers make their greatest mistake. We refer especially to the annual pruning, which is best done in March or early April. All kinds must be pruned when planted.

In the case of Hybrid Perpetuals, a proverb of "spare the knife and spoil the bush" is decidedly apt, as the best results cannot be obtained unless the knife is freely used in the spring. The operation of pruning is a most simple one. Cut away all weakly growth, and cutting back the strong stems to five or seven eyes, keeping this in mind, that the weaker the growth the more closely it should be cut back. Another consideration is the size and the number of the flowers desired; the closer the cutting, hence the less buds remaining, the larger will be the flowers; if quantity is the object then more buds should be left. Some kinds of Hybrid Perpetuals should be pruned after their first crop of flowers to induce the driving of flowering wood for autumn.—*Popular Gardening.*

AGRICULTURAL APHORISMS.

Don't rent more land than you well can work;
Don't hope to succeed if you love to shirk;
Don't think you will ever get through learning;
Don't think that saving is less than earning;
Don't starve your stock nor o'erwork your hands;
Don't expect good crops if you starve your lands;
Don't use poor tools nor let good ones rust;
Don't ask your neighbor for time nor trust;
Don't make a debt when you know you can't pay it;
Don't make a poor rule lest none will obey it;
Don't get behind lest you work in haste;
Don't let money, time or manure waste;
Don't stint your home to help swell the banks;
Don't fail to give for a favor, thanks;
Don't spend your time at the corner store;
Don't give a little, expecting more;
Don't hope the Lord will award you pelf,

Till you make an effort to help yourself;
Don't hope nor expect a happy life,
Till you treat as well as your horse, your wife;
Don't growl, don't whine, don't cheat, don't lie,
And till you have done your part—don't die.

—*Colman's Rural World.*

PEOPLE WILL TALK.

You may get through the world, but 'twill be very slow
If you listen to all that is said as you go.
You'll be worried, and fretted, and kept in a stew,
As meddlesome tongues must have something to do;
For people will talk.

If quiet and modest, you'll have it presumed
That your humble position is only assumed;
You're a wolf in sheep's clothing, or else you're a fool.
But don't get excited—keep perfectly cool,
For people will talk.

And then if you show the least boldness of heart,
Or a slight inclination to take your own part,
They will call you an upstart, conceited and vain,
But keep straight ahead—don't stop to explain,
For people will talk.

If threadbare your dress, or old-fashioned your hat,
Someone will surely take notice of that,
And hint rather strong that you can't pay your way;
But don't get excited, whatever they say,
For people will talk.

If you dress in the fashion don't think to escape,
For they criticise then in a different shape:
You're ahead of your means, or your tailor's unpaid;
But mind your own business—there's naught to be made,
For people will talk.

—*Selected.*

KEEPING CUT FLOWERS.

There are two important points—to keep the water pure and to cut off the ends of the stems as they harden. The water may be kept pure by frequent change, but it is easier to use some antiseptic—ammonia, nitrate of soda, or salicylic acid. The last-named is the best Be careful not to use too much. The ends of the stems should be ct

off each morning, at least, as they harden and close the sap vessels, and water cannot be absorbed; and also, the ends of the stems should not rest on the bottom of the vessel. The vessel should be so large that the stems are not crowded in it. The flowers can be kept longer by removing them from the vessel over night, sprinkling them until quite damp, and wrapping them in several thicknesses of paper or putting them in a pasteboard box, and placing them in a cool place. Flowers may be revived by cutting off the ends of the stems and placing them for ten minutes in water almost boiling hot, then in cold water to remain.—*American Agriculturist.*

In many French villages boards are set up, bearing the following instructions: "Hedgehog: Lives upon mice, snails and wire-worms, animals injurious to agriculture. Don't kill a hedgehog. Toad: Helps agriculture; destroys twenty to thirty insects hourly. Don't kill a toad. Cockchafer and its larvæ: Deadly enemies to farmers; lays seventy to one hundred eggs. Kill the cockchafer. Birds: Each department of France loses yearly many millions of francs through the injury done by insects. Don't kill the birds."

DOUBLE-FLOWERED CHINESE PLUM.

(Prunus triloba.) There are but few more beautiful hardy flowering shrubs than this, yet one seldom meets with it. For small gardens it has special value, as it does not grow to a large size, forming, when grown as a standard, a dwarf-spreading head. For this reason, when placed in shrubberies where vigorous growing trees abound, it should be brought well to the front, where, in early spring when crowded with blossoms, it forms a conspicuous object. In the standard form, indeed, it well deserves a position on the grass; but it should, if possible, get some shelter, for rough winds and heavy rains damage the expanded flowers. It may also be grown in bush form, and it is really admirable for forcing under glass in winter,, as it flowers freely in pots in a small state, and requires but little heat to induce it to open its blooms. The same plants may be used year after year if carefully hardened off, plunged or planted out, and well fed in summer, but it is better to have two sets, allowing one year to recuperate.—*J. C.*

HOT WATER VS. STEAM.

Prof. L. R. Taft of the Agricultural college of Michigan has also made some comparative tests of the hot water and steam systems for heating green-houses, which corroborate Prof. Maynard's conclusions that the hot water system is less expensive, and consequently preferable. The records kept of the two test green-houses on the college grounds show that during January the hot water house averaged 1.5 degrees warmer than the steam-heated house, and to secure this it required 675 pounds of coal less than was used in the steam heater. In February the water house averaged one degree warmer than the other, and the coal used was 625 pounds less. Altogether, Prof. Taft feels justified by these results to say that while the old method of piping for water heating with four-inch cast-iron pipes was undoubtedly less economical than steam heating, the present system of water heating with small pipes will certainly prove more satisfactory in every way for houses less than 100 feet in length.—*Popular Gardening.*

POISONING THE ENGLISH SPARROW.

A recent report of the Department of Agriculture contains the following recipe: Dissolve an ounce of arseniate of soda in a pint of warm water; pour this upon as much wheat as it will cover (in a vessel to prevent evaporation), and soak twenty-four hours. Dry the wheat so prepared and it is ready for use. The sparrow should be baited for several days previously with good wheat, and the poisoned wheat substituted at the same place and time. The utmost care must be used in administering poison of any kind to sparrows, and any person or animal eating the dead sparrows are liable to be fatally poisoned.—*Popular Gardening.*

CALIFORNIA FLOWERS.

The average bouquet culled from the garden consists of too many flowers; it is a crowded mass of bloom instead of a charming nosegay in which the individual flowers show to the best advantage. That the crowding of the material in any flower arrangement is a mistake is easily susceptible of proof. Let the reader take a liberal quantity of bloom and arrange it in a single large bunch; then take an exactly

similar lot and divide it into two or three bouquets, spreading the flowers somewhat so as to have the outlines of each about equal in size to first one made, and note the superior results from an equal quantity of flowers, says "Popular Gardening." This test, however, presupposes the use of ordinary garden blooms cut with long stems, some of them to be very long, say eighteen inches or two feet in length. This is a point in itself not sufficiently appreciated. For to arrange advantageously one should employ an abundance of long stems. Indeed, if such stems are naturally lacking, it may be well to follow the florists and provide suitable artificial stems. In the making of every kind of bouquets we may take some most useful lessons from the commercial florist. Where flowers have a money value it of course increases the profits to be able to make any given quantity go as far as possible, and yet the spreading out of blooms may be carried far with no disadvantage to the buyer. The ideal bouquet has every flower uncrowded.

Where the stems of flowers are short, or the object is to tie a flat or rounded hand-bouquet, how is one to proceed in spreading the blooms? Let us watch the commercial florist tie up a nosegay. In the first place, if any flowers are too slender to be stiffly supported by their own stems, or the stems of which are very short, he supplies a wire to make up the deficiency of nature. Then he commences his bouquet by selecting a good, bold flower, such as a rose, lily or camelia for the center, which he winds with strong thread onto a thin, stiff twig. Around this center flower he then places a few leaves, and outside of these, to be an inch or two below the flower, he binds sufficient moss so that when a circle of flowers is added, they will not unduly crowd or overlap the first flower. It is usual to start with smaller individuals or trusses of flowers in this front line outward, and place a few light sprays of bloom between them to stand out boldly above the regular surface; next another ring of moss is bound on the center stem, after which more green is applied and another circle of flowers and of projecting sprays. In this manner the bouquet is proceeded with until a suitable size is reached, when it may be finished by the addition of an edging of pleasing foliage, as smilax, fern, rose or camelia leaves.

In the making of a bouquet thus, the use of a variety of flowers is assumed. But the style now very much and very sensibly in vogue is the use of but a single kind of flowers in a bouquet; it may be of roses, sweet peas, mignonette, violets, pansies, tulips, lilies, or other kinds. In this case the course to employ for preventing crowding is not dissimilar from that we quoted. But to avoid a stiff and monotonous appearance in the boquet, pains must be taken to have some flowers stand out con-

siderably beyond the others and yet not be crowded, a matter easily effected by the use of plenty of moss back of the inner line of flowers, for keeping the arrangement open. A very handsome style of bouquet is one in which several shades of the same flower are used, arranging them uniformly in lines crosswise. We allude to the use of the darkest shade on one side of the bouquet and then grading in the line of next darkest, and so on in succession to the lightest on the further or opposite side. A similar style may be employed in making an upright anchor, cross or other floral design suitable for a funeral. For instance, it may be the desire to make a harp of pansies alone. After gathering the flowers, grade them according to color and shade. Then in their use begin with the lightest ones at the bottom and proceeding with the various successive shades in regular order to complete the entire piece, ending with the darkest, even if it be black pansies, at the top. Whatever the nature of any piece of flowers, it should have some kind of edging or setting of green.—*California Fruit-Grower.*

THE BIGGEST APPLE TREE ON EARTH.

The Boston Journal says the largest apple tree in New England, and probably in the world, is in the northwestern part of Cheshire, Conn., standing in Mr. Delos Hotchkiss' dooryard. Its age can be traced by a family tradition to 140 years at least, and it may be twenty or twenty-five years older.

It is at the present time of symmetrical shape; the trunk is nearly round, without a scar or blemish on it; there are eight large branches five of them have been in the habit of bearing one year and the other three the next. Mr. Hotchkiss has gathered in one year from the five branches eighty-five bushels of fruit, and his predecessor had harvested a crop of 110 bushels from the same five branches.

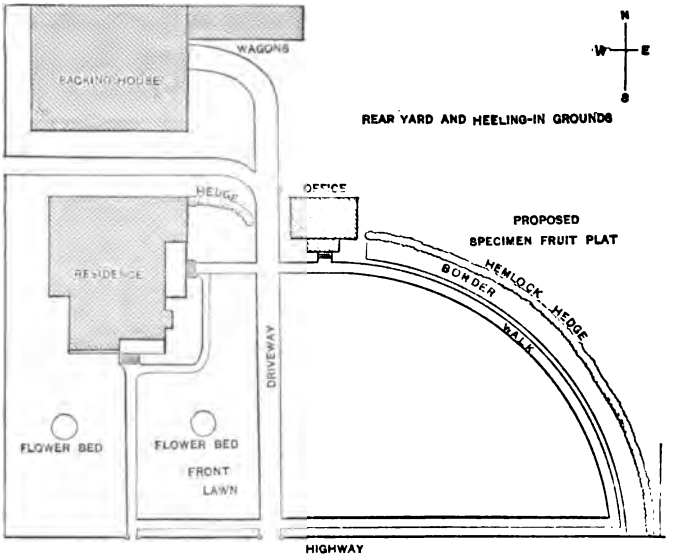
By careful measurement, the circumference of the trunk one foot above the ground, above all enlargements of the roots, is thirteen feet eight inches. The height of the tree has been carefully measured and found to be sixty feet, and the spread of the branches, as the apples fall, is 100 feet or six rods. The fruit is rather small, sweet, and of moderate excellence. But only think of it: 85 bushels of apples in one year from a single tree, and 110 bushels from another. This noble old tree has no peer, thus far, in the apple tree history of this or any other country.

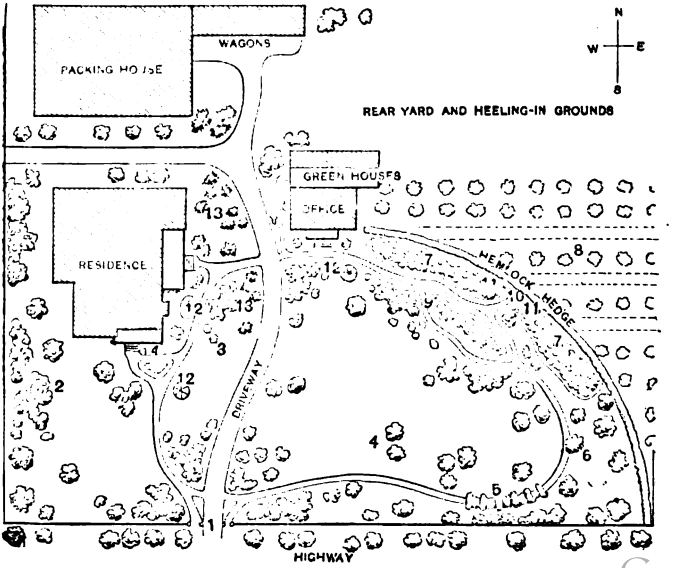
TASTE AND TACT IN ARRANGING GROUNDS.*

[The following plan, taken from "Popular Gardening," I consider of sufficient value to give us some thoughts in regard to laying off our grounds. The cut has been kindly loaned us by the publishers of that journal. A little study of such a plan will help any one who wishes to improve their home.—SECRETARY.]

SECOND PAPER.

Our second article in this serial, relates to the home grounds of a New York State nurseryman. This gentleman sent to us the upper sketch of grounds, annexed, with a request for any suggestions on im-





proving the same which it might occur to us to submit. It is a pleasure to comply with this request, for if there is one class more than another whom we are glad to see interested in tastefully improving their grounds, it is the nurserymen.

Indeed, but little argument is needed to show that not only every nurseryman, but every florist and seedsman as well, should follow the example of the present applicant, to the extent of providing, as his opportunities will allow, a fine object-lesson in ornamental gardening, for the good of the public in his respective locality. These men sell trees, vines, plants and seeds to others; they should show others by example how effectively to use such embellishing materials. Not only should their grounds be handsomely arranged, but the growing of many specimen trees and shrubs, which are now largely unknown to planters, should receive much attention, with a view to acquainting the public with such. They should aiso undertake, by liberal and judicious leadership, to influence public sentiment toward improving the public highways, cemeteries, parks, squares, school grounds, etc.

Glancing over the upper plan as submitted by our friend, it is at once seen that here there is considerable room for improvement. The place, as it now is, presents a certain poverty of garden expression and lack of pleasing features. An exception is found in the curved hedge of hemlock, which extends from the office to the highway, and this is retained in the new plan. The merit of this boldly-curving hedge lies is its relieving, very decidedly even here, the numerous straight lines and angles which, at present, constitute one of the chief faults of these grounds.

In the lower plan we endeavor to show how, without discarding, or even varying greatly the position or course of any principal element of the garden, there may be secured a strong preponderance of graceful curves and irregularity throughout. As is commonly the case in gardens, there already exists in this one, in the boundary and building outlines, more straight lines and angles than is conductive to pleasing garden effects. The object therefore must be, instead of increasing this characteristic, by embodying these into the walks, drives and other features, to take a reverse course, so that the fixed lines and angles may be subdued in effect. How easily this can be done in the present case is shown by the details of the lower plan.

Take the drive-way and walks for instance, and it is seen that with but slight curves introduced, they may be nearly as direct in their course as are the old straight ones, while being far handsomer in contributing to garden beauty.

Again, to have the front yard divided by a straight walk through its center, and then each division centrally occupied by a round flower

bed, is not nearly as pleasing to the eye as to have the plat or plats unoccupied at the center. Let it be laid down as a fundamental principle in all good gardening, to which there are very few exceptions, that for the best appearance, the centers of all lawn areas should be kept clear of walks or other features besides grass.

To the average reader it might appear that trees and shrubs are suggested almost to excess for use throughout the grounds. This is not true, especially in the present instance, as the owner desired provision for many specimen ornamental trees and growths throughout. But in any case where the principle here illustrated is observed, namely to keep the plantings largely toward the margins of the different plats and of the grounds in general with the centers of the grass areas open, there is little danger of introducing too many trees, shrubs and plants so far as appearances go. The cost of the stock, planting and maintaining might be an objection in the minds of some, but it ought not to be to a nurseryman. If all the improvements cannot be completed in one season, it is yet well to work on a comprehensive plan, doing a portion of the work each year until all is accomplished.

The plan of arranging the shrubs, plants and trees mainly in groups is one almost always to be recommended. Numbers in a mass, especially of shrubs and plants, contribute boldness and character in a degree not attainable by scattering the same about singly. In the arrangement here shown, if judgment and taste are bestowed on the selection, the masses of shrubs, flowers and rock-work indicated by 7, 9, 11 should contribute a most attractive part to the garden. The heavy masses of flowering shrubs through which the entrance to the grounds at 1 is made, afford a charming introduction to the home and its garden.

With locating some choice evergreens at 13, 13, an abundance of shrubs and handsome trees along the western boundary near the residence, a tree grove in the southeast portion of the grounds, and having the beautiful curving hemlock hedge at one extreme side, pierced by a passage-way leading to the fruit plat 8, and plats occupied with a profusion of shrubs and flowers at 7, 9, 11, as referred to above, and an abundance of other choice natural material scattered over the place, and a vine arbor spanning the walk at 5, with the open lawn areas affording pleasant vistas in many directions, and gracefully winding drive-way and walks throughout the grounds, altogether there would be provided in the present subject the elements of a most beautiful, complete and well-balanced garden, one that could not fail to impart endless charms to its owner and to all beholders.

The "New York Herald" received the following question:

I am a country boy. I came from a farm in New Hampshire to New York, with the hope of making a name and a fortune. Either the fame or the fortune would satisfy me, but I prefer both if they are within reach. Will you kindly tell me how I can carve out for myself a successful career?

In the course of its instructive reply the "Herald" asks: Is a surplus of cash the prime factor in the problem of happiness, and is a citizen's usefulness to be measured by his bank account solely? You may also get the fame you wish. It depends on your education, on the quantity and quality of your brains and on your native genius. With these, everything is possible; without them, you will everlastingly hunger for the unattainable, and in the end draw the coverlid of a wasted life over your head and die a disappointed man. Don't make any mistake in this matter. If you wish to get out of life all there is in it—for you—there is a way to do it. Real happiness consists of health, self-respect, the good-will of the community and a sufficient income to gratify your reasonable wants. Everything else is trivial and not worth bothering about. The man who has steady work, fair wages, a cosy home, enough to eat, a thick overcoat, and the consciousness of personal integrity, is a mightily favored fellow, in possession of more than three-quarters of the best things which this world affords. If you are mechanic, or artisan, or farmer, be proud of yourself, and the rest of the world will soon come to be proud of you. Nothing is needed so much in this generation as a man with skilled fingers. You may have a long pull, but the clock will strike an unexpected hour, and the opportunity—which comes to everybody in turn, but which most people miss—will present itself. Study the bull-dog, and when you get your teeth into a big thing, let them stay there. Save money. The coward runs in debt, the brave man has a $5 surplus in his pocket. The world may laugh at you because you can't have a four-in-hand neck-tie. All right, let it laugh. You are your own world, and the people who sneer are simply outside barbarians. When they see that $5 bill growing bigger, they will all want to shake hands with you and send you to Congress. Keep well within your income, and you will save yourself from skulking round the corner like a kicked dog when the dun is on your track. The handiest thing on the planet is the penny laid up for a rainy day. Now, young sir, get rid of the nonsense that you are a genius, settle down to the conclusion that you are just an average North American boy, and then start in. Keep yourself alert, look after your digestive apparatus, don't smoke cigarettes, get to bed early, be square-toed in all your dealings, and we will wager a cookie that at sixty you will have to look backward for those who began the race when you did. Are you ready? Then, Go!—*Rural N. Y.*

WHEN TO PRUNE APPLE ORCHARDS.

EDS. COUNTRY GENTLEMAN—This is a subject on which a great variety of opinions have been expressed, and yet does not appear to be fully decided. Having had some experience in the matter, and having charge of some thousand orchard trees, and being advanced in years, I thought I would make a statement of the conclusions reached in my judgment.

Most orchardists know that the practice of neglecting to prune an orchard for some years, and then pruning heavily, is very injurious. If trees are properly pruned while young, and the sprouts or suckers rubbed off once or twice each summer, it will obviate a great deal of after-pruning. But what I want to show is, when it is necessary to take off thrifty limbs of some size, as in the case of top-grafting or opening out the top of a tree—at what season of the year it should be done.

About twenty years ago the idea was current in many papers that June was the time to prune; that if done then the wound would soon heal over. I tried that season and pruned some trees, and was pleased to see how soon the new wood began forming over the stumps of limbs taken off at that time. But I soon found that the healing over was not the main object, but the preservation of the wood below and down the body of the tree, for I noticed that in a few years after, the stumps of limbs taken off at that season of the year had decayed, and often showed signs of decay some distance below. I therefore concluded that late spring or early summer was, of all seasons, the most unfavorable for pruning.

I had noticed that where limbs were broken off in the fall with weight of apples, the part below the break generally remained sound. I therefore determined to give each season of the year a fair trial for pruning. I selected a thrifty apple tree about half grown, which was furnished with a number of limbs, and cut off a limb about the middle of each month in the year, leaving a stump of two or three inches long, labeling it with the date of the operation. I observed in a few years after, that the stumps of those limbs taken off in late spring and early summer were somewhat decayed, while the others, and particularly those taken off in the fall, were sound. A few years after, I cut the tree down for inspection, and found that the decay of those limbs showed in the body of the tree by colored portions approaching decay. Therefore, I was fully convinced that the spring of the year and early summer were not the time to take off thrifty limbs of some size, though it might do for small pruning or for decaying branches. Any person

who is familiar with the cutting of young timber knows that a sapling cut in the spring of the year soon sap-rots, and the stump also; but if cut in the fall will remain sound for some time, and the wood when dressed will have an oily appearance.

As to the time for larger pruning, I would recommend for the latitude of Central Pennsylvania to commence about the middle or latter part of 9mo. (September). Fruit-gathering may prevent beginning thus early, but it may be done immediately after the apples are gathered. Another great advantage in pruning before the leaves have fallen off is that we can more readily observe those limbs which Nature has concluded to throw off, and assist her in the operation. I would say to orchardists, do not too readily take up with the conclusions of others, but experiment, and let us get this matter of the time to prune settled.—*W. P. Fisher in Country Gentleman.*

Centre County, Penn.

THE BIG TREES, CALIFORNIA.

It has been sufficiently shown that there are in the State several forests and groves of big trees still belonging to the Government, aside from those embraced in the Vandever bill. To insure the safety of these, and to put them beyond the designs of timbermen, and above all to protect them from devastating forest-fires, it is exceedingly desirable that they be reserved and placed under expert supervision. We need no reminder that the greed of timber and cattlemen will soon work havoc with what remains unless something be done to stay the devastation; and if we would save a portion we must begin at once.

Concerning the utility of the region embraced in these limits as the best natural reservoir for the storage of waters needed for irrigation, we need not dwell. But for a moment let me touch on the suitability of the country for a park because of its charming natural attractions. You need hardly be reminded of this. The heart of the Sierra culminating in Mount Whitney affords grand scenery of peculiar charm and great variety. Here are three Yosemites rivaling their noted prototype in many features, with a little world of wonders clustering around the headwaters of Kern, Kaweah and King's rivers. We will simply mention the Grand canon of the Kern, where, for twenty miles, the mad waters of the river are walled in with the continuous battlements of the California Alps, crowned with nameless and unnumbered

domes and towers. Then, only a few miles across the divide, extends the canon of King's river with its wealth of impressive scenery, and some eight miles farther to the north lies the valley of Tehipitee—the gem of the Sierra—with its wondrous dome of rock rising in rounded majesty some 6,000 feet from the level of the river-cleft meadow at its foot. Yet a view of the most impressive and characteristic scenery of the region is to be earned by scaling one of the lofty peaks of the Kaweah range. At least a hundred peaks here rise to altitudes exceeding 10,000 feet. One never can forget the impression who has once looked out over California Alps from the pinnacle of Miner's peak. As I once before said, in describing this scence: "Here, amid the companionship of peaks, one beholds with speechless wonder the spectacle beyond. No satisfactory view of the Whitney range can be found from the San Joaquin plains. The intervening Kaweah range veils the view of the higher peaks beyond. But here, standing on the crest of the Keweah Sierra, one looks across the Grand canon of the Kern, and the encircling wildernees of crags and peaks is beyond the power of the pen to describe. Mounts Monache, Whitney, Williamson, Tndall, Kaweah and a hundred nameless peaks—the crown of our country—have pierced the mantle of green that clothes the canons below, and are piled into the very sky, jagged and bald, and bleak and hoary—a wilderness of eternal desolation."—*Garden and Forest.*

SHRUB BUDDING.

We have before alluded to numerous examples of bedding hardy shrubs effectually on our grounds. Figure 5 shows one of the smaller beds of this kind, such as would from its extent be suitable for introducing into grounds of almost any size. The occupants in this case are as follows: Five Golden Bell *(Forsythia viridissima)*; nine Variegated-leaved Weigelias; seven Panicled-flowered Hydrangea; seven Mezeron Pink; one Strawberry bush *(Eunymus)*. The selection is capable of affording bloom almost continuously from the time of the Mezeron Pink in April to the end of the Hydrangea season in October, while the fruit of the Strawberry bush gives attraction to the bed in late autumn. The foliage of the bed is also pleasingly varied from the light-colored leaves of the Variegated Weigelia to the intensely dark foliage of the Golden Bell. Between the shrubs at the edge of the bed are scattered Hyacinths, Verbenas and other flowering plants—*Popular Gardening.*

AUTUMN FAVORITES.

The Maple is a dainty maid,
The pet of all the wood,
Who lights the dusky forest glade
With dusky cloak and hood.

The Elm a lovely lady is,
In shimmering robes of gold,
They catch the sunlight when she moves,
And glisten fold on fold.

The Sumach is a gypsy queen,
Who flaunts in crimson drest,
And wild along the roadside runs,
Red blossoms in her breast.

And towering high above the wood,
All in his purple cloak,
A monarch in his splendor is
The proud and princely Oak.

—*Youth's Companion.*

BEES AND FRUIT.

Professor Cushman, apiarist at the State Agricultural Experiment station, declared before the Rhode Island Horticultural society that bees never attack sound fruit, but only such as is decayed or has been already injured by other insects; and his words were indorsed by all his auditors.

THE SPRINGFIELD (MASS.) AMATEUR HORTICULTURAL SOCIETY

Is only two years old, but has already a membership of over 400, and holds two exhibitions a year. It is doing much to create a love for the cultivation of flowers among the people here. Every one is invited to show what he can, but no premiums are offered, so there can be no jealousy felt.

THE BLESSINGS OF HORTICULTURE.

Horticulture is, *per se*, one of the most pleasant pursuits which men have ever followed. It brings into healthful exercise both mind and body. It neither racks the one nor wrecks the other. To the gardener—even the aged gardener—the aching bones, the stiffened joints and distorted form and hungry soul are still indefinitely postponed.—*Dr. Ridpath.*

WILD FRUITS.

Are any wild fruits susceptible of improvement, so that they may become valuable additions? We have severely slighted our native fruits. In the old world a class of fruits has been developed adapted to their soil and climate. We have sought to reap at once the benefit of that long process of improvement by removing their fruits to our land, with its widely different climatic conditions.

To what extent our precarious fruit crops are assignable to this cause I do not know. The foreign grape we have abandoned, and in its stead has sprung up a multitude of vastly improved varieties of native grapes. The same may be said of the raspberry. Would it not have been a good fortune for us had the imported plum and cherry been more susceptible to injury from the curculio, and less able to endure our winters? If so, by this time perhaps we might have been rejoicing in delicious native plums and cherries that should be as hardy as their unimproved parents.

One boon of the experiment station is to demonstrate that, with some exceptions, America's native fruits will furnish varieties equal to those of the old world, with the great advantage that they will stand our climatic conditions.

Probably we have wild fruits not yet introduced into culture that are capable of amelioration. The dwarf June-berry *(Amelanchier Canadensis)* in certain localities offers some promise. The huckleberry and blueberry take less readily to culture, but are enough superior in quality to merit more efforts for their improvement. We have domesticated the cranberry, a cousin of the huckleberry, by suiting our treatment to its ascertained needs.

The huckleberry and blueberry should become profitable market fruits when we have learned how to compromise between their exacting requirements and our arbitrary culture.

IMPROVEMENT BY SELECTION.

To what extent can the vigor of trees or plants that are propagated by grafts, buds or cuttings be increased by propagation from exceptionally vigorous plants? Weakness and disease are transmissible through the graft. The experience of President Smith with the Wilson strawberry, and the New York Agricultural Experiment station with potatoes, have shown conclusively that in these plants at least, which are propagated by offsets, much can be gained by selections from the strongest individuals.

If our fruit trees may be increased in vigor in a similar way, an important point will be made. The relation of the grafted or budded tree to its parent needs to be thoroughly investigated. Nurserymen have assumed that it makes little difference where they obtain their cions or buds when they are of proper variety, but the most observing and skillful grafters insist that it does make a great difference.

Carriere, a learned French horticulturist, declares that in budding roses he can produce plants that flower profusely, sparingly, or not at all, by selecting buds from differents parts of the same plant, and he adds that it is very probable that the same principles apply to fruit trees. Evidently the whole science of propagation has not yet been worked out.—*Popular Gardening.*

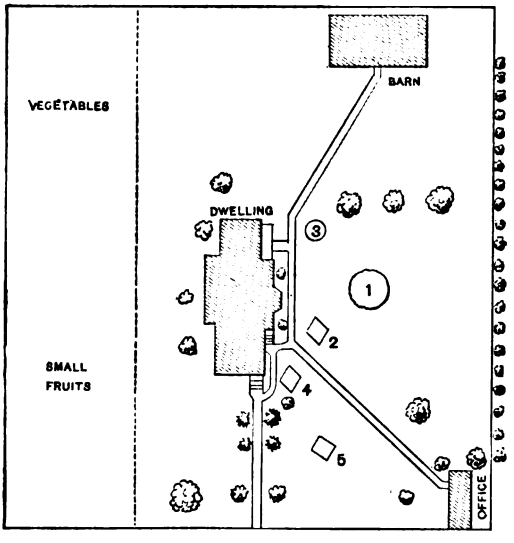
WISCONSIN STATION, BULLETIN NO 23, APRIL, 1890.

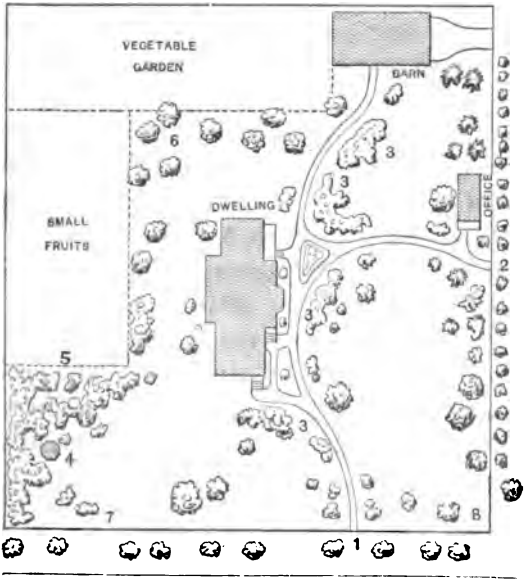
PREVENTION OF APPLE SCAB, E. S. GOFF (illustrated).—This contains a brief illustrated account of the apple scab fungus (*Fusicladium dendriticum,* Fckl.), and details of experiments in the use of fungicides for this disease, conducted by the author and Mr. A. L. Hatch, of Ithaca, Wisconsin, in co-operation with this department. These experiments are also reported in Bulletin No. 11 of the section of vegetable pathology of this department, pp. 22–29. As the result, the author is confident that damages from apple scab may be almost entirely prevented at a slight cost, by spraying the trees once in two or three weeks during the summer with ammoniacal carbonate of copper, of a strength not to exceed 1½ ounces of the carbonate and one quart of ammonia to 100 quarts of water.

TASTE AND TACT IN ARRANGING GROUNDS.

[The following plan, taken from "Popular Gardening," I consider of sufficient value to give us some thought in regard to laying off our grounds. The cut has been kindly loaned us by the publishers of that journal. A little study of such a plan will help any one who wishes to improve their home.—SECRETARY.]

FIRST PAPER.*





The present is the first of a series of illustrated articles to appear in "Popular Gardening" on the subject of the heading. It is designed to render these articles widely useful through imparting ideas on arranging home and other grounds with taste and discernment, basing the same on actual examples. The directions and illustrations are to be of the most simple and practical character, and such as it is believed there is a large and growing demand for in the present day.

The plan is to invite, and we hereby do cordially invite, sketches of home plats, rural cemeteries, town squares, etc., from our readers, with a view to our furnishing through these columns, and without charge, designs and suggestions for improving such grounds to be more attractive in garden beauty. That there is great room for improvements in such a line is widely conceded. As a

* By reason of loss in transit of cut belonging to First Paper, the Second Paper was printed out of its order, while this was held back to await the arrival of another cut.

people we are only beginning to waken up to the possibilities of the garden art in embellishing home and public grounds everywhere.

To render this project as profitable as possible to all readers, we desire not only to make use of such sketches sent us, for getting up engravings showing the location of the objects on the grounds, but along with such respectively, the new plans embodying the improvements it occurs to us to suggest. That this may be all clearly understood we herewith present the plans which are to serve as the initial ones in this series.

A subscriber in Allegan county, Mich., whose name and post office are withheld (as we shall always do in these articles), sends us a sketch from which the upper engraving annexed was made, with the following letter:

September 9, 1890.

Dear Sir—Being a subscriber to "Popular Gardening," and taking a very great interest in the beautifying of homes, I herewith send you a sketch of our home and grounds, asking you the favor of suggesting improvements in the lawn arrangement, as the features are not exactly to my taste. I intend setting out some shrubs and evergreens next spring, also laying out larger beds of tulips, hyacinths, tea roses, etc.

We have already decided if necessary to move the office (a physician's), as it obstructs the view to and from the road.

In accordance with the purpose of these papers, therefore, and in answer to this subscriber's request, we present the plan received, and under it another containing certain added improvements. The numbers in the upper cut represent the following: 1, a bed cut in lawn, occupied with tulips and later with dahlias, gladiolus, etc.; 2, bed of hyacinths; 3, bed of day lilies; 4, bed of coleus; 5, bed of tea roses. Various trees and shrubs besides are scattered over the ground as shown. The figures in the lower plan may be explained as follows: 1, front entrance, 2, side and office entrance, 3, 3, 3, beds of irregular outline to be planted with shrubs and hardy, tender plants, bulbs, etc.; 4, an arbor to be covered with hardy and tender vines; 5, a shrubbery walk in the midst of irregular masses of hardy shrubs, and surrounding the arbor and leading from the lawn to the small fruit plat; 6, fruit trees irregularly arranged in the rear lawn; 7, 8, vistas extending from the house toward the street; numerous trees and shrubs abound. Some evergreens are located both to the front and rear of the office.

Now briefly for the lesson: That which will impress the reader in comparing the two sketches, is the angularity and lack of general method and harmony in the arrangement of the features of the upper one. A garden of any size to be most pleasing should, especially in the growths, present a degree of naturalness approximating the pleasing

arrangement of trees, shrubs, etc., to be met in natural landscapes. It has well been said that nature abhors straight lines. But usually in starting out to make a pleasing home garden, we meet with a number of lines and angles in the outlines of buildings, the boundaries of the place, the streets, etc. Shall we therefore add more straight lines by introducing such prominently into walks, tree rows, outlines of beds, etc. The aim should be the reverse of this in dealing with all such features as will admit of variations from straight lines, angles and geometrical figures. Usually the walks, drives, trees, plants, etc., very readily harmonize with this principle.

The lower plan shows how we should prefer the improvements. Here simplicity, harmony of parts, graceful curves and irregularity are the order—with what gains for garden beauty let the reader judge. Not only do the objects seem to fit the places well and serve to the making of a harmonious whole, but the grounds appear to be larger, without this really being true—a result of the fine open centers in the grass-plats and the delightful vistas that extend from point to point. While the walks present bold curves, it will be observed that they lead very directly from the street to the buildings.

Let the reader in imagination pass over the one plan and then the other as if examining the various features, and he cannot but be impressed by the superior arrangement of the lower one; this simply because better principles are observed in the arrangement. Even the fruit trees at 6 and the front street trees are located with the idea of keeping down straight lines and regular distances apart.

In having thus complied with our subscriber's request for assistance, it is possible that more shrubs and trees have been suggested than can at once be planted and cared for. In that event it is only necessary to carry out the improvements step by step, constantly having in view the completed whole.

To others who may favor us with sketches of grounds to be improved, we would say that such plans, even if made crudely, will answer our ends very well. Of course, if pains are taken to locate the buildings, trees and other objects by scale, the result may be slightly more satisfactory. We will be pleased to consider the arrangement of the fruit and vegetable garden of home grounds as well as the ornamental parts, although it may be said that the former are less difficult, as here straight lines should largely prevail.

WINTER MEETING AT CLINTON.

[In order to give a rather condensed report of the successful meeting and the enthusiasm of the horticulturists, as well as the papers read and what others think of the work of the society, I append at the outset a report by Judge Miller, and one also of "Colman's Rural World."—SECRETARY.]

ANNUAL MEETING OF THE MISSOURI HORTICULTURAL SOCIETY AT CLINTON.

The first day was taken up in arranging fruits and flowers, with some of the regular business of the program. The attendance was very good so far as members were concerned, and the crowd of citizens of the place at the night sessions was encouraging, and showed that the people felt an interest in the matter.

The display of apples was a grand one, and shows what Missouri can do in this line. There were on exhibition 345 plates of apples and six of pears; one specimen of Keiffer weighing over one pound, apparently just in good condition for eating, from Texas, was to me a curiosity, and leads me to believe that we may make a winter pear of this variety here.

A fine collection of ferns and other green-house plants, an orange tree with fruit on, two India rubber trees, some eight feet high, some handsome flowers, and conspicuously a bouquet of a new Passiflora of unique and beautiful form and color.

A collection of fruit from New Mexico, showing that it will make its mark in raising fruit; also a bottle each of wine and brandy from the same place by the same contributor, Dr. I. H. Bailey, Mesilla, N. M., who told me that they could grow as good grapes there as in California, as well as many other of their brag fruits, and that they were weeks earlier than California. The doctor is well started with a large vineyard of Muscat of Alexandria, for the purpose of making raisins.

But to the meeting. To my notion it was the best one I have attended for many years. The essays and discussions were of the right metal, so that there must good result from it. The only sadness was the information given that our old and beloved Brother Holman had been suddenly stricken with paralysis, and perhaps at death's door. If he never meets us in council again, may his greeting at the Great Bar be, "Come hither, well done, thou good and faithful servant."

The old officers were re-elected, including the treasurer, as, while there is life there is hope, and we pray that we may meet him again.

It is the rule for the citizens of a place that invites the society to entertain the members, which the good people of Clinton were ready to carry out, but I think more than half of the members went to the hotels. This latter seems to me to be the most proper thing, as they are in this way thrown together more closely, are free and independent, are no trouble to the citizens, which, at times, is by no means a comfort or a convenience, although they welcome the guest. A better plan, in my notion, would be for the citizens to make arrangements with good hotel keepers to entertain the members at a reasonable rate, and then pay their bills at these places, if they think we who travel hundreds of miles and pay our railroad fares and expenses all the way, are willing to impart to them all the information we can without one cent of pecuniary reward. If not, then let every one pay his own way throughout. But this latter necessity might keep some at home, for horticulturists are not all rich. An outsider to attend one of these meetings must be struck by the earnest, social and friendly character of the whole affair.

These meetings are becoming more interesting as the years roll on, and in the years to come may become an occasion of the greatest importance. I can hardly expect to attend many more, but so long as able will lend my feeble aid to the good cause. I was obliged to leave before the close of the session, so as to get home at the time appointed.

There were three nurseries represented by trees of different fruits. The trees were taken up with all their roots, showing the uninitiated just how long roots are when not too roughly cut with the spade. Here was shown the difference between whole and piece root grafts, the difference between crown piece, middle piece or the smallest end of the root, an interesting comparison. Also the difference in growth of the pear on the different stocks, as well as that of the plum on the different foundations. The Marianna shows to great advantage in this test.

The Stark Bros., of Louisiana, Mo., had the largest display, and surely convince one that they know how to grow and handle trees.

A beautiful tree of the Krull pear, by Robert Mallinckrodt, one year from bud, was shown, as well as specimens of this noble winter pear. A tree of the Clayton by Monsees, of Beaman, Mo., with fruit of this promising variety tied to it.

A complete account and description will be given in the report of the committees when printed, which every lover of horticulture should procure, and which can be got annually by becoming a member of the society for one dollar; and the next dollar in same line, seeking infor-

mation, send for the "Rural World," in which there can be as much useful knowledge on this subject found, as in any other paper in the United States, and a great deal more than most of them.

S. MILLER.

MISSOURI HORTICULTURISTS.

THIRTY-THIRD ANNUAL MEETING AT CLINTON.

From Colman's Rural World.

The meeting was held in the City hall, commencing on the evening of December 2. The attendance was unusually large for the opening session, there being delegations present from nearly every fruit-growing locality in the State. The large collection of fruits, vegetables and floral displays gave the hall a cheerful and enchanted air, indicative of that cultivated and refined taste which is a part of each and every successful horticulturist. The aid given by the local florists and fruit-growers, supplemented by the very efficient service of the Faculty of Baird college, was conclusive evidence in the opening of the meeting that the choice of Clinton as the place for this meeting had been a good one.

The officers present were, J. C. Evans, President, Harlem; N. F. Murray, Vice-President, Elm Grove; L. A. Goodman, Secretary, Westport. Opening exercises began with music, "Praise God, from Whom all Blessings Flow," after which Rev. Taylor Bernard, pastor of the C. P. church, made the invocation. This was followed by a double quartette—Mrs. George Holliday, Misses Barcafer and Jennings, sopranos; Mrs. Bernard and Miss Salmon, altos; Prof. Hall and W. L. Windsor, tenors; Dr. Rubey and J. L. Elliston, bassos; A. M. Fulkerson, cornet.

Mayor Carter, in a brief and well-timed address, welcomed the delegates and visitors, and referred to the educational institutions, water-works, gas and electric lights and street railways as synonyms of a live, progressive city. He hoped their deliberations would result in a general benefit to horticulture throughout the State.

Mr. J. C. Evans, President of the society, responded in his happy manner. Among others, he said the fruit product of Missouri had brought $10,000,000 into this State, and the yield from many orchards this year had been worth more than the price of the land.

Mr. N. F. Murray, of Elm Grove, read a valuable paper, "Missouri's Opportunity."

Miss Ardie Kistler, of Clinton, a pupil in Franklin public school, delivered a touching recitation.

J. H. Logan was appointed Treasurer *pro tem*, on account of the absence and serious illness of D. S. Holman, of Springfield, the present Treasurer.

Secretary Goodman read a list of the usual committees.

Mrs. J. M. Pretzinger, wife of the President of the Henry County Horticultural society, read an appropriate essay, followed by a history of the State society by F. A. Sampson, of Sedalia, read by the Secretary.

C. W. Murtfeldt contributed an article on the same subject, entering more fully into detail. These two papers will do much to preserve the early history of this society. The paper, "Geology in its Relation to Horticulture," by Prof. Edwin Walters, of Kansas City, was the bright particular star of the evening; in fact it opened up a broad field for thought, characterized as it was by those apt illustrations, beautiful analogies and clear statement of well-known facts, clothed in choice language. It was received with undivided attention, and many expressed themselves as anxious to see the same in print, that they might study it at their leisure. It will soon appear in the "Rural World."

The roll-call on Wednesday morning showed fifteen horticultural societies in the State represented by regularly appointed delegates.

Orcharding in North Missouri, by Charles Patterson, of Kirksville, brought out the statement that they had a good crop of fruit and it was sold at good prices. Their surplus crop of apples shipped out of Adair county, he stated to be between 100,000 and 110,000 bushels. He believes the bulk of fruits will in time be raised by specialists. The ordinary farmer will not give the cultivation to his orchard that is necessary to success. In the discussion that followed, thorough cultivation was pronounced the watch-word of perfect success. For small orchards, the cultivation of sweet potatoes has proven not only a success but old grounds have been renewed by this crop, said S. W. Gilbert, of Thayer.

Orcharding in West Missouri, by Henry Speer, of Butler.—Some failures were noticeable, but they were mostly owing to a want of information as to the kinds best adapted to the locality. He regarded as elements of success: A proper location, a sub-soil without hard pan, and for varieties would plant Maiden Blush, Grimes' Golden, Ben Davis, Jonathan and Willow Twig. Gets his trees from the nearest reliable nursery. Trim carefully, he said, cultivate thoroughly, and keep at it, and you will reap your reward in due time. It is the uncared-for orchards that are unprofitable.

Discussion.—As to the kind to plant, Secretary Goodman would study the market to be supplied. Vice-President Murray emphasized this point. Jacob Faith gave some excellent illustrations as to the site to be selected. When trees fail here and there or do not bear freely, it was recommended to plant between the rows where trees die, or top graft when not good bearers. J. T. Stewart would select dry locations, sloping north or northeast preferred.

Low Lands for Orchards—a discussion only, was one participated in by a large number, which brought out the fact that the low lands of the Missouri bottoms are excellent for orcharding, especially for the Winesap, said Mr. Maxwell, of St. Joseph. He prefers a northern slope. Prof. Walters believes the Missouri river bluffs the best of apple lands, having the proper subsoil and porosity. The beneficial effects of bodies of water was remarked upon.

Spraying, by Prof. Clark, who elaborated upon the several solutions used on the different kinds of fruit, citing a large number of experimentals, form different experiment stations, and their efforts on spores, fungi, parasites and scab.

WOOLLY APHIS.

J. W. Simpson, of Mammoth Springs, Ark., showed several samples of trees that had been attacked by this insect. What shall he do with his orchard? After a lengthy discussion the conclusion was drawn that to dig up and burn the entire planting was the most certain and effective means of getting rid of the same. It was also recommended that he replough the ground, buy new trees from some nursery where the aphis did not belong, and begin again. H. B. Francis would dip the roots of all trees in a solution of water, consisting of hlaf a barrel of water, two ounces of carbolic acid, and half a box of concentrated lye. Has always used this when planting, and has never been troubled with the aphis.

The history of the Apple, by A. W. Taylor, of Clinton, was a well-prepared paper that commanded universal attention.

Berries in South Missouri, by G. W. Hopkins, of Springfield:

Strawberries.—His experience was that in his locality anyone can succeed in berry-growing with a reasonable degree of effort. Believes the crop will not be as large next year as in the past two or three years.

Raspberries do not do as well in his locality as farther south and west. Crop was light and the local demand took all produced.

Blackberry—Grown extensively in Greene county. The gooseberry is not cultivated in South Missouri.

He would counsel growers against planting new varieties until fully tested on their own soil and latitude. Prof. Clark gave the results of experimental work at the Station. Bubach No. 5, Crescent, Haviland, Lady Rusk, Stayman's No. 2, and Warfield No. 2 proved, out of a very large number, the best. Lady Rusk withstood the drouth better than any others, but had too many double berries.

Roadside and yard-tree planting and best to plant, by G. E. Kessler, Merriam, Kansas.—He recommends White Elm and White Maple as best suited for roadside planting. For city streets, Carolina Poplar, Maple and Sycamore. Where roads and streets have been graded down, large holes should be made and care taken thatt he trees are not planted too deep. Nursery-grown trees are preferred to forest-grown. A full list of flowering and non-flowering shrubs was named, but we must refer to the society's report, in which the paper in full will be found.

Horticulture and Home life, by Mrs. G. E. Dugan, of Sedalia, was a vivid picture of the old orchards, and meadows and the spring. She said: "Homes that are not homes, have no fruit-trees or flowers." It was a poem in prose.

Humbugs, by J. G. Kinder, was a paper characteristic of the subject and the writer, was well handled and commanded the closest attention. It was a general shaking up of the nursery men, the shippers, the freight carrier, and lastly, but not leastly, the commission man.

Progress of Floriculture, by J. M. Jordon, of St. Louis, was a short and concise paper, well prepared and just to the point.

Secretary Goodman's report is always listened to with great interest, and this one more than usual. We glean as follows: 20,000 farms are devoted to fruit; 100,000 people are engaged in fruit culture; $10,000,000 is the value of the fruit crop of this State for 1890. The work of the horticulturist is now divided up. The florist is a specialist; the tree-grower is a specialist, and the fruit-grower is a fruit-grower only.

The growing demand is for special fruits for special localities. More knowledge needed; more reading necessary. The timely words of warning through the Rural World had made thousands of dollars to the fruit-growers of the State who were raising apples. He read several letters from parties who claimed they had beeen swindled by selling their crop too low. The general belief was expressed that these "kickers" were the same fellows who are always "too poor" to take a paper, or want a first-class paper for almost nothing. Some of these had lost over $500, because some fellow had told them there was a big crop of apples everywhere. The Secretary reported twenty-seven horticultural societies in the State.

ELECTION OF OFFICERS.

The old officers were all re-elected unanimously.

THE WORLD'S FAIR.

A resolution with a long list of whereases was adopted, asking that in view of the fact that the fruit interests of the State now exceed $10,000,000, we hereby ask the Legislature of this State to appropriate the sum of $25,000 to aid in an exhibit of the fruit interests of the State at the Columbian Exposition.

Berries in North Missouri, by J. N. Menefee and Samuel Miller, of Bluffton, and Berries in South Missouri, by J. H. Logan, of Nevada, were all excellent papers, rich in practical suggestions so necessary to the amateur berry grower.

The discussion which followed brought out the oft-repeated fact that certain varieties have their favorite localities, while out of these they do not succeed as well. Michel's Early so far as fruited is giving very general satisfaction as one fit for general planting.

Mr. Hopkins asked for a remedy for rust on raspberry and blackberry canes. Prof. Clark believes it is caused by a vegetable or fungous growth and knows of no remedy that has proved effective. Bordeaux Mixture has been tried, but the results were not satisfactory.

Mr. Speer thinks much of the so-called winter-killing of vines is due to this. Some thought it same as the red rust on the raspberry, while others thought differently.

VINEYARDS

Mr. Espenlaub reported the best crop of grapes for years. Says we should plant for early grapes, and we can thus avoid competition with the eastern product. Mr. Kinder reported in favor of Moore's Early and Diamond. Empire the best early white grape. Samuel Miller indorsed all Mr. Kinder said. Mr. Espenlaub had good success with the Niagara. Maj. Evans thinks the coming grape will be the Jewell. Mr. Espenlaub says it shows more wood than the Concord, is a great bearer, thick skin, size that of a medium Concord. Mr. Kinder thinks the coming red grape is the Ulster Prolific. Samuel Miller thinks the Jewell is as good a grape as we can get. The Goethe was pronounced the best of the Rogers family.

Plums, by Jacob Faith.—One of those really good, strong, every-day papers, highly practical, bristling with good, common, every-day sense. Recommends that hogs and poultry have free access to the plum orchard;

also that the plum be grafted on peach roots; should be picked three to four days before using. Wild Goose and Crimson Beauty succeed best in Vernon county. N. F. Murry said to get good sauce from the Wild Goose they should be pitted before cooking.

Fruit Packing, by Mr. C. C. Bell, of Boonville.—Should pack the fruit honestly—same quality all through the barrel; ship a less amount; but make the quality better, and the shipper will receive as much money and have the poorer fruit for other purposes.

Evaporating Fruit, by J. B. Durand, Prairie City.—The object of this paper was to show what to do with the fruit that was not fit to ship. Believes every fruit-grower should have a dryer for his surplus stock. Has often received more for his cull stock when evaporated than for his choice stock when shipped. Every bushel evaporated assists in keeping up the market for the green stock. Evaporated apples have the world for a market. Can be kept for years if properly packed. A very excellent paper.

Planting, Protecting and Pruning, by H. B. Francis, of Mulberry.—He regards good horticultural literature an absolute necessity. In choice of soil and location, get the best experience you can to aid you. Stake out the ground for rows thirty feet apart in the dead furrows. Fill in the dead furrows with well-rotted manure, and back-furrow it under and set the trees on or in this ridge. Getting the trees—I go to the nursery and select my trees; by doing this I have no trouble in getting good trees; wash the roots as I set them, in a mixture of half-barrel of water containing two ounces of carbolic acid and half a box of concentrated lye, which kills all the root lice or "woolly aphis." Would not lean them to the southwest, as is often done, but set upright with the largest limbs on the south side.

Pruning.—"Heading low" and "cutting back" is not the best method, as it requires too much time for the tree to come into bearing, and generally grows a weekly tree. Discussion: Mr. Strauss prepared his ground the year before by plowing from twelve to fifteen inches deep. Planted the grafts where he wanted the trees, putting two in a place. Planted the ground in potatoes and thoroughly cultivated the ground. Trees now five years old and bearing a light crop.

Propagation of Fruit-bearing Trees, by J. G. Kinder, of Nevada.—Believes a constant deterioration is going on in our fruit-trees, and this is owing to a lack of congeniality between the graft and root used, and often the use of grafts from scrubby or ill-conditioned trees. Cites the Jenet as an illustration of this deterioration. This was one of the papers that set fruit-growers to thinking and most likely to observing. It opens up the whole field of "breeding" trees.

CLOSING SESSION, THURSDAY EVENING, DEC. 4.

The best of recitations and music both instrumental and vocal, have been freely furnished by the citizens of Clinton for the evening session. The faculty of Baird college showed its breadth of culture and willingness to co-operate in any efforts to educate and instruct even those not within its own special line, by rendering most efficient service in both day and night sessions. Personal Association, by Judge C. I. Robards, of Butler—Moral of his theme: Though gold may have its use, there are better things than gold. We must circulate among each other to secure the very best results.

A most valuable paper, Entomology, by Miss Murtfeldt, which was read by Secretary Chubbuck, of the State Board of Agriculture, and like all of her papers was well received.

The closing paper was by L. Geiger, of Boonville. Subject: The Poor Horticulturist. In this he showed readily that the poor horticulturist was so by his own lack of effort. A paper that will bear reading in our spare moments.

AWARDS AND PREMIUMS—FLOWERS.

Best basket of flowers—First premium $6.00, R. S. Brown, Kansas City. Second premium, $4.00, E. A. Barnhart, Clinton

Best hand boquet: First premium, $3.00, M. L. Bonham, Clinton.

Best table boquet: First premium; $3.00, E. A. Barnhart, Clinton.

Collections of plants: E. A. Barnhart and M. L. Bonham, each a gratuity of $5.00.

Judges: Mr. Sam'l Miller, Mrs. L. A. Goodman, Mrs. Baird.

ON APPLES.

Best display, twenty-five varieties: 1st premium, $20, T. J. Shinkle Burk; 2nd premium, $10, to Shephard & Wheeler, LaMonte.

Best ten varieties for family, W. G. Gano, Olden, 1st premium, $6; J. M. Monsees, 2d premium, $4.

Best ten varieties for market, Olden Fruit Co., 1st premium, $6; second premium, Shephard & Wheeler, $4.

Best ten varieties for show, 1st premium, T. J. Shinkle, $6.

Best five varieties for market, 1st premium, Shephard & Wheeler, $3; 2d premium, W. G. Gano, $2.

Largest apple, 1st premium, W. G. Gano, $2 (the apple selected was the Ben Davis).

Handsomest apple, Shephard & Wheeler, 1st premium, $2 (also the Ben Davis); second premium, T. J. Shinkle, $2 (the Huntsman,)

For quality, Grimes' Golden, T. J. Shinkle; 2nd, C. C. Bell.

Best seedling, 1st premium, S. Miller ; 2nd premium, M. L. Bonham.

Committee also reported on exhibition on tables, about forty-five varieties of apples ; also, find some apples by C. Hartzel, of the crop of 1888 and 1889, kept by his plan of preserving fruits ; also, a collection of seventeen varieties of very fine apples, exhibited by J. T. Scott, of Putnam county ; also, a large assortment of fruits by J. H. Baily, of Mesilla, New Mexico ; also, some fine wines by Jacob Faith.

G. F. ESPENLAUB,
G. W. HOPKINS,
L. T. KIRK,
Committee.

NOTES.

Miss Bettie Settle's rendition of "Uncle Ned and his Little Mule" was rewarded by the very hearty applause of the audience and a basket of the premium apples.

The Gipsy Girl, by Miss Kate Holmes, was first-class, as were all of her recitations and musical performances.

Major C. C. Bell had several photos of his future assistant in the fruit-packing business.

The visitors to Baird college were highly pleased. The trip to the artesian well, which is eight hundred feet deep and flows four hundred gallons a minute, was appreciated.

The next winter meeting will be held at Sedalia. The location of the summer meeting is not yet fixed by the committee.

Mr. Lamb of Sedalia was the best laugher, and Jacob Faith the best German singer.

Congratulatory messages were sent and answers received from the societies of Kansas, Michigan and Indiana.

Treasurer D. S. Holman was reported to be dangerously ill, and a message of sympathy was sent to Mrs. Holman.

A. Nelson was the tallest man and W. G. Gano the shortest.

Chas. Patterson was sent as a delegate to the Illinois annual meeting, and a package of fruit was also sent.

The usual resolutions were passed. This was the best meeting ever held by this society. Can Sedalia duplicate it? We shall see. B.

PROCEEDINGS.

CLINTON, MO., Dec. 2.

The first day was spent in decorating the hall, arranging the fruit and flower exhibits, welcoming and assigning the visitors and delegates to homes, and other preliminary work.

TUESDAY, DECEMBER 2, 8 P. M.

The meeting was opened with singing the doxology, "Praise God from whom all blessings flow," and prayer by Rev. Taylor Bernard. Next came a double quartette, beautifully rendered.

WELCOME ADDRESS BY THE MAYOR.

You people who are acquainted with me know that I am not an orator. When a boy I joined a debating society, and like many other boys, I thought that the eloquence of Henry Clay would be laid in the shade by my efforts; but when I made a speech the audience left the house. Although not an orator, I do extend to you a most hearty welcome here to-night. It is claimed by the east that we of Missouri are on the outskirts of civilization; but so many horticulturists here to-night show that we are not so far out. Horticulture is one of the fine arts, and is developed only among civilized peoples. The name of Henry Shaw is almost a household word in this country, and his garden is a lasting monument.

Who does not love flowers and feel that their cultivation is refining and ennobling? Among the most valuable products of art are those which include the cultivation of fruit, vegetable and flowering plants. Most farmers think garden culture requires too much work. If this meeting of your Society should give an impetus to progress in the direction of horticulture, you will have earned our gratitude. There are men here, I see by your program, who can give us the information we need, and we give you a generous welcome.

When you see our churches, schools, water-works and electric lights you will be convinced that we are a progressive and Christian people. I think there is not a better school in the State than our public school. Lampkin's academy holds a high rank, and last but not least is Baird college. I wish and hope that you will have a pleasant visit, and that when you go away you will always have pleasant memories and a kind word for our citizens.

PRESIDENT EVANS' RESPONSE.

I will say that on behalf of the State Horticultural Society I thank the Mayor for this very hearty welcome I trust they will continue to feel thus toward us, and that they will continue to come and encourage us by their presence. Our night sessions will consist in part of entertainment; our day sessions will be work almost entirely. You will find out something of what we have been doing in the past, and I trust you will find out enough to interest you, so that you will watch us much closer in the future. Think of a revenue of ten million dollars in one year for Missouri apples alone! The mayor says that some farmers think horticulture is not a paying pursuit. Many men have sold their crop of apples for more than they could have sold their land for the day they sold their apples. Yet some say that horticulture don't pay.

We will now have a paper in the same line.

MISSOURI'S OPPORTUNITY

N. F. MURRAY, OREGON, MO.

Located in the geographical center of this great Union of States, and blessed as she is with the greatest variety of soil, climate and mineral of any State or like area of country on the globe, a land that not only flows with milk and honey, but never fails to produce an abundance of grain, grass, fruits and vegetables, and the air is fragrant with the rich perfume of her native flora, where the husbandman is sure to reap a rich reward for his toil, and with all her vast undeveloped wealth, she has the grandest opportunity before her of any of our many great States that comprise the grandest and best government that God has ever given to man.

We are well aware and willing to confess that Missouri has not in the past embraced and made the most of her great opportunities. But if Watts was right when he penned the lines,

> That while the lamp of life holds out to burn,
> The vilest sinner may return,

Then we may yet hope that Missouri may repent of her sins and her wasted opportunities, and awaken to a proper sense and realization of her true greatness and grand possibilities, rise up in her might, shake off the dust that has settled over her in years of stupid lethargy, and strike out on the great highway of progress, move onward and upward till she reaches that proud position that Nature's God and destiny seems to have pointed out for her, the empire State of the Union.

For a quarter of a century Missouri has looked upon with almost criminal indifference and beheld the great tidal wave of emigration rolling through and far beyond her western border in answer to the call and glowing descriptions of the great Eldorado beyond, so beautifully painted by the able and well-paid advertising agents of railroad corporations and land syndicates, to struggle with all the adverse conditions of the arid and blizzard-stricken plains of the great American desert; many of the pale-faces that have succumbed to the unequal task will doubtless rise up in judgment to condemn these heartless men for their crime against suffering humanity; but the great tidal wave that has rolled out over the plains, up over the Rockies, down upon the golden shores of the Pacific ocean, and far out to the northwest over the Dakotas, has at last spent its force and broken to fragments over the mountains of difficulties and sad disappointments of blasted hopes for remunerative crops for years that failed to appear; hope long deferred has made the heart sick,

and thousands of them, like the wandering prodigal of old, have said, why do we and our little ones longer starve in these unfruitful lands, when there is plenty and to spare in good old Missouri. We will arise and go to the land of plenty, where the climate is mild and crops never fail—to a State that has ever provided for her own. A wise conclusion, indeed, and for months we have almost daily beheld scores of wagons loaded with these disappointed people returning into this goodly land of promise.

Here again is Missouri's opportunity. Let her people rise up to give a friendly greeting to these way-worn and weary travelers, and point them to our rich, broad river bottoms; to our beautiful and picturesque bluff ranges, already famous for their abundant crops of luscious fruits; to the beautiful and wonderfully healthy plateau of the Ozarks, and their gentle, sunny south slopes, so famous for their never-failing crops of peaches; to our broad rolling prairies; to our inexhaustible mines of coal, iron, zinc, marble, lead and granite, and to our vast expanse of cheap, wild lands. Invite them to make their homes within our borders, and help unlock Nature's store-house of wealth, and bring forth her hidden treasures to supply the wants of a rapidly increasing and higher civilization.

The failure of the fruit crop in most all of the Eastern States the past season brought a small army of buyers to Missouri hunting fruit. They were not disappointed, but left hundreds of thousands of dollars among our people in exchange for their fruit, and were agreeably surprised at what they saw. A New York gentleman, after spending a week in Northwest Missouri, remarked that it was a grand, good country; that he was very much pleased with the people. Said he, "I wrote to my family the other day that I was agreeably surprised with Missouri and her people; felt quite at home and just as safe as I would in New York." Another remarked that Missouri was the best place in the world for young men in the Eastern States to come to for good and cheap homes. Another opportunity for Missouri: let us bid them come, and give them a kindly welcome to make and build their homes in this fruitful land, where each may, with a little capital, industry and economy, soon sit beneath their own vine and fruit-tree, and enjoy such pleasures and luxuries as home alone can give. And here permit me to earnestly urge our own citizens, who have not secured themselves homes, and our young men who are inclined to roam, to at once, while you may and can, buy some of our cheap land, and make you a pleasant home, surround it with fruits and flowers, and in the evening of life you will thank the writer for this advice.

> Remember that the world hath its delights and its delusions too,
> But home to calmer bliss invites, more tranquil and more true.

Missouri's fruit crop this year has gone east, west, north and south, giving an opportunity to tens of thousands of people to eat and test the superior quality of Missouri fruit, which will prove a grand advertisement for our State. But Missouri's grand and crowning opportunity to show the world her wonderful products and superior fruits will be at the World's fair at Chicago in 1893. And she should at once prepare to embrace this golden opportunity and arrange to show her vast products on a mammoth scale worthy of her rank among our sister States. And as horticulture is well to the front, if not in the lead, of all other industries, amounting in the aggregate to over ten millions of dollars annually, and ought, if properly encouraged, to reach fifty millions in the next ten years, we, as a State Horticultural Society, should at once organize and muster our forces and prepare to do our duty and act well our part in this great drama, that we may acquit ourselves with credit as citizens of the coming empire State of the Union.

After Mr. Murray's paper came a recitation by Miss Ardie Kistler, of the Clinton public schools.

The following committees were appointed by the President for the session:

On Fruits—G. F. Espenlaub, L. T. Kirk, G. W. Hopkins.
On Flowers—Samuel Miller, Mrs. Baird, Mrs. L. A. Goodman.
On Finance—J. W. Menifee, Chas. Patterson, Henry Speer.
Obituary—C. I. Robards, C. C. Bell, J. G. Kinder.
On Final Resolutions—A. Nelson, J. H. Logan, S. W. Gilbert.

Treasurer D. S. Holman, of Springfield, being sick and unable to attend, J. H. Logan was appointed treasurer *pro tem.*

HORTICULTURE.

MRS. J. M. PRETZINGER, CLINTON.

We have assembled together at this meeting to engage in the means to promote an art that is suited to man and woman's highest destiny; it is an art that is calculated to afford the intellect abundant themes, to which a patriarch's long life might be devoted with increasing gladness, for it extends above, around and beneath us; its beauties are without limit, its varieties without end; there is no human science that is so ample in its range, so attractive in its allurements; there is no occupation of man that is so ennobling, or that brings him so intimately in connection with nature and nature's God; its votary has the wide world of beauty unfolded to his view as a living landscape. Both as science and as an art, horticulture, if it be properly appreciated as abundant in its resources, has numbered among its votaries the wisest, ablest and best men of all ages and of every nation; they have gathered, transformed, naturalized and adapted to our uses whatever of earth's products can please the eye, satisfy the appetite or regale the senses, or is of any use whatever in sustaining life, or promoting the happiness of man. An art that is so abundant in its resources, and that has occupied the meditations of the learned for past ages, is worthy of at least a little of our consideration. It is the art that means gardening of every kind the world over. Gardening by the orchardist, the vineyardist, the florist and the tree planter. It includes the amateur and the professional cultivator, the market gardener with his broad acres, and the poor woman with one solitary geranium.

In all well-organized bodies of workers, each member not only brings to the meeting the experience he or she has gained in his avocation, but he shows a disposition to help others, and if differences arise in brushing against them, he may get some sharp angles knocked off. But he will return home a better informed man, and if he has had a good time, as he should have, he will be younger in heart. The study and practice of horticulture, or any other noble subject that brings man in contact with nature, inspires a tendency to keep the heart young. Horticulture is a science, the study and advancement of which is well worthy of emulation; it has reference to the comfort, the beauty and the refinement of home and its environments, conducing to the promotion of the enjoyments, the pleasures and the real luxuries of civilized life; it promotes refinement in the family circle, as shown in the cultivation of beautiful plants and lovely flowers, tending to the adornment of home; it teaches the best and most approved methods for the embellishment of both city and rural homes. Our homes are truly what we make them; and a home, let it be ever so humble, there is no place like home. There is an endless

variety of ways in which we may fill our homes with beauty if we will; when every home has its flower garden and house plants, and every woman does half her housekeeping out of doors, making the home a source of pleasure, we may then dedicate our floral treasures to the Deity and humanity, and thus carrying the love of God and man into one pleasure, make it one of the means of doing our little share of blessing and being blessed. Our floral missions, taking the brightness of fresh flowers into rooms filled with suffering, and oft-times sin and grief, they are like angels of mercy bringing tidings of purity and peace. May the time soon come when every heart may welcome them, and every eye rejoice at the presence of these gifts of love, fresh from our Father's hand.

OUR FLOWERING BULBS.

HANS NIELSON, ST. JOSEPH.

Mr. President, Ladies and Gentlemen:

Having been assigned the pleasant duty of furnishing a paper on "Our Flowering Bulbs," I take it for granted that not simply a long enumeration of varieties and kinds which could be classed under the above heading, but a few hints as to their proper cultivation, would be what this Society requires of me. Hence, I take the liberty to confine myself to such classes and varieties as have come under my personal observation and practical experience in cultivating the same, so as to obtain the best results in large and perfect flowers, and corresponding richness of color. A great many amateurs with whom I have had correspondence appear to have formed the belief that just to buy the bulbs and put them in the ground is all that is required, and success will naturally follow. In the first place, I would state, all bulbs require well-drained ground, and next is the proper season for planting, proper depth, and, lastly, efficient protection during our quite often cold and changeable winters. The proper time for planting hardy bulbs is in the fall, during September and October, or later if the weather permits. Of all the bulbs in general cultivation, the lilies stand pre-eminent at the head of the list for the enormous size of their florets, purity of color and majestic appearance. They are nearly all hardy in this State, but should be planted about six inches under the surface of the ground, and twelve inches apart in the row or bed. If the soil is of a heavy, clayey loam, I should prefer to plant the bulbs on a thin layer of sand, so as to prevent the bulb from decaying before commencing to grow; and when frost sets in the beds should be covered with four or five inches of manure. With few exceptions, lilies succeed in our gardens admirably, and continue to increase in strength and beauty, especially when left undisturbed for several years.

Lilium Auratum, or, as it is commonly called, "The Gold-banded Lily of Japan," is a superb variety, producing flowers ten to twelve inches in diameter, composed of six white petals thickly studded with rich chocolate-crimson spots and having a bright golden-yellow band through the center of each petal. To its size and beauty it adds an exquisite vanilla-like perfume. As the bulbs acquire age and strength, the flowers attain their maximum size and number, and upward of twelve flowers on a single stem is not an uncommon production.

Lilium Candidum, our common garden variety, with pure white flowers, and seen in almost every collection, is also cultivated extensively in pots, blooming about Easter. It forms one of our principal flowers for church decoration, and is so well known as to hardly need comment. *Lilium Harrisii*, the Easter lily of Bermuda, has large, pure white, trumpet-shaped flowers, often seven or eight inches long. It is a lily of great beauty and exquisite fragrance, and is probably the most valuable and popular lily in cultivation. It is especially valuable for

winter blooming, when thousands upon thousands are annually grown, and their beautiful blossoms adorn the altars of our churches, wedding tables and dinner parties; also in large clusters for funeral emblems.

Lilium Lancifolium, *Album* and *Rubrum*—the former a pure white and the latter a white and red spotted variety of the Japan class—are both very fine for garden culture. If lilies are wanted for winter blooming in pots, the dry bulbs should be placed in five or six-inch pots, according to the size of the bulb, and about half way down in the pot. The reason why lily bulbs should be so planted is, when they have grown a few inches above the pot they send out a number of roots along the stem, and unless these roots can find their way into the soil and add strength to the plant, it is impossible to obtain the best success. After the bulbs have been so planted the pots should be sunk in the ground outside in a protected place and given a good watering, after which they should be covered with four or five inches of loose soil, where they remain until the pots are well filled with roots, which generally takes six or eight weeks. Should frost appear before they are removed into the house, a mulching of a few inches of manure would be well as a further protection. After they have been removed to the house, they should be kept in a cool room until the advanced top becomes green, when they can stand and should be given more heat, according to the time they are wanted to bloom.

Calla Ethiopica, or Lily of the Nile, is an old but favorite variety, which no one can afford to overlook. It grows freely, requiring an abundance of water, producing during the winter large spade-like pure white flowers. The Calla requires to be rested during the hot months of summer, which is best done by withholding water and turning the pots on their sides in some shady place. After this rest the Calla should be repotted into good rich soil and started into growth, a single bulb often producing four to six blossoms in a season.

The Hyacinth is justly entitled to the great popularity it has attained, as no plant will produce such beautiful spikes of blossoms with so little care and labor. The Hyacinth is perfectly hardy, and if wanted for the garden should be planted out in October or any time later, before the ground freezes up. The bulbs should be planted about four inches below the surface of the soil. A light rich soil, thoroughly worked, suits them best. Before the advent of frost a light mulching should be given. In the spring the longer parts of the manure should be removed to give a better chance for the young growth to push through. When well under way they should be covered on cold frosty nights with muslin, and when in bloom should likewise be protected on windy days against dust, as their beautiful large spikes of blossoms are of such a character as to be easily damaged by dust. With care such as the above bestowed upon them, they will surprise the cultivator with an array of flowers which for splendor and richness are not excelled by any other class of plants. Where hyacinths are wanted for pot culture they should be placed in 5-inch pots, near the surface of the pot, and afterward treated in the manner spoken of previously for lilies. For early forcing and winter blooming the single hyacinths will be found far better than the double varieties.

Tulips make an excellent show in our gardens during the spring months, and from their brilliancé of color and easy culture have become general favorites. When wanted for pot culture only the early varieties should be selected, and given a treatment similar to hyacinths.

The Narcissus are another branch of the bulb family, deservedly popular. All the varieties of this class are hardy with the exception of the Polyantha Narcissus, which shou'd be used for winter blooming and treated similar to hyacinths.

Now, Mr. President, the field assigned to me is so large that it might take days to only mention a few of the endless variety of flowering bulbs in cultivation, and I shall now only allude to the Snowdrop and Crocus, which you all know are the best indicators of the coming spring.

I should have liked to touch upon the summer flowering bulbs, such as the Gladiolus and others, but time forbids, and I will leave them until the summer, when the Society casts its festive tent around the luscious strawberry and proclaims with the rest of the world "there is nothing like it."

Then followed a recitation by Miss Addie Kistler, Clinton, very nicely rendered, indeed.

THE INCEPTION AND HISTORY OF THE MISSOURI STATE HORTICULTURAL SOCIETY.

C. W. MURTFELDT, KIRKWOOD, MO.

In undertaking to write an historic sketch of the Missouri State Horticultural Society, its life and transactions, I had but a dim idea of the formidableness of the task. Had I duly considered it, it would never have been undertaken by me. Even now, that but little has been accomplished, it must of necessity be fragmentary, and if you will remember that in order to write it, the consulting of all the volumes of your transactions was required and read, in part at least, I fear I shall not be able to hold your attention, because it is difficult to avoid repetition and to make bare facts interesting. Overlook the faults you are sure to notice, and grant me your indulgent attention.

Of one thing I am pleased, namely, that the early history of which President Evans and Judge Miller said they had no knowledge, and of which even Henry T. Mudd, for nine years a President of this Society—even in the time of the "wah"—could find no printed record, has been happily brought to light, and will now, perhaps, have an enduring place in your transactions.*

You will notice from what an humble beginning, step by step, the Society has made progress, until now it ranks with the best in the land. If you argue that the membership is small, I refer you to the volume for 1887, and, granting that the membership of the parent Society is small, we point to the large membership of the county societies as our legitimate children. You will then please notice the exceding modesty, not to say humility, when after five years of begging among friends, they petition the Legislature for the pitiful pittance of one hundred dollars—say $100—a year to assist in publishing the transactions that a record might be preserved, while all the time the officers and members have given time and money and labor to keep the breath of life in the Society.

After twelve long years of usefulness the Society receives from the State the munificent sum of a thousand dollars a year, its reports being printed with those of the State Board of Agriculture, and is thus enabled to pay its Secretary $200 per year.

From such small beginnings this Society became the mother of our State Board of Agriculture, and in regular sequence also of our Agricultural college and the Agricultural Experiment station.

Its published transactions are a horticultural library in themselves. Its original papers and essays, its poetic quotations, were not written to live "but a day;" they will be read with interest as long as the State and the nation exist.

*I am much indebted to Wm. Muir, Esq., a former horticultural editor, with myself associated, on the Rural World.

The harmony and good-fellowship of its members among themselves, and their unselfish labors, as well as their high morality and truly Christian conduct, will meet, as they deserve, the approbation of all right-thinking men, and serve as examples to our children's children.

And when we consider the practical writings of such men as Dr. John A. Warder, of Ohio; Drs. Long and Hull, of Alton, Ill.; Willard Flagg, of Moro, Ill.; Rev. Chas. Peabody, Drs. C. W. Spalding and H. Claggett, of Missouri—and I might justly name dozens of men from our own State in this connection—we are led to exclaim, "verily, there were giants in those days!" Let us twine a chaplet of evergreens and flowers of sweet odors around their memory to-day, and embody it as an *in memoriam* in this historic sketch.

And let me not omit here to record the fact that in our public acknowledgments of Him who ruleth in the heavens and doeth His pleasure among the children of men, it was not in vain that we craved His blessings upon our transactions, submissive to His will, and His protecting care over us in our travels to and fro. I do not now recall a single mishap to a member while in attendance upon our meetings. To God be all the glory!

ORIGIN AND HISTORY OF MISSOURI STATE HORTICULTURAL SOCIETY.

In the summer of 1858 a number of the citizens of Meramec township united to form the Meramec Horticultural Society, the officers of which were: President, Dr. A. W. McPherson; vice-president, Samuel Wilson; recording secretary, William Muir; corresponding secretary, Charles H. Haven; treasurer, Philip Tippett. The members of this society felt the want of a State organization, and, being frequently in St. Louis, met with N. J. Colman, Carew Sanders, F. R. Elliot (then from Cleveland, Ohio), John Garnett, Dr. C. W. Spalding and other lovers of horticulture. The result was that in the November issue of the Valley Farmer the editor, N. J. Colman, published a call requesting the fruit-growers of Missouri to meet at Jefferson City on Wednesday, the second week after the Legislature met, for the purpose of forming a Missouri Fruit-Growers' Association. The object of this association was declared to be to have the fruit-growers meet together annually, or semi-annually, or oftener if it be thought advisable, for the purpose of discussing the merits of the various varieties of fruit that were cultivated, to determine from experience which were best, and to recommend such varieties as were worthy of cultivation, and to reject such as were unworthy.

Following this call, the fruit-growers convened at Jefferson City, at which meeting it was resolved (January 5, 1859) to form a state organization, for the purpose of advancing and directing the fruit-growing interests of Missouri and the West, under the name and title of "The Missouri Fruit-Growers' Association." Prof. George C. Swallow was called to the chair, and F. R. Elliot appointed secretary. Messrs. Elliot, Wells and Hussman were appointed a committee to report a constitution and by-laws, which was done and the constitution adopted. Permanent officers were then elected, with the following result:

PRESIDENT—Norman J. Colman, of St. Louis.

VICE-PRESIDENTS—

First Congressional district—Dr. A. W. McPherson, Allenton.

Second Congressional district—Prof. George C. Swallow, Columbia.

Third Congressional district—Gen. M. Horner.

Fourth Congressional district—Dr. McGuire, Platte county.

Fifth Congressional district—Eldridge Burden, Lafayette county.

Sixth Congressional district—William C. Price, Greene county.

Seventh Congressional district—John Dedrick, Platin Rock.

RECORDING SECRETARY—F. R. Elliot, of St. Louis.

CORRESPONDING SECRETARY—George Hussman, of Herman.

TREASURER—John Garnett, of St. Louis.

At this meeting the apple was fully discussed; also tree-planting and grape-soils.

SPECIAL MEETING AT THE FAIR GROUNDS, ST. LOUIS.

In accordance with a published call, a number of the members of this association convened at Pomological hall, on the Fair grounds of the St. Louis Agricultural and Mechanical association, on Tuesday, the 27th day of September, at 8 a. m. Many of the members not having arrived, on motion, the Society adjourned to meet at the same place on the following day. At 1 o'clock p. m. Wednesday the Society met according to adjournment; President Colman in the chair; L. D. Morse, of Allenton, elected secretary.

There was quite a display of fruits and wines; also several varieties of new grapes. A committee, consisting of Messrs. Hazeltine, Hussman, Haven, Cannon and Ewing, was appointed to "test the wines," which they did, and duly reported.

FIRST ANNUAL MEETING.

The first annual meeting of the Missouri Fruit-Growers' association was held at Jefferson City, commencing December 27, 1859; Norman J. Colman in the chair. This session was largely devoted to the preparation of a list of the several fruits; a vote being taken on the several varieties adopted. "The protection of fruit-trees against climatic agencies" was fully discussed.

The election of officers being in order, the president and all the vice-presidents were re-elected. Recording secretary, William Muir, Laborville; corresponding secretary, Dr. L. D. Morse, Allenton; treasurer, Dr. C. W. Spalding.

At the close of the first annual meeting, the following is a list of members and postoffice address of each:

John Garnett, St. Louis.
Ben. F. Hickman, St. Louis.
Norman J. Colman, St. Louis.
Robert S. Mitchell, St. Louis.
W. W. Stickney, St. Louis.
C. S. Rannells, St. Louis.
P. Papin, St. Louis.
G. B. Lewis, St. Louis.
F. R. Elliott, St. Louis.
Carew Sanders, St. Louis.
John Dalton, St. Louis.
G. C. Swallow, Columbia.
Odin Guitar, Columbia.
R. W Wells, Jefferson City.
E. L. Edwards, Jefferson City.
A. W. Morrison, Jefferson City.
J. L. Minor, Jefferson City.
Isaac Dwight, Jefferson City.
P. T. Miller, Jefferson City.

A. W. McPherson, Allenton.
John S. Seymour, Allenton.
George Hussmann, Hermann.
Jacob Rommel, Hermann.
C. C. Manwaring, Hermann.
George Klinge, Hermann.
James L. Bell, Bell Air, Cooper county.
James H. Walker, Bell Air, Cooper county.
Lewis Hutchison, Bell Air, Cooper county.
N. Leonard, Bell Air, Cooper county.
John D. Read, Tuscumbia, Miller county.
W. A. Davidson, Cambridge, Saline county.
M. P. Tarlton, Cambridge, Saline county.
John F. Huston, Carrollton.
W. Richter, Morse's Mill P. O., Jefferson county.
W. P. Darnes, Commerce, Scott county.
Samuel McGuire, Parkville, Platte county.
E. Burden, Lexington.
Wm. Newland, Hydesburg, Ralls county.
Joshua Chilton, Eminence, Shannon county.
T. C. Williams, Iron Hill, Franklin county.
Sol. P. McCurdy, Weston.
James Raines, Sarcoxie.
Walter B. Morris, Bridgeton, St. Louis county.
J. R. Ruby, Bellmont, St. Louis county.
Henry M. Myers, Boonville.
Alexander Snyder, Boonville.
O. Brainard, Ossawottomie, K. T.
C. J. Mallinckrodt, Augusta, St. Charles county.
Dr. J. B. H. Beale, Eureka, Allenton, St. Louis county.
E. R. Mason, St. Louis.
L. D. Voteaw, Eureka, Allenton, St. Louis county.
William Wesselhoff, Hermann, Gasconade county.
Wm. Muir, Laborville, Melrose P. O., St. Louis county.
Jos. O'Neil, St. Louis.
Dr. W. A. Curry, Jefferson City.
Dr. C. W. Spalding, St. Louis.
A. L. Tyler, Bonhomme, St. Louis county.
Gen. J. L. Minor, Jefferson City.
F. J. North, Labadie, Franklin county.

A special meeting (President Colman in the chair) was held at Hermann, September 7th, 1860, at which twelve new members were admitted. There were presented at this meeting a large number of specimens and seedling apples; also samples of wines and some canes of the Catawissa raspberry. There were over thirty varieties of grapes on exhibition. There was the usual committee on wines and their report.

It was on motion

Resolved, That we cordially approve of the object of the "Maramec Horticultural Society," recommending the calling of a Farmers' convention to meet at Jefferson City for the purpose of taking into consideration measures for agricultural improvement in Missouri.

This was the nucleus of the State Board of Agriculture and the Agricultural college.

THE SECOND ANNUAL MEETING

Of the State Fruit-Growers' association was held in St. Louis, January 8th, 1861, President N. J. Colman presiding.

Nineteen new members were elected

There was a very large display of fruits.

Other by-laws were adopted.

President Colman feelingly declined re-election and thanked the members for kindness received while in office.

Dr. C. W. Spalding was elected president. All the vice-presidents were re-elected with the exception in the Fourth district, W. L. Irvine of Buchanan county, and Seventh district, W. S. Jewett, Pevely; recording secretary and treasurer, Wm. Muir of Laborville, Melrose P. O.

Lists of six, twelve and twenty varieties of apples were recommended for orchards of a thousand trees.

Small fruits were also discussed at length.

The attendance was very large, and a wide-spread interest was manifested by the press and all classes of citizens. The hotels were remarkably liberal.

THE THIRD ANNUAL MEETING

Was held in the room of the Probate court, St. Louis, January 14, 1862.

Dr. C. W. Spalding, president-elect, was introduced by his predecessor, N. J. Colman, with complimentary remarks. Dr. Spalding, on taking the chair, addressed the Society in a most beautiful and forcible manner. In the course of his remarks he alluded to the importance of changing the designation (name) of the Association, so as to allow of a wider scope of useful knowledge and discussion, suggesting the name of "Missouri State Horticultural Society," as more appropriate than the name of Fruit-Growers' Association.

Before the close of this session the title or name as recommended was adopted.

Fourteen new members were admitted.

Apples, pears, wine and implements were on exhibition or presented to the Society.

THE FOURTH ANNUAL MEETING

Was held in St. Louis January 13, 1863, and the following days. Sickness had prevented the President, Dr. Spalding, from preparing his regular annual address.

On motion,

Resolved, That a committee of five, of which the President shall be one, be appointed to memorialize the State Legislature in regard to the Agricultural college act of Congress, and other matters pertaining to the agricultural interests of the State.

The following names were appointed such committee: Dr. L. D. Morse, N. J. Colman, Geo. Hussman, T. R. Allen and the President. The programme reported covered the entire list of fruits and ornamentals. (Another step forward.)

On motion,

Resolved, That the State having recently re-districted, so much of the constitution as states, there shall be a vice-president from each Congressional district, be repealed, and that the Society shall elect five (5) vice-presidents.

The following officers were elected:

President—Henry T. Mudd, St. Louis.

Vice-President—Dr. B. F. Edwards, St. Louis.

Vice-President—O. H. P. Lear, Hannibal, Mo.

Vice-President—Isaac Snedicker, Jerseyville, Ills.

Vice-President—William Hadley, Collinsville, Ills.

Vice-President—Geo. Hussman, Hermann, Mo.

Corresponding Secretary—Dr. L. D. Morse, St. Louis.

Recording Secretary and Treasurer—Wm. Muir, Fox Creek, Mo.

The agricultural committee report in favor of petitioning the Legislature of the State to accept the conditions of the Agricultural college act of Congress.

2. To pass an act to establish a State Board of Agriculture.

3. To appropriate 100 dollars for the purpose of aiding the publication and distribution of the proceedings of this Society.

Adopted, and referred back to the committee for the necessary action.

An able report upon the fruits on the table was made by Dr. John A. Warder of Ohio.

(Notice the several important steps taken at this meeting, especially organization of a State Board of Agriculture recommended, etc., and the membership of Illinoisans, and electing them as officers.)

President Spalding introduced the President elect, Henry T. Mudd, who returned thanks for the honor conferred, and hoped to be excused from offering any special address at this time.

On motion, the following resolution was passed:

Resolved, That we recommend an appropriation by Congress of means sufficient to establish and maintain an experimental fruit and vegetable garden at or near Washington, D. C., under the direction of the Commissioner of Agriculture, from which department we as horticulturists entertain the highest hopes to this great interest, to wit: The agriculture of our country.

Dr. Warder read a very interesting essay on the Van Mons theory of propagation, viz., by raising continually from the first ripened seeds of the trees. (It will be remembered that Van Mons paid especial attention to the raising of new varieties of pears.)

Mr. Willard C. Flagg, of Moro, Illinois, also read an essay on the apple, which created a lengthy discussion on varieties. (Mr. Flagg's papers always were exhaustive and thorough.)

An essay on grapes, by Geo. Hussman, had the same effect.

The "Spiral Theory of Foliation" was the subject of an essay by Dr. Warder.

Wm. Muir offered an essay on the pear.

Dr. Claggett read a report on "Summer Pruning," and Jonathan Huggins offered an essay on "Timber Trees."

THE FIFTH ANNUAL MEETING

Was held in St. Louis, January 12, 1864.

The session was opened by prayer by Rev. Dr. Post.

(Notice, please, another step in the right direction.)

President Henry T. Mudd read his annual address.

N. J. Colman, chairman of the business committee, suggested that as each session had about gone over the same ground, that the action of this meeting be confined to the selection of a few of the choicest varieties of the various fruits for family and market. On these lines discussion commenced with apples.

Dr. B. F. Long, of Alton, Illinois, read a paper on "Live Fences."

A. Pettingill, of Bunker Hill, Illinois, an essay on the "Pear and its Culture." This was followed by discussion on the same subject.

Dr. C. W. Spalding, Wm. Hadley, B. Smith, Dr. B. F. Long and James Kelley acted as a committee on fruits.

An address by R. S. Elliot, of St. Louis, on the "Influence of Woman on Horticultural Pursuits," was read. (It affords me pleasure to be able to submit a copy, and if time allows I hope it will be read at this meeting.)

The election of officers resulted as follows:

President, Henry T. Mudd; Vice-Presidents, Dr. B. F. Edwards, St. Louis, T. A. Quinette, St. Louis, B. Smith, Cuba, Jonathan Huggins, Illinois, and Dr. E. S. Hull, Alton, Illinois; Corresponding Secretary, Dr. L. D. Morse; Recording Secretary, Wm. Muir; Treasurer, Jno. H. Tice.

THE SIXTH ANNUAL MEETING

Was held in the Supreme court room, St. Louis, on January 10, 1865, and the following days. President Mudd in the chair. The meeting was opened by prayer by Rev. Dr. Elliott. Let us listen to the first opening sentence of the President's address:

"The ever-watchful care and guardianship of Him who ruleth all things, extended in our preservation from the many dangers which threatened us during the year that is past, enables us to meet under many evidences of His continued favor for the sixth annual convention of our Society."

(When we remember the years just closed when these words were written, we will appreciate their significance. While I had in contemplation to write this sketch, Mr. Mudd has told me that this Society was the only one of its kind in this State that lived and held its regular meetings during the entire war.)

On motion of N. J. Colman, the publisher, Mr. C. M. Saxton, formerly of New York, now of St. Louis, was elected an honorary member. (Another step forward.)

During this session, quite a discussion was had on the propagation of grapevine from a single eye.

About a dozen members took part in discussion on the strawberry, among these a number of doctors, to wit: Drs. Claggett, Minor, Hull and Long, a strong quartette.

The essay of Geo. Hussman and the remarks of Dr. Herman Schroeder provoked a long discussion upon the diseases of the grape—the first intimation we have of mildew and rot.

Committees on fruits and wines were still in order.

Prof. Tice read a paper on our "Wild Flowers," with a very large list, giving both the common and scientific names. I copy one brief sentence and a couplet:

"For cheerful influences that speak to the hearts of all, there is nothing like flowers;"

"Whose voiceless lips are living preachers,
Each cup a pulpit, and each leaf a book."

Here also we encounter another trouble for the horticulturist. Dr. Claggett, chemist, reports for the committee on "Pear Blight."

Prof. Tice reports from the committee on entomology, and the committee suggest that the Legislature now in session do pass a law for the protection of insectivorous birds.

Dr. Minor presents an essay on Bee Keeping.

E. R. Mason offers an essay on Drainage, which we find full of good suggestions.

The committee on vineyards report for Alton, Highland, Mascoutah and Belleville, Ill., and from Hermann, Mo. Never did the grape list receive a more thorough overhauling.

THE SEVENTH ANNUAL MEETING

Was held in one of the court-rooms, St. Louis, January 9, 1866. President Henry T. Mudd in the chair. Every morning session was opened by prayer, Revs. Peabody, Coe and Prof. Barler officiating.

This was the first session in which your humble servant took a part as the representative of the "Prairie Farmer," of Chicago, Ill., and I find the record contains a little paper which I had the privilege to offer. It contains nothing that I wish to take back, although some of my prophecies have not yet been fulfilled. Padron, if you please, this bit of egotism, and also this:

Mr. Murtfeldt—I wish that something like the resolution I now propose might have been offered by some one from Missouri:

Resolved, That in view of the great destruction of fruit and farm crops by birds and insects, the State Horticultural Society recommends to the Legislature of the State the appointment of an entomologist and ornithologist to give the necessary information to the farmer and fruit-grower, to enable them to determine which birds and insects are friends or enemies.

The Society adopted the resolution. As far as my memory serves me, this was a very interesting and well-attended session. I learn also by a motion made by N. J. Colman that the membership fee shall be two dollars instead of one, and that the Society hitherto had asked for and received voluntary subscription. In the treasurer's report we find four items, to wit:

Debit, $166.80; credit, $92 00; balance on hand, $74.80. Notice how small the account and how rich, with a balance of $74.80.

Progress: Four standing committees, to wit: Business, Entomology, Vineyards and Orchards, with ten specials, including a Committee of Arrangements for meeting of American Pomological society.

Officers for 1866:

President, Henry T. Mudd; Vice-Presidents, Geo. Hussman, O. H. P. Lear, Barnabas Smith, Dr. B. F. Edwards and Dr. W. L. Dyer; C. M. Saxton, Corresponding Secretary, St. Louis; Wm. Muir, Recording Secretary, Fox Creek; John H. Tice, Treasurer.

(We hoped to have the reports of other meetings given in their order. Mr. Murtfeldt was unable to obtain a complete report of all the meetings, and there are necessarily so many omissions that we omit the rest and hope some day to complete them.—Secretary.)

Then followed a song by Prof. Hall, of Baird college, Clinton, Mo.

HORTICULTURAL GEOLOGY.

PROF. EDWIN WALTERS, KANSAS CITY.

We are daily learning that all truths are, in some way, related—that there is a point beyond which one cannot consistently "magnify his office," especially if he does so to the disparagement of other avocations and lines of investigation. It is the work of this generation to discover truths. Future generations will harmonize and correlate them. This observation is especially applicable to the truths of all of the natural sciences and the application of their principles to the daily affairs of human activity. We gradually learn that one cannot be thoroughly well informed on any subject without being acquainted with a number of subjects or

branches that are related to it. The astronomer must understand physics, mathematics and something of chemistry. The chemist must be informed in physics, and have at least a fair knowledge of mathematics. The list of correlated branches could be extended indefinitely.

This much can now be safely claimed: The natural sciences lie at the foundation of a thorough knowledge of every avocation that has to deal with material things. The progress of the human race is measured by the degrees to which it applies the principles of natural science. When we know to what extent the people of a given age or nation applied the principles of natural science, we know, without further inquiry, to what plane of civilization it attained.

Classics direct our thoughts backward for models. The sciences invite us to go forward, to discover something better than the dead past ever knew. If civilization depended on the past, all progress would be in a circle; all knowledge would be largely second-handed; all the principal faculties of the mind that would be developed would be memory and imitation. Possibly herein lies a reason for believing that man descended from the monkey! The monkey is a great imitator!

Let us put away childish things and push forward—leaving the wrangles and disputations of Cicero, Marc Antony and Cæsar to those who have more time than we to study the history of the human race when in its infancy. Let us insist on the sciences having their proper places in our school and college courses of study. As a rule, they are sadly neglected. A few second-hand ideas are given out and labeled "the natural sciences." Too often, experiment, observation, personal investigation—actual work—are entirely omitted.

What should the horticulturist know of the natural sciences? A knowledge of all of them would greatly benefit him. But it is essential that he know something of botany, including plant physiology, agricultural chemistry, entomology, ornithology, the elements of meteorology and geology. Why all of these? The higher an avocation, the greater and wider should the range of knowledge be to successfully pursue it.

Inasmuch as horticulture, including floriculture, is the highest branch of husbandry, the knowledge necessary to fully qualify one for its pursuit must take in an extended range. No other rural pursuit requires such high intelligence; no other is so important to a high civilization. Without it the present civilization would, at best, be in a state of "hog-and-hominy" savagery.

Before proceeding to discuss the main points of the subject under consideration, attention is called to material environments as factors in human history. Geology, meteorology and chemistry afford the key to history. A thorough knowledge of the philosophy of history, past, present and prospective, it seems to the writer, must depend upon, or include, a knowledge of these branches of natural science.

The chemistry of the rocks determines the physical features of a race or people. Man, being largely a creature of circumstances and environments, must, necessarily, conform to his surroundings. The nearer he is to a savage state the more will he be influenced by attending conditions.

As mental and moral traits so universally accompany certain physical features of the person, the destiny of a race largely depends on the rocks on which it dwells. It must be remembered that the term rock, in geology, means and includes any and all earthy substances, such as soils, clays, shales, coal, limestone, mud, and even water.

If the human race would ever advance to the high plane of moral and mental manhood that is its greatest possibility, the circumstances of rocks and climate—meteorology—would not enter as such important factors in human history. But we

must acknowledge the facts as we discover them, even though by doing so we acknowledge that man is "of the earth earthy." The most civilized and enlightened peoples are no exceptions to the rule. If it were not for two neutralizing or disturbing factors, these underlying principles of the philosophy of history would have been discovered and applied long ago. These are immigration and the importation of articles of diet. The influx of new races and food products neutralizes the local effect of rocks and climate. When a race lives in social and commercial isolation for several generations, its physical and, consequently, its mental and moral characteristics are fully determined by its physical surroundings. The topography of a country is stamped on the physical features of the inhabitants of that country. The use of lime or other alkaline waters makes the complexion dark. Those who live in mountainous countries are more angular, to correspond with the profile of the country they inhabit. Those who live on high, dry plains, where there is much sunshine, have the pupils of their eyes permanently contracted. Rotund people originate in hilly or gently rolling countries. The Esquimaux are small boned because their food and drink contain so little lime—a bone-making material. Huxley has observed that slaves, or nations that have been enslaved, lived on alluvial soils, and that no people who lived on granite or granite rocks were ever reduced to slavery. Examples sufficient to occupy the space of a volume could be given.

If the great law of adaptation to geological environments is of so much importance in the study, and in determining the destiny, of the human race, how much more important is it to a proper understanding of plant life.

Certain plants must always be associated with certain rock formations. Many plants have a wide habitat, considered geologically, but, as a rule, they attain their highest perfection in particular geological formations. A certain narrow-fronded fern is called to mind, which I have never observed except growing on the limestones of the Carboniferous and Sub-Carboniferous periods. White oak is a tree of general distribution in most parts of the temperate zone, yet its wood is not valuable for the highest purposes to which white oak is put, unless it grows on clayey soils, such as are most abundant in the Silurian and Sub-Carboniferous periods.

The apple and all fruit-bearing plants are subject to this law of geological adaptation. It is true that man can, by the application of manures and by other artificial means, supply the deficiencies of nature or neutralize the antagonistic elements of the soil, but these results can only be obtained to a limited degree and at an additional expense over that of more favored localities. Such attempts are more or less abortive.

When fruit-plants must be treated as exotics, their yield will be deficient in some important particulars; this is usually in the item of flavor, if in nothing else. All have observed the wide difference in the flavor of the apple in different localities. Apples are common to something like two-thirds of the United States; yet the belt in which they attain their highest perfection, in the particular quality of flavor, is limited to two or three geological periods. These periods are the Carboniferous, Sub-Carboniferous and Lower Silurian periods. Take a geological map of the United States and examine it. You will find that the finely flavored apples of Western New York grow principally on the Niagara limestone. The Michigan apple belt is principally on the Niagara and Lower Silurian limestones. Western Pennsylvania, a portion of Eastern Ohio and Western West Virginia are celebrated for the flavor of their apples. The best apples of these localities grow on Carboniferous, Sub-Carboniferous and Silurian rocks.

Coming further west, the great apple districts of Southwestern Missouri and Northwestern Arkansas are in the Sub-Carboniferous and Lower Silurian periods. Here we find the famous cave—probably Burlington limestone—together with the cherty, flinty Keokuk limestone, or "Joplin flint," both so common to the Ozark region. The loess or bluff formation is a good fruit soil. The rocks of the carboniferous period form a basis for soils adapted to the growth of the apple, as the fruits of Illinois, Iowa and Northern and Western Missouri attest. But there is no one rock formation that seems to form so good a basis for apple soils as the cave limestone, common to Southwestern Missouri, Northwestern Arkansas, a portion of Kentucky and a portion of the countries mentioned above.

The rocks adapted to the peach are somewhat different. It requires more iron, and, being of a semi-tropical habit, is better adapted to light, sandy soils.

The peach belt of the United States begins with the sandy, ferruginous, iron-like soils of Delaware and New Jersey, and extends with several gaps or breaks to the sandy valleys of California and the Pacific slope. Sand is composed of decomposed quartz. Quartz originates in azoic, granitic rocks; hence, sand is most abundant in the azoic period. In many countries the azoic rocks, which are the lowest rocks in the earth's crust, have been lifted up when mountains were formed, and now occupy positions higher above sea level than the newer or younger rocks do. As an example, take the granitic rocks of the Rocky mountains; they are much above any portions of Missouri, yet they belong from five to six miles, geologically considered, beneath us. As these granitic rocks have decomposed and eroded, they have freed granular quartz sufficient to afford a layer of sand over the soils and clays and other rocks of the countries that occupy lower levels. The peach tree thrives in such soils where favorably located in other respects. But, unfortunately, meteorology here asserts itself as a ruling factor.

A sandy soil is favorable to rapid evaporation of moisture and great radiation of heat. Along the moist coast of the Atlantic, notably in Delaware and New Jersey, this tendency of sandy soil is checked, and the peach, receiving the full benefit of a favorable soil, attains the highest degree of perfection known in the United States. To sum up then, and localize, the peach flourishes in azoic rocks, or on soils derived directly from them. The slopes of the Blue Ridge, Alleghany, Rocky, and of all of our mountains that are composed largely of granitic bed-rock are adapted, geologically, to the growth of the peach. Where too dry, as is well known to most of you, the flavor of the peach is inferior. In some of the driest portions of California, the peaches are almost tasteless.

The pear is quite similar in its geological distribution to the apple. It is freer from blight in a sandy loam. With sub-drainage, it will flourish almost anywhere that the apple will, except that its natural habitat is not so far north.

It will be seen from the remarks on the apple that the favorite rock for apple soils is limestone. But all limestones are not favorable. As a rule, the Devonian limestones are not good as a basis for fruit soils. It is probable that it is because they do not decompose so readily as do the limestones of the periods mentioned.

The rocks that are impervious to water afford a poor basis for fruit soils. Many western fruit-growers have learned this to their sorrow. Shales of fine texture, improperly called soap-stone, unctuous, oily clays, or any impervious material, make bad subsoils for fruit. If they are not too close to the surface they do not interfere with the growth of grain and other annuals that receive their earth-food from near the surface, but trees reach down to bed-rock, and if the bed-rock affords their roots no moisture their vigor is impaired. The reason for such a state of affairs is mechanical.

The bed-rock of Western Missouri has a primary dip of about eleven feet to the mile. In all parts of the country the bed-rock has more or less dip. When water falls on the surface soils it soaks down to bed-rock. If the bed-rock is porous it continues down indefinitely, and is brought to the surface by capillary attraction, and is appropriated by the roots as it is needed to sustain plant-life. But if the bed-rock is soapstone, shale, or some impervious material, the water, on reaching it, commences to run down hill in the direction of the greatest dip—just as water runs down the sides of a roof. It is plain that this mechanical condition will soon drain the soils above of moisture. The only known remedy is a pit under each tree of sufficient size to store enough water to last through the dry season. Where there is a sinus or trough in the bed-rock, nature will store the necessary water for the soils above. Where the bed-rock is impervious to water, the selection of a site for an orchard should be determined by a geological survey. Such a survey would, by levelings and measurements, determine the location and extent of such troughs in the bed-rock. A location far down on a slope in the bed-rock might serve as well, or even better, than a trough.

Many of us know by experience that sometimes our young trees do splendidly above such an impervious bed-rock as much of the West affords, but the trees get about a certain age and then begin to show signs of a loss of vigor. This is the date at which their tap-roots reach an impervious rock or subsoil. After this, their life is uncertain. When the bed-rock is porous, the trees continue to grow till they almost rival the trees of the forest in size and splendor.

For want of time and space, further specification of the different species of fruit must be abandoned for the present, and all of our temperate zone fruits considered collectively.

To show that certain fruits are best adapted to particular geological formations comes within the province of horticultural geology, but to give the reasons for these adaptations would lead to a discussion of some of the subjects included in botany, chemistry, entomology and ornithology; hence the assertion that these branches are necessary to the horticulturist. In this instance, however, it is only necessary to refer to those important subjects incidentally to correlate them with the one under consideration.

The cultivated fruits follow the same laws of growth and organic development that all plants do, but being more tender than indigenous plants, the laws of growth will admit of fewer violations.

When woody fibre is burned, the residue or ash contains small quantities of earthy or inorganic substances that vary, but it usually consists of potassium, silica—a form of grit or quartz—lime, magnesia, iron, etc. This ash is only a small portion of the bulk or weight of the plant. From ninety to ninety-six per cent of wood consists of cellulose or hard cellular tissue. It is composed of carbon, hydrogen and oxygen. The hydrogen and oxygen are derived from water and are principally supplied through the roots in the form of sap. The carbon is taken in from the air, mainly through the leaves, in the form of carbonic acid gas. The limestones of the geological periods favorable to the apple are easily decomposed, and consequently give up their carbonic acid gas readily and in about the proper proportions to develop the highest plant forms. It is true that rich alluvial soils and those that contain the most decomposed organic matter stimulate and promote plant growth, but there is proportionately less fruit and it is of an inferior quality. Such soils over-stimulate and bring on diseases of the sap, some of which are known as "blight," "sour sap," etc.

One of the reasons why sandy soils are sometimes objectionable to the horticulturist is because insects that injure fruit thrive best on or in a warm, sandy soil, especially a dry one. This observation leads us into the domain of entomology. Certain insects bring certain birds that prey on them. This brings the discussion within the province of ornithology. To correlate, certain geological (rock) formations are favorable to certain fruit plants; these plants conform in their chemical constituents, and other qualities, to the rocks on which they grow; certain insects prey upon these fruit.plants, and certain birds, and other insects, prey upon these injurious insects; thus does all organic life—whether animal or vegetable—depend on the geological formations that give character to the soil for their sustenance, characteristics and distribution.

The united thicknesses of the rocks which I have assigned to the apple zone would not exceed 3,000 feet. The united thicknesses of all the stratified rocks from the highest and youngest down to granite—the lowest and oldest, when considered geologically—would be at least fifteen times that number of feet. It will be seen from this that the geological range of the perfect apple is somewhat limited.

The subject of this paper suggested itself to me a few days ago. It is entirely too vast to be treated thoroughly without a lengthy preparation. The object of this short paper is to show the possibilities of the subject, and ask you to observe for yourselves. Fruit statistics are so meagre and data so hard to obtain, that nothing more than a general theory can now be formulated. Observation verifies the theory as far as tested. It is possible that in localizing, I have fallen into error, but I have all confidence in the theory that the great law of adaptation works along the line of geological formations.

To settle the question of the local application of this theory, it is necessary to collect fruit statistics for, say three to five years. These statistics should be obtained from the portions of the country where the best of each kind of fruit is supposed to grow, and should take in a wide geographical range. The statistics should be arranged by counties, with differences noted in same county, if any were observed, and such data would afford a connected history of the fruit industry of the localities under consideration. At the end of the three or five years, these results could be correlated with the geological formations of the several counties. The geological formations could be ascertained from the reports of the various state surveys.

The geologist must of necessity "run every subject into the ground." It is in the line of his business to do so. Having brought horticulture down from poetic heights to the rocks, to the "dust of earth," into the ground, I leave it.

A recitation was beautifully rendered by Miss Audrey Knowles, of Clinton academy.

WINTER WORK FOR THE FRUIT-GROWER.

J. A. DURKES, WESTON, MO.

"Our fruits are in the cellar's bin,
What wealth the mows and granaries hold."

After the season's fruit-crop has been stored away and cared for, the thought of the orchardist will be for his trees, the best manner for their winter protection, or the best treatment to put them in a condition for a fruitful crop the coming season. The first step would be to plow the ground before it freezes; this may not be necessay if the orchard was in crops that had thorough cultivation during summer, a thorough harrowing and raking together of all grass, weeds, stubble and decayed branches, and burning them will be of the greatest advantage, for in these

we have the foundation of untold ills the fruit-grower is subject to; in them we have a great harbor for all insects.

Trees in orchards, thus treated, will be free from the ravages of mice, and we have noticed that rabbits will do no or very little damage to young orchards or nurseries where perfect cleanliness was the rule, and all harboring places had been destroyed.

The apple curculio or gouger hibernate or hatch under and in every crevice of wood and bark; hence the complaint of knotty pears and apples; and it will be observed that trees nearest fences, hedge rows or woodlands will be most affected. This is an important task, and can so well be done throughout the winter months.

Late fall is also a good time for planting. Our winters are often so open that we can do this at any time, wherever trees can be had near that there would be no fears of being overtaken by a freeze.

Borers, too, can be looked after. Leaning trees, of moderate size, can be straightened by digging around them, cutting a few of the straining roots, filling in again, firming the ground, banking up somewhat to make the brace stronger.

In examining our trees we will find broken limbs, injured places in the bark, as well as much loose bark on the trunks of the older trees; these are infested with aphis and the larvæ of many other injurious insects. Destroy everything of the sort, and next fruiting season will show the results.

Pruning is another work that ought to be attended to—

> "Superfluous branches we lop away,
> That bearing boughs may live."

The orchardist will find it of the greatest advantage to attend to as much of this as possible. As a rule, spring and the growing season are considered the best time for trimming, but the press of other work at those seasons often result in total neglect, or a partial attention. So it will be well to have done with this, to be ready for other work.

Annual pruning ought to be done. The heads of trees should be well formed, opened in the center, letting in the sunlight and air. Suckers will grow, small branches thicken up the center, growing to right and left, crossing and rubbing those we wish to remain; cut them out with a close, smooth cut.

To enumerate all that can be done, and should be, we fear would make this paper to long.

The fruit-grower has indoor work when the days are too cold; his fruit needs looking after, sorting over, changing about, boxes, barrels and bins cleaned and mended, cellars fumigated, to drive out fungus arising from decaying fruit; graft his own trees from which to replant his orchards—a much better plan than to depend on others, especially the tricky tree agent.

A thoughtful review of his past success or failure will be the guide for his work in the future; plans are made now, and means to carry them out may become the studies of his long winter evenigs.

Work is always plenty for the busy ones. Now his attention may be turned to intellect work; in busy times, when employed in caring for his fruits, his favorite books must be neglected; now the time has come, and reading and studies may be resumed.

Thus we see that there is work for the fruit-grower in winter—work of the most pleasant, of the most profitable and elevating kind.

Then followed a duet by Prof. Hall and Mrs. Taylor Bernard; enjoyed by all.

WEDNESDAY—9 A. M.

The Society was opened with prayer by Rev. Mr. Armstrong.

REPORTS FROM COUNTY SOCIETIES.

At the roll-call fifteen county societies answered. Some are doing excellent work, while others are sleeping, but the number of workers here prophesy a good session.

ORCHARDING IN NORTH MISSOURI.

READ BY CHAS. PATTERSON, KIRKSVILLE.

In attempting to say something on the subject assigned me, it is quite gratifying to not enter any competition or rivalry with other sections of the State, but simply to show that our section enjoys a satisfactory share of the phenomenal combination of a good crop and uncommonly good prices. In such a fortunate combination each section is liable to conclude that it enjoys special advantages over any others, or has adopted the best methods to secure them, and thus forget to improve glaring and reprehensible shortcomings that may prevent forever any recurrence of such a profitable crop. When we observe the general condition of our orchards in any part of the State that I have visited, and the methods generally pursued, we find grave reasons to apprehend that such a combination may never occur again in our life-time, and very possibly not in that of our children, and in a few years we may forget all this prosperity, or think of it as the good old times, and hear croakings about short-lived trees, unpropitious climate and uncongenial soil; whereas, if we read the lesson that our trees plainly present before our eyes correctly, we can have every reason to hope for almost regular recurrence of profitable crops, if not as phenomenal as this.

I had intended to secure a fairly correct estimate of the apple crop in our county, but failed to get returns from some shipping points, and at others it was impracticable to find how many came from adjoining counties into this, or how many went from our county to stations in next counties; hence, I can only make a rough estimate, and will endeavor to avoid exaggeration, so often liable to occur in such estimates. By this method I would place the crop of Adair county at from 100,000 to 110,000 bushels, and the net income to our farmers at $34,000 to $37,000.

I am well aware that this will not average with estimates from many other counties, but it is certainly a good refutation of the idea sometimes entertained, even at home, that we are just a little too near the border of the best apple belt. The fact is only that we have scarcely a single commercial orchard worth the name, and that every one is just left to grow like Topsy. In a large proportion of them you can look under the branches down the row and not see a single green leaf in summer time, and when you look at the tops, you see only a scattering of cider apples, and that in orchards less than twenty-five years old, that passed for models when young. They have never had a knife or pruning saw about them, or a cultivating tool since they commenced a precocious fruiting, but have been pastured with calves and pigs, if not larger animals.

I have quit arguing this subject with common farmers, because I am thoroughly satisfied that they do not want to, and therefore never will, learn to take half care of trees, and that the bulk of fruits will sooner or later be grown by specialists.

For their benefit I keep a watch of two orchards in my immediate vicinity—both very nearly the same size (about thirty acres), planted the same year from the same block of nursery trees, but one kept partly in sod and partly cultivated hap-hazard in the common way, and the other under continuous, clean cultivation; one about four-fifths Ben Davis, the other something over one-fifth, and both thirteen years old. The net income from each the past season was as one to six. This may look like an exaggerated statement, but it is not. The difference may be partly due to the disparity of Ben Davis trees, but all are now old enough for any variety to bear, especially in sod. If there is any unfairness in the comparison, it is in favor of the sod-orchard, because the Ben Davis were partly cultivated of late years. Hence, on measuring the circumference of twenty average Ben Davis in each orchard last week, I found less difference in size than I had expected. Nevertheless, on reducing the measurement to the cross-section, I find the cvltivated trees nearly thirty-three per cent the largest, which shows only the difference between partial and clean cultivation, and not the difference between cultivation and no cultivation. And I am well satisfied that the bearing surface of the cultivated orchard (the top of the trees) is fully in the same proportion, although they were trimmed up two to three feet higher some two or three years after planting, which must have stunted their growth to some extent.

Another good-sized orchard in the same vicinity consists in part of a good assortment of varieties, and in part trees apparently over thirty to forty years old, of unrecognized varieties.

The entire crop sold this year for just the same per hundred pounds as that of the cultivated orchard sold for per forty-eight pounds, to the same buyer and for the same purpose—evaporating. I accept this as tangible, substantial evidence that cultivating the orchard pays, notwithstanding some old farmers have told me that they broke up the sod in part of their orchards last spring, and they show no perceivable difference from those undisturbed.

DISCUSSION.

Sam. Miller—That is an excellent article. It comes up to my doctrine exactly.

Mr. Patterson—The sod orchard has a number of varieties.

Mr. Gano—Was there any marked difference in the merchantable quality of the apples in the sod orchard and the cultivated orchard?

Mr. Patterson—I will call upon Mr. Tascott to answer.

Mr. Tascott—The difference was, those that grew in the sod were worth twenty cents a bushel less than the others. We made a difference according to the quality of the apples. Those in the sod were wormy and knotty.

Mr. Carpenter—Was one orchard sprayed?

Mr. Patterson—No; neither was sprayed.

Mr. Murray—I would like to say this: There are a good many ways to cultivate an orchard. To deeply break up a sod in an orchard that has gone for years without cultivation may cause great injury by cutting the roots near the surface. I think that shallow cultivation is best. The surface of the soil should be reduced to the finest possible con-

dition. I use the turning plow once in five years. In other years we cultivate with a fine, sharp steel harrow and a corn cultivator. This year we cultivated three times with a corn cultivator and three times with a harrow. The orchard is eighteen years old. The crop was fine. It was sprayed twice, but should have been sprayed three times. I think that up to the present time spraying has been almost entirely experimental. It is not reduced to certainty. I used this year a preparation sent out by a New York company which I think a great improvement. This will come up again under the head of "Spraying."

ORCHARDING IN WEST MISSOURI.

HENRY SPEER, BUTLER.

The subject assigned me is one of vast interest to a great many persons at the present time, and the business is only in its infancy. The fruit crop of Western Missouri is an important one almost any season, and this year it has been especially so on account of failure of the crop in the apple-growing regions east of us. But how vastly more important will it be when, instead of our orchards of fifty to a hundred trees, with twenty-five to seventy-five per cent of them worthless on account of bad selection of varieties, we have large commercial orchards of 40, 80 and 160 acres, all planted to choice, productive market varieties; and these large orchards, not as now, a rare sight, but a common thing, and dotted all over our hills and prairies—then will Western Missouri fill the high place in fruit production which she is destined to occupy at no very distant day. The experimental work has been done, and while a great many failures have been made, still orcharding in Western Missouri is a grand success. And what has caused the failures? Simply the same things which would have caused failure in any other business: Lack of knowledge on the part of the planters and cultivators of the orchard. One lacked knowledge of the proper varieties to plant, and planted largely of McAfee's Nonesuch; another planted ninety-nine per cent Jannett, and then planted the other Jannett. Nearly all of us planted Yellow Belle, Rambo, Nonsuch, Lawver and a host of others that have proved unprofitable to the grower commercially, while a great many of them find a proper and useful place in the family orchard; but I have yet the first orchard to see where a proper selection of varieties has been made, and good trees planted on suitable soil, and then properly cultivated and cared for, that they did not prove profitable to the owner. Now, what are the elements of success in orcharding? The first thing to be considered is the site, and while I should prefer a northern exposure, I do not regard it as at all essential; neither do I regard the character of the surface soil of as much importance as the subsoil. Any soil which has an open, porous subsoil, in which the roots can penetrate deeply and freely, and not be compelled to stand in stagnant water in a wet time, and be dried up in a dry season, can be made a good one for the orchard, though a soil sufficiently sandy to dry quickly and naturally, rich enough to give a good growth of wood, is desirable. A close, hard-pan subsoil near the surface is the most undesirable of all, and I would not advise the planting of trees for profit on such a soil; but if nothing better is to be had, a family orchard may be grown on such a soil by extra care.

After the site is selected, the variety or varieties to plant is the question. Some say plant Ben Davis first, last and all the time, but we cannot agree with them. While the writer is a firm friend of the Ben Davis, he does not believe in the one-variety theory any more than in the other extreme of too many varieties, nor

would I exclude the summer and fall apples from the list. Were I planting a commercial orchard in Western Missouri, I should plant Lowell, Maiden Blush, Grimes' Golden, Jonathan, Ben Davis and Willow Twig, and no more, though there are others that in some situations are profitable, and which should not be neglected in the family orchard. Among these will be found Huntsman, which in some situations is fine, while in others it is worthless. Minkler is generally profitable, and may come to the front as a commercial apple. Missouri Pippin in some locations, and while the tree is young, is fine but not in every respect desirable. White Winter Pippin is another that does well in some places, but fails in others. Some of the newer favorites may yet supersede the old, but their claim to public favor is yet to be established.

Next in order comes the selection of the trees. Get them of a good nursery, the nearer home the better. Plant them properly. Protect them from rabbits, mice and stock. Give them good, fair cultivation, and keep on at it. Don't quit after the first few years. Prune moderately. Fertilize the soil if it needs it, and you will reap your reward in abundant harvests of fine fruit. Spraying the trees with arsenical poisons may be necessary to keep down insect pests, but can be done cheaply and is said to be effective. Our own experiments have not been sufficient to determine its utility; except as to leaf-eating insects, there can be no doubt about the matter with them. There is one point the fruit-grower must keep in mind: constant care and unremitting attention is the price of fine fruit. What may reasonably be expected from an acre of bearing orchard? is asked by one. This is a question hard to answer, but brings to my mind one small orchard of less than five acres of Ben Davis, Willow Twig, Winesap, Grimes' Golden and Dominie, planted twelve years ago. We bought the shipping apples and received them in the piles in the orchard as they were picked from the tree, and paid the owner one thousand and eighty-nine dollars for the shipping apples. What he got for the culls I do not know, but probably enough to pay all his expenses. Remove the orchard, and the farm is not worth to-day what we paid him for the fruit this year. Of course this is a long way above what may be expected as an average; but divide it by four, and an orchard of forty acres will pay a net revenue of over two thousand dollars, or more than twice the average value of the land. Now, I do not pretend to say that all orchards pay this kind of profits, but I do say that where the varieties named (and even others not so generally productive) have been planted on suitable soil, given good care and cultivation, properly pruned and fertilized, they have proved universally profitable. It is the uncared-for orchards and those planted with unprofitable varieties that bring orcharding into disrepute. The writer knows how it is himself. I planted without knowlydge, and oh, the dead-heads, they have been a source of weariness and vexation, and I am now transferring a great many of them to the wood-pile and brush-heap, and will replace them with the varieties named. Had I done so several years ago, it would have saved me vexation and loss. In conclusion, will say that I have confined my paper to the apple, and will leave the other orchard fruits to other papers and more able writers. And if anything I have written shall prove an aid to the fruit-growers of Missouri, I am more than repaid for writing it.

DISCUSSION.

L. A. Goodman—You need to study the requirements of your market, as well as your soil and climate. This was called to my attention by the orchardists of Southern Illinois. They make money out of

the Winesap gathered early and shipped north before other apples are in the market.

Mr. Murray—I consider that one of the best papers we have heard. The Jonathan, by picking early, September 15, can be kept through the winter. Samples sent to Montana came back the next May in perfect condition. Let us profit by experience. The young planter need not make the mistakes we older planters made. The young can learn from the older. They should plant the standard kinds, such as Ben Davis, Jonathan, etc.

Mr. Faith—If I understood Mr. Speer, he said that trees would not grow upon low ground. There were no more perfect apples in Vernon county than upon ten acres of low ground in my orchard. I planted upon little mounds.

Mr. Armstrong—There was no scientific nonsense about Mr. Speer's paper. I would like to ask if trees can be profitably planted in an old orchard?

Mr. H. B. Francis—I have planted new trees in an old orchard; seven trees in one place in eight years.

Mr. Speer—I should prefer new soil by all means. I consider it only a make-shift to replant an old orchard.

Mr. Goodman—I have had some experience in that line. I should remove the old stump and the soil in the fall, fill up with manure and soil from another place, and plant in the spring.

Sam. Miller—I have planted new trees right where the old trees stood, by the side of the old stump, with success. The old trees had not died; they were cut down. When an old tree dies it has exhausted the soil.

J. G. Kinder—If I had thrifty trees of unprofitable kinds I would top-graft them. I call for experience in top-grafting.

Sam. Miller—I graft about one-half of the tree one year and the other part the next year. I pinch the sprouts during the summer, and don't remove them entirely.

Mr. Murray—In a small orchard top-grafting will do, but for commercial purposes it is time lost. It is too expensive. It is seldom fully successful.

J. N. Menifee—My experience is that blight almost invariably ruins top-grafted trees.

L. T. Kirk—I don't know whether new members can talk here or not, but I will say that I never knew top-grafted trees to live very long. The better way is to dig it up.

Mr. Hopkins—A top-grafted tree would be as useful as a cork leg to a healthy man.

Sam. Miller—Some top-grafted trees make as sound trees as I ever saw.

A. Ambrose—Perhaps most of those who condemn top-grafting are nurserymen, who have new trees for you to plant in the places of the unprofitable ones.

Chas. Patterson—I dig a large hole, taking out as many of the old roots as possible. My replanted trees did well in cultivated ground.

Mr. Durand—It does not pay to replant an orchard after the trees are six or seven years old. Plant new orchards on new land.

J. C. Evans—Some of us have no other ground.

Jacob Faith—My observation fully agrees with Mr. Durand's.

A. Ambrose—I do not suppose that anyone of large experience would advise planting any other than new trees. Top-grafting might be done successfully for a family orchard.

Sam. Miller—If you graft a whole tree as large as a stove-pipe you will have a dead tree. Graft only half of the tree and leave some of the suckers at first; remove them gradually. Never graft branches larger than one inch in diameter.

J. C. Evans—If intelligently done on trees not too large, top-grafting will be successful if the cion and stock are congenial. If not it will be a failure.

C. M. Stark—We find that top-budding is more successful than top-grafting for large trees.

ORCHARD LOCATION.

J. F. Stewart—I am not qualified to write a paper upon this subject, having had only a little experience in planting trees. I advise to select dry locations, sloping to the east or northeast, but I have seen good orchards upon almost all slopes.

C. M. Stark—As to late frosts and orchard locations, the main point is to watch out for air drainage. The cold air or frost drains off in the same way that water does. Lowlands or valleys are all right, if there be yet lower valleys affording unobstructed drainage for the cold air. However, three or four days of cold, cloudy weather, with drizzling rains and cold northeast winds during blossoming season, or even until the fruit be as large as buckshot, will be as fatal as a killing frost. The small apples turn yellow and drop off; hence, orchards protected on the northeast have often borne when others have failed.

ORCHARDS FOR LOW LANDS.

C. T. MALLINCKRODT.

[Paper will be printed in another part of the report.]

L. A. Goodman—I gave these subjects to bring out the point that it is not always best to avoid low lands. We need more information upon this subject. What varieties do best upon low ground, what upon high?

Mr. Scott—Along the Missouri river, on the loess formation, whether high or low, fruit can be planted successfully. The river protects from frost. I think a northeast slope is better; the southwest is too hot and dry. Wind-breaks should be upon the south and west, not on the east. Here high grounds are in every way better. Sometimes peaches can be grown upon our high prairie when you cannot raise one upon low points.

N. F. Murray—In Northwest Missouri our experience is about this: It was my conviction that the sandy lands of the Missouri river would grow apple orchards. In a dry season the best places are the Missouri river bottoms. Gumbo soil will not do unless it is underlaid with sand. If you have the tree topped as it ought to be, it don't make any difference where the wind comes from or how long it blows. If your land slopes south, make a low top and the sun will not burn your tree. As to varieties, the Jonathan will ripen earlier upon south slopes. If you plant upon wet land, raise a mound or underdrain your land; you can't grow orchards upon wet land; it would be like a man with his feet in cold water. The top of a hill is sometimes flat and wet, and the worst of places, lowlands are not always wet, uplands are not always dry.

I advise to plant trees twenty-five feet apart. I have made more money at twenty-five feet than at thirty. Some want their trees forty feet apart, so they can cultivate between them. I prefer to have my orchard in one place and my cultivating land in another. I want to get the most I can from my orchard with the least labor. In general, where you can grow a good crop of corn you can grow good apples. I don't think there is a great difference in a series of years between the top and the sides of a hill.

Mr. Maxwell—I have an orchard planted fifteen years, two miles from the Missouri river. Some of it slopes east, some northeast. Winesap on the east and the northeast, on the high land, have borne but little. In the lower part, where they cross the hollow, I have had crop after crop, making twenty dollars there to one on top of the ridge.

Willow Twigs have done well on the lower ground. On the west slope I have one hundred Ben Davis. They have done better than on top of the ridge. I would prefer a northern slope to any other if I had a choice.

Mr. Walters—I don't think there is any question that the loess is the true soil for an orchard. We have no loess in this part of the State. The loess was deposited soon after the glacial period. The Missouri river was practically the southern limit of the ice. The cave limestone is the land for the fruit-grower in Southwest Missouri. The ice stood many hundred feet above the present surface of the soil, and, moving to the south, it scratched the bluffs and left a large deposit. Latitude 40° is the southern limit of the ice in Kansas and 39° in Missouri. Farther east it goes even further south. Some call the Missouri river bluff formation clay; but it is not clay. It forms the basis of a soil especially favorable to tree-growing. It is porous and has the proper chemical elements in the right proportion.

My observation in regard to temperature is that large bodies of water modify the effects of cold winds that blow over them. The effects of frost are not so marked in the vicinity of such bodies of water.

C. W. Murtfeldt—As a proof of the position the gentleman has taken, I instance the success of the Alton Illinois orchards, where the Missouri and the Mississippi rivers come together. On the east side of Lake Michigan they can produce peaches almost every year so far as the frost is concerned; on the west side not at all, not even the trees.

VARIETIES OF APPLES.

BY F. LIONBERGER.

HUGO, MONTGOMERY CO., MO., Dec. 1, 1890.

To the President and members of the Missouri State Horticultural Society:

Although the fruit men of our State in general have made a good thing out of their apples this season, I am sorry to have to state that such was not the case in this county (Montgomery). However, what few apples that were raised brought a good price. We had a number of severe frosts last spring, which had killed a great deal of the fruit. Of what was left, a large portion was made unsalable on account of the coddling moth, as well as the fungi *fusicladium dendriticum*, generally known as scab. The continued cold, moist weather during spring was very favorable for the germination of the spores of the above-named fungi. I have noticed apples not larger than a pea to be covered with the small dots which mark the first appearance of the fungus, which soon spread to such an extent as to check the growth of the fruit. Missouri Pippin, Lawver, Red June, Sweet June and a few others never ripened any specimens that were even fit for cider. I intend to grub out all the trees I have of the above sorts or graft them over to something better.

As I was billed on the program for a paper on varieties, I will give my experience with a few sorts I have been fruiting. A number of new and rare varieties, of which I have only a tree or two, and in most cases not more than a few top grafts,

were so injured by the late frosts last spring that I could not form anything of a correct opinion on remaining specimens. The first apples that got ripe in my orchard were Early Harvest; fruit poor, knotty, only half grown and full of scab (which is more or less the case with them every year); trees short-lived. The next were about one week later, Yellow Transp., from top grafts upon Early Harvest; fruit smooth, perfect and free of scab. This last variety last year ripened nearly a week before Early Harvest, but the latter were full grown. A few top grafts of the Rist, set upon Lawver, had ripened their fruit several days ahead of Yellow Transp. The fruit was of fair size and form, but as the specimens had lain upon the ground, and were partly eaten by chickens, I could not form much of an opinion as to its value. This sort must not be confounded with Riest. This is a later apple, which originated with S. S. Riest of Lancaster, Pa., while the one I have originated with C. Rist of near Table Rock, Neb., where the late S. Barnard first propagated it, but to what extent I do not know.

Red June was the next to come in; a full crop of deformed, scabby productions, which the hogs would not eat. This variety is absolutely worthless here, unless it is for a breeding place for scab. Sweet June was but little better, while R. Astrachan, Oldenberg and Benoni bore fine and perfect fruit. The trees seem to be hardy and fine growers, and I think are among the best to plant here for early fruit. All Summer is also very good, but does not come up with the last named. Maiden's Blush: this I find to be but little affected by scab, and is certainly one of the best and most profitable early fall apples. Chenango is a very fine apple, but a tree or two is enough in any orchard. Lucy Pew, a very fine apple for evaporating; very productive, but the trees are short-lived. Pa. Redstreak and Rambo I find very fine for home use. The former, however, is quite subject to scab, while the trees of the latter do not seem to be long-lived. Grimes I find to be a fine apple that sells well, free of scab, but not productive enough. N. Spy I find to be worthless with me. Twenty-ounce, Gloria Mundi and Lady apple, I would only plant a tree of each for exhibition purposes, not otherwise. White Pippin rots on the tree; not desirable. Yellow Bell, unproductive. Smiley, very fine; one of the best for home use and local market; a fine upright grower, but a little subject to scab. Holland Pippin, tolerable. Stark I find to be a fine large apple, free of scab; it sells well; the trees are fine stocky growers, with very large leaves. Prior's Red, Vandevere and Jenets I find to be very good winter apples for home use. They all seem to do well here; of no special value for market. Withe: of this I only have one tree, and am very favorably impressed with the fruit; fine, large, and undoubtedly a good keeper. The trees are spreading, bloom late and have rather peculiar foliage. Baldwin is a fine fall apple here; very productive and free from scab; one of the best. Roman Beauty, unproductive; trees short-lived; I expect to grub out every tree I got of them; I had planted it quite extensively for market. Mo. Pippin and Lawver still worse; of no value whatever, except as a breeding place for scab. Huntsman is indeed a fine apple; sells well, but is nothing to compare with B. Davis for market; subject to scab to a great extent. Clayton, I have only fruited a few specimens; they were fine and free of scab; tree a rather upright grower; it seems to do well here, but must test it further before forming an opinion.

Ben Davis—This apple will be very largely planted here. Quite a number of our members are setting out nothing else. There will also be a great deal of top-grafting done this spring by our members, and most of the worthless scab-breeders will be transformed to B. Davis. I do not think that any other variety will bring

in as much money to the grower as this will. Jonathan, I think, comes next. Willow Twig, Winesap and Smith's Cider are also good, but neither of them will come up to the Ben. Newton Pippin is also fine and sells well; however, it will never be as profitable as some of the others. Those are about all the varieties that I have fruited so far, but think that I can report on about fifty more sorts by another year. I expect that some of our fruit-growers will think that I had no sense in setting out such a mixed lot of apples. I admit that I did not have much; however, I had a desire to find out which would do the best on our soil, and for that purpose have set out a plot of just a tree or two of a variety—in some cases only a few to grafts. On one tree alone I have over thirty different varieties grafted, all numbered and recorded. In the main part of my orchard (about 1,000 trees) I have nothing but Ben Davis and Jonathan, with a few Willow Twig. A word more about that *apple scab*. I find it to be a very serious drawback in apple-culture. Happily, our leading market apples are not very subject to it, unless, indeed, the weather is very favorable for the formation of the spores. A few years ago I sprayed a few trees to check the fungi, under the instruction of Prof. Galloway. However, the formula used happened to be too strong; but so many experiments have been carried on since that I have no doubt but what the formula of the chemicals used has been properly modified. I therefore think that by spraying, the fungus could be held in check. However, as the remedies have to be of a preventive and not of a curative nature, much will always depend upon having the spraying done at the proper time. For that reason I think that, unless a man is a close observer, who will learn by experience as he goes, the chances for success will be small. But why do we plant such varieties, that are subject to the disease, at all? Why not discard them out of our orchards? If we discard those scab-breeding varieties, there will certainly be less spores left in the orchard to reproduce the scab the spring following.

SPRAYING OF FRUITS.

PROF. JOHN W. CLARK, COLUMBIA.

As the cultivation of trees, fruits and flowers becomes more general in this and other States, the necessity of a more thorough knowledge of the nature, habits, diseases and insect enemies of each tree, flower and fruit becomes more apparent, and there is not a successful horticulturist in the country who does not admit that the time is past when trees, flowers and fruits can be left to care for themselves, and give profitable returns.

The ravages of insects (as a country becomes more thickly settled, and the native growth of vegetation gives place to cultivated crops) become more marked and injurious, for, deprived of their accustomed food, they seek other plants on which to subsist, and in many cases multiply more rapidly on these new plants than on their original food; so in a short time an insect scarcely noticed becomes a scourge to the land. The Colorado potato beetle (*Doryphora 10-lineata*) is a marked example of such an insect.

Insects from other sections and lands have been imported and added to those already preying on our crops, until their numbers have increased to such an extent that we may almost feel content if anything is left. Every tree, flower and fruit has its insect enemies. Saunders in his "Insects injurious to fruits" gives eighty-two different insects that prey on the apple. But the insect pest is not the only drawback in the way of successful fruit culture; in addition to it comes the long line of diseases, such as rusts, smuts, blights and mildews, which have caused a loss of millions of dollars annually in this and other States. It has only been a

short time since the real nature of many of our most destructive plant diseases have been understood, and even now we have a very limited knowledge of many of the diseases affecting our fruits, and before which we are almost powerless in our efforts to stop their ravages.

Within the last few years greater advancement has been made in finding out the nature and cause of many plant diseases and how to treat them than has been made before—due to the systematic manner in which the investigations are now carried on.

The spraying of trees and plants for the destruction of insects is of recent date. Paris green was first recommended in the report of the Department of Agriculture in 1871, for the Colorado potato beetle. In 1872 it was first suggested for the codling moth, by Dr. Le Baron, of Illinois. In 1879 a Mr. Woodward of Weston, N. Y., in a paper stated "that early in the season he sprayed apple trees with Paris green to destroy the canker worm, and found that the fruit grown on these trees was less injured by the codling moth than on trees not sprayed." Since that date experiments with arsenical solutions have been carried on in different parts of the country, and by different individuals, until their use is acknowledged to be the cheapest and most effective remedy for the canker worm, codling moth and tent caterpillar. The proper time to spray for the canker worm and tent caterpillar is when the effect of their ravages is first discovered, which should be before any harm is done to the tree. But with the codling moth it is different: the injury is not seen at once. The moth lays its eggs in the blossom or blossom end of the fruit. The blossom and fruit while small stand erect on the stem, with the calix end uppermost, which forms a kind of cup in which the egg is laid.

In about a week the egg hatches. The little worm does not leave the egg at once, but reaches out its head and part of its body, bites into the fruit, but does not leave the egg until it has eaten far enough into the fruit to conceal its whole body. This is the time to destroy the worm. As soon as the petals or leaves of the flower fall the trees should be sprayed.

They should be sprayed at least three times before the fruit has become of sufficient weight to bend the stem and lose its upright position, in order that the poison may be held in the cup formed by the calyx. After the fruit has lost its upright position, spraying will do little good. There is a second brood of worms hatched about July; spraying for these will not be as effective as it is early in the season, and should not be practiced with the earlier varieties of apples, and it is doubtful if the results obtained will pay the cost, even with the later varieties, if the work has been thoroughly done early in the season.

The past season four trees were selected in the orchard on the Experiment station grounds, two of which were sprayed twice, May 8th and May 16th, one with Paris green, one pound to one hundred and sixty gallons of water, the other with London purple in the same proportion. The remaining two trees were not sprayed.

The tree sprayed with London purple gave thirty-one per cent of wormy fruit, that sprayed with Paris green twenty-five per cent, while the average of the two trees not sprayed was sixty-two and one half per cent of wormy fruit, or a difference of thirty-two and one-half per cent in favor of London purple, and thirty-eight and one-half per cent in favor of Paris green.

The results obtained by this experiment correspond very closely with those obtained at other Experiment stations.

The remaining trees in the orchard were sprayed part with Paris green and part with London purple. Where the trees were sprayed with Paris green no

injury was done to the foliage, but where London purple was used the foliage was somewhat injured.

In each case the proportions were one pound to one hundred and sixty gallons of water.

Spraying for the curculio (*Conotrachelus nenuphar*) is a question of considerable interest just at the present time, and has been discussed extensively since the paper of a Mr. G. M. Smith was presented to the Michigan Horticultural society in 1869, recommending the use of Paris green for the plum curculio.

A prominent entomologist a year later, referring to the paper, says: Even if the uniform application of such a poisonous drug as Paris green on large trees were practicable, it would never succeed in killing one curculio in a hundred." In a letter written by Prof. Riley, March 8, 1889, and published in the last report of the Massachusetts Horticultural society, he says: "There can be no question as to the advantage of spraying plum trees with some one of the arsenical mixtures. The adult beetle feeds somewhat in the early spring and in mid-summer, and spraying the trees soon after the blossoms fall will kill a certain proportion of them"

Prof. Cook, of Michigan, says, in a bulletin just issued, "that, after spraying for the plum curculio for about ten years, I never seemed to have met with any success until 1888, when I thought I received signal benefit from spraying with arsenites."

Encouraged by this, he commenced a series of thorough experiments to test their value for the plum curculio, and gives the following as the results of his experiments: "That, while I would not say that spraying will do no good, I feel certain that it will never prove satisfactory and reliable."

Dr. C. M. Weed, of the Ohio Experiment station, reports that he sprayed on a large scale the past season, and has had remarkably good results. Other and similar examples might be given, but those already presented will show that the value of arsenites for the plum curculio is not fully settled and needs further trial.

The effect of the various arsenical solutions on the fruit and foliage of trees varies with the material used and attendant circumstances. Of the three forms of arsenites generally used, when applied with equal strength, white arsenic (arsenious acid) does the greatest injury, London purple next and Paris green the least.

The injury done to the foliage is due to the soluble arsenic contained in the substance used. In white arsenic the arsenic is readily soluble in water; London purple partially soluble, while in Paris green it is practically insoluble.

The addition of flour, milk, soap, etc., to make the poison stick to the leaves, seems to increase the amount of the damage done.

When a dashing rain follows the spraying of the trees, it does not increase the injury, but where a light drizzling rain follows, the injury is increased. In the first instance the arsenic dissolved is washed from the foliage at once, but in the second case it has time to penetrate the tissues of the leaves, causing in many cases considerable injury. Heavy dews have a similar effect.

Young foliage is not as easily injured as it is when it gets older, on account of the waxy coating which it has that prevents the arsenic penetrating the leaves.

The strength of the solution of either Paris green or London purple (which is safe to use) varies with different fruits.

The cherry is the least injured, after which come the apple, pear, plum and peach. The last should never be sprayed with either white arsenic or London purple, on account of the soluble arsenic they contain, which is absorbed by the peach. Although solutions as strong as one pound of Paris green or London purple to fifty gallons of water have been used without injury to the foliage, yet, from the results

of experiments carried on in different sections and by different individuals under a variety of circumstances, one pound of either Paris green or London purple to two hundred gallons of water (especially London purple) seems to be as strong as it is safe to use; and Paris green not stronger than one pound to three hundred or three hundred and fifty gallons of water for the peach. If lime is added to the solution, the danger of injury to the foliage is lessened.

One great reason for the difference in the results obtained from the use of Paris green or London purple is probably due to the difference in the composition of the article used. Paris green unadulterated should contain about fifty per cent of arsenic and London purple at least forty per cent. These two compounds are often much adulterated when put on the market—in some cases to such an extent that no good is derived from their use, and the person using them concludes that spraying for insects is useless.

This State should enact laws compelling manufacturers to label each and every package offered for sale within its borders, with the per cent of arsenic guaranteed; this would not only protect the purchaser, but also increase its sale. The danger from the use of Paris green, if sufficient care is taken in handling it, is not as great as many supposed when its use was first advocated. Experiments have demonstrated that there is little or no danger of injury to hogs or sheep running in the orchard from the use of either Paris green or London purple, and that their removal is unnecessary.

Professor Kedzie of Michigan, says: "Paris green that has been four months in the soil no longer remains as such, but has passed into some less soluble state, and is unaffected by the ordinary solvents of the soil. The power of the soil to hold arsenious acid and arsenites in insoluble form will prevent water from becoming poisoned, unless the green is used in excess of any requirements as an insecticide."

Turning now to some of the diseases affecting plants and fruits, we find that many of them are caused by a class of minute parasitic plants called fungi, commonly designated as rusts, smuts, blights and mildews, whose appearance was once regarded by the superstitious as a direct visitation of Providence before which man was powerless, but are now recognized as the direct effects of natural causes capable of investigation and treatment. In speaking of plants, in a general way, we understand them as taking their food from the earth and air and preparing it for their own use and that of man and beast, which they do through the action of the green coloring material contained in the leaf called chlorophy, without the presence of which animal and vegetable life upon our globe would soon cease to exist. The class of plants known as fungi are not supplied with the green coloring matter or chlorophyl and are, therefore, incapable of taking their food from the crude materials of the earth and air, but must obtain it from other plants which have this power. These minute plants are very simple in their structure; some are composed of only a single cell, while others are formed by a combination of cells. Fungi do not flower or develop seed, but produce what are called spores, which take the place of seeds, and by which they are propagated.

These spores are very small and are carried for long distances in the air, in this way spreading the disease from one locality to another. The spores lodge upon plants and their fruits, where they grow if the conditions under which they are placed are favorable. Some kinds of fungi affect several species of plants, while others live only on one. The plant or fruit upon which a parasite lives is called its host or feeder, and attacks it by means of its spores or by the germ tubes emitted by the spores. The act of penetration is accomplished in two ways: the

germ tube or branch of the mycelium either grows into the interior through the natural openings in the leaf (the stamata), or through the firm membrane covering the leaf or fruit. Heat and moisture are the conditions necessary for the germination of the spores of fungi the same as for germination of seeds.

Spores deprived of moisture cannot germinate, which explains why mildews are less prevalent in dry weather (unless there are heavy dews) than when it is warm and moist. Heavy fogs tend to increase the amount of injury done. Fogs, according to the now accepted theory, are caused by moisture collecting around minute particles of dust floating in the air.

The spores of various forms of fungi, continually floating in the air, come in contact with the particles of dust and are deposited with them; the moisture surrounding these spores causes them to germinate and grow if the plant or fruit upon which they lodge is suited to them. The apple scab is caused by a minute parisitic plant (*Susicladium Dendriticum*) whose spores are carried by the air from tree to tree. The scab works on young twigs, leaves and fruit, and propagates itself most rapidly during the moist weather of spring, early summer, and again in autumn. During the hot weather of summer the damage is usually less, yet at no time is the apple free from its ravages. The greatest loss from the scab occurs when the fruit is attacked early in the season when in flower or while the fruit is small. When this occurs the fruit generally fails to develop and drops from the trees. The orchards of western New York presented a marked example of such a case the past season. The trees blossomed full, but dropped their fruit before it had attained any considerable size, which upon examination was found to be due to the attacks of the scab. When the fruit is attacked while small, and does not drop, it is apt to grow knurly.

The mycelium of the fungus does not penetrate into the flesh, but works in the skin, epidermis or cuticle, in many cases destroying the epidermis, which turns brown and dies. A new epidermis is formed under the one destroyed, which in turn is also destroyed, causing the part to become thick and corky. The fruit continuing to grow, while the diseased part cannot, causes a rupture of the skin, which, as the fruit grows, opens and becomes deeper, producing what is known as cracked fruit. If the scab does not attack the fruit until late in the season, the mycelium does not penetrate the epidermis, but grows upon the outside and shows itself by covering the skin to a greater or less extent with a cloudy coating, which makes the fruit present a bad appearance when placed on the market, and affects its value.

Various mixtures have been experimented with to test their value in checking the scab. Of the several compounds used, that known as the Bordeaux mixture has in nearly every instance given the best results—the fruit, when it was used, being larger, more perfect in shape, and less covered with the scab than fruit grown on trees not sprayed. To obtain the best results the trees should be sprayed thoroughly with the Bordeaux mixture before the leaves start, doubling the quantity of sulphate of copper.

While in flower the trees should be sprayed with the simple mixture. After the petals of the flowers fall, the Bordeaux mixture may be mixed with either Paris green or London purple when spraying for insects.

The past spring two rows of Jenitons were selected in the station orchard. One was sprayed when the fruit was but one-third of an inch in diameter with the Bordeaux mixture mixed with Paris green; the other row was sprayed with Paris green. The fruit on the row not sprayed with the copper mixture was small, cracked and spotted, while that on the row sprayed with it was much larger and showed less cracked and scabby fruit. The leaves on the trees sprayed with the

mixture were large, of good color and remained longer on the trees; while on the trees in the other row the leaves were narrow, had a light sickly color, and the trees during the summer looked as if about half of the foliage had fallen.

During the whole season the contrast was very marked in favor of the trees sprayed with the copper mixture.

The vineyard, covering about two acres of land, was sprayed regularly with the Bordeaux mixture last year and during the past season. The crop of last year was considerably injured by the rot, while this season fully 90 per cent of the fruit was saved.

To obtain the best results, the spraying should be done on an extended scale and for a number of years. If only a limited area or single tree is sprayed the benefit may not be noticed, although a large number of insects or spores of fungi may have been destroyed, as these may be more than balanced by the new supply from neighboring fields and orchards.

But when an orchard of considerable size is sprayed, or where spraying is practiced by a community, the benefit derived from it will be marked, and spraying will be found to be one of the most profitable and necessary operations in the cultivation of fruits.

EXPERIMENT STATION, COLUMBIA, MO.

DISCUSSION.

Mr. Helvern, of Arkansas—What time does the codling moth deposit its eggs?

Mr. Clark—The egg is laid just about the time the blossom falls and for two or three weeks afterward. If you spray before the blossom falls it will poison the bees. Spray after the blossom falls and again in about two weeks. One insect lays about fifty eggs.

Mr. Helvern—In my orchard the eggs were laid before the leaves came out.

Mr. Clark—You are thinking of the canker worm.

Mr. President—What is the experience of those who have sprayed?

Mr. Clark—That a man should spray only one tree might not be much benefit, for the insects come from everywhere. Spraying large orchards and whole neighborhoods will give the best results.

We got only one good crop from the college vineyard. The grapes rotted year after year. It was a regular hot-bed of rot. Last year, after spraying with the Bordeaux mixture, we got some grapes. This season I sprayed regularly and got a better crop than the good crop we got three years after the vineyard was planted. It has to be done systematically and on a large scale to accomplish much good.

The eggs of the first brood of the codling moth are laid in the calyx or blossom end of the apple. They are not covered with a web. The after-crop is laid and eats its way into the fruit. If you spray thoroughly for the codling moth you will kill it surely. Last year one man in New York sprayed five times and had fine fruit. His neighbor's fruit was worthless.

J. W. Sallee—I lived fifteen years in California; they spray there as regularly as they cultivate, but spraying for the codling moth has never been very satisfactory. It kills insects upon the foliage, but the codling moth has almost ruined the business of apple and pear growing. If there has been any successful experience in spraying for the codling moth it would be a great thing for the Californians. Some of the horticulturists of California spend thousands of dollars a year fighting insects.

Mr. Carpenter—I would like to know what kind of pump it requires for two hands to spray one hundred trees in a half day? Don't they have one more brood of the codling moth in California than we have, and might not that make a difference in our favor? They might increase more rapidly there than here.

Mr. Sallee—They use a force pump with two hose; one man at the pump and one to carry the hose. The hose has attached a long piece of gas-pipe for reaching all parts of the tree. If three men spray fifty orange trees in a day, they do well.

Mr. Speer—I found one good paying orchard free from wormy fruit, and the reason the owner gave was that he had washed the trunks of his trees every year with strong soap-suds and carbolic acid. He claimed that the smell of the carbolic acid kept the insects away. Right in the same neighborhood I found insects plentiful. Whether there is anything in his reasoning, I don't know.

Sam. Miller—Is the codling moth a night or day insect?

Mr. Clark—It moves mostly at night.

Sam. Miller—I have raised several crops of plums by smoking with coal tar.

Mr. Wade—My experience in spraying on a small orchard of 150 trees is: I bought a small pump; I have used it for three years; one of my neighbors has borrowed it; we have sold our fruit for one to two dollars a barrel more than our neighbors; we gave thorough cultivation; in an orchard sprayed but not cultivated the fruit was wormy; I think the most good is thorough cultivation and not in the spraying.

Mr. Clark—Mr. Hazeltine did not prune or cultivate his orchard, and the whole soil is full of insects. In plowing your orchard you made your trees grow thrifty, covered and killed many insects.

Mr. Wade—This other neighbor of mine who sold his fruit for a good price did not cultivate.

Mr. Murtfeldt—The treasurer of the Kansas Horticultural society has a large commercial orchard; he spent a good deal of money and much time in spraying his orchard, and when asked what good it had done, said: "None at all." By spraying you are killing your insect

friends as well as your foes. I doubt whether there is one intelligent horticulturist in twelve who knows insect foes from friends. Spraying will kill your birds; you can turn your swine or sheep in your orchard; they will kill may worms.

G. W. Hopkins—There is one thing to which I wish to call attention before we pass: We have something in Greene county that is becoming quite serious; it is called the black or bitter rot; is there any remedy for it?

President Evans—We will ask Prof. Clark about that in a short time.

H. B. Francis—When a young man I saw a trap in a California orchard for the codling moth. I don't believe it can fly; I think we can trap it.

WEDNESDAY—2 P. M.

The Henry county society invited the State society to visit the artesian well in a body.

It was moved and carried that the society visit the well at 8 a. m. Thursday.

An invitation to visit Baird college was accepted, and the time set at 4:15 p. m. Wednesday.

Mr. Simpson of Mammoth Springs, Ark., exhibited samples of trees from his orchard killed by the woolly aphis.

Mr. Simpson—I have been in business twenty-one years. I left the farm twenty-one years before. When I had been away from it that long I thought I could start in again just where I had left off. I bought some land, had it put in good condition and had a thousand trees set out. I got the trees in Howell county, Mo, as near home as I could; not more than thirty miles from where I planted them. I thought I was safe in planting them. I want to show you some of my trees. I had them cultivated and the ground plowed three times this summer, but I found my trees were dying, and the leaves falling off. I pulled up one and found the roots wrong. The neighbors said the trees were diseased. I have taken up about 120 of the trees and have not found one healthy. Here are samples of them: (The trees had knotty roots, and were miserable looking specimens in every way.) Do I run any risk in planting new, sound trees in the same ground?

Mr. Francis—I had some trees three years old affected with the aphis. I took a barrel, filled it half full of water, and added a pint of carbolic acid. I washed the trees in this water, set them out and none of them died.

Mr. Helvern—In June I told Mr. Simpson I thought it would be God's blessing for all of his trees to die. They were all diseased and some of them were seedlings. Those trees will never make him an orchard. I noticed but one tree that appeared all right. In fact I don't think there is a single tree in the orchard that I would leave standing. This fall he asked me to go through the orchard. I marked 700 trees as bad, and left many that I thought were not good. My opinion was that he would have to dig up every tree and burn them up.

Mr. Simpson—Is there any method of treating these trees?

Mr. Francis—I have trees that were once infected with the aphis so that at one time I was very uneasy. I plowed my ground thoroughly and put ashes around the trees. That was some seven years ago. They have borne good crops since. I wash the roots thoroughly before I plant.

Mr. Durand—The gentleman asked what he could do with his trees. If I had the orchard I would dig up every tree.

Dr. Bailey, of New Mexico—I had some trees similarly affected two years ago. I put one ounce of carbolic acid into one gallon of water and poured it around the collar of the tree. I don't see anything the matter with them now. The trees were not as bad as these shown by Mr. Simpson.

Mr. Evans—It is evident that Mr. Simpson's trees were infected when planted, and the disease has grown on them.

Mr. Helvern—The trees are, many of them, seedlings, old, rough, scrubby stock.

Mr. Faith—If the trees were mine I would dig up every one of them. I would take some of the best of them and plant them in nursery rows as an experiment.

Mr. Murray—The right thing would be to root every one of them out of the ground. I would not be deterred from planting other trees in the same ground, even in the same spaces. When trees are isolated it is not as dangerous as small-pox among people. I would plow up the ground this fall.

Mr. Carpenter—It seems highly probable that the gentleman's trees were enervated when he planted them. I would take them out entirely.

Mr. Wade—I fear that he might fail to get rid of the aphis. Timber land, fresh cleared, seems to be highly favorable to this insect.

My son-in-law planted two acres of timber land four years ago, and his trees continue to die.

Mr. Turner—I think they should be eradicated, the ground plowed, and make a new trial. It is well that the nurserymen look well for the woolly aphis. I want to know if the aphis which makes a spot upon the body of the tree is the same?

Several members said it was the same thing.

C. M. Stark—I would take the dirt away from the roots of the tree and give it a bath of boiling hot water.

L. A. Goodman—The first thousand trees I planted took three times a thousand before I got a stand of thrifty trees. Don't be discouraged by a little back-set. Those trees were diseased. Take every tree out; plow up the ground this fall; leave it rough; mark off newly and set twenty-five feet apart.

Mr. Simpson—Would it be safe to plant trees in the same places next spring?

Mr. Goodman—I think so. Pay no attention to the old spaces. I replanted with good trees on the same ground.

Sam Miller—If we had such land as the Arkansas land, I would not be afraid to plant in the same spaces.

President Evans—Those trees were nearly dead when he planted them.

Mr. Nelson—I think Mr. Wade left a wrong impression in regard to planting on new land. My plan is to stake the ground before plowing it, and burn the brush where the tree is to stand.

Mr. Simpson—I thank you for your information, and think that I can profit by it.

HISTORY OF THE APPLE.

J. W. TAYLOR, CLINTON.

The origin of the apple is shrouded in obscurity, which can only be removed by the patient study and research of modern horticulturists. The definition of the word apple: 1. The fleshy pome or fruit of a rosaceous tree (*Pyrus Malus*), cultivated in numberless varieties in the temperate zones. 2. Any tree of the genus (*Pyrus*) which has the stalk sunken into the base of the fruit.

The first mention made of the apple is in "Holy Writ," before Christ 1,000 years. Solomon, in speaking of the mutual love of Christ and his church, says: "Stay me with flagons: comfort me with apples." "As the apple tree among the trees of the wood, so is my beloved among the sons." "I sat down under his shadow with great delight, and his fruit was sweet to my taste." * * * "I raised thee up under the apple tree." Profane history by Josephus says: "There was a certain place about fifty furlongs distant from Jerusalem, which is called Etham; very pleasant it is in fine gardens, and abounding in rivulets of water; thither did Solomon use to go out in the morning, sitting on high (in his chariot)." "He made him gardens and orchards, and planted trees in them of all kinds of fruits;

he made him pools of water to water the wood that bringeth forth trees;" and to the finest part whereof he seems to allude, when he compares his spouse to a "garden enclosed," to a "spring shut up," to a "fountain sealed" (Canticles, 4-12), a part of which fountains (according to Mr. Maundrell) are still extant. Solomon also built other cities in order to the enjoyment of pleasures and delicacies in them, such as were naturally of a good temperature of the air, and agreeable for fruits ripe in their proper seasons, and well watered with springs. (Antiquities of the Jews)

Again (in the sacred writings), the lamentations of the prophet Joel, 800 years before Christ: "Be ye ashamed, O ye husbandmen; the vine is dried up and the fig tree languisheth; the pomegranate tree, the palm tree also, and the apple tree, even all the trees of the field are withered, because joy is withered away from the sons of men." Before Christ 484 years the apple is mentioned by Herodotus, also by Theophrastus 287 years before Christ.

The common apple tree (*Pyrus Malus*) is supposed to be a native of the Eastern hemisphere. Europe furnishes only a small number of sweetish-acid fruits. Of these the apple and the pear are of the most importance. The apple tree is a native of the mountain forests of temperate Europe, as also of the Caucasus. Apples were raised in the gardens of the Phenicians, but the Romans first occupied themselves more closely with the cultivation of it, and produced numerous varieties, among which we may recognize, in part, the kinds of apples of the present day.

Some of the kinds were introduced by Appius from Greece 313 years before Christ. Theophrastus knew two kinds; Cato, 234 before Christ, seven; and Pliny (the naturalist), who lived until A. D. 79, knew thirty-six kinds. Palladius, who lived in the sixteenth century, only knew thirty-seven kinds of apples.

The *Pyrus Baccata*, or Siberian crab, is so distinctly marked as to be admitted as a species. It has been improved by culture, and has produced some quite distinct varieties. Pallas, who found it growing wild near Lake Baikal, says it grows only three or four feet high, with a trunk of as many inches in diameter, and yields pear-shaped berries as large as peas. Among the early writers on the subject of pomology we find grafting to improve the wildling to be a very ancient invention. Pliny, the naturalist, certainly deserves our praise for his wonderful and comprehensive industry in all branches of natural history. In regard to grafting which seems to have been well understood in his day, he says, that he had seen near Thulia a tree bearing all manner of fruits, nuts and berries, figs and grapes, pears and pomegranate—no kind of apple or other fruit that was not to be found on this tree.

That the *Epirotica*, from Epirus, were what we call apples, there can be no doubt, as they are described by Pliny as a fruit with a tender skin, that can be easily peeled off; and, besides, he mentions "crabs" and "wildlings" as being smaller, "and for their harsh sourness they have many a foul word and shrewd curse given them."

The cultivated apple, probably, was not very abundant at Rome in Pliny's day, for, he states, "There were some trees in the villas near the city which yielded more profit than a small farm, and which brought about the invention of grafting." "There are apples," continued he, "that have ennobled the countries from which they came; and our best varieties will honor their grafters forever; such as took their names from Matius, Cestius, Manlius and Claudius." Columella, a practical husbandman, who wrote some years before Pliny, describes several ways of grafting, as handed down to him by the ancients. Horticultural pursuits were deemed so honorable among the Romans that many of their distinguished

families derived their surnames from some species of fruit or vegetable which they were celebrated for cultivating. In modern days we have reversed this order and bestowed the surnames of our eminent botanists on the plants themselves. Even the trees supply their quota of names. Who is not aware of Mr. Harper Twelvetree's existence, and cannot see that his ancestor, having made his abode beside some remarkable group of birch, oak or apple trees, has been styled by his neighbors Peter atte Twelvetrees? Hence the French Quatrefages, and more English Crabtree, Plumtree, Rountree, Appletree and Peartree. Dr. Prior remarks that all these names still exist, and entries can be found (in the London directory) to prove that they existed at least six hundred years ago.

Legends respecting the apple are very numerous. As there existed in far western seas the garden of the Hesperides, or the fortunate isles, so we find in the traditions of the British isles similar stories about Avalon. "Of all fruits, the apple seems to have the widest mystical history. The myths concerning it meet us in every age and country. Aphrodite bears it in her hand, as well as Eve. The serpent guards it, the dragon watches it; it is celebrated by Solomon; it is the healing fruit of Arabian tales. But oftener the apple is the tempter. In northern mythology, the Isle of the Blessed, of which we read in Keltic traditions, is the beautiful Avalon, or Isle of Apples,

> "Where falls not hail, or rain, or any snow,
> Nor ever wind blows loudly; but lies,
> Deep-meadowed, happy, fair with orchard lawns
> And bowerly hollows crown'd with summer sea."

Among other adornments of the Paradise which the Polynesian imagination has depicted, we find the tabooed bread-fruit tree and the sacred apple tree. The priests of the olden time are said to have held that the forbidden fruits of these trees were in some manner connected with the trouble and death of the first man and woman, a legend which reminds us of the forbidden fruit of Eden.

Closely connected with this tree is the tree of Life. How far the religious systems of the great nations of antiquity were affected by the record of the Creation and Fall preserved in the opening chapters of Genesis, it is not perhaps possible to determine.

There are certain points of resemblance which are at least remarkable, but which we may assign, if we please, either to independent tradition or to a natural development of the earliest or primeval period. The trees of Life and of Knowledge are at once suggested by the mysterious Sacred tree which appears in the most ancient sculptures and paintings of Egypt and Assyria, and those of the remoter East. Professor Walters claims to have seen copies of paintings made 384 years before Christ, in which the diameter of the apple was only twice the width of the leaf. In the symbolism of these nations, the Sacred tree sometimes figures as the type of the universe, and represents the whole system of created things, but more frequently as a tree of Life, by whose fruit the votaries of the gods are nourished with divine strength, and prepared for the joys of immortality. The contaminating influences of bad manners are set forth by the Dutch and Spanish proverb: "The rotten apple spoils its companion."

The custom of throwing the peel of an apple over the head, and judging whether single blessedness or the married state awaits the person in the future, is very old, and still well known in England. Some read in the shape of the peel, as it falls on the ground, the initial letter of the future sweetheart's name. The German peasantry shoot an apple-pip from the fingers on New Year's night, at the same time uttering a prayer, and watching the direction taken by the seed. The

sweetheart may be looked for from the same direction. In Austria, we are told that on St. Thomas' night an apple is cut in two, and the seeds in each half carefully counted. If they are even, a marriage will soon follow; if one of the seeds should have been cut in two, the course of love will not be smooth. Perhaps, however, this is not to be altogether regretted, if the old adage that "true love never runs smoothly" be true. If two be cut, it indicates coming widowhood. Something similar to this is found in the custom common still among our young people, of counting the seeds of the same fruit, or sticking them on the forehead, to see which will remain longest in position. In some remote German villages it is customary to put an apple into the hand of a child while it lies in its little coffin, that it may have the apple to play with in Paradise, as the people express it. The apple-tree has been regarded in some countries as being endued with the power of producing showers of rain. In Northamptonshire, if flowers flourish out of season, sickness and death are thereby indicated; thus the blooming of an apple-tree after the fruit is ripe, is regarded as a sure omen of death; whence the following couplet:

"A bloom on the tree when the apples are ripe,
Is a sure termination to somebody's life."

Very quaint are some of the names of apples as employed in different localities in Devonshire and elsewhere. A few examples will suffice: There are Stubberds and Quarranders, Quinces and No-pips, Tom-urns and Pig-noses—names drawn from the strange shape, flavor or other peculiarities of the fruit. We meet, too, with apples called Flesh-and-blood, with Leather-hides (spoken of by Shakespeare) and White-heads and Tom-pots, the last being a familiar name in Somerset. There are Sweet-ladens in Sussex, and Five-crowns and Duck's-bills, while Bitter-sweets are common everywhere. Then the Jack-tars and Buff-coats, Bow-bills and Winter Wardens, not to mention such well-known varieties as Sweet Herefords or Ribstone pippins.

In some of the disturbances in Italy, party spirit ran so high in Bergamo (says one writer) that a party meaning was attached to apples, peaches and other fruits. The battle of Hastings is said to have been fought (aet thum harau Apuldrau) "at the hoar apple tree." This, as De Dasent remarks, was evidently some venerable tree, grey with years, and well known as a landmark. From this word, Apuldrau, we get the place-names Appledore, Appledram and Appledurcombe. In Devonshire, the peasantry gather in apples which they intend to store away at the "shrinking of the moon." So long as the moon is increasing, the apples are full, and will not keep. So if the apple is stored "full," it will not keep long; but it begins to fast as soon as the moon begins to wane. That is the argument, although you do not hear it reasoned out, perhaps, in so many words. Another superstition among the same simple folk is to the effect that if the sun should shine on the apple tree on Christmas day, and the day be fine, it is an indication of good crops the ensuing year. On the other hand, a gloomy Christmas day, with no sun, augurs ill. This may perhaps be a proper place for mentioning the old custom of blessing or wassailing the apple trees. This custom has not yet died out; for on the 17th of January of the year 1882, the men and lads of Wivelscombe, in the west of England, went round singing to the apple trees on the various farms as they used to do a century ago. This custom owes its origin to the superstition to which Herrick refers that in the following lines from his Hesperides:

Wassail the trees that they may bear
You many a plum and many a pear;
For more or less fruits they will bring,
As you do give them wassailing.

The toast having been sung, three cheers are given for the tree, and of late years, in the neighborhood of Newton Abbot, guns were fired as well. The custom has a long and interesting history. Some have suggested that as the mistletoe grows largely on the apple tree, this latter came in for a share of the sanctity and reverence to which the oak had laid claim. It is said that the Romans introduced the apple tree into England, and the custom above referred to is observed in honor of Pomona, the goddess of fruit trees. Others find in the custom a connecting link with the German methods of inciting the trees to fruitfulness, while others finally think that the ceremony is connected with the old customs observed still in the Black mountains and elsewhere, and corresponding to the sun worship at the time of the new year. Hogg, in his British Pomology, quoting Owen, says, the ancient Glastonbury was called avallic or avallon, meaning an apple orchard, and from this he infers that the apple was known to the Britons before the advent of the Romans. We are told that in 973 King Edgar, when fatigued with the chase, laid himself down under a wild apple tree, so that it becomes a question whether this plant is not a native of England (as of other parts of Europe), where in many places it is found growing wild and apparently indigenous. The making of cider was introduced into Britain by the Normans, who, it is said, obtained the art from Spain, where it is no longer practiced. This liquor is supposed to have been first known in Africa, from it first being mentioned by the two African fathers, Tertullian and Augustine.

Thornton informs us in his history of Turkey that apples are common in Wallachia, and he cites among the varieties one, the *Domniasca*, "which is perhaps the finest in Europe, both for its size, color and flavor."

The introduction of the common apple tree into the British North American colonies dates back to the early periods of their settlements. The seeds of apples were brought from England at the order of the "Governor and company of the Massachusetts Bay in New England," in 1629.

Apples were cultivated near Plymouth by the Pilgrims soon after their arrival, and some of the original trees were standing there up to within a few years (A. D. 1853). To Massachusetts we are indebted for the famous "Baldwin apple," so much esteemed for its good qualities and long keeping. Orchards were propagated freely from it more than eighty years ago. The first orchard planted in Rhode Island was in 1636 by Rev. William Blackstone. The apple was planted at Hartford, Connecticut, previous to the year 1645. An ancient tree of the "Pearmain" variety is still standing on the Charter Oak place in that city, which was brought from England by George Willis more than 200 years ago. The "Fisher apple" was brought to Portsmouth, New Hampshire, by John Fisher, a merchant from London, in 17—. The original tree is still standing on the public farm of that city, in good bearing condition In 1741 apples were exported from New England to the West Indies in considerable abundance. Prior to that period one hundred hogsheads of cider were made from a single farm. The common apple was grafted on wild crab stocks in Virginia in 1647. The original "Newtown Pippin" tree is stated to have been the spontaneous production of a seed near a swamp in Newtown, Long Island, New York, more than a century and a half ago. After enduring more than 150 years, this tree died in about the year 1805 from excessive cutting and exhaustion. Its scions were in great request by orchardists of the day, and engrafted trees are still to be met with in the neighboring towns, which have stood beyond the memory of those who are now living. A "Codling" tree, sent from England about a century ago, to Benedict Calvert, is now standing in full vigor, near Mt. Airy, Prince George's county, in Maryland. It appears from

"Dodsley's London Register" that a premium of ten pounds was awarded to Thomas Young, of Oyster Bay, in 1768, for the largest nursery of apple trees, the number of trees being 27,123. The quantity of apples exported from 1820 to 1853 amounted to 910,803 barrels, worth $1,552,827. It is said that the apple crop of the United States in a single year has reached the enormous amount of 50,000,000 bushels, and that 1,000,000 of acres are planted with apple trees.

DISCUSSION.

Conrad Hartzell—I am well pleased to say to you a few things. I think our friend from Holt county left a wrong impression. I do not find Mr. Murray's trees as close to the ground as some seem to think. I can get around and under his trees. I raised two orchards in two different states. There is a mistake about planting orchards and making them profitable in seven years and taking them out. The best orchard I know, in Michigan, the trees are forty feet apart. It produces more fruit per acre than any other orchard in the State of Michigan—not per tree, but per acre. That gentleman who did not want to make any mistake must not plant too close. The talk about spraying reminds me that here is another mistake. The problem of keeping insects in subjection is solved, but I cannot make you understand. If I gave it to you, you would not believe it.

Jacob Faith—It appears to me, Mr. President, that we should discuss what are the most profitable varieties.

President Evans—Ben Davis is the answer to that.

C. C. Bell—The gentleman who has just taken his seat (Mr. Hartzell) has a plan for keeping apples. That might be good for the dealer, but not for the producer. I still think that there is nothing like clearing up the market.

Sam. Miller—The horticulturist could keep his own fruit.

Mr. Murray—A neighbor of mine has used Mr. Hartzell's plan of keeping apples for years. I have seen him sell his apples for three dollars per bushel, after I was done selling my Early Harvest and Maiden Blush.

KEEPING OUT BORERS.

Mr. Murray—Screen wire cloth will keep them out. When they are in, cut them out with a knife.

D. A. Robnett—Two years ago last fall, I commenced planting an orchard of one hundred acres. I got them from a nursery that had no borers. I put wire gauze around the trees. My man who looked over 1,500 trees, said he would give five dollars for every borer found in them. If you take up the wire in the fall and loosen it, you will have no trouble.

What month in the year is best to prune apple trees?

Jacob Faith—I have an orchard of 2,300 trees in which I will pay ten dollars for borers found. In another eighteen-year-old a man could get rich at five cents a borer. I make a solution of crude carbolic acid with which I can wash eight hundred trees a day.

S. W. Gilbert—I have used a wash of carbolic acid that was successful with apples but a failure with peaches.

Mr. Robnett—Will not strong alkali injure the trees?

Mr. Goodman—No; the alkali does good.

Mr. Patterson—I have washed my trees for seven years with alkali.

Sam. Miller—Paper will keep out borers. A man told me that a good forkful of manure would keep them out.

Mr. Francis—Thirty-six years' experience proves that corn-stalks tied around the tree will keep them out.

J. G. Kinder—Cut elm stove-wood when the bark will peel; put the bark around the tree; it will protect from both borers and rabbits.

D. A. Robnett—This would be very injurious to trees. I killed some of my trees with tarred paper.

Mr. Walters—I want you to try ants' nests around your trees. A little sweetened water will induce them to come and get the borer. If the ants get too numerous, kill them with burning sulphur. I believe the time will come when the people will care for ants as much as we do for bees now. You can send them almost anywhere.

J. W. Sallee—Will they eat the parasites from the trees?

Mr. Walters—They most certainly will.

BERRIES IN SOUTH MISSOURI.

G. W. HOPKINS, SPRINGFIELD, MO.

The subject assigned me is rather of an indefinite character, and I hardly know what is expected, but will endeavor to touch upon some points that may be of interest. My experience and observation on this question is confined to a very small portion of South Missouri, and I cannot and will not attempt to speak with any degree of certainty, except in the immediate locality in which I reside. I shall begin with the strawberry. After an experience of four years in raising the above fruit in this locality, I am satisfied that, with the proper preparation of the soil and good cultivation, it can be brought up to its highest degree of perfection. I have never seen finer strawberries anywhere than myself and others have grown in the vicinity of Springfield. There seems to be something in the soil which gives to the berries a rich color and glossy appearance, and some climatic influence which makes the berries more firm than the same varieties are found to be further north.

There is no excuse for any one not succeeding in raising a crop of strawberries in South Missouri. The soil should be well prepared, the plants of suitable varieties and well selected, carefully set and thoroughly cultivated during the season, and a crop of berries is almost absolutely certain.

There is but little danger in this locality of strawberries, if properly mulched, as they should be, ever being injured by drouth during the fruiting season.

The rains generally continue up to July and August, though this year it was dry the middle of June, which was too late to materially affect the strawberry crop. I shall say nothing about varieties, as that question will be before you and discussed from another standpoint.

The following varieties are principally grown in this locality: Crescent, Bubach, Cumberland, Windsor Chief and some Mt. Vernon and Gandy. Other new varieties are being tried in a small way, but as yet are not sufficiently tested to know how they will succeed.

The present year witnessed the largest crop of strawberries ever grown in South Missouri, and prices were ruinously low. Many growers were so discouraged that they have given their vines no attention, while others have plowed them up. The present outlook would indicate that the crop next year will not be near so large and the prices much better.

The strawberry is something that is perishable. When it is ripe it must be disposed of immediately.

There are some things which the grower must face, and the sooner the better. We must have better transportation rates, utilize the surplus fruit in canneries, or grow less of it.

RASPBERRIES.

My experience and observation in this locality has convinced me that the raspberry does not succeed so well here as at other points. My information is to the effect that it does better farther south (in Howell county and on the western borders of the state) than here. Whether this is owing to something lacking in the soil, or to high altitude and sudden climatic changes, I am unable to say. My vines for the past two seasons have been affected with some kind of a scab. They present the appearance of having been visited with a severe hail-storm or stung by some insect. Some say it is caused by hot sun in summer, while others attribute it to a sudden cold spell in winter. I do not believe that either is correct, as I found it on my young canes the last of May. I made a careful examination several times, but failed to find an insect at work. Any information on the subject will be thankfully received. The raspberry crop the past season was light and prices good. In fact, the crop was hardly sufficient to supply the local demand in the city of Springfield. The varieties mostly raised are: of Black Caps; Souhegan, Hopkins, Gregg, Mammoth Cluster. Newer varieties are being tried. Of red varieties, the Turner and Shaffer's Colossal are principally grown.

BLACKBERRIES.

Like the strawberry, this fruit seems to be perfectly at home in South Missouri. It grows spontaneously all the way from Springfield to Arkansas. The blackberry has been set quite extensively in Greene county in the last two years.

The price of blackberries is considerably affected by the wild crop. Last year there was an immense crop of wild berries, and prices ruled low. This year the early drouth cut off the wild ones and prices were better.

The principal varieties raised here are Kittatinny, Western Triumph and Snyder. Some are testing the Agawam, Erie and Knox.

I have seen but little rust among the blackberries in this locality during the five years I have lived here. The gooseberry seems to do well in South Missouri, though we seldom see it growing, except in the wild state, or a few bushes in the gardens for home use. And now, in conclusion, I want to caution my brother

fruit-growers against the practice of setting largely of new varieties of berries before they have been properly tested. There seems to have been in the last few years a mania, a perfect craze among nurserymen to propagate and introduce new varieties of berries. The country has been flooded with them, and while some few have been good, the great majority have proved worthless. Buy sparingly, and fully test in your own locality before planting to any extent. If the new is no better or not so good as the old, it is folly to plant it simply because it is new. Nurserymen commit a wrong when they introduce a new berry and recommend it for general planting in all kinds of soil and climate without knowing such to be the case. The history of berry culture in this country shows that among strawberries, only a few varieties have been successfully cultivated in all parts of the United States. The old Wilson's Albany, Charles Downing, Crescent, and later the Bubach No. 5, seem to be the only varieties that have done well in most all parts of the Union. It is highly necessary that new varieties shall be produced to take the place of old ones that are on the decline, but let us be sure they are an improvement before introducing to the public.

DISCUSSION.

J. W. Clark—I thought perhaps it would be well to state which varieties did best at the station this year.

Lady Rusk is very fine indeed. It does not soften when picked. It is a good shipper, but there are a great many double berries.

Haverland, Stayman's No. 1, Crescent, Warfield and Bubach did well. Cloud produced a fine lot of foliage.

Jessie blossoms very early and is injured by late frosts. It is not desirable.

Lady Rusk stands the drouth best of any kind we had.

Capt. Jack did tolerably well.

Gandy is a shy bearer.

Monarch of the West is only fair.

Cumberland is good for home use, but is not a shipping berry.

The Bordeaux mixture checked and prevented the rust.

Bubach will not fertilize itself in every season. It would be a little risky to plant it alone.

Crescent is not well fertilized by the Jessie, which blossoms too early. Capt. Jack is good for this purpose.

President Evans—The Michel is the best fertilizer of any berry I know.

Mr. Clark—Manchester is not profitable. It rusts and the fruit fails to mature well.

Mr. Ambrose—Nurserymen are censured for sending out new kinds which often fail to come up to the expectations of the purchaser, but they are not always to blame. The originator or introducer generally gets the indorsement of prominent horticulturists, so that nurserymen have to get and sell these new varieties to meet the demands of their customers.

BERRIES IN NORTH MISSOURI.

H. SCHNELL.

Mr. President and Members of the Missouri State Horticultural Society:

My name is on the program for a paper on "Berries in North Missouri." As I am not able to speak for North Missouri in general, you will have to be content with a few brief notes on berries here at Glasgow. You all know there is no time to visit fellow fruit-growers during berry-picking time if things are to go right at home. We had the promise of an immense berry crop the past spring, but dry weather set in and the crop was cut short. Red raspberries suffered most; many dried up on the vines. Of strawberries, we had about 3½ acres to fruit; 1 acre bearing third crop, 1 acre second crop and 1 acre first crop, and ½ acre planted the fall previous; from these we gathered 13,000 quarts, leaving a profit of $150 per acre, or 4 cents per quart after paying for picking, boxes, etc. Raspberries—2 acres in Black Caps and ½ acre in Reds—5,000 quarts; profit per acre, $120, or about 6 cents per quart. Blackberries—1 acre, 2,800 quarts; profit per acre about $90, or about 3½ cents per quart. As we usually sell plants enough to pay the cost of cultivation, mulching, etc, the above about constitute the net profits per acre. This, in a dry season and low prices, I consider a very good showing. Wild blackberries were so plentiful here that we had to sell ours mostly at 5 cents per quart or 20 cents per gallon.

In strawberries, Haverland, Jessie and Bubach No. 5 head the list, and will take the places of Crescent, Cumberland and Windsor Chief, respectively. Gandy is the best late one; not quite productive enough. Stayman's No. 1 and Warfield not up to the standard here. Michel's Early heads the list for the best grower; never saw such matted rows as they formed; planted in rows four feet wide in April, they now cover the entire surface; foliage 8 inches high; no need of any mulch, they have covering enough with their own leaves. Lady Rusk looks well; not fruited yet.

Of raspberries we grow Tyler, Hopkins, Ohio and Gregg, blacks; like them all, and they ripen about as in order named. Gregg not quite hardy here, but was very fine the past two years. Shaffer, no good; canes die every winter. For reds, we grow Turner and Brandywine; Cuthbert and Marlborough discarded.

Blackberries—Principally Snyder and Stone's Hardy; some Taylor and a few Erie; the latter not productive enough, but large and fine and good quality. I find the old saying, "There is room on top," very appropriate for the berry grower. I find no trouble in disposing of choice berries at good prices, while poor stock goes begging and does not pay expenses.

As one of the committee on small fruits, I will say that the prospects for a full crop for the coming season are very good. Plants all made a fine growth and in good shape for winter. No insects worth mentioning came to our notice the past season, and while weather was dry the fore part of summer, we have had fine weather since 13th of August, when the drouth was broken.

WEDNESDAY—DECEMBER 4, 8 P. M.

A very entertaining violin duet was given by Misses Doyle and Simpson, after which was read

ROADSIDE AND YARD PLANTING.

BY G. E. KESSLER, MERRIAM, KAS.

In roadside planting in our comparatively new country, we seem compelled to consider only the ornamental features of the subject, not the profitable side.

Many considerations make it undesirable for us to follow the excellent example set by village communities and towns in some European countries, of planting fruit trees along the country roadways.

There the trees serve the double purpose of giving grateful shade to travelers, as well as paying with their fruit the entire cost of maintenance of the usually excellent roads along which they are planted.

Could such trees be properly protected and cared for here, we might have country roads that we could travel over in bad weather as well as good. However, since good roads and absence of sneak thieves and vandals would bring us too near Utopia, we must content ourselves with planting shade trees. And after all, the cooling shade they afford makes us more willing victims of bad road laws and still worse road overseers.

Both in country and city roadways, shade is the principal object sought for. To obtain this in the country or suburb, selection can be made from quite a large number of trees. As the Conifers do not seem adapted to this purpose, we will consider only the deciduous kinds.

Since it is shade that we plant for, the tree that makes the most lateral growth in addition to good height, other things being equal, is the one to select, and as there are many such kinds, the one that appears to thrive best in a given locality is the tree that should be used most there. Such selection often gives a distinctive feature to a locality.

Our standard trees for this purpose seem to be the White Elm and the Soft Maple. Of the many other kinds, the following are excellent trees and do equally as well: Sugar Maple, Linden, Box Elder, Walnut, Ash, Hickories, Sycamore, Cottonwood, etc., among the native trees.

From the nurseries we can obtain even a larger selection of suitable varieties. For instance: Silver leaved Linden, European Linden, Yellow Locust (*Rob. Pseudo Acacia*), Oriental Plane (Sycamore). Tulip tree, Norway Maple, Magnolia Acuminata, Ailanthus and even Horse Chestnut.

The selection of trees for city streets narrows down to only a few kinds that will survive the many hardships they are subjected to. Where much coal soot prevails, the smooth, glossy-leaved trees seem to thrive best. The hardiest in such positions is found to be the Carolina Poplar. After it come the Maple, Sycamore, Ailanthus and a few others. This last tree has been in bad repute on account of the disagreeable odor of its flowers. When planted near dwellings, there is no reason why the buds should not be cut off before opening. This is necessary only once in one or two years, and it would make it possible to again use a very serviceable and easily grown tree. The Elm is often used in thickly populated districts, and always presents a dingy appearance because of its rough leaves to which all soot

adheres, and for that reason makes an undesirable tree there, although quite hardy under such conditions.

On ordinary roads in the country or suburb we usually find good land to plant trees on, and on such places nearly all will of course grow well.

The planter is frequently called on to place trees on streets and roads that have been graded down, leaving the clay surface exposed. Here it is necessary to dig the holes not less than 2 to 3 feet deep, and with a diameter of 4 to 5, even 6 feet, refilling with loam.

Many trees are killed and valuable time lost by attempting to crowd the roots into a hole barely large enough to put the spade into.

Again, planting too deeply causes much loss that could be avoided. To place a tree 2 to 4 inches lower than it stood in the nursery is fully sufficient as a general thing, but when, as many do, the trees are set 6 to 12 inches below the surface, loss is sure to occur.

For immediate shade it is well to plant street trees 20 to 25 feet apart, cutting out every second tree when they begin to crowd each other. When the planting is done so, the alternate trees can be of some other kind than those intended to be permanent. Under all circumstances it is best to plant young nursery-grown trees. Nothing looks worse than to see a large tree, when planted, cut back like a post. Even if it grows, the new leader and lateral branches do not have the strength that the natural ones possess, and usually the first heavy snow or sleet breaks them down and destroys the future appearance of the tree.

As in roadside planting, so also in the yard, it is undesirable to consider fruit trees or shrubs. The mistake usually made when planting on house grounds is that of completely covering the lawns with trees and shrubs. When trees are used on lawns they should be placed so that they will supply all the shade that is desirable without obstructing the views to or from the house. In no case should they be planted promiscuously over the grounds, but should be grouped where they will produce the most pleasing effects. Used as screens, to cover any undesirable spots, close planting becomes necessary, but as a general thing only a few large trees are required near a house.

It is with the shrubs, both evergreens and deciduous, that the yards are made to look best. And with this material we must be careful not to overload the grounds.

Shrubs placed in clumps, partly around the grounds, partly in smaller groups on the lawns, form pretty pictures, and should be selected for a succession of flowers throughout the season.

Among the shrubs are some with bright foliage that can be used to produce excellent effects of light and shade when placed in contrast with the darker evergreens, such as the Silver Thorn (*Elæagnus*), Lea Buckthorn, the variegated Altheas, Box Elders, etc.

Of the flowering shrubs the following would give a succession of blossoms from late April to September and October. Among the early kinds are the Daphne, Lilacs, Dogwood, some Spiræas, Golden Bell, Magnolia glauca, etc. Later on come the flowers of Weigelia, Tamarix, White Fringe Deutzea, Snowball, Snowdrop tree (*Syringa*), Philadelphus, Altheas, Corchorus, Japonica, and many others.

Last of all come the Hydrangea and Desmodium—the one with its great white balls of flowers, contrasting beautifully with the pretty purple Desmodium—not to forget roses, the best of all.

Among the desirable evergreens we find the Arbor Vitæ, not exactly the best but at least the hardiest and most serviceable. Then Biota, Retinospora, Junipers, Yew, Mahonia, Mountain Laurel, etc.

Such a collection of shrubs, well grouped and cared for, would make a very handsome looking yard, and looking at it from a purely business standpoint alone, would enhance the value of such a place many times their cost, provided, always, that the yard and all within it is neat and well cared for.

Mr. Kessler—I had occasion some three weeks ago to inspect a section of land south of Fort Scott, Kansas, that was planted in timber trees to see how they would grow. It was planted very closely, four by four feet, eleven, ten and nine years ago, mostly with Catalpa Speciosa. They are now thirty feet high and need trimming. Box Elder, Ash and some others have not made a good growth, the Catalpa Speciosa only being satisfactory.

HUMBUGS.

BY J. G. KINDER, NEVADA.

Our worthy Secretary has given me the above subject without designating the kind of humbugs I should proceed to dissect, but as this is a gathering of horticulturists, and as there are quite enough horticultural humbugs to consume all the balance of this week to fittingly write them up, I shall have nothing to say of any other kind. It would have helped me greatly if some entomologist would have given a correct definition of just what family of bugs this most destructive insect to fruit-growing belongs, but I doubt very much if it is possible to do so, because of the many sizes and shapes we find them. However, he is usually found with two legs, but not always, because the completest one I have heard of lately had only one, and went on crutches; but he "got there with both feet" all the same.

In the common acceptation of the term, to humbug is to obtain something of value for an article that is worthless. To put it less mildly, it is to obtain money under false pretenses. To call it by its proper name, it is just the meanest sort of stealing. Ordinarily the thief can pick your pocket and he only has that sin to answer for, but if he humbugs you he goes for the pocket just the same, and has that and a whole batch of lies added to the other sin to answer for; and his victim not only loses his hard-earned money, but loses the care and labor bestowed on the article. He also is very likely to lose his grip on the hereafter in the extremely forcible manner in which he expresses his opinion of the blankety blank son of a gun that lied to him. Nurserymen are more or less to blame for the horde of horticultural humbugs perpetrated on the community. They too often are the silent partner in the transaction. They perhaps do not tell the lie themselves, but hire others to, and grow or purchase the article, and accept their share of the boodle. At the same time they know that the article is absolutely worthless, and know that they are accepting a price for it from five to twenty times its cost.

Pick up the catalogues of our leading nurserymen. Do they carry a stock of prunes Simoni, Ogon, Boton, or Mariana plums? Have they the Russian mulberry, Utah hybrid cherry, tree gooseberry, or ever-bearing raspberry, and dozens of other articles just as worthless? If so, what price do they receive for them, and how can the transaction be completed and the money received without someone being defrauded and humbugged? But nurserymen ease their conscience by claiming that they grow their stock to sell, and much of it is wholesaled to dealers, etc.; but in law the receiver of stolen goods is held to be as guilty as the burglar, and nurserymen cannot but be judged as accessory before the fact, when they know

only too well the destination of such articles, and know that somewhere there is a victim waiting to be defrauded.

There is another species of humbuggery that is such because of the means used to disseminate the article. For instance, we can take the Arkansas black apple. It received a premium at the New Orleans exposition, I believe, and I suppose it is a valuable variety where it originated, but this fact was used to give it extraordinary qualities in the fertile imaginations of those disseminating it, and the people were made to pay from five to ten times the price of our well-known reliable varieties. This has been going on for several years, until now a few of these high-priced trees are coming into bearing, when lo, we find the Arkansas black a very ordinary apple indeed: that is, if true to name—a thing not occurring in every instance by any means.

But a very few years ago I picked up a catalogue of one of our prominent nurseries, and in it I saw a very strong indorsement of a certain apple by several of the officers and members of the Missouri State Horticultural society. Now I believe their indorsement was entirely honest, and I have no doubt but this apple will be found a valuable acquisition. But this same indorsement will be the means of inducing the people to pay five or ten times as much for it as they could procure the Jonathan for. Yet I doubt if one of those gentlemen would honestly advise planting an orchard of it in preference to the Jonathan, even if trees could be procured at same price.

I do not mention this as in any way to censure any one for publicly indorsing any valuble acquisition, but as a caution that in doing so, they place a leverage in the hands of those disseminating it to lift the hard earnings from the pockets of the people that could be expended more advantageously in other ways.

A year or more ago, the world was electrified, so to speak, by the advent of the Idaho pear. A nicely printed pamphlet, with an elegant colored plate of a mammoth pear as a frontispiece, was spread broadcast. This pamplet was made up by giving a history of the pear, and notices copied from different horticultural journals, and copies of letters from prominent horticulturists. Of course, all those who spoke highly of the qualities of the new fruit were copied, but I saw none of the other sort, and perhaps there were none. But with all this flourish of trumpets, the doleful cry comes to us that the much-vaunted Idaho blights. Now, the Bartlett can do that, and a dead Bartlett is just as valuable as a dead Idaho, and will only cost one-tenth as much. Another source of positive evil, and one that is often an outrage, is the clause all nurserymen have in their catalogues, of reserving the right of substituting in case they are out of the variety ordered. Of course, sometimes this might be done and no injury occur, and the party might even be benefitted. But as a rule, the varieties nurserymen are out of are the leading, reliable fruits, and it would be safe to say that not once in ten times does the customer get as valuable a fruit as the one ordered.

I was somewhat amused last spring at a neighbor who sent to a very prominent nursery in New Jersey for a few articles; among them was the Wonderful Peach, price for 1-year tree 35 cents. When the bill came there was a peach tree in the lot, and it was wonderful in one sense: it was wonderfully small, and it had a label tied to it marked Early Crawford. The explanation was that he was just out of Wonderfuls, and my neighbor concluded he was pretty near out of Crawfords from the size of the specimens sent. The moral of this anecdote lies in the fact that he could have bought a 1-year Early Crawford of our home nurseries seven feet high for 10 cents. Only a few days ago I met a victim of substituting, and saw where he had been compelled to top-graft about 100 trees to Ben Davis, the variety

originally ordered. The people will rise up and bless the first nurseryman who will emphatically state that under no circumstances will he substitute one variety for another without the written consent of customer.

It may seem unjust to attack a business so necessary to horticulture, and I am willing to admit that with all the wrong and outrageous humbugs that are perpetrated by and through them, they do a great deal of good, and I believe there are a few conscientious and honest nurserymen. I have never counted a hen's teeth, consequently could not say whether she has more teeth than there are honest nurserymen, but will say this: that if she has not, she will need to go to the dentist and get a set while they are cheap.

Go out among the people and listen to their tale of woe. Hardly one individual who has a home but has been in some manner defrauded, many of them shamefully so, and the time has come when this society should put themselves on record as strongly condemning the present methods used to disseminate new varieties of fruits, and to condemn the misrepresentations by overdrawn colored plates or of salesmen, or any system or method that takes more from the people than the article is intrinsically worth, and this society should recommend the passage of stringent laws that would punish such misrepresentation or substitution, or falsely labeling any variety by a heavy fine and imprisonment in aggravated cases. They should do it to protect the people, and should do it to protect our legitimate nurserymen who have no wish to wrong any man, and who are being driven out of the business by irresponsible men, who are usually too far off to reach by the ordinary process of law.

You will, perhaps, say that if people would read any one of the many horticultural journals, they would know better, and could not be humbugged so easily. In answer to that, I will say that, if there has been one humbug variety of fruit that has been introduced in the past twenty-five years, that has not been advertised in just these journals, and lied about just as industriously in their columns as any perambulating tree-dispenser ever did, then I fail to remember it. No, you cannot depend on the papers. A man can pay so much for a space, and say about what he pleases in it, and it is looked on as all perfectly legitimate. No, I will tell you what's the matter. We have been sending too many missionaries to the heathen to furnish a change of diet to the South Sea islander, and all that, when we needed him right here among us in the fruit business. What time he could spare from his labors with the nurserymen and their employes could be profitably spent in supervising some of our packing of fruit, so that occasionally there would be a choice specimen not on top; and, for that matter, he could go along with the fruit, and on the trip he could labor with the railroads and their employes—the one for more reasonable rates, and more careful handling on the part of employes. When fruit is turned over to the tender mercies of the commission man, then it is time for this missionary to put in his best licks; and if there are any means by which he can get help from on high, now is the time to ask for it. But I must confess that, when it comes to describing ways that are dark and tricks that are vain, as practiced by the average commission man, I find myself totally incapacitated. You can't call them "humbugs;" the name has too soft a sound. And why call them anything? just as though every man who has shipped any fruit doesn't know all about it, and know that he couldn't express his feelings on the subject without being turned out of church. So I trust you will excuse me for so slight a mention of the commission man, the most gigantic humbug in the whole business.

Recitation, Miss Addie Doyle, of Clinton, was very admirably rendered.

PROGRESS IN FLORICULTURE.

J. M. JORDAN—ST. LOUIS.

Mr. President and Members of the Missouri State Horticultural Society:

Your Secretary informed me some weeks ago that I was assigned to the duty of telling the members of this convention what progress has been made in floriculture. To the well-informed horticulturist this would seem an easy task, for they would consult the reports made by the Agricultural department at Washington, D. C. But floriculture has never been honored by any statistics in any former decades but through the exertions of some of the leading florists, the Census bureau is now making a full report on floriculture to the Census department on this very important branch of horticulture. Therefore, all I can do is to show by a few comparisons that have come under my own observation within the short period of thirty years.

In 1860, Boston alone held the proud place in this country of producing cut flowers, where a regular supply could be had at all times during the winter months. The varieties of flowers were very few, and but two kinds of roses, Sofrano and Bon Silene, were all the varieties grown for cut flowers at that time. New York then boasted of one place where a floral artist occupied a store and carried a supply of cut flowers for sale, but now New York has 220 retail stores and 22 wholesale dealers where flowers can be bought in quantities. The sales of the retail florists should average 100 dollars each day, or an aggregate of 22,000 dollars spent for flowers each day by the people of New York City alone; and what is true of New York is true of all the cities of this country in proportion to their wealth.

In 1869 the first floral store was opened in St. Louis where cut flowers were kept on sale ready for delivery. Now there are 49 retail and 4 wholesale establishments where flowers can be had in quantities.

Fifteen years ago flowers were considered to be a luxury in the winter, and only the wealthy could afford to pay the price. But now nearly all can enjoy their refining influences.

The increased supply made it a necessity to use flowers in many ways. Few are the festive boards that are not decorated with flowers. We sell large quantities of flowers to go into sick rooms, and the cures wrought by their associations are wonderful. Many a mind distracted and depressed has taken on new vigor and been restored to health; many a sad household has been comforted and cheered by the silent lesson taught by these messengers of love.

Let us labor for a more general use of flowers on all occasions, believing in their elevating and refining influences. By so doing, we will evolve into that higher civilization so much desired.

After this, a song by Prof. Hall was given in his usual excellent style.

FRUIT CULTURE AND ITS INFLUENCE.

BY MRS. H. T. BURRIS, CLINTON.

We have all read of a "fruit garden," which carries us back to the early days of the history of our race, when the "Lord God" planted a garden, eastward in Eden, and out of the ground made He to grow "every tree that is pleasant to the sight and good for fruit."

We are left to infer that the keeping of this garden was a pleasant occupation; the inhabitants were not perplexed about the kind of soil they should plant upon—whether upon a north, south, east or west slope, the kind and variety of trees, vines and plants they should choose, and the kind of cultivation and protection they should give them.

We infer farther that they had no frosts, no withering winds, no insects or germs to destroy their trees or injure their fruit, no anxiety about over-production, supply and demand; in fact nothing to mar their happiness or cause care for their future welfare, until, while sitting under their own vine and fig tree, listening to the melody of birds and rejoicing in their bounteous and glorious estate, there appeared to them a "fruit agent," with a fine specimen of fruit, in alcohol, magnified by deceptive words, beautified by arts and devices, its color so rich, its odor so sweet and delicious: what will its flavor and nectar be?

From sacred history we infer our first parents and the "fruit agent" arranged a partnership, wherein each was to have greater power, dominion and happiness, and the fruit seemed to be some kind of exchange whereby the transfer was to become valid.

We, to-day, of the 19th century, recognize that this fruit agent was a deceiver, that the color and odor of his fruit covered decay and canker, that his stock was all watered of the gall of bitterness. That beautiful and productive garden was struck with frosts, blight, insects and destructive germs, and with death, and the fruit, withered and bitter, was carried by birds and the winds to the four corners of the earth; the seed dropped upon fertile and barren places of earth, were by the action or frosts, winds and insects, covered, and in due time came forth seedlings, thorny bushes, producing sour, bitter, insipid fruit.

Later it appeared there was a transfer made, and by this transaction they quit-claimed their right to the garden and were moved out, and in their change of location and surroundings found themselves beset by the perplexing problem, how can we change these thorny and scrubby trees, bearing fruit not fit to eat, to those beautiful in appearance and bearing fruit pleasant to the taste, sustaining and invigorating life?

Insects and disease are wasting our trees and fruit. How can we protect them? Frosts and elements sting and bite the buds or developed fruits, and many seasons we are deprived of all.

What can we plant to give a contitued daily and yearly supply? Thus they then realized that they would have to struggle with difficulties, and then and there was organized the first horticultural society, and they started out horticulturists indeed. and from that day to the present hour it has been the lot of man to be driven to the necessity of toil, constant watchfulness and care.

Their descendants, inheriting their tastes and appetites, took up the work where their fathers left off, and each succeeding generation has produced many men and women who have and are giving much thought, work and money to make mankind better and happier. Surely they are public benefactors, leaving the world a great deal better for their living in it.

The cultivation of fruits contributes in no small degree toward enlarging and developing the mind, strengthening the body, creating a fountain of health at our very door, beautifying and making home the dearest place on earth, improving and making all who come under its influence better.

Beyond the sacred confines of the happy hearth-stone, with its dear familiar circle, there can be no more pleasant associations than those of the garden and orchard, where, in our tender years, we have aided loved parents, from them taken

the first lesson in plant-culture, gathering the luscious fruit of their planting or our own; nor of the rustic arbor in whose refreshing shade we have reclined, to rest and meditate under its sheltering canopy of verdure; and when we have gathered the purple berries of the noble vine at a later period of the rolling year; nor of the orchard, with its bounteous supply of golden and ruddy apples, blushing peaches and melting pears.

With such attractions about our homes, with such ties to be sundered, it is wonderful and scarcely credible that youth should ever be induced to wander from them into paths of evil.

The physical as well as the moral qualities of our nature are wonderfully promoted by the exercise fruit affords us—the pleasant excitement, the expectation of the first fruit, the praise of fellow man, all influence, strengthen perseverance and greater endurance, and with these develop a noble man and womanhood.

The fabled fountain of Thygeia has been located in an orchard, where it came from earth that sustained the roots of the tree and vine, shaded by the branches of the wide-spreading apple and pear; approached by alleys that were lined by peach trees, laden with downy fruit, and over-arched by vines bearing rich clusters of the luscious grape; and they were garnished at their side by the crimson strawberry, the pink gooseberry and crimson currant.

The family which is at all times supplied with delicious and refreshing fruit from its own garden and orchard has within its reach not only a very important means of economy, but a real domestic comfort. An influence is thus created of an exalted character; a strong tendency is directly exerted toward making home the dearest place on earth, parents, sisters and brothers, the kindest and dearest of all, each contributing to the other's comfort, pleasure and profit.

What fond memories come to each of us of our dear old homes! Let us make our homes as beautiful, attractive and ennobling as we are able, planting trees, vines and shrubs, that our children will be so influenced and directed that they will attain higher enjoyment, greater benefits, and become noble, useful men and women. We reap of that we sow, and by our fruits we are known.

HORTICULTURE IN THE PUBLIC SCHOOLS.

REV. W. P. ARMSTRONG, CLINTON.

Popular education is indeed the distinguishing achievement of modern civilization.

In it are the patriot's trust for the permanency of free institutions and the philanthropist's hope for the well-being of the race. Of all the inventions of the ages, that of universal education is the grandest in its conception, and promises the most varied and beneficial results. It marks at once the era of free government, the moral development and physical well-being of the human race. But in nations as well as individuals, there is always a better beyond—a higher and still higher—for the achievements of the future. In my opinion, the next great educational step is to be an industrial one. The public schools, in addition to the general training which they furnish, must also educate specially with reference to the future vocation of the student. All capital is the product of labor, and society itself rests on the broad shoulders of laboring men and laboring women. I feel, therefore, that all efforts to increase the educational opportunities of the industrial classes is a work in the right direction, and that, in the advocacy of the introduction of horticulture as a study into the public schools, I am standing on firm ground, sustained alike by reason and experience. It is objected that the design of education is mental and

moral growth, and that as mind is superior to matter, and knowledge better than riches, that system of education should be adopted and that course of study pursued which will fill the mind with the greatest of useful ideas and produce the greatest mental and moral development. This objection comes from the educators of youth themselves, and is in truth the only one worth a moment's consideration. I accept every word as truth, and regard it in fact as a powerful argument in favor of the study of the industrial sciences, if I may so style, in the public schools. If it can be shown that the study of the sciences in reference to and illustrative of the industries is equally as well adapted for mental culture and discipline as the study of them in the abstract, or with no such reference, then the value of such course as a disciplinarian is equal to that of the course now adopted in the schools. If it can be shown that such a course is better adapted for mental training, then the argument preponderates in its favor; and in either case the fact that the student is thereby the better fitted for life's duties powerfully reinforces the argument.

"Use strengthens powers," says the good Spurzheim. The facilities of the mind like those of the body become active, vigorous and strong, each by its appropriate exercise. Now, which is the most favorable to mental excitement, the study of a science with or without reference to its practical application? In both cases the same formularies and theorems must be studied and demonstrated. In both cases the same scientific principles must be exemplified by experiment and by facts in nature.

The difference will be that in the study of science with reference to its uses, a greater number of experiments will be made and a greater number of familiar phenomena explained.

Horticultural studies are, therefore, valuable in the fact that they appeal to and teach the reasoning faculty during the whole life. The horticulturist employs practically nearly all the physical sciences, and very wide is the field of research for the educated fruit-grower. He who opposes such studies as superficial is in great danger of proclaiming his own shallowness.

It is true that the elementary works which must be employed for a time at least in the district schools may not contain a great amount of theoretical science. They will nevertheless contain much of practical and useful knowledge.

Teachers in the rural districts will universally attest that one of the obstacles in the way of introducing the more thorough sciences into their schools is the belief, too prevalent, that there is no practical use in them. But the utility of fruit-growing as a study is so apparent that this objection will not be urged, or if urged at all will be easily overcome.

The objection that there are no suitable text-books can be made only by those not familiar with the literature on horticulture, or the progress which this comprehensive science has made. Several very valuable works have been written, some of which would serve now as excellent text-books in the schools and colleges. Besides, in this as in other things, the demand will bring the supply. Only let the want for such text-books be known, and a thousand pens will contest the privilege of supplying it. Every publishing house will have a new book on fruit-growing, designed for the use of schools. Their agents will visit the schools, horticultural and agricultural societies, and every one interested at all will be waited on with distinguished consideration. Competition will elevate the standard of these works, and the horticultural text-book will soon equal in learning, depth and adaptation for the school-room, and in every other excellence, the best works in other departments of education.

Another objection sometimes urged is the want of qualified teachers. To this it may be answered that the teachers of this State are an intelligent and enterprising

class of citizens. Let it be established as a fact that horticulture is to be taught in the public schools, and they will not be slow to add this to the list of certified qualifications to teach.

Again, it is objected that the pupil does not know what his future vocation is to be, and should therefore educate himself without special reference to any vocation.

This objection is not true in fact. Practically the future calling of the child is very early determined, and whatever theories there may be, whatever teachers may advocate to the contrary, the pupil actually does educate himself with reference to what he supposes will be his future vocation; and even the sturdiest opponent to this movement does not stand to his own theory. If a boy is to be educated for civil engineering, whatever else he may betaught, he is certainly trained in mathematics. If he is to be a theologian he is certainly taught Greek and Hebrew if possible, and carefully instructed in the opinions of the early fathers. And generally, whatever he intends his boy to follow, he will, despite his theories, cause his education to be warped into the character of his future pursuit. His general education may be more extensive, he may lay a larger foundation, than the student of the district school; but the fact remains that whatever amount of general culture theb oy receives, he is yet specially educated for his future life-work.

The State itself has established a legal department in the State University for the education of those who may wish to practice the law. This, then, being the rule, with hardly an admitted exception, that the child should be educated in reference to his life occupation, is it just that those who cannot attend the schools of higher learning should be deprived of its advantages? In the district schools the pupils receive a limited amount of general instruction, and, in my opinion, the public interests will be greatly subserved by giving also the opportunity of special instruction. It is urged again that fruit culture is so extensive a subject that it will be difficult to know what amount of knowledge is necessary to fit one to teach. Properly considered, this objection admits away some of the others that are sometimes pertinaciously urged. If the subject is this extensive, the pupil who masters it will have the general education so often set up in opposition to special education, and the argument so plausibly urged that it is better to make a man of the student than a farmer, or mechanic, or lawyer, or doctor, or preacher, finds itself completely answered in the above objection stated. It might not be astonishing if even those who use this plausible sophism should be compelled to recognize in the student who had mastered the horticultural sciences a man, or mayhap a woman, in the highest and noblest sense of the word.

But is the extent of the science an objection to its study in the schools? People do not reason so foolishly on other subjects. Who has been able to tell where the science of astronomy, chemistry or mathematics ends? The sciences in general, like their great author, are infinite The profoundest philosopher has not the wisdom, nor even the shallowest pedant the assurance, to prescribe bounds to them; but do we on this account exclude them from the schools? The amount of knowledge necessary to teach horticulture will regulate itself just as with the other sciences. It is not necessary or required that one should be a Silliman or a Draper to teach chemistry, or a Lyell or Miller to teach geology; neither is it necessary that one should be a Liebig or Downing to teach the science of fruit-growing; though in this, as in other subjects, the more knowledge one possesses, other things being equal, the better teacher he will be.

In the several sciences, as taught in the schools, certain text-books have been prepared. Precisely so will it be with horticulture, and the teacher will be required to pass a reasonably good examination on the subjects therein treated.

As on other subjects, whatever experience, observation or other reading may add, will only increase the qualifications to teach. Observation, investigation, discussion would, from year to year, add to the teacher's knowledge, and correspondingly elevate the standard of qualification. The knowledge which would have secured a certificate to teach English grammar ten years ago might not enable an applicant to pass muster to day. This, too, would be progression, and the standard of qualification would be fixed to such an adjustable scale as always to meet the public demands.

One other objection and I will close this part of the argument, which I fear is already too tedious. This is the vague, ill-defined, sometimes wise, sometimes foolish objection always ready against any innovation: It is said to be impracticable. But why impracticable? If the introduction of fruit culture as a study in the public schools will result in undoubted good to the State, far surpassing all the additional costs and inconveniences, this progressive, utilitarian, go-ahead age will demand other evidences of impractibility than that of merely looking wise and ominously shaking the head. Before the single power of utility these flimsy objections will be swept away, and we shall live not only to see horticulture, but the sciences illustrative of all the industries, taught in the public schools.

In that good time coming labor will be honored, and laboring men and laboring women will take their places in public opinion, as they are now in fact, the real aristocracy of the State.

There was a time, not long ago, when book horticulture or scientific farming was the standing jest of farmers. It was looked upon as a piece of pedantry set up in opposition to experience. And it must be confessed that many were the men with heads full of theories and poetry of the country, whose great promises and great failures gave point to the general joke.

If indeed I were compelled to choose between theory without experience and experience without theory, I should unhesitatingly take the latter, confidently expecting routine, with habits of industry and strong muscle, to win the race; for the fruit-grower needs educated muscle as well as educated brain, and habits of industry as well as habits of thought. No one should be foolish enough to suppose that theory of itself can produce great crops. It is theory applied—a skillful hand guided by a wise head—that must accomplish results. The science of horticulture—a phrase used for convenience—it is not one but many sciences, or such parts as relate to and explain the practical operation of the fruit farm.

Horticulture, as a business, is by universal consent one of the oldest of human pursuits. It dates back to Eden, and "'tis said was the bait of Eve." Congress has made valuable donations in connection with general agriculture for the purpose of having this science taught. Its utility as a collegiate study is admitted while it is denied that it may be introduced into schools of lower grade. You may teach it in colleges, but not in township schools. I cannot conceive of a proposition more sophistically absurd. Not more than one farmer's son in a thousand takes a collegiate course of study, and of those who do, the number is very small who return to the farm. I agree, however, that the introduction of a course of horticultural studies will greatly increase the number of farmers' boys who enter college, as well as the number of those who, after having graduated, will return to rural pursuits.

But after making a liberal allowance for this, it must still always be true that only a very small per cent of the whole people can ever have the benefits of a collegiate education. Whatever of horticulture is taught to the great mass of the people must be taught in the common schools. A few wealthy men will be able

to send their children to the colleges, a few young men of great energy will work their way through the collegiate course, but the large majority, unless it can be taught in schools of lower grade, will be compelled to forego the advantages of horticultural instruction entirely. The whole people should be educated in the knowledge and business of practical life. By denying the introduction of horticultural science into the district and township schools, those will be deprived of it who most need its advantages.

The farmer tills and grows fruits on his own land. His boys take the place of hired help and cannot well be spared from home. The district and township schools are their only opportunities, and we should make these opportunities equal to their wants. To say that fruit culture shall be taught, and yet not taught in those schools, is to deny the teaching of it when it can be the most beneficial. The hired man is capable of doing better service by having this kind of education. He accumulates means, and ultimately himself becomes the owner of land and in his turn the employer of others. In order that this science be valuable to the people, it must be taught where the people can have access to it.

The question of utility properly stands at the threshold of every enterprise. What use? On the proper answer to this question will depend the final success of that, this and every other movement. We live in a utilitarian age; we are a utilitarian people; and in the widest sense of this much-abused word I confess to the title of utilitarian. Utility is the motive power that gives force to enterprise and overcomes the inertia of popular indifference. By it let us test the present movement, and let its fate be decided by the answer to the question, for what good? The first, most manifest benefit arising from horticultural education will be the increase of these products.

As already stated, the fruit farmer applies practically important principles of science. That in order to apply these correctly it is necessary to understand them, is a proposition that needs no argument. When the fruit farmer plows and plants, he changes the mechanical and chemical condition of the soil. When he plants and cultivates, he is making a beautiful experiment in organic chemistry. He is also applying the principles of physiology and hygiene, and finally all kinds of work in and on the orchard require, in order that it be done at the right time and in the proper manner, practical knowledge, as well as practical skill.

All these should be taught in the school books; the best methods explained and the reasons for them. The effect will be to form early habits of thought, and to cause knowledge and judgment to take the place of routine.

We should expect to find, as is the fact, that in those sections and countries where fruit-culture is better understood and better applied, a corresponding increase of these products. Great crops of anything are not accidents. The laws of nature are uniform. In fruit culture, as in other things, the same causes will always produce the same effects. Wherever exist the necessary conditions, great crops must be produced. To explain what are these conditions—how, at the least cost, to preserve them when present, or to produce them when absent—is the legitimate work of horticultural instruction.

Let us suppose that all the valuable knowledge on this subject contained in horticultural books and papers, arranged into convenient and systematic form and published in a series of school books, numbering 1, 2, 3, etc., from easy primary works to those more thoroughly scientific, and that these were made a part of the school course for the farmers' boys, what great results might we not reasonably expect? Within the next generation the horticulture of Missouri would take a new form and a hundred per cent be added as the product of fruit culture. These con-

ditions properly met, our glorious Missouri would become the Arcadia of the United States.

The single fact of proper under-draining for fruits alone, the State would be compensated more than a hundred fold for all the cost of teaching horticulture in the public schools. Educational institutions are for the young. The youth should have opportunities to prepare for the life battles in which they are soon to engage. Let the farmers' sons be thoroughly educated in the principles of scientific horticulture. Let theory and practice go hand in hand. While the muscles are being educated to habit and skill in work, let the mind be instructed in such knowledge as will make their skill valuable. The year that witnesses the adoption of this measure will mark the era of improvement, and the person of middle age will live to see advantages accruing beyond all calculation.

I do not mean to teach that the student should give his attention to this subject alone, or to the exclusion of other needed information. I would not shut him out from other sources of knowledge or whatever there may be of refining and humanizing culture. Every child that comes into the world has, by virtue of its humanity, an inalienable right to the growth of its powers, and should have not only during minority, but through life, the best opportunities for mental and moral culture.

With the improvement of fruit-growing will come a corresponding improvement in the other industries and of society itself. Endless, indeed, are the collateral advantages which would result from this education. Certainly a general increase of intelligence among the people would of necessity follow. The great resulting moral advantages must not be forgotten It has been beautifully said that the laws of nature are the "elder word of God." The student of horticulture is the student of nature, and whether studying or applying this "elder word of God," he will feel that he is ever in the presence of the invisible but omnipotent God, to whom study and labor are at once a homage and a prayer.

HORTICULTURE AND HOME LIFE.

BY MRS. G. E. DUGAN, SEDALIA.

There is not a spot on this wide-peopled earth
So dear to the heart as the land of our birth;
'Tis the home of our childhood, the beautiful spot,
Which mem'ry retains when all else is forgot.

Can the language of strangers, in accents unknown,
Send a thrill to our heart like that of our own?
The face may be fair and the smile may be bland,
But it breathes not the tones of our dear native land.

In the sweet sacredness of memory's whitest chamber hang the ineffably beautiful and exquisitely wrought pictures of home. In the foreground in the clearest light is always the dear, care-crowned face of our mother.

Grouped around the hearthstone are the other members of the family, and we look back with glances of love and tenderness to our childhood home. A soft reflective radiance shines like a halo about the scenes of our earlier years, and when weary with the trials and perplexities of a later existence, involving toil and conflict, it is restful and comforting to wander back and to dwell once more, by the magic of memory, amid the quiet rural pleasures which rendered our childhood cheerful, if not perfectly happy.

Associated with our memory of home there are always the orchards. Meadows may gleam fair and fragrant; the soft sweep of the south wind may bend the plumed heads of the timothy and bluegrass; great waves of sunlight and shadow may play at hide-and-seek there as the clouds alternately veil and unveil the sun; but the orchards have a loveliness never attained by the meadows, and in all the world there is no fragrance so exquisitely dainty and refreshing as the perfume of the apple blossoms. Lovers delight to linger about the orchards, and all the novelists choose this place for their heroes to declare their unoying affections; and the maidens wooed beneath the apple-trees are always kind, and not cold, haughty and sarcastic, like those who are won in palaces beneath the unsympathetic glare of brilliant chandeliers.

Horticulture and home life are indissoluble. You cannot disassociate the two. Every person who was reared in a country home has enshrined in some quiet corner of his heart a favorite apple-tree.

Other fruits may have left a lingering taste of their lusciousness in his mouth, and he vaguely recalls that the blooms were pink or white, fragrant and pretty; but with his every sense of remembrance dwells the knowledge that the apple-trees were prolific of foliage, sheltering him from the fierce rays of the summer sun; that the clustering blossoms were sweetest of all the offerings of spring-time, and that the fruit was perfection.

What is home without fruit trees?

Charles Lamb has said in one of his essays of Elia, "There are homes which are no homes," and we invariably think of this trite saying when we pass by a human abode in the country where there are to be seen no orchards.

I sometimes think that the first thing our Puritan ancestors did on landing at Plymouth Rock was to set out rows of orchards. Right certain am I that in those weird old pioneer days, about which cluster dim ghosts of camp-fires, rude log cabins, and those fierce, red-skinned creatures who went prowling through the dense forests thirsting for blood—that amid all these discouragements and desolations, our thoughtful forefathers did not forget to plant fruit trees just as soon as the wilderness yielded a place for them.

"Homes that are no homes" have no fruit trees around them. There are no flowers in the door-yards, and the aspect of these places is unlovely and repellant. On approaching such an abode the weary traveler feels a chill as he notices the desolation, and he will hesitate to ask shelter there even from a hail-storm. Fruits and flowers mark the home-like homes, and though they may be only village places, with grass plats instead of gardens, along the borders of the tiny lawns will be observed dwarf fruit trees and currant bushes. Even a vegetable garden may be idealized.

The daintiest flowers may twine gracefully about among the tomato vines; marigolds may smile along the cabbage rows; about the fruit trees may be benches of pansies and sweet violets, a beautiful union of the poetic and the practical, delightful to contemplate.

There is just such a garden as this in the quaint little city of Washington, Missouri, and it is well worth a visit to the place, merely to see how harmoniously flowers and vegetables get along together, and how each assist in glorifying the other.

But we must not be heard for our much speaking, is a lesson taught by divine authority, and so I will not presume to occupy valuable time, but will hasten to conclude my brief essay, after earnestly entreating all who have so kindly listened to me to plant fruit trees.

If you have neither orchard space nor garden spot, let the fragrant and beautiful dwarf specimens of fine fruits adorn your door-yards. A pear tree is prettier than a maple; a cherry tree surpasses an elm; an apple tree is better than a box elder.

Make home so delightful that it shall forever be a hallowed memory to your children. We pass this way but once. Let us leave behind us, when we step over the border to the other land, the benediction of deeds well done. Let us strive to make the world a little brighter and better for our journey through it, and let us at all events make sure of a monument that will remind our friends that once we lived and loved, by planting as many fruit trees as possible.

"The breeze-like music wandering o'er the boughs,
Each tree a natural harp—each different leaf
A different note, blent in one vast thanksgiving."

Let us aid to the utmost of our ability this grand thanksgiving chorus.

HORTICULTURE IN MISSOURI.

REV. ARMSTRONG.

We have a fine evening. As my sight is not very good, I was a little fearful that I could not read my own paper by gaslight, so I will speak off-hand. I am getting old, going on seventy-three.

We are living in a great time and in a great country—a country of great area, great products, and great people; from Maine with her lumber, to California on the west with her wine and her olive oil; South Carolina with her negroes and war of races; but greatest of all, with the richest and most varied products, old Missouri, with her climate, her soils, her lead, zinc, iron, coal, her timber, and higher than all, her women and men. That is the subject of my exhortation, and an exhorter has the privilege of scattering. I have a good deal in my mind, for I have a good deal to do. I should like to say a good deal upon the subject, for it embraces horticulture, garden, fruits and flowers.

Missouri is exceeded in the amount of her fruit only by two States, New York and Michigan. This is owing entirely to their earlier settlement. She will soon outstrip them. Her progress in ten years is almost incredible—over ten millions of dollars in apples alone this year. Just think of it! When we think of Missouri with its wide area—and there is not a county in the State poor for apple growing—what shall be the result? There is hardly any part of the State where they cannot grow fruit for home use and for market. Southern Missouri is especially suited to the peach.

I took a little run to California once—I am a traveled gentleman. I have been as far as California. I saw everything ever seen in Southern California in summer. I bought a few grapes. They were about as sour grapes as I ever tasted anywhere. Outside of the raisin grape, Missouri can surpass California. Southern Missouri lands are cheap. As luscious peaches grow there as anywhere, California not excepted. When people go to California they pay a thousand dollars an acre for land. That does not seem to me to be the right kind of thing.

Referring to the apple, how many people in Missouri are growing them that ought to? Convince the farmers that an acre of ground will hold forty-eight apple trees, that in seven years will produce five bushels of apples per tree, worth $2.50 per barrel.

There are several aids that Missouri requires. Let me name a few:

Common sense. The world has more need of good, common sense in this than in any previous generation. Put common sense into fruit culture and it will

always be successful. Proper attention with common sense will always pay in this business. I should like to tell you what I think and hope can be done in an orchard under proper training. My impression is that an orchard trained from four to six feet trunks and properly cultivated will yield fruit three times as large and of better color than the low, neglected orchard.

I have a few plum trees near a large cistern. The plums are large and perfect. I think it would be a good idea for fruit growers to dig cisterns in their orchards to hold water for dry seasons and for drainage in wet seasons. Fruit could be grown under such circumstances. But I am going to stop. I said at the beginning of this exhortation that I was going on 73, but I lack a good many years of being there.

The State society needs more money to forward her work and to advertise the State. Horticulture should be taught in our public schools, so our children may understand its principles and practice. Agriculture should be taught there, too. Text-books would soon come if we wanted them. I am quite sure that when horticulture is being taught to the children that the whole State will become enthusiastic. Then will we have orchards that will be an honor to the horticultural society and the wonder of the world.

C. W. Murtfelt spoke of the culture and beauty of flowers—more particularly of the chrysanthemum as improved of late years. There are more than 100 varieties of this flower. They can be had for several weeks in the late fall, and are certainly very beautiful.

Among the roses well worthy of cultivation he named Madame Charles Wood, Madame Wm. Wood, Gen Jack, Empress of India, Paul Neyron and the Bride.

THURSDAY, DECEMBER 5, 9 A. M.

At the opening of the session the Secretary presented the following telegram, which he had sent to the various State societies now in session:

CLINTON, Dec. 3, 1890.

The Missouri State Horticultural Society, now in session at Clinton, sends greetings to her sister society.

L. A. GOODMAN, Secretary.

Sent to the Secretary of Michigan State Horticultural Society, in session at Kalamazoo, Mich.

Also to Secretary of Indiana State Horticultural Society, in session at Indianapolis, Ind.

Also to Secretary of Kansas State Horticultural Society, in session at Topeka, Kansas.

The Secretary reported also that he had sent to Mrs. D. S. Holman, Springfield:

CLINTON, Dec. 3, 1890.

The State Society, now in session, sends sympathy to you and yours and asks news about the condition of Bro. Holman.

L. A. GOODMAN, Secretary.

The following telegrams were read in response to those sent on December 3:

INDIANAPOLIS, IND., Dec. 3.

L. A. Goodman, Clinton, Mo.:

The Indiana Horticultural Society, now in session, sends greeting to her sister society. C. M. HOBBS, Secretary.

TOPEKA, KAN., Dec. 3.

L. A. Goodman, Clinton, Mo.:

The Kansas Horticultural Society greet you with kind regards and wishes for the success of your annual meeting.

G. C. BRACKET, Secretary.

The following letters were read:

DIVISION OF POMOLOGY, U. S. DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., November 13, 1890.

MR. J. C. EVANS, Harlem, Mo.:

DEAR SIR—Your letter of the 8th instant is just received, and I am glad to hear from you again, as is always the case. It would be a great pleasure to me to visit your Society and have a talk with yourself and others of my good friends, but this will be impossible for me this time. If you have anything special in mind relative to my work, either favorable or unfavorable, I should like to know it. I feel certain that you have a deep sympathy with the work of this division, so I want the best advice that can be had, in order that I may conduct its affairs with discretion and satisfaction to the fruit-growers of the country. Please be kind enough to express to the members of your Society, at some convenient time during the meeting, the sympathy I have with them, and allow me to rejoice with all of you who raised a big crop of apples this year and got a good price for them.

H. E. VAN DEMAN,
Pomologist.

MISSOURI AGRICULTURAL EXPERIMENT STATION,
COLUMBIA, BOONE COUNTY, MO., November 29, 1890.

L. A. GOODMAN, ESQ:

MY DEAR SIR—I have been absent for two weeks, in attendance upon the annual meetings of the representatives of the Agricultural colleges and Experiment stations of the United States, and of the American Fat-Stock association, and on my return I found your kind invitation to attend the annual meetings of Missouri Horticultural Society next week, and an announcement of a part assigned me for Thursday, December 4. I had fully intended and expected to be present, but I find that the work assigned me by our Executive committee at their meeting this week is of such a character that it will be out of the question for me to be absent at the appointed time. I very much regret the fact, as I am very anxious to meet and make the acquaintance of the live men who compose the State Horticultural Society of Missouri.

With best wishes for a pleasant and profitable meeting, I am

Yours respectfully,
EDWD. D. PORTER.

BUSHBERG, JEFFERSON COUNTY, MO., December 2, 1890.

L. A. GOODMAN, ESQ., *Secretary Missouri Horticultural Society, Clinton, Mo.:*

DEAR SIR—It is with sincere regret that I have had to forego the pleasure of being with you at your meeting at Clinton, but I have been unable to get time even to prepare a few notes on the subject of vineyards, the fine weather of this fall hav-

ing prolonged our busy season to an unusual extent. So I must once more ask your kind indulgence for my shortcoming.

Wishing that your meeting may be a successful one in every respect, as I know it will be pleasant for all who attend, I remain

Very truly yours,
G. E. MEISSNER.

SOUTH ST. LOUIS, Mo., Dec. 1, 1890.

MR. L. A. GOODMAN:

DEAR SIR—I am sorry that I cannot be with you at Clinton this week, but my school and other business that happens to come this week will keep me at home.

I have finished one case of those birds and have mounted quite a number for the other case, but I find it difficult to procure good specimens of certain species that are not very abundant and yet of considerable importance to the horticulturist.

I am making a careful dissection of all birds I mount, as well as of other specimens that are not in proper condition for mounting, so as to be able to give a correct account of their food in different seasons of the year and different localities. By the time I get all the birds mounted I will have ready a full account of their habits, distribution, etc., which I will place in your hands for the reports.

I wrote to you some months ago with reference to the best manner of mounting the birds, and also for a report of last year, but received no answer or report. Please send me a report as soon as you can.

Best regards to all my friends in the M. H. S.

Yours respectfully,
H. W. SPECKING.

OREGON, Mo., November 27, 1890.

L. A. GOODMAN:

DEAR FRIEND—I have been waiting to write you for the last week, hoping I could make a favorable report, but now at the last moment I am compelled to write you that owing to my sickness I will not be at the meeting or give you a paper. I have had a carbuncle on back of neck—and if you ever had the pleasure of this luxury you know what that means—then it was followed by a crop of boils, so I have been sick for two weeks; was confined to my house for over a week, did not eat or sleep, so was in no condition to prepare a paper, and am now so weak I can hardly get around. I am very sorry, but I see from the program it is a full one, and I will not be missed much, but I would have liked to meet with you once more, but the memories of one year ago would detract very much from the pleasure.

With best wishes for self and family, I am as ever,

Yours truly,
A. GOSLIN.

U. S. DEPARTMENT OF AGRICULTURE, DIVISION OF POMOLOGY,
SOUTH HAVEN, MICH., Nov. 18, 1890.

L. A. GOODMAN, *Secretary Missouri Horticultural Society:*

MY DEAR SIR—Your kind favor was awaiting reply on my return after a week's absence.

December 2d to 4th seems to be a favorite date with horticultural societies, no less than six of which in the West and Northwest have chosen this week for their annual meetings. Of these I will try to give at least part of a day each to Michigan, Indiana, and possibly Kentucky, taking in Illinois the following week.

I suppose it will not be possible to be at Indianapolis on the 3d and reach your place on the 4th. If such were practicable I would make a great effort to do so.

Very truly yours,

T. T. LYON.

OREGON, MO., October 24, 1890.

MR. J. C. EVANS, Harlem, Mo.:

Dear Sir and Friend—At your request as to my views on Missouri making a show of her fruits at the World's fair, I would say that it seems to me the fruit interest of our State has become one of such magnitude and importance, amounting to nearly fifteen millions of dollars annually, that it should be a matter of State pride to make a grand display of Missouri fruits at the World's fair, and do it in such a way and manner as will place Missouri, where she of right belongs, in the front rank as a fruit-growing State. In order to do this properly and to make success sure, preparations must be made very soon. We should commence next summer to put up in glass jars specimen fruits, and also organize all our counties and get them into shape for effective work. Of course, such a display as I have in my mind will cost a large amount of money and hard work. We can get our societies to do a great deal for the honor of the State and the good of the cause in the way of work, but we will need at least twenty thousand dollars in cash to carry the work through in a satisfactory manner. For this we can only appeal to our State for an appropriation, and I have faith enough in our Legislature to believe that if we will only present our cause to them fairly and on its true merits, they will respond to our request. But some no doubt will ask, why should the State assist such an enterprise? And how and in what way will she be repaid for so doing? I answer, by the more speedy development of this growing industry, which should be ten-fold what it is at present. The show of fruit we contemplate would attract the attention and win the admiration of visitors from all parts of the world, and advertise Missouri as the fruit garden of the world. In this way we will not only induce immigration, but will draw a class that will make desirable citizens, as fruit-growers must own their lands, and hence, are tax-payers. In fact, we have such an amount of desirable and very cheap fruit land in this State that it is my honest opinion that the twenty thousand dollars given by the State to make this show would in the ten years following be returned ten-fold to the State treasury by increased taxable property. Then it will add largely to the internal trade and prosperity of our State. It would open up employment for thousands. It would add much to the prosperity and happiness of our people, while the elevating and refining influence upon our people by the development of this great industry could not be computed by dollars and cents. I am so impressed with the importance of making our fruit display so it will be a grand success and reflect credit on our great State, that I would suggest and urge you to wait on our worthy Governor and present this matter in its true light, and ask his assistance and co-operation in securing such legislation as we may need. I feel sure he is a man of progressive views, but in his official capacity, his duties are certainly too numerous for him to notice in detail all of the many great interests of our great and glorious State.

Respectfully yours,

N. F. MURRAY.

Invitations were presented for places of holding the next meeting.

Invitations for the next meeting were received from Carrollton, Sedalia, St. Joseph and Kirksville.

L. T. Kirk—In behalf of the Pettis County Society, I invite the society to come to Sedalia. The county court has offered us the use of the court-house, one of the best and most commodious in the State. We would like to show you the great city that has grown up there in the center of the State in the last few years.

N. F. Murray—There is a newly organized society at St. Joe, and they desire me to invite this Society to meet in that city. I think we could do a great deal of good there in the way of aiding and encouraging them. The large and fine court-house we can have for the meeting, with rooms for the several committees. St. Joe annually packs from 200,000 to 300,000 barrels of apples. It is the center of a great fruit garden.

Chas. Patterson—I feel free to invite the Society to meet at Kirksville. You have never met in that section of the State. We have the same advantages as a fruit-growing country as well as the western part of the State.

Mr. Armstrong—I should be opposed to meeting in a large city like St. Louis or Kansas City. They have too much to do and no time to attend or entertain this Society. Such a place as Clinton or Sedalia would be much better.

Mr. ————The gentleman is mistaken in thinking that the citizens of St. Joe do not take any interest in the meeting of this Society. We have a local society there and would be glad to welcome you. We have fourteen railroads, making it easy of access from all parts of the State.

President Evans—We all know we can not have a successful meeting in a large city. You are mistaken, Mr. Armstrong: St. Joe is not a large city.

Mr. Murtfeldt—I would be glad to go to St. Joe. Sedalia is also a good place for a meeting, but I think it is too close to Clinton. We don't want to stay too long in the same place.

The place for the next meeting was left to the selection of the Executive committee.

[It was decided to hold the semi-annual meeting at St. Joseph on June 2, 3 and 4, 1891, and the thirty-fourth annual meeting at Sedalia on December 1, 2 and 3, 1891.—SEC'Y.]

The following resolution was presented and adopted, and the secretary ordered to notify the Commissioner-General of our wishes:

Resolved, That the Missouri State Horticultural Society, in its 33d session assembled, believes it will be to the best interests of horticulture in the United States that Mr. Parker Earle be placed in the charge of all matters appertaining to horticultural exhibit at the Columbian Exposition of Chicago in 1892 and 1893.

SECRETARY'S REPORT.

Mr. President and Members of the Missouri State Horticultural Society and Friends:

For one-third of a century has the Society been meeting in annual sessions. Thirty-three years ago the Society was organized for the same purpose that we now meet together. Some of the members of that first organization are still engaged in the same work. What these thirty-three years have done for Missouri we can all see in the growth of grand cities where there were none, in the opening of farms where there was nothing but wild prairie and timber, so that to-day we are over 300,000 strong farmers at work on our rich soils.

These thirty-three years have seen put upon Missouri soils over 8,000 miles of railroads; they have seen a thousand cities grow up and prosper in the 114 counties of the State; mines opened, the richest in the world, of lead, zinc, iron and coal; some of the finest quarries of stone that can be found anywhere. These years have seen the rich lands of Missouri covered with the finest farms in our whole country; the best horses, mules, cattle, sheep, hogs, poultry grown anywhere in the whole United States. Instead of going outside of the State for our stock, to-day we see the other States coming to us for their fine stock, and to-day thousands of carloads are annually shipped to other lands.

These thirty-three years have seen the State increase from a few thousands of people, until now we have nearly three millions, and room for many millions more. Our fruit interests have grown from a few growers, and a few orchards, and a few fruit farms, and a few interested people, until now we have over 20,000 farms wholly devoted to horticulture, and 100,000 people wholly engaged in horticultural work, and more than another 100,000 partly devoted to this work.

Then there was no demand for quantities of fruit, and every farmer had but to plant the trees and gather the fruit. The trees seem to grow almost spontaneously and to bear abundantly. A few thousands of bushels of apples would supply the market, while now it takes millions of bushels.

To-day we have orchards which singly produce more than whole counties would then, and to-day we find that our fruit crop is worth over $10,000,000 to our state. To-day we see orchards sell for $6,000, $8,000, $12,000, and up to as high as $100 and $150 per acre for the

apples alone. To-day we find the apple crop of the State worth millions of dollars. The small fruit plantations have grown as well, and now we see a ten, twenty, forty or eighty acres wholly devoted to small fruit-growing.

In vegetable gardening, in floriculture, in seed-growing, in nursery growing, in roadside and yard-planting, in parks and cemeteries, in the study of the insect life, our friends and enemies, in the study of botany, of the rusts and mildews, in our agricultural colleges, in our experiment stations, in our horticultural press, in the reports of our State societies, in the experiences of our workers, in every avenue of study and thought, of experiment and experience, of practice and preaching, we find a wonderful development in the last thirty-three years.

If we have anything to be proud of, after being proud of our State, it is to be proud of the development of horticulture, until now we have avenues leading in all directions and open ways for any to follow, as well as great work still to do, and great studies still to be entered into, and great problems still to be solved.

So, then, meeting here, dear friends, we do so, as no idlers in this world of work or study; we are no laggards in this onward rush and push of the age. We have plenty to do, and are doing it with a will and a way which means success. We have plenty of study and investigation and experiment, and are following it with the utmost zeal and energy, which means success. We are lovers of the work and the study, and expect to follow it to its final success.

We are trying to systematize all our efforts in the different lines of our work, and are accomplishing better work and more profitable.

The florist has separated his work from the vegetable grower, or the fruit-grower, or the nurseryman, or the seed-grower, or the landscape gardener.

The nurseryman is a nursery grower; the fruit man is a small fruit grower, an orchardist, or a vineyardist, or all together, but leaves off the nursery, the greenhouse or the vegetable grower. Each part or department of this great work is being put in its proper channel, and we find this a day of specialists.

There is enough for any man to learn in any one department of this work to engage the interest and attention of any one who wishes to enter in upon it. When once you begin the study or the practice of horticulture, you will find fields open up before you so broad that you will never fear of running across or exploring the whole of it, but you will begin to wonder how it is that there is so much to do and so much to learn.

And then the capabilities of our State and the needs of horticulture—can I begin to touch upon them?

Either of these subjects would require a paper by itself. The hill and bluff lands all along the Missouri river are the locations for our orchards. From the north line of the State to the south line there are thousands of locations for the best fruit farms in the country. There are openings near thousands of our towns for good small fruit plantations, or good florists, or good small nurseries.

Special varieties for special locations is the secret of successful fruit-growing. In every part of the State study your market and what it demands. If they want some early apples, plant them. If cherries are wanted plant them. If an early-maturing winter or late fall apple is wanted, plant them. If peaches are demanded, plant them, always having in view the special adaptation of your soil and climate to what you plant. If the market wants strawberries, plant them. If raspberries or blackberries are in demand, plant them, keeping always in view the demand and supply, and the adaptability of your special fruits. If good-keeping winter apples are called for and you are far from market, plant them, and plant them in quantities large enough to be an inducement for the buyers to come to you for them.

The capabilities and possibilities of the State will fulfill every demand made upon them in the location, soil, climate, market, varieties, and success is sure if intelligently followed.

The needs of horticulture are too many but to enumerate here. They embrace the needs of the orchardist, the gardener, the tree planter, the yard decorator, the florist, the seed-grower, the nurseryman, the forester, the landscape gardener, the botanist, the entomologist, the geologist, the ornithologist.

The needs of horticulture are to show our advantages, our possibilities, our successes. We need more knowledge, closer communication with each other, more business-like methods, more instruction from our scientists, more study, better work, more intelligent use of the opportunities given us. We want to know how to feed and how to breed our fruits, so that we may know something of the results.

We need new blood in our work. Every time I go out through the State I find some good worker who should be with us in heart and body, both for his success and ours, as well as the benefit of the State. We need the assistance of every true horticulturist all over the State in this work. There are hundreds or thousands of good, earnest workers and enthusiastic students who should let their light shine for the good of the State.

Above all, we need the lovers of the work and the cause. If a lover of the profession like Brother Miller, we will let other people know what we are doing and what can be done—not all of us like him

in writing so much, for we are not so handy with the pen, but we can tell it from word of mouth, and it will help others.

The work of the Society for the past year has been one of improvement and encouragement. We have now twenty-seven horticultural societies in different parts of the State, and some of them are doing good work for the members individually, and the society collectively, and the State work continually. In the following counties there are societies formed: Adair, Atchison, Barry, Bates, Barton, Buchanan, Butler, Camden, Cooper, Greene, Henry, Holt (2), Howell (2), Jasper (2), Lafayette, Laclede, Linn, Mercer, Montgomery, Pettis, Polk, Phelps, Ripley, Vernon, Missouri Valley Horticultural society, Kansas City. Many of these are helping themselves and their county far beyond what they have any idea, possibly.

You will not find the well-posted members of any of our local societies complaining that they knew nothing of the prices of apples this fall, and consequently losing hundreds of dollars by their neglect. I shall instance two such complaints, which came to me a few days ago, by such persons, who never can afford a dollar for their society, or for papers either, probably. One complained that all the apple-buyers were swindlers, because he sold his orchard to one for $300, and it turned out that the man packed 900 barrels of apples. He lost only about $1,500—that is all—on that one deal.

Another reported that a buyer was a rascal because he came and represented the great surplus crop there was all over the State, and that apples would be very low this year. He sold his apples, gathered in piles on the ground, at 50 cents per barrel, and now is growling that on the 600 barrels he lost over $1,000.

Do you want stronger proofs of the benefit of organization and in keeping posted in all our matters? I hope to see 60, 70 or 80 good, live horticultural societies in our State, and we will not only do our State good and our county good, but will make for ourselves money.

From last July I have been receiving letters from fruit-buyers, evaporator men, cider men all over our country, North, South, East and West, "Where shall I go to get plenty of good packing apples?" "Where can I get apples enough to pay me for putting up an evaporator?" "Where can I get 100,000 bushels of cider apples?" "I want 150,000 barrels of apples; where can I get them?" "I want nine carloads of apples; where shall I go?" "No apples in Western New York; I must have some to supply my customers; where can I get them? how is Missouri off for apples?" "Our apple crop is a failure here in Michigan; how is it in Missouri?" "Northern Ohio will have a very short crop of apples; what can Missouri do?"

And so on to the end. I really believe that there were located in the State hundreds of buyers of apples from information sent out by the State Society, and that hundreds of thousands of dollars were saved to our fruit men by encouraging and locating so many fruit-buyers in the State.

The report for 1889, although late in its appearance, has been well received, and is anxiously called for. The call for our volume is so great that next year we should have our edition increased to at least 6,000 copies. We could then supply more of our own State also with the report, as well as send to other State libraries, societies and fruit-growers.

The report begun by Miss Murtfeldt has been highly complimented and called for, and we should by all means have the same continued in each year's issue until completed. This is just the work we should do for the information and instruction of our people in entomology, and I hope to see the good beginning go on to a good completion.

The World's Fair should demand our attention and earnest beginning of the work for a complete display of horticultural products of the State.

Our Society should prepare a lot of large, fine jars for the showing of fruits, and they should be put up next summer as a test of what should be done, and then added to as we find we are able to do during the next two years.

We are in hopes that the wishes of the States, expressed at Chicago last August, be complied with, and that horticulture be given a department by itself, and that Parker Earle be made its chief. A strong vote on these points by the State Horticultural Societies this winter would have an influence in deciding the matter with the commissioners.

I think that the State society of this State should take the work of making the horticultural part of the display for our State. With the assistance of all our local societies and all our horticulturists, we think that Missouri would stand in the lead in the show of fruits. It seems to me that a display made something like the one in St. Louis, by counties, would be most just to all concerned and give the State as a whole as good a display as can possibly be made, and then each county would get their proper credit.

It does seem to me that such display should be made by the States, and that no premiums should be given, but each strive to do its best, and leave the judgment of the displays to the people as a whole. Every State should pay for its own work and displays, and thus leave off these petty jealousies and troubles which so often arise from com-

petitive exhibitions. If each State would pay enough to do the work well and no premiums offered, each would be put on its State pride to do its very best, and leave the judgment to the body of people and passers by.

Our State should appropriate at least $10,000 for the department of horticulture, and not leave us like they did at New Orleans, without a dollar to work with, while others had as high as $7,000 for horticulture alone.

Our State is fast becoming noted as a fruit State, and $10,000 is little enough to represent this State in all the departments of horticulture as we understand it.

FRUIT-GROWING.

Some plain, simple directions in fruit-growing from the strawberry up to the pear are being called forth often by the citizens of our State. Ofttimes I will receive a full letter with a dozen or more questions to answer, when to answer them satisfactorily would take a half day's writing, and I find it impossible to do it. I think a little pamphlet with instructions to beginners on the different fruits would be something which would reach the mass of our people better than in any other way. How it is best to do this and who shall do it will be a matter of discussion. It seems to me that some one who has made a specialty of the different lines of work should be chosen to do that part which they could do best—strawberry to one, raspberry and blackberry to another, grapes to another, cherry and plum to a fourth, peaches to the fifth person, currants and gooseberries and quinces to another, apples to a seventh, pears to the eighth person, nut trees to the next one, yard planting to the tenth. By this plan we would get the best in each department, and it would be of great value to every beginner.

If we do not do this now, I shall arrange the subjects for our next annual meeting in such a plan, and use the papers thus presented and discussions on them for the purpose here stated.

OUR WORK.

Of one thing I shall always be proud, and that is the State of Missouri. There has not been a year since I entered the State in 1867 but that I have planted hundreds and often thousands of trees each year in our orchards. It has been our aim to prove to our people that we have a grand fruit State, not only by showing its advantages, but by planting and planting, and it has been our province to be one who has planted the largest and finest orchard to be found in any part of the western country, down on the Ozark mountains, where we now have 50,000 peach trees, 20,000 apple trees, 5,000 other trees, and 40 acres

in berries. We hope to prove to the people of this and other States by our works that we have one of the best States in the Union.

It has been our province, since being Secretary of this Society, to assist and induce more planting of apple orchards than usually falls to the lot of man; and to-day those who planted only wish that I had made them plant more.

Our work has grown and grown, until now its influence is being felt in every State of the Union; and I speak the truth, soberly and in earnest, when I say that no other State has a better State Society or more earnest workers than has Missouri; and, with the unity and sympathy of feeling, all pulling together, united and strong, we shall step upon a higher plane of usefulness; and we say now, as we said to you at the beginning of our work in 1883, that, if we were united in our efforts, we had no fear of success.

There are grand possibilities before us yet, and it is my ambition that our Society attain the highest point. I have three great plans and subjects in my mind which I am using every effort of my make-up to do all that is in my power to do in reaching the end desired.

The first is my duty to God in matters pertaining to His kingdom; the second is the advancement of the interest of horticulture in our State, and the third is education.

Horticulture in our own State is my ambition, and not in others. I am proud of Missouri, and want other people to know what we have out here, so that when inducements come to me from other places or national organizations, I give only one answer: "I am for Missouri, and have plenty of room to work here." And that is what I told the American Horticultural Society, at its meeting in Texas, when they wanted me to become secretary of that society. I cannot; there is too much work in Missouri.

When I look back over the work which we have accomplished in the last half-dozen years, I am delighted to see our progress; but when looking ahead at the work to be done, progress seems slow. But we have every reason to be proud of the work and the opportunity offered; and, with a united effort and as one man, working with a will, our end will be attained, and we have no fears of the result.

OUR REPORT.

On November 27 I visited Jefferson City, the Commissioners of Public Printing and the State Printers. I am happy to state that I have secured the order for our printing to be done at once, and work will be begun on it this week. I have sent the report of the June meeting to them, and in a few days after this meeting I will have in readiness the report of this meeting, and we hope for once in our history

that we shall have our report ready for distribution soon after the first of January, 1891.

The report for last year has received a great number of favorable notices, and is being called for to such an extent that the edition is nearly exhausted.

THE HISTORY OF OUR SOCIETY

For its thirty-three years I consider of much interest and value for the future. In looking up this matter I find that the Society has very few of the old reports. If any member has any of them in duplicate or any which he will part with, I wish he would send them to me, for we are anxious to get a complete set in duplicate.

We are wanting reports of 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1868, 1869, 1872, 1873, 1877, 1878 and 1882. If you have any or know where any of these can be obtained, we should be thankful indeed.

The History of the Society, by F. A. Sampson, of Sedalia, and C. W. Murtfeldt, of Kirkwood, will give you the facts and a list of the reports published. We owe to them many thanks for their painstaking researches.

THE SOCIETY LIBRARY

Has been increased according to the recommendation made one year ago, by the purchase of eighty of the best works on horticulture to be found in the land. We shall be glad indeed when we can have such a location and complete library as is now found in some of our eastern libraries. We have now lists of reports from most of our State societies for a number of years back, and it is my aim to secure as complete a set of reports from each State as can be had. These of themselves would be quite a library, and if completed, as I now hope, I hope to be able at our next meeting to give you a rather complete list of all the States. Our own report is now being called for and sets, especially from so many libraries, that I find myself unable to fill them.

Shaw's School of Botany is going to be, and in fact now is, one of the great educators in our work. By a wise provision scholarships were provided for a number of young men and a six years' course provided for them. They are under the charge of the head gardener and are advanced to different work as they become competent. They are paid the first year $200, the second year $250 and the third year and after $300, together with a convenient lodging house. It was our good pleasure to meet with the director of the garden, the head gardener and some of the trustees last October, and learn much more of the workings and the value of the plan laid out.

The Society has two young men in the school, the nephew of our Vice-President, and the son of friend Nelson.

Two scholarships are given to our Society, and we shall see that they are always full. It is possible that there will be another place vacant next year, and if so, we must see that it is filled.

The best wishes of your Secretary will always be the portion which belongs to this Society, and with the same united effort in the future as in the past, we have no fears of our success.

Respectfully,

L. A. GOODMAN, Secretary.

Some of the uses we put the money of the Society to for the benefit of our State.

1. Organizing local societies (county).
2. Fruit statistics (orchards, etc.)
3. Nomenclature and new fruits.
4. Entomology and ornithology.
5. Injurious fungi.
6. Fruit shows and delegates to sister societies.
7. A grand Missouri fruit show, by counties, at the World's fair.
8. Advertise our possibilities (for growers).
9. Advertise our fruits (for buyers).
10. General promotion of horticulture.
11. Transportation (R. R. and cars).
12. Annual and semi-annual meetings.
13. Hold county institutes with State Board of Agriculture.
14. Dissemination of all this information.
15. Ornamentation of public grounds and school yards.
16. The general upbuilding of the cause of horticulture.

SECRETARY.

REPORT OF TREASURER.

The Treasurer, D. S. Holman, being very sick, probably upon his death bed, the Secretary reported that he had none of the bills which had been paid, but could give the amount of warrants drawn since the last report of the Treasurer at Poplar Bluff, in June, 1890.

June 7..	Balance on hand as per report		$989 22
July 2..	Warrant No. 153—map for report	$20 00	
Aug. 6.	Warrant No. 155—library books	107 00	
Aug. 30	Warrant No. 156—expenses of Secretary's office and salary ($200)	289 25	
Aug. 30	Warrant No. 157—Tribune Printing Co.	25 00	
Sept. 22	Warrant No. 159—binding 1,000 reports	157 75	
Oct. 7..	Warrant No. 160—P. O. bill	25 88	
Oct. 10.	Warrant No. 161—P O. bill	66 72	
	Total		691 60
	Balance		$297 62

At this meeting there will be a good many bills to be paid which are usually settled up at the meetings after being referred to the Finance committee, which I am sorry to say I am not able to give, because they are all in the hands of the Treasurer. As soon after this meeting as possible I will see the Treasurer and get the bills, and refer to our finance committee.

SECRETARY.

ELECTION OF OFFICERS.

By motion, the rules were suspended and the entire corps of officers were re-elected by special ballot.

WORK OF THE SOCIETY.

Secretary Goodman—I want suggestions from the members as to what we ought to do to better our condition and accomplish the work we have to do. We want all the help we can get.

Mr. Lamb—I don't believe I have taken up any of your time, but I will say a few words now. We want information in regard to the amount of the different fruits produced in each county of the State. What county produces the most apples? which the most strawberries? which the most grapes? I move that we have a committee appointed to get up a plan to get at fruit statistics.

Levi Chubbuck—It is part of the business of the State Board of Agriculture to gather statistics of agriculture, which includes horticulture. I want to get the Legislature to pass an act requiring the county assessors to list the acres and the product of each and every kind of farm crop and every kind of fruit, and send the lists to the State Board of Agriculture, and there you will have all the data. It is successfully done in Ohio and other states. If this Society will lend its aid, it will help us to get such a law passed.

Mr. Lamb—The suggestion of Mr. Chubbuck may help us in years to come, but I don't believe it will help us now—for the next meeting.

Mr. Patterson—I often get requests for such information; but I feel wholly incompetent to express any opinion even, in the absence of any definite information. I hope we will not hesitate to give Mr. Chubbuck the assistance he requires.

Secretary Goodman—To get the desired information costs a good deal of money, and the Society cannot afford to do it. Before you want the statistics next year the Legislature will have met, and if we can get them to pass such a law we can get the statistics for next year. If they refuse, then we can try to do somethiug. I have tried the plan of sending out cards with utter failure. Such incomplete reports as I have been able to get do little or no good.

Mr. Blake—The State Board can do but little with $3,000. Illinois gives $25,000 for institutes alone, and $100,000 to the State Board, and $5,000 to the State Horticultural Society. We are far behind. We must capture the Legislature. We must get them by prayer or by force

Mr. Lamb's motion was put to a vote and lost.

THE WORLD'S FAIR.

Mr. Hartzell—This Society ought to have $25,000 to make an exhibit of the horticultural products at the World's fair.

REPORT OF COMMITTEE.

MR. PRESIDENT: Your Committee on World's Fair resolutions would submit the following:

WHEREAS, the horticultural interests of the State of Missouri as now developed, amounting to over ten millions of dollars annually, and not excelled by any other one product of the farm; and

WHEREAS, if properly encouraged would very soon double in value; and

WHEREAS, the benefits derived from horticulture are general in character, as all are benefited directly or indirectly; and

WHEREAS, a display of our horticultural products at the World Fair in 1893 that will do justice to our great State, which now ranks third in fruit products, will be attended with a great amount of work and expense; therefore be it

Resolved, by the State Horticultural Society in session assembled at Clinton, Mo., that we ask of our Legislature an appropriation of $25,000 to be placed under the control of the State Horticultural Society; 2nd, be it further

Resolved, that we recognize the great importance of the great agricultural interests of our State, such as live-stock, dairy, cereals, etc.; that we appoint a committee of our State Horticultural Society to confer with the State Board of Agriculture in the near future, to formulate a plan and work in harmony to secure liberal appropriations to make the different displays.

N. F. MURRAY,
A. NELSON,
HENRY SPEER.

DISCUSSION.

C. C. Bell—I second the motion to adopt the resolutions, and want the amount left at $25,000.

The resolution asking for $25,000 was adopted.

C. C. Bell—I suppose it will be the duty of the Governor to appoint a commission in charge of that fund in case it should be allowed. This commission should consist of our practical horticulturists of this State, and not of politicians. I think we should designate the members of the commission. We know better than the Governor who would suit us.

C. M. Stark—I move that the officers of the Society be recommended as the officers in charge of the fund.

Mr. Blake—Let us go slow, boys; let us get the money first.

Mr. Speer—We might defeat our object by asking too much.

Secretary Goodman—I hope we will be careful. Let us not ask for too much. I am satisfied we can have enough influence with the Governor to have him appoint good men. Let us go at it with a vim.

Mr. Upton—I think if the State society gets that money, it goes to the treasurer.

Mr. Bell—I desire to ask for information. In that resolution we ask for $25,000; is that money to be granted to this Society?

Mr. Murray—That is the way the resolutions reads.

President Evans—I know that Governor Francis will put the right men in the right place.

Mr. Gano—I have a motion to offer. It will come in place if we are to make an exhibit. I move that we have one hundred flint glass jars of fruit put up for the benefit of our exhibit at the World's Fair. Carried.

LANDSCAPE GARDENING.

Mr. Kessler exhibited a plan for the improvement of the grounds of the Missouri Valley college at Marshall, Mo.

Secretary Goodman—The grounds embrace thirty acres, lying beautifully on a ridge, and have nothing on them. They asked us to

prepare plans for the improvement of the grounds, as we did at Springfield. We do this as a part of our missionary work. We ask for gifts of trees to plant the grounds.

Mr. Kessler—We plant closely at first. We ought to have some of the best native trees, deciduous and evergreen, that do best in this climate.

A voice—Russian mulberry? [Laughter.]

Mr. Kessler—We can use a large number, or we can do with a smaller number. About 1,000 are needed in the grounds, and 140 street trees of one or two kinds.

The following list of donations was secured:

J. C. Evans, Harlem, 100 trees.
L. A. Goodman, Westport, 100 trees.
A. Ambrose, Nevada, 100 trees.
E. A. Barnhart, Clinton, 100 trees.
C. I. Robards, Butler, 100 trees.
J. Bagby & Son, New Haven, 100 trees.
Holloway & Speer, Butler, 100 trees.
Stark Nursery Co., Louisiana, 100 deciduous trees.
Stark Nursery Co., Louisiana, 100 evergreen trees.
J. T. Stewart, Blackburn, 25 evergreens.
Chas. Patterson, Kirksville, 100 trees.
G. H. Shepard, Lamonte, 100 trees.
M. L. Bonham, Clinton, 100 trees.
Blair Bros., Kansas City, 100 trees.
J. W. Turner, Meadville, 50 trees.

C. M. Stark—I move that a donation for Baird college be in order.

Secretary Goodman—If Baird college will put their grounds in the hands of the State Society, and allow them to be laid out right, we will do it. We don't wish to send the college 500 trees and tell them to plant them out helter-skelter. Let us lay out the grounds carefully, and then plant.

Mr. Chubbuck—The grounds of Kidder institute have never been planted according to Mr. Kerns' plans. Some of the trustees asked me to put the matter before you. I would suggest that any surplus at Marshall be sent to Kidder.

Much good might be done to encourage landscape gardening by planting the grounds of railroad stations. The roads would in many cases pay for the trees if plans and suggestions for the work were furnished. If this Society had the money, I think it would pay a landscape gardener $500 or $1,000 to visit the stations and make plans for their planting.

BERRIES IN NORTH MISSOURI.

BY J. N. MENIFEE, OREGON.

Secretary L. A. GOODMAN:

DEAR SIR—I received your call for a paper to be prepared for the State meeting. I suppose it would be entirely out of the regular order of things for me to decline, as it seems to be generally understood that to be loyal to the horticultural fraternity we must always be ready to answer when called to tell all we know, and cheerfully to divide all our good things among the brotherhood, and surely I must not be the exception to so good a rule as this, though the task be hard.

There has been so much said and written about the great fruit belt of Central and Southern Missouri that one would naturally infer that we were just a little beyond the limit of successful fruit growing. Well, while we do most heartily congratulate our brethren south of us in their world-wide and well-deserved reputation as having a fine fruit country, yet until facts and figures change, we must modestly decline to admit that there is a belt anywhere in Missouri or anywhere else better adapted to successful fruit-growing than North Missouri. Let this suffice on the subject of fruits in general, as the subject assigned me was "Berries in North Missouri."

That our soil and climate is excellent for the production of berries may be seen in the fact that wild berries grow in great abundance where they have not been destroyed to make room for something better. Hundreds of bushels of wild blackberries were sold and shipped annually from one station alone in Holt county. But that is a thing of the past.

When the writer planted his first berry patch, consisting of one acre of Wilson's Albany, Triomph DeGand and Jucunda strawberry, one acre of Doolittle and some wild raspberries, and one acre of Lawton and Kittatinny blackberries, he was hooted at by most all who chanced to hear of it; and later, when a thousand each of Crescent strawberry, Gregg raspberry and Snyder blackberry, which cost $112, were added to the patch, the whole neighborhood whispered "crank," planting such costly berry plants when the market is already full of wild berries.

Two years later and the three-acre berry patch netted as much as the 80-acre farm had done previously, which had been poorly cultivated for want of proper teams and tools. The demand for berries and plants increased, acre was added to acre; many other "cranks" also planted berries. Eighteen years have passed and berries are grown all over the country.

While we estimate the last crop short one-half, there were shipped from my shipping point alone about twenty-five hundred crates, beside hundreds of crates that were sold on the grounds or delivered to customers by wagon; and to-day the demand for both berries and plants is as great if not greater than ever before. People are just learning that berries are not only a luxury but a staple article of food, possessing just the acids necessary for our physical condition after living so long a time on salt and dry food; for berries contribute as much toward good health as powders and pills, and are not only cheaper but easier taken.

When we consider the growing North and West, the stream of immigration pouring into North Missouri, Iowa, Nebraska and Kansas, that a much larger per cent of our population are finding homes in the towns and cities, where they become consumers, the rapid growth of our towns and cities, the increased railroad or transportation facilities, the advantage of canneries and evaporators, by which gluts in the markets may be avoided, and our surplus, canned or evaporated,

may be shipped by freight to distant markets where berries cannot be grown—with all these facts before us who can estimate the magnitude of this branch of industry in the next eighteen years? When with our experience in growing, handling and marketing the fruit, our improved varieties of all kinds of small fruits, the superior packages and cheap lands of North Missouri is certainly a guarantee that the berry business in North Missouri must become an immense industry, that will give remunerative employment to every idle man, woman and child who is able and willing to work.

We cultivate the blackberry, dewberry, raspberry, strawberry, serviceberry, gooseberry and currant in all their varieties. The huckleberry alone persists in demanding its native wild, uncultivated, rocky hillside, where its shallow creeping roots are kept moist and cool by the shade and fallen leaves of trees and other brush.

Our berry crop last season was cut short about one-half by late frost and hailstorms, followed by a most distressing drouth, which leaves us at this writing with a very short, inferior plant growth for the coming season; yet we hope the favorable open fall will so recuperate the plant roots that the spring growth will be better than the present appearances indicate. All go into winter quarters well matured.

Give North Missouri the next June meeting and come and see, taste and believe that North Missouri is equal to the best in the production of berries.

BERRY-GROWING IN SOUTH MISSOURI.

J. H. LOGAN, NEVADA.

I hardly know just how to commence on the subject assigned me in any other way than by giving my own experience as a small fruit-grower in Southwest Missouri. I purchased a forty-acre tract of timbered land near the city of Nevada, in the fall of 1883, paying thirty dollars per acre. This astonished the natives: thirty dollars per acre for land that was thought to be almost worthless. They said several men had starved out and left the country, that had tried to make a living on it. There were twenty acres of the tract under cultivation, and about one hundred bearing apple and peach trees on the tract. The following winter I commenced to improve the cultivated portion of it by hauling barn-yard manure. The following spring I set out 500 strawberry plants and 500 raspberry plants. This was my first experience, having never seen a strawberry patch in my life, except wild ones, and my means was just about as limited as my experience, labor being my only capital, having two sons large enough to do most of the hard labor. To be brief, will say that we gave our plants ordinary care the following summer, and by fall we had raised enough plants to set out one and a half acre; the following spring one acre more. We obtained excellent results during the berry season; sold all of our crop in our home market. I also set out four acres more raspberries, Souhegan and Gregg mostly, and they grew finely and produced a fine crop the next season. So we still kept on increasing our plantation, so that during the season of 1888 we sold from about five and one-half acres of strawberries and eleven acres of raspberries $3,480 worth of fruit; had for our net returns about $2,500, after paying for box material and picking. We were still encouraged to press onward, and have found the business profitable with the exception of the season just past. And as every strawberry-grower's experience has been about the same, I will not relate my own. But we have increased our plantation now to eighty acres—seventy-five of this being in berries—thirty-six acres in strawberries, twenty-four acres in raspberries, and fourteen acres set to blackberries.

We have given our plantation the past season good care. We have a field of twenty-five acres of strawberries that not an armful of weeds or grass of any kind could be found in it; have also about one and a half acre set to plums, and over 3,000 other fruit trees on thirty-six acres of the berry field. Our soil is sandy, gravelly loam, all of it being timber land, on quite a high elevation for our part of the country. Now I will say to those engaged in the business that it requires a good deal of sand (in the craw) for any one to be encouraged to stick to the business after such a disastrous season as the one just past, but I think the prospects are encouraging for the next season. Our plants are all looking finely. Many plantations all over the country have been neglected, and I have noticed some fields have been plowed under. Although I do not attribute the low prices obtained the past season was caused by an over production, but the condition in which our berries reached the markets.

I will not say anything in this paper as to our mode of cultivation or planting. Now as to the adaptation of our soils for producing fine fruit and in paying quantities, Missouri's reputation is reaching out all over the country as being one of the finest horticultural States in the Union. From my own observations and experience, and after traveling over different sections of the country, from the Pacific slope to the Atlantic coast, from Dakota to Southern Florida and Texas, having visited many of the largest strawberry plantations in Southern Mississippi, I think Missouri can safely challenge the world as a fruit-growing country.

I think the problem for the fruit-grower to solve is transportation. This is becoming to be a great question to solve. Many of you remember that during the past year that a large number of our small fruit-growers organized a fruit-growers' and shippers' association, and made arrangements to ship in car lots, using the Thomas refrigerator car. I notice in reading over the Secretary's report that the society shipped thirty-nine car-loads of berries—all of them strawberries with one or two exceptions—18,558 crates of twenty-four quarts each, or 452,592 boxes. These were all shipped in car lots. These berries were shipped from Nevada, Carthage, Sarcoxie, Lamar, Liberal and Golden City. I notice that he concludes by saying that they realized 66 cents per crate net on an average; but I go on down and find a little item of an expense account paid to the officers for looking after this business, stencils, etc., of $640, leaving the average net price of about 62 cents per crate. Now I presume the experience learned through the losses sustained by this association may be worth something to the fruit-grower in general. We shipped our fruit by express with one exception. We were induced to ship one shipment of raspberries, 65 crates, in the refrigerator car attached to a regular freight train, to Omaha, Nebraska, and our net returns were 50 cents per crate. At the same time we shipped twenty crates by express (soft berries) to Kansas City and received $2.27 per crate. I was told by the manager of the car that if our berries were sound when placed in the car that they would be sound if taken out in seventeen days. This is what led me to try the experiment. What next?

BERRIES IN 1890 AT BLUFFTON, MO.

SAMUEL MILLER.

The Strawberry.—As this is about the first to ripen in the season, and perhaps the most popular and useful of all the berries, it deserves special mention.

The number of varieties were but few this year; therefore, this report is not as extensive as might be expected from one who is looked upon as a regular strawberry grower.

The first ripe strawberry was a Crescent, although Michel's Early and Schnell's Early are on my ground; but as the Michel were plants received last fall and small plants at that, they had no chance, and Schnell's were in too crowded a mass to come out as early as they otherwise might have done.

Crescent, Captain Jack, Bubach and Warfield No. 2, that had been established, bore fine crops.

Stayman's No. 1 did nobly, and this berry, I believe, has come to stay.

Among the newer ones, such as Eureka, Mrs. Cleveland, Ohio, Centennial, Townsend's No. 3 and No. 7, all showed up well; but the beautiful and excellent Eureka suffered with the drouth more than any other one. Perfection, Comet, Miller from La. and Cloud, did not acquit themselves to suit me. Haverland and Payne were splendid. To test some of the almost forgotten varieties along with the new ones, I procured last spring Harvey, Big Bob, Pineapple, and they gave me some fine berries. Hoffman I must not forget; it promises well.

In a test bed I set out last spring Payne, Ella, Pineapple, Hoffman, Harvey, Big Bob, several Nos. of Thompson's, Van Deman, Bessie, Regina Nos. 1 and 2, Rich's Seedlings, Gen. Putnam (in Sept.) last. All these were well cultivated, and each variety allowed to make six plants, which were set out in a new place in August and September; all of which look as if they might show fruit in perfection.

In addition to these, six plants each of quite a host of varieties were set the past fall, all of which may give fruit to taste next season, but of course cannot show off to any advantage, among which are Stephens' Alabama, Jefferson and some others, thirteen seedlings of our own, some of which look promising. All told, there are about 100 varieties. If spared until 1892, these will all have an equal chance, and out of the multitude there should be something good.

None of these please me so far better than Van Deman, which will not be let out yet, I understand. But it must be remembered that only about one dozen of those set out last spring bore fruit, so that we cannot judge of the merits of the others.

I almost forgot Vem, a splendid large one.

Some will think and may say: What is all this for? The answer is that some one ought to test them, whether there is money in it or not, and as the making of more money than is necessary to keep myself and family comfortably has never yet fallen to my lot, why should I refuse to try this? particularly when men send me their new seedlings from all parts of the country, even from the Pacific coast, to test for them, what can I do? Not throw them away, surely. Some have gone so far as to say that they have more confidence in my report than they expect from the experimental stations.

How this will turn out time will tell. Some of the earliest are planted on a slope on the south side of the lofty cliffs, while the latest ones, such as Gandy and Memphis, are on the north slope of a hill. This will show how long the strawberry season can be prolonged.

Raspberries.—Centennial, Hopkins, Mammoth Cluster and Gregg are my choice black crops; Turner, Thwack, Cuthbert and Shaffer's Colossal for red ones; Caroline and Golden Queen for white, although the latter has not yet fruited with me.

Blackberries.—Snyder, Triumph, Taylor, Stone's Hardy, Freed, Erie and Minnewaska are all good and worthy of cultivation.

Gooseberries.—Houghton, Downing and Orange are the only ones I have. They do well, but as they usually go by the board, I pay but little attention to them. When we have plenty of other berries no one seems to care about them.

Currants.—Red Dutch and White Grape are my main crop. Fay's Prolific I got some years ago, but they don't stand the hot summer, and they were all lost.

Last spring another lot was planted, and we will give them another trial. Crandall's Large Black is also planted, but from appearances I don't expect much from it.

Dewberries.—Lucretia, as a trailer, is the best I have tried—early, large in size, good in quality and bears well; but they are such rampant growers that it takes work to keep them within bounds. I tie the fruiting vines to stakes so the fruit is easily gathered.

The Dwarf Service berry.—This splendid little fruit deserves more attention than it has received. They come in early, can be planted like currants, and bear full every year. The fruit is about the size of our medium wild ones.

In conclusion, I will say that the farmer who has no berries, and an abundance of them, is behind the times, and don't live as it is intended he should.

These very men who say it is too small a matter to bother with have something small in their estimation of the good things of this world.

DISCUSSION.

Sam. Miller—From my earlist recollection, since I knew anything, my father had an abundance of fruit. A man with such surroundings in childhood is a born horticulturist, and I hope to die one.

Mr. Helvern, of Arkansas—I am acquainted with the history of Michel's Early strawberry from the first. It has proven for four years one of the best known in that section of country, and by all odds the earliest. In 1889 it was shipped to St. Louis from Arkansas as early as April 15, ten or twelve days earlier than the Crescent. From two and one-fourth acres $800 worth of fruit was sold before the Crescent began to pour into market. From the same patch $1,300 were realized in fruit, and after picking, Mr. Michel sold two-thirds interest in the two and one-fourth acres for $2,000.

Mr. Turner—Around Fort Smith and Van Buren it seems to be a very vigorous growor, yet not too thick. It is earlier than Crescent, of sufficient size, and productive as far as tried. They think they have the thing in the way of an early berry. Every man should get it at once. We don't look for any berry to succeed everywhere, but we believe this to be worthy of trial. The plants sell from $2.50 per hundred to as low as $1 per hundred.

J. C. Evans—I am glad to know that the Michel's Early is doing so well. I said to our people two years ago that I believed it was the coming berry. I saw it two years in its native country, and thought that with all its good qualities it would come to the front.

Mr. Helvern—I could write up its history for your next report, but that would be too late for next spring planting.

Hoffman is early and fine, but not prolific.

During the last season—a dry one—Michel's Early grew and set twice as thick in the row as the Crescent. Reports from Kentucky and Nebraska all speak well of it. It has only two faults: it is rather

pale, not red enough, but it comes so early that it is salable. The first crate of sixteen quarts sold for $5.35. It is also rather soft—not softer than the Crescent. It should be picked early before the sun is warm. There is very little complaint on that ground. I can secure plants for $2.50 per thousand from reliable men. They have been sold for from $5 to $10 per thousand. It has a perfect flower, and can be planted alone. I have known ten acres of it planted without other kinds, and never saw an imperfect berry in the patch.

Mr. Ambrose—All the good varieties should be known, but I don't believe any grower should plant ten acres of it. It may do well and it may not. Some growers a few years ago planted the Jessie largely—resulting in failure. One grower planted 12,000 plants of it on the strength of what he had read. He made a mistake.

Mr. Logan—I never go very much on these new varieties as they come out. I thought I could rely on Mr. Helvern, so I set a few plants in November, and I expect to set 30,000 or 40,000 in the spring.

Jacob Faith—I have about seventy-five kinds of strawberries. None promise better than Michel's Early. That is all I can say.

J. G. Kinder—Judge Miller spoke of raspberries six inches around. Would not that be a good kind to send out?

Sam. Miller—I meant strawberries.

G. W. Hopkinds—I would like to know how to escape the rust on raspberries.

Henry Speer—I, too, would like to know something of the raspberry cane rust.

J. W. Clark—It is a rust of the cane and leaves that sucks the juices of the plant and stops its growth. The Bordeaux mixture is being tried for the disease, but when in the plant there is very little use to fight it. The department at Washington gives no remedy. The Bordeax mixture, so far as it is effective, is only a preventive of this disease. I should spray before the leaves start in the spring. Spores are lodged anywhere and everywhere. Wherever they happen to light there they are. If the conditions are favorable they will grow when the heat and moisture are sufficient. You must fight it before it gets into the plant. Stop its germination before the leaves start.

Mr. Speer—My first observation of the raspberry rust was at West Plains. When I went home I looked for it. I found that it had affected my plants and injured the crop of the year before. During the summer the canes will be spotted. When bad it will go clear around the cane and kill it, and the berries will dry up prematurely. I have no doubt that in many cases of winter-killing the damage was done by the rust the summer before.

J. M. Clark—The black raspberry and the red raspberry have no red dust on them, but it is the same rust that injures the blackberry.

Mr. Gano—My observation is that it commences about the last of May or the first of June as a little spot. Then the bark appears to burst. The cane never makes a good growth after that. I have never seen it on the cane of the second year's growth.

Mr. Hopkins—I have seen it on the old cane. I have seen them spotted clear to the ground. It comes first on the new cane. It is entirely different from the old blackberry rust. It does not affect the leaves.

Mr. Hartzell—An account of the trouble and the remedy was published in the "Rural World" of November 13. The whole cause of the trouble is the want of moisture.

Mr. Hopkins—It is worse in a wet season.

Mr. Hartzell—Too much moisture is worse than too little.

Mr. Clark—Some have said that this rust was caused by not stirring the ground. Our patch was stirred every few days, but the rust was there right along. It is caused by a little plant that works like the grape-rot.

Mr. Hartzell—It never hurts the cane when there is a good growth.

Mr. Pollard—The Shaffer is one of the strongest growers, and it is the most injured.

President Evans—The discussion seems to run more upon fungi than upon small fruits.

Mr. Kinder—The more fungi the smaller the fruit.

BERRY CROP OF 1890 FOR DOUGLAS COUNTY, KANSAS.

REPORTED BY B. F. SMITH, LAWRENCE, KAS.

This has been a very busy year with me. I gathered the largest crop of berries I ever raised. My strawberry-picking began on May 20, ending with blackberries the last of July. Owing to the extreme drouth continuing through June and July, raspberries and blackberries were seriously injured. But notwithstanding the long drouth, my crop of all kinds of berries rounded up above 42,000 quarts, 40,000 of which were strawberries. This crop in Douglas county was the largest berry crop in its record. Almost every blossom produced a perfect berry. We had the longest berry season ever known in Kansas, lasting, as it did, thirty-two days. Owing to the favorable weather for ripening, the crop was abundant; in fact, the supply greatly exceeded the demand. The overplus was due in part to there being less than one week's difference between the ripening season of Southwest Missouri, Southern Kansas points and Lawrence. Prices ruled lower than ever before in our county. Our Western markets, which heretofore had returned remunerative prices, were so glutted that the consignments of our large berry-growers brought them in debt, while others received hardly enough to pay for crates and picking. Hence, our strawberry-farmer friends are becoming somewhat discouraged over future possibilities. Again, when we read that in all the Eastern and Middle States large

berry-growers receive from ten to fifteen cents per quart for their entire crop, it is still more discouraging when we remember that some of us came West years ago, where we expected better prices for our fruits than we had received in our Eastern homes.

The lesson of the season teaches us that it is no longer worth while seeking Western locations for profitable berry-growing, and that it is better to continue the business near the more densely populated districts of the East.

NOTES ON VARIETIES.

Captain Jack—This grand old variety led the van for shipping a long distance. For three weeks in succession I shipped its berries to Albuquerque, N. M.--1,100 miles from Lawrence. No other berry stood the wear and tear so well as this one. Many growers think its berries too small, but give me the berry that sells for the most money in a distant market, regardless of its size.

Crescent—This sort, as usual, produced a large crop of berries, but the market being glutted with them, and prices too low for any profit, we gave the pickers all they would take away and left the balance for the birds and bees, while we picked firmer and better berries for the markets. When the Crescent is about half gone the rest of the crop is of no value for shipping purposes. In fact, it is, all through the season, a hindrance to the sale of good berries, and the sooner berry-growers drop it from their list of commercial berries, the sooner will the markets of the country become more active, and growers will make more money on the less productive varieties.

Bubach—This berry was a surprise and wonder to all who saw it on my grounds, but my commission merchant in Denver wrote me to "stop shipping those large, soft berries, and send more of the Captain Jack or other sorts that could be reshipped to the mountains."

Jessie—This much-advertised Wisconsin Mammoth berry is not as large as the Illinois Bubach, but its flavor has not been surpassed by any of the newer varieties.

Burt—If any of our friends have the pure Burt, they have the genuine Captain Jack, and *vice versa*.

Michel—This is the earliest of all my fifty varieties. We picked the first ripe berries of the Michel ten days before the Crescent was ripe. Its berries are not of the mammoth order, but large enough for an early sort. It is fairly productive, and will be retained until an earlier variety is brought out.

Cloud Seedling—Am real sorry that I am unable to say a good word for this Mississippi wonder. In all my twenty-five years' experience I never was so disappointed in any new strawberry. Our Southern friends sent it North with a blow equal to a Kansas cyclone, claiming it to be earlier than the Crescent by at least a week; but with me it is not as early. On the poor, thin soils of the South it may have been a success.

Pineapple—A real dead-beat, in fact. I have destroyed several of my own seedlings that were ten times more productive.

Pearl—The plant is a good, strong grower, and while its berries are not as large as those of some other sorts, they are firmer than the Crescent, Miner or Downing.

Haverland—The many visitors who were daily on my grounds looking after the behavior of the newer varieties were loud in their praise of this variety. It is nearly as large as the Bubach, but its berries must be tenderly handled before and while being shipped to market.

Warfield—Has a long future before it, and will stand shipment. It is as productive as the Crescent and more attractive to the eye.

Gandy—A fine, valuable berry for Kansas. I have fruited it for two years, and shall continue it, as it comes in after many other sorts are out of the way. The plant is a strong grower, and is at home in our rich, black soil.

Now I have a host of old worthy sorts that you all know. I mean the Downing, Miner, Manchester, Glendale, Mt. Vernon, May King, and others that need no introduction. Then I have a host of worthless new varieties sent from the east, where it is supposed all the good things come from. Their acquaintance will do you no good. These are the Jewel, Gold, Dutter, Itasca, Belmont, Mammoth, Monmouth, and others not worth the writing of their names.

I carry several varieties in my list, partly for comparison with good sorts, as well as for patrons who are often behind the times by waiting to purchase at lower prices.

RASPBERRIES.

The raspberry crops were less satisfactory in product than they were last year. While it was too wet then, this season was too dry. Berries, however, were firmer, and stood the racket of transit; and prices were better than they were last year.

Behavior of varieties.—For earliness and productiveness the Souhegan is first. However, it is not giving the satisfaction it did a few years ago. The cane growth is becoming more spindling, while its fruit is not so large. In fact, some of its friends are losing confidence in it, and they are looking for an early variety that has more vitality. The Gregg is likewise growing less productive, while its cane growth is not as large as formerly. The old McCormick, Miami, Smith's Iron-clad, and even Hopkins, are not the berries they were eight or ten years ago. Hence it is advisable that we, as berry growers, be on the alert for varieties of black caps that will stand the extremes of our seasons and return us value for labor bestowed on their growth.

The red varieties, Cuthbert, Thwack and Brandywine, seem to be as vigorous in growth of bush and product as formerly. Likewise the Shaffer, which is neither black nor red, but purple, still holds its own in vigor of growth. The fruit, however, is too tender for distant shipments.

BLACKBERRIES.

In the race among the blackberries for a long life, the Snyder and Taylor are in the lead. These two varieties are as strong and vigorous as they were in the beginning. While there are other sorts whose fruit is larger, their canes are full of disease, made so, probably, by cold winters. Hence the experience among berry growers is in favor of the Snyder for the first place, and the Taylor next in the race. The Early Harvest is too small and too early, coming as it does, along with the Souhegan raspberry. Stone's Hardy is but little larger than the Early Harvest, the only merit in it being its continuing a few days after the Snyder has gone.

There is more anxiety among small fruit-growers for improvement in the raspberry and blackberry than there is on the strawberry. We have at least a dozen profitable market varieties of the strawberry, while we have only two or three of blackberries.

There is, therefore, an inviting field open to the finder or producer of a few good raspberries, and for at least half a dozen good blackberries.

TESTING NEW FRUITS.

Every season new varieties of all kinds of fruit are offered for sale, and, usually, at high prices. I do not bite, however, at every new thing advertised; but

when I see that a new fruit has been tested at some one or more of the experiment stations, with a good report thereon, then I feel inclined to give it a trial in a small way. My bite at the Cloud Seedling, before referred to, was an exception, as it had never been tested at any experiment station. But new strawberries are frequently introduced by a long story about their origin, with the assertion by the introducer that their favorite is the ideal—in fact, the best strawberry in the country. Now, some allowance should be made for the enthusiasm of the originator of a new fruit.

There are possible merits in some of the new seedlings. Probably one in ten is worthy of propagation. In order to be abreast of the times, we must keep testing, and by so doing we shall improve on those we now have. It was by testing new sorts that we now have the firm shipping berry in the Captain Jack, and the large size in the Sharpless, Bubach, Jessie, Haverland, Parry, Jersey Queen, Manchester and others. It was by experimenting and testing that we got the Crystal City and Michel for early berries, and the Glendale, Mount Vernon, Atlantic and Gandy for late varieties. So, when I look back twenty-five years ago, when I began berry-culture, when the old Wilson was the ideal of every berry-grower, I think we have made great progress, and should never grow tired of well-doing, but should continue testing new fruits as long as there is any possibility of improvement.

I am now testing the Great Pacific, Edgar Queen and Lady Rusk, all from Illinois; and Robinson's and Sproul's seedlings, of Kansas origin, with a few of my own seedlings.

MARKETING THE BERRY CROP.

The question of marketing fruit has grown to be a serious one, and by no means easy of solution. The berry product the last two years has been larger than the demand, or, in other words, the berry growers are increasing faster than the consumers. Again, the cost of transportation is not in keeping with the low price of our berries. Another serious matter is the careless handling of our berries when transferred from one road to another. The wagon and truck drivers in the employ of the transportation companies seem not to understand the imperative necessity of carefully handling easily-bruised and easily-damaged fruits. Tender fruits must be handled tenderly when in transit, even for a short distance, in order that the packages may arrive at their destination in a fit condition to meet the wants of consumers. Were a petition signed by all the small fruit-growers, and sent every season to the transportation officials, asking for the proper handling of our berries, the evil might be remedied. Let us think over this matter, and see if we can have our berries handled in a better shape next year.

Before closing this long report, I would like to discourage the planting of large fields of berries anywhere west of the Mississippi river. Our cities are too small yet, to consume the product of our fertile lands; therefore, for the present, let us confine ourselves to smaller patches of strawberries. Should the price advance to $5 or $6 per crate occasionally, let us not become wild over it and double the acreage with the view of doubling our product and also the price. We should remember that every berry-grower may be like minded on the increase of acreage. So if we would only content ourselves with, say from the half-acre plots up to the two or three-acre patches, then with a diversity of other fruits to go with our high-priced berries, we will be slowly, but surely, climbing the hill of prosperity; otherwise, we shall be left in the valley of adversity. We should so gauge all our planting that we may not become demoralized by severe adversity nor unduly elated by great prosperity. The tendency of the age is to become suddenly rich. We would plant to-day, and, if possible, reap to-morrow. To become wealthy in

a few years, and spend the remainder of their lives in ease and luxury, appears to be the paramount desire of a large majority of our business men in this fast age. If we would be prosperous berry-cultivators, we must study how not to produce a surplus, or when we have a year of great abundance, instead of glutting the markets of our country with our berries in their fresh state, we must preserve the overplus for a winter market. Every berry-grower might learn some method of preserving the surplus product, and thus have a marketable product for the dull winter season.

THE VETERAN FRUIT-GROWER.

To the fruit-grower who has chosen the occupation for life, it may be said, that with all the hindrances, there is encouragement in the fact that all kinds of farm products are on the upward tendency, and those who, on account of the low prices of grain products, were seeking for the avenues of horticultural life, will now switch off or return to the old well-beaten road that leads to agricultural prosperity.

THURSDAY—DECEMBER 5, 2 P. M.

Special subjects were taken up at the opening of the session, and reports from committees were first in order.

REPORT OF COMMITTEE ON FLOWERS.

Best Basket Flowers—
R. S. Brown, Kansas City, first premium, $6.00.
E. A. Barnhart, Clinton, second premium, $4.00.
Best Hand Bouquet—
M. L. Bonham, Clinton, first premium, $3.00.
Best Table Bouquet—
E. A. Barnhart, Clinton, first premium, $3.00.
Collection of Plants—
E. A. Barnhart, gratuity of $5.00.
Collection of Plants—
M. L. Bonham, gratuity of $5.00.

SAMUEL MILLER,
MRS. L. A. GOODWIN,
MRS. BAIRD.

The committee take leave to compliment the contributors of the flowers on the excellent condition of their plants. Quite prominent among the collection are two India Rubber trees and a collection of green-house trees.

REPORT OF COMMITTEE ON FRUITS.

Your committee have made the following awards, to wit:
Best display of twenty-five varieties—
T. J. Shinkle, West Plains, first premium, $20.00.
Shepard & Wheeler, Sedalia, second premium, $10.00.
Best ten varieties for family—
W. G. Gano, Olden, first premium, $6.00.

J. H. Monsees, Beaman, second premium, $4.00.

Best ten varieties for market—

Olden Fruit company, Olden, first premium, $6.00.

Shepard & Wheeler, Sedalia, second premium, $4.00.

Ten varieties for show—

T. J. Shinkle, West Plains, first premium, $6.00.

Five varieties for market (South Missouri)—

Shepard & Wheeler, Sedalia, first premium, $3.00.

Olden Fruit company, second premium, $2.00.

Largest apple—

W. G. Gano, Olden, first premium (Ben Davis), $2.00.

Handsomest apple—

Shepard & Wheeler, first premium (Ben Davis), $2.00.

Olden Fruit company, second premium (Huntsman), $1.00.

Quality—

T. J. Shinkle, first premium (Grimes), $2 00.

C. C. Bell, second premium (Grimes), $1.00.

Best seedling—

Samuel Miller, first premium, $3.00.

M. L. Bonham, second premium, $2.00.

We also find on the tables about forty-five varieties of apples, some very fine plates from the Henry County Horticultural Soicety. We also find a number of plates of apples exhibited by C. Hartzell, some of the crop of 1888 and also of 1889, kept by his plan in an excellent state of preservation, which have lost none of their original flavor; we also find a collection of about seventeen varieties of very fine apples exhibited by J. T. Scott, Powersville, Putnam county; we also find about fifteen varieties of apples, some pears and quinces and large Spanish onions all very fine, from J. H. Bailey, Mesilla, N. M.; we also find samples of blackberry and cherry wine, also unfermented grape wine by Jacob Faith.

All of which we respectfully submit.

G. F. ESPENLAUB,
L. T. KIRK,
G. W. HOPKINS.

List of 25 varieties taking 1st premium.

Rome Beauty.
Ben Davis.
Winesap.
Huntsman.
Minkler.
Jonathan.
W. W. Pearmain.
Willow Twig.
Missouri Pippin.
Grimes Golden.
Ortley.
Smith's Cider.
Penn. Readstreak.
Ingram.
Janet.
Red Romanite.
Lawver.
Nicajack.
Yellow Bell.
Baldwin.
Winter May.
Ozark Imperial.
Gen. Lyon.
Clayton.

List of 25 varieties taking 2d premium.

Winesap.
Smith's Cider.
Large Romanite.
Cannon Pearmain.
Jonathan.
Vandivere Pippin.
Red Vandivere.
Clayton.
Missouri Pippin.
Stark.
Rome Beauty.
Lawver.
Winter Spice.
Pryor's Red.
Limber Twig.
Rawles' Janet.
Small Romanite.
Lansingburg.
Minkler.

Ben Davis.
Kirby Red.
White Pippin.
Willow Twig.
Red Canada.
Huntsman.

List of 10 varieties for family taking 1st prem.

Jonathan.
W. W. Pearmain.
Rome Beauty.
Winesap.
Huntsman.
Grimes.
Rambo.
Seedling.
Baldwin.
Minkler.

List of 10 varieties taking 2d premium.

Ben Davis .
Stark.
Rome Beauty.
Clayton.
Missouri Pippin.
Huntsman.
Jonathan.
Winesap
White Pippin.
WillowTw ig.

List of 10 varities for market taking 1st prem.

Rome Beauty.
Ben Davis.
Winesap.
Jonathan.
Minkler.
Huntsman.
Willow Twig.
Ortley.
Smith's Cider.
Gilpin.

List of 10 varieties for show taking 1st prem.

Rome Beauty.
Lawver.
Ben Davis.
Huntsman.
Missouri Pippin.
Seedling.
Tulpehacking.
Yellow Bell.
Smith's Cider.
Grimes.

List 5 varieties for market, South Missouri, taking 1st premium.

White Pippin.
Huntsman.
Rome Beauty.
Willow Twig.
Ben Davis.

List of 5 varieties, South Missouri, taking 2d premium.

Ben Davis.
Rome Beauty.
Winesap.
Huntsman.
Missouri Pippin.
Minkler.

EVAPORATING FRUITS.

J. B. DURAND, PRAIRIE CITY.

The object of this paper is not so much for the purpose of showing the advantage and profits of the evaporating business as it is to show the benefit which it brings the fruit-grower, by converting a perishable and almost worthless product into a good marketable condition, at fair paying prices.

All fruit-growers, and most especially of the apple, know that more than one-half of their fruit is unfit for market, either being wormy, specked, scabby, knotty or small. Now all this fruit can be utilized by the evaporator and placed upon the market at remunerative prices. It is not necessary to have a large establishment to accomplish this result. There are driers with their capacities ranging from one to two bushels of green apples per day up to thousands.

The work can be done just as well and as cheaply on a ten-bushel machine as in any of the large factories, and my experience has been that they are the least expensive.

I think every fruit-grower should have an evaporator of sufficient capacity to work up all his inferior stock, and in seasons of low prices and glutted markets, it will often pay to evaporate the whole crop.

I have often realized more for my culls than for the shipping fruit.

One hand can run a ten-bushel drier, with twenty-five cents worth of fuel, and make fifty pounds of white fruit per day, which, at ten cents per pound, about the average price, would net four dollars and seventy cents, making nearly fifty cents a bushel, including the day's work, and at this year's prices, would be over 70 cents, and if the waste is dried, almost a dollar.

Again, one important point thus gained is culling out your shipping fruit, making it grade fancy, and thereby obtain the highest market price for it.

Market only the best, evaporate the rest. Thus you would avoid the breaking down the markets for the green fruit. This is always done by inferior stock being run on the market, and never by good choice fruit. This would be more satisfactory all round to the growers, the shippers, the dealers and the consumers. We can, at nearly all times, see apples quoted on the markets at from 75 cents to $1.25 per barrel. Now every one knows these are lost to the grower. All of this kind should never go on the market, but in the evaporator; then the markets would keep active, and this stock realized from; but until it is used in this way it will be thrown on the markets, breaking them down, injuring the sale of the first-class fruit.

When once the fruit is evaporated you have the world for a market; you have nearly four barrels of apples in a fifty-pound box that can be shipped just as safely to Alaska, China or India as to St. Louis, and you need be in no hurry to market it. Next spring is as good as this fall, and often better prices are obtained.

When properly packed, and with proper storage, it can be kept for years as fresh and sweet as when first prepared, except a little loss in color, but even this may be overcome by cold storage.

If prices are as low as they were two years ago, when it was worth only from four to six cents a pound, and the waste and chop less than one cent, it can safely be kept over until there is a shortage like the present, when fifteen cents can be obtained for the white fruit, and four to five cents for chop and waste. The chop is apples sliced just as they are without any paring or coring, and dried; in this the small and knotty apples that cannot be pared are used. The work is done quite rapidly with a machine made for the purpose; forty or fifty bushels can be sliced in an hour by two hands.

One bushel of apples will make ten pounds of chop, which is now worth four cents a pound.

The waste is the skins, cores and trimmings from white fruit, which needs no other preparation only to put it in the evaporator, dry it and pack it in sacks or barrels ready for shipment. It is used for making jellies, and usually brings about one-half cent more than the chop. Most of the chop is, I understand, shipped to Europe and there manufactured into fine wines and sent back to this country and sold from one to five dollars a bottle. The price is, therefore, greatly influenced and governed by the grape crop in the old country. Many thousands of tons are manufactured each year. Everything can be used, nothing wasted.

Mr. ——— —I think still more can be done than the gentleman says. I evaporated some 1,400 pounds of fruit which sold for ten cents per pound. I made use of every part of the fruit, except the wormy part. Vinegar was made of the waste. I sold some ten or twelve barrels at 20 cents per gallon, $9.60 per barrel of forty-eight gallons.

I picked out the choicest to ship and evaporated the culls and second, which would have damaged the whole lot if shipped together. The vinegar apples made nearly as much money as any. I netted $85, using a cider mill that cost $15. We used a pear corer and slicer to prepare the apples for drying. Wife and two little girls did the work, apples and wood being brought to the house for them.

Some of the apples kept a year and a half, were as white and good as when first put up. No trouble to keep them five years. We used about a tablespoon of sulphur to a half bushel. When dry, we put the fruit right into flour barrels, and headed it up tight. Some kept eighteen months, are as nice and fresh as when first put up. They are better to cook than fresh fruit, as they don't require sugar, while fresh fruit does.

We pack them hot, right from the trays. If they stand open, the miller will get into them. Turn them from the tray into the barrel, and keep them perfectly close. Just as soon as a barrel is full I headed them up.

ON PLANTING, PROTECTING AND PRUNING.

H. B. FRANCIS, MULBERRY.

Thinking that a few thoughts on this subject might be interesting to some, I will try and contribute something, hoping thereby to bring out some ideas differing somewhat from what we used to practice. Then one could plant an orchard almost anywhere and have it succeed; but now, when our orchards have become infested with so many kinds of insects and diseases, we hear some say that fruit-raising won't pay. Then the question arises in the mind of the tree-planter: How am I to proceed? Nothing affords me more pleasure than to walk through the orchard and explain the different methods on the treatment of the apple-tree. And now, if you care to walk along with me, I will point out some of the most common mistakes made by the beginner in tree-planting, and the result of the same.

FIRST.

We will suppose one to have some knowledge on this subject, and that he takes an interest in the business, or it will be almost useless to try and explain or teach him much about this very important industry. Now, one of the very best helps on this subject is good horticultural literature in the house, that our children and every one else may have access to every day; but as a rule, I am sorry to say, I find those who have passed middle life the most anxious to learn.

OUR SOIL AND HOW TO PREPARE IT.

In our county there are a variety of soils, and on some kinds it is useless to try to raise an orchard. How select this soil and location? A beginner had better obtain his information from some one who has had experience in the business, or he might make a mistake.

After trying various ways in preparing the ground, I have adopted the following method: First, stake out the ground in rows thirty-three or more feet apart; then, with a heavy team, plow the ground, beginning in the middle of each row and finish where the trees are to stand; then haul and put in this furrow plenty of well-rotted manure; then again plow up this subsoil as deep as you can and mix with the manure; if properly done you will have made a ridge or back-furrow in the dead-furrow; the ground is now ready for planting; dig no holes but set the trees upon the loose ground, mound them up nicely and then with the plow turn some furrows back to the trees. There are two reasons for doing the work this way: the first is, you have all the ground thoroughly cultivated under the tree, a thing you can never do again; the second reason is, it gives the surplus water a chance to soak away along the furrow. But if a tree is set in a hole and

neavy rains come, you will find a mortar bed around the tree that will bake when it again turns dry and thus very much check the growth of the tree.

GETTING THE TREES.

I take my wagon, put on the side-boards, put in some wet hay or straw, go to the nursery, and as I select each tree I have it taken up; they are then tied into bundles and set in the wagon. In doing this way I have no trouble in getting the best, and when they are set out they will all grow off evenly; but if one takes second or third-class stock, there will always be some that appears to be dwarfed, and will never keep up with the rest; just why this is so I don't know, but think as most of our trees are grafted on pieces of roots, that the last or lower part of the root is what produces the dwarfed trees; time is too precious with me to set them out.

WASHING ROOTS.

For a number of years I have practiced washing the roots as I set the tree. I find many good reasons for this. Sometimes the ground in the nursery is muddy and sticks to or among the roots, and if set out in this condition, it will get hard and bake almost like a brick when the weather becomes dry. This will most always kill the tree. Another reason is, sometimes we find root-lice; a bluish looking mold at first sight, but on closer observation, one finds them resembling hen-lice. It is no trouble to detect their presence, for when they have been on long the roots become very knotty and full of little fibers grown tight together like a sponge. This kind of a tree is not so good, and should not be planted. I put in half a barrel of water, which we sit in some convenient place, about a half box of concentrated lye and two ounces crude carbolic acid. In this we dip each tree til washed clean. I have not yet seen any injurious results from this treatment, and the trees treated this way have always made a splendid growth.

LEANING THE TREE.

Most nurserymen advise leaning the tree toward the southwest. This theory is contrary to nature, and a bad mistake. All new shoots or limbs will come out on the top side, and if the tree is leaned to the southwest, the top will all start on the north side just where we do not want them. And as the tree straightens up with the prevailing south wind, the top will be all on the north side, and hang out like a flag on a pole. But says one, how are we to remedy this difficulty? I say easy enough. There are two ways: if you prefer very young trees, say one year old, just lean them to the northeast, and when the little limbs come out, they will mostly be on the south side; they will do this the first summer; then go along and with the hand push the tree up straight, and press the earth with your foot to the north side, and the work is done. The other way is to get three-year-old trees, cut off the lowest branches, and set them perfectly straight, taking care to place the larger limbs on the south side.

PRUNING.

This requires more study and practice than anything else, and the worst mistakes are made or have been made by us all. When we first began to plant we had no horticultural societies where we could get together and talk over these subjects, so we would ask the nurseryman or tree agent, and generally do as they told us, that was to head low and cut back—both wrong—claiming that as the roots were short so must the top be. Now, this forever dwarfs the tree and also shortens its natural life and makes it several years longer in coming into bearing; my experience of five years says this is a fact, and who can afford to practice it when a

tree set and the center or trunk left in, it will grow to be a tree and begin to bear at least five years sooner than the one that is topped and make to grow with a great lot of limbs like the head of broom-corn, to split off one at a time and destroy the tree before it has had time to half pay for itself?

Now, the true way is, the center must be kept in, then the branches will come out nearly at right-angles and one above another, like a cedar or water-oak, and as they become loaded with fruit they will bend and hang down without breaking or splitting with their precious load. Under this process I believe the life of the tree to be prolonged for many more years. With low heads one can't cultivate and the trees will soon die, and while they do live they won't bear much good fruit.

PROTECTING THE TREE.

There is nothing of so much importance as this, and it is the most generally neglected. I have tried and seen tried nearly everything recommended, but the best and most satisfactory of all is cornstalks cut twenty or twenty-four inches long, then split, then set up around the tree and tied top and bottom with binder twine. This nicely put on and well tied will stay on three years, and has for me kept out the borer, the mice, the rabbit, and also has kept the body protected from the sunscald. Stalks put on this way seldom ever get tight, and they never will hurt a tree, for as the tree grows the stalks dry up and dust out, leaving only a thin, tender shell.

PROPAGATION OF FRUIT-BEARING TREES.

J G. KINDER, NEVADA.

In choosing the above subject, I do so more with the intent of drawing out discussion than from any new light I profess to being able to throw on the subject.

That there is yet much to be learned of the best methods of reproducing our fruit-bearing trees there can be no doubt. Shut our eyes to the fact as we may, it yet remains that there is a constant deterioration going on in many of our best varieties of fruits. How much of this is due to our present system of propagation no one can say, but there is evidence on every hand to prove that much of it is due to that cause. Take the peach as an instance. We are wont to say that our best varieties of peaches are not so hardy as the common seedling, without stopping to think that all our improved varieties of fruits were once seedlings, and were once as hardy perhaps as any other. Why are budded peaches less hardy than seedlings? Is it because they are budded, or is it because they have been worked indiscriminately on any sort of seedling stock, whether hardy or otherwise? The question arises, does there exist what we might term a congeniality or an antipathy between two varieties of the same species of fruit, making their union in the one case advisable and in the other not? In answer to this I ask, how else can we account for the extra vigor or the extreme weakness of individual trees of any given variety growing under apparently the same conditions? Yet who is there but has noted just this very thing?

Another proof can be cited of this congeniality and antipathy in the case of the pear. Some varieties unite readily when worked on the quince, and are improved by being so worked. The Duchess pear is an instance, while we find many varieties that refuse to unite with the quince, or else do very poorly, and never make a perfect union, and in order to dwarf them they must be double-worked. That there does exist congeniality and antipathy between varieties of the same or of slightly different species, I have not the slightest doubt, but perhaps less pronounced than is shown in the case of some varieties of pears and the quince. The

difference in results in working the Wild Goose and the Damson plum on the peach root is very near as conclusive—the Wild Goose being improved and the Damson being very much weakened by this forced union. Now, I contend that when there is a forced union between different species, or between different varieties of the same species (and remember that all seedling-stocks are varieties), that when this union is uncongenial, that there is a decided weakening of the constitution of the tree, and this going on and on, under our present hap-hazard method of propagation, will eventually so weaken a variety as to make it practically worthless. This I believe is the cause of the weakening of the constitution of all budded peaches, is the cause of the failure of the Jennet apple the last few years. I believe its work is beginning to tell on the Ben Davis and is the primary cause of pear-blight, the black knot, and many other evils we must contend with.

How often do we hear the remark, when speaking of the many hardy seedling pears that may be found in almost any section of the country, they admit their hardiness now in their natural condition, but say that they will not remain so when propagtad as others are. Why? There can be only one answer and that is that when you propagate as under our present system, the variety becomes weakened in constitution because of the unsuitability of the stocks upon which it is grafted, and soon falls a prey to disease. Another proof can be found in finding here and there individual trees of almost any variety that are apparently healthy and blight-proof. Why? Because in this instance the stock upon which it was fortunately worked proved especially favorable to that variety, and gave to it a vigor that enabled it to resist the attacks of disease. Of course, it can be argued that some other cause might have occasioned this favorable result, and this would be true in some instances; but there are too many instances where only one out of perhaps a dozen of a certain variety remained healthy; yet all apparently were under the same conditions of soil, climate, etc. I speak of this influence in regard to the pear because its growth with us is more uncertain than of any other fruit; but I believe this influence is ever present, to a greater or less extent, in the growth of nearly all our fruits, and believe it is of sufficient importance to receive the closest investigation of those interested in fruit-growing and in the general welfare of our State, because if we are journeying on the wrong road, the sooner we turn back the better. I will again mention the Jennet apple. The universal decision is that it does not succeed as formerly. Why? Do the trees get less care? Are the climate and soil less favorable? I think not. I believe the Jennet apple is simply played out, or, in other words, propagated to death, or, at least, so weakened by propagation that it has become unfruitful, and rots on the tree to that extent that in a very short time this most excellent variety will be entirely discarded. In line with this, I wish to relate an instance that came under my observation in connection with the Ben Davis apple.

About twenty years ago I bought the crop of an orchard, mostly of the Ben Davis; the main part of the orchard was trees about twelve years planted, but there was one tree that stood to one side of the orchard at least twenty years older than the balance, and also one tree that had been top-grafted on a Limber Twig, and it was surprising what a difference there was in the shape, size and flavor of the apples growing on these two trees to that on the balance of the orchard; they were much more juicy, were slightly longer and more perfect in shape; this difference was frequently remarked by several who saw the fruit. I had almost forgotten the circumstance when it was forcibly brought to mind a few weeks ago. On the farm of J. P. Legg, near Calhoun, Henry county, Missouri, stands what I believe to be the oldest Ben Davis in the State; at any rate, it is over forty years old,

and it has a sound, sturdy trunk yet, but the limbs are mostly decayed. At the foot of this old tree lay a specimen of its fruit, and it certainly was not all imagination when I noted the superiority of its flavor over the modern Ben Davis; and so impressed was I with it that I took scions from the tree, and if there is a deterioration going on in our varieties I shall escape about forty years of it by going back to this old tree and coming forward again.

Now, it would be idle to advance such a theory without attempting to point out or suggest some remedy to avoid this evil, if it exist, and which I for one firmly believe. The remedy I would suggest would be either to propagate entirely by cuttings, or at least until by experience a certain variety of stock has been found upon which a certain variety of fruit has proven its especial fitness, then I would reproduce that stock by cuttings and use it for that certain variety, and for nothing else, unless it had proven suitable for other varieties also.

Already we hear of the LeConte pear, because of its being easy to reproduce from cuttings, highly recommended and widely advertised as valuable for a stock upon which to work other varieties of pears. While I have no doubt the LeConte will be found to be of especial value as a stock for some varieties, and it is a value we can secure and count on, but I am positive it will be found the reverse of valuable in others, as for instance the Duchess, which has been shown to need checking in growth to produce the best results, and is not desirable as a standard, consequently would not be desirable worked on a strong growing variety like the LeConte. Were I to suggest a suitable stock for the Duchess as a standard, it would be the hardy but slow-growing Seckel, which I believe will be found to exert the proper influence, or in that direction. I merely mention these as hints of the influences that may possibly be under our control should we take the trouble to investigate. To prove that I am not trying to point out the way for others to travel without journeying on that road myself, will state that while in Moniteau county this fall I noticed an extremely hardy and vigorous pear tree; beside it and about forty feet distant stood another of the same variety, but it had many dead limbs and was on the road to destruction; these trees were each about thirty years old and had borne annual crops of fruit for many years. Now, under the healthy tree were about a thousand thorny sprouts from six to eighteen inches high; under the unhealthy tree there were none. What did this show? It showed that one was grafted on a seedling that had gone back toward the original wild, hardy variety; the other from its throwing up no sprouts showed that it was of a more improved variety, but less hardy, and perhaps was, if the matter could have been determined, a better variety than the one grafted on it. So impressed was I with the value of that particular variety of stock that I dug up all the sprouts and shipped them home, and I also procured grafts from the healthy tree, and if I do not reproduce that tree, root and branch, blight-proof and all, I shall be very much mistaken in my judgment; and supposing I find upon testing it that this variety of stock is able to impart a like vigor to the Bartlett and make it blight-proof, or any other, or even one other of our best pears, who could compute the value of the discovery?

Let no one imagine that, once such a discovery is made, it will be too much trouble to reproduce these vigorous stocks. They could be propagated by millions by cuttings with bottom heat. And this work need not stop with the pear, but can be extended to the apple and other fruits. I will warrant that, if any one will take the trouble to wander through old orchards, and note the instances of extra hardiness and extra productiveness shown by individual trees that have outlived all their fellows, he will find it hard to explain this vigor upon any ground so reasonable as that there had been a fortunate congeniality between the stock and the scion. And

when such an instance is found, I believe that all that is necessary to reproduce this favorable result is to exactly reproduce the tree, root and branch, and plant on similar soil.

I will not wear out your patience by giving other evidence in proof of the theory herein advanced, though I have noted them by hundreds since giving the matter my attention, and trust that I have awakened sufficient interest on the subject that others will also give the matter their attention, and will aid in proving or disproving my theory by experimenting, as I shall continue to do. Before closing I wish to make a few remarks on another branch of this subject, or one, at least, closely allied to it.

Too much attention is given to the dissemination of fruits of accidental origin that could better be bestowed on ascertaining the better methods of growing the varieties we have. But if we must have new varieties, let them be originated in a scientific manner by hybridization. We want an apple with the size and productiveness of the Ben Davis, the color and quality of the Jonathan, the tough skin of the Winesap and the late-keeping qualities and hardiness of the Little Romanite. Now, how long will it be before we accidentally secure all this? A very long time, I fear. But, by a scientific hybridization of these varieties, it is not unreasonable to believe that the result could soon be accomplished.

But this is a work that no ordinary individual can carry on at his own expense, because the time required to determine the value of experiments is such that it would land most of us in the poor-house before we could realize any profit from it. These experiments in improved methods of reproducing fruit-bearing trees and producing new varieties by hybridization, are a work that should be carried on under the supervision of this Society and at public expense. It seems ridiculous to think that we are sitting with folded hands as it were, and waiting for accident to discover those varieties of fruits that just suit our latitude and soil, and are making no well-directed effort to obtain them. Ten thousand dollars carefully expended would, by growing seedlings and top-grafting on bearing trees, give results from at least ten thousand varieties in ten years' time, and even less. If those seedlings were from valuable varieties grown in close proximity to other varieties that would add to their good qualities, it is only reasonable to believe that very valuable results would be obtained. Who would undertake to compute the value of 500 seedlings of the Jonathan apple crossed with the Limber Twig? Should there be but one that would retain most of the good qualities of the Jonathan and be lengthened three months in its season of use, it would be worth millions to the fruit-growers of Missouri.

Look at the results in the breeding of our domestic animals. Lead up the thoroughbred running horse beside the heavy draft animal, and note the power of man over the things of this world. It is idle to say that man has not an equal power in producing any certain type or quality of fruit if he should put the attention to it that is used in the breeding of domestic animals. But on account of the rapid manner in which fruits can be reproduced, no matter how valuable a discovery might be made or how valuable a variety might be originated, it is of such a nature that the discoverer cannot control it to his personal advantage or profit. Hence the slow progress made in this direction. Therefore, such investigation should be made by the State and at public expense, and the public should receive gratis the benefits of this research. I will no longer tire your patience, but will invite a careful scrutiny of the ideas herein advanced, and ask the co-operation of all in proving or disproving the correctness of my theories. The horticultural field is broad, and glorious scientific results may be reached by him who will dig and delve in its fertile depths.

Mr. Ambrose—I don't think the gentleman believes more than half of what he has written.

Mr. Murray—I thank friend Kinder for that paper, whether he believes more than one-fourth of it or not. A large per cent of the pear trees being sold are from the south. Trees upon LeConte roots blight. The two best pear trees I know are grafted upon apple roots. The pear will throw out roots, thus making the tree upon its own roots. Perhaps this lessens the danger of blight. I know of the Winesap apple grafted upon Hews' Va. Crab, which are not much larger than the crab. I think we will have to go to selecting and breeding our varieties of fruits. The nurserymen of the United States are growing most of their apples upon seedlings grown from seed of the French crab. May not this have a tendency to make the fruit resemble the crab? You will find that the fruit of the same variety grown upon trees in the same orchard is very different.

I heartily concur in the ideas set forth in the paper.

Mr. Blake— Kinder simply knocked the bark off in a fresh place. Along the same line, the Illinois society asked for $5,000 to experiment. They put this into the hands of five different persons. The first meeting held only six months after this arrangement was made, was eager to hear the reports from these experimenters. In reference to this breeding of fruits; if you breed your live stock indiscriminately you will get plug stock. There is in Illinois a curious genius who crossed the Yellow Bellflower upon the Ben Davis. The result is an apple like the Ben Davis on the outside with the quality of the Bellflower inside. He is going to graft it.

Secretary Goodman—Peter Gideon in Minnesota found only one seedling in 5,000 that was good. He produces seedlings from seedlings. He keeps them from being fertilized by accident. It has cost an immense sum of money; it is an expensive work; but who knows how much it may be worth to the State?

When we say that seedlings are hardy, we say what is not true. Take seedlings from some of the best, and Prof. Trealease says it will take from twenty-five to fifty years to prove any-thing positive in regard to it. The seedlings we use for stocks do not come true. With peach trees nurserymen have tried to keep up the vigor of the trees by procuring sound, healthy seed from seedling trees and from a section of the country where the peach thrives and is free from disease. Tennessee peach-pits are noted. We want this matter taken up and studied by the experiment stations. The experiment stations should work together. Fifteen stations, each working in a special line to produce some special result, could accomplish much more than if they worked independently.

Again, why could we not feed our fruits to make them firmer or softer?

President Evans—I have in mind an orchard which I visited once in the fall of the year, which was made in this way: Seed of the Ben Davis and the Limber Twig grown together, and not fertilized with anything else, was planted. From these seedlings was planted an orchard of 700 trees—700 varieties of apples in one orchard. He had had many good kinds of summer apples, and I saw the fruit of some sixty fall and winter apples. I don't know that I would care to have any other kind of apples than some of these seedlings. I found one resembling the Ben Davis and of the best quality, some not quite so good and quite a number of good ones. The Limber Twig gave them quality; Ben Davis, size and color. Anybody can get scions from these trees in White county, Arkansas.

J. G. Kinder—There is a Ben Davis tree in Henry county that is certainly forty years old. It has a sound trunk and a very good top, only some of the branches blown off by storms. It must have a good root, some kind that was suited to it. Let us use that root and graft the Ben Davis on it and we shall have the same results.

Secretary—You are not sure of it by any means.

J. W. Sallee—I think the gentleman is mistaken when he thinks he can reproduce the parent root from cuttings. They don't make well rooted trees.

Jacob Faith—I have grafted from two trees of Ben Davis in my orchard that bear finer fruit than the others.

Mr. Hartzell—The author of the first paper was exactly right in his thorough preparation of the ground. He plowed his ground first, knowing that he could not do it thoroughly after the trees were planted. Every farmer in Missouri has two farms—one below the other. Few of them cultivate the lower farm. As to planting two kinds of trees together with a view to cutting half of them out, if we want a tree to live fifty or seventy-five years we must not plant so close. High top trees will be in profitable bearing when low tops are dead and gone.

Mr. Stranz—I have planted several orchards. In the first I prepared my ground the year previous, in the fall, with a heavy team of three horses and a 14-inch plow, twelve to fifteen inches deep. In the winter I went to the nearest nurseryman and had him to graft me one thousand grafts of such varieties as I wanted. In the spring I laid off my ground and planted the grafts two in a place, just where I wanted the trees to stand. When the time came I planted the land in potatoes and kept it perfectly clean. My neighbors said I could not grow an orchard in that way. One of them planted an orchard of the largest nur-

sery trees he could get. He said they would bear in three years. In five years mine bore a few apples. My neighbor has not had an apple and my trees are larger than his.

I planted last spring thirty-five acres more in orchard, ten acres in strawberries and thirty-five acres in raspberries and blackberries. I prepare my ground a year in advance, turn under clover in June, plow it as deep as I can in September and plant in the spring. I grew about one hundred bushels of potatoes to the acre in the orchard. Trees started from the graft will have deep and wide-spreading roots.

FRUITS OR FLOWERS FOR MONEY.

M. L. BONHAM, CLINTON.

The growing of fruits and flowers for money is all easy enough to talk about, but doing it is the difficult thing with most people. I think I should prefer the fruits as a staple, yet both are profitable if rightly followed.

The apple, I believe, is the first on the list of fruits, and I think the most profitable for the care necessary. A great many make mistakes and sad failures with apple planting, as they think if the orchard is planted that is all they have to do, while in fact they have only begun. Like planting a garden and then letting it take care of itself, how soon you would fail. The tree is planted; you then must cultivate it, keep it pruned, protect it from rabbits and insects that will soon destroy it if left to itself; even after the orchard is in full bearing the fertilizing and constant care must be kept up. As the prices of apples are high this season a great many will embark in tree planting that will stop at that, and in a few years you will hear of their failure, and consequently crying against Missouri as an apple-growing country. Missouri has its faults as a fruit-growing country, yet I predict it to take the first in the Union in producing abundant and fine specimens of almost all sorts of fruit grown in our temperate climate. For this part and north I do not think there is any fruit that will pay better than the apple; and I may also say there is no sort that will pay equal to the Ben Davis. There is more demand for the Ben Davis tree; in fact, I have received more inquiries where they can be had and the reply from our best wholesale nurseries is, I cannot furnish more than 1-6 or 1-10 Ben Davis on orders. Some object to a certain apple because it does not suit their taste, but I have learned that if people want a thing, that is what I must grow if I would make money. The peach must of course be a great crop in the southern portion of the State, but from the perishable nature of the fruit, I think I should prefer the apple tree for sure success, although when peaches fail in this part and farther north, the profit would be greatly increased. The quince is generally very unsatisfactory as a profitable fruit here. The requisites for success I think are good heavy soil, protecting in winter (and also fertilizing) with coarse manure and salt. The raising of the pear is very profitable, provided you can get them, but my experience with them is very unsatisfactory.

The growing of small fruits for profit depends a great deal on the market that you can reach, and I should prefer, when I can get it, a local market. Consigning such fruit to commission men is generally very unreliable business. Strawberries pay me better than either raspberries or blackberries, although all are very satisfactory in a good market, but the small fruits all require good culture and plenty of work. As our facilities increase for getting to market through fast fruit trains,

our perishable fruit will become more profitable and reliable. The taste for such fruits has grown to such an extent in the last few years that instead of our small fruits being a luxury, they are now by many considered a necessity.

I can remember twenty years ago I raised a row of strawberries and had two or three gallons to spare, and brought them to market in this city. I left them in one of our groceries where this hall now stands; the groceryman could not think of risking so much as to buy them, but he would take them and see what he could do with them; he poured them out of my basket into a wooden tray. They attracted a great many as they passed by, and would run their fingers through them as you have seen them do in a barrel of beans. In a day or two my consignment of strawberries was exhausted by curious tasters and decay. I raised no more berries for near ten years. Now this city will consume ten to twenty bushels sometimes in a day. I will leave the growing of flowers for money to some one more able than myself, and will ask my friends to not criticise this weak attempt.

THE VINEYARD.

MR. PRESIDENT AND GENTLEMEN—I regret very much that I cannot be with you this time, owing to my health at present will not permit me to be with you, so I will attempt to give you a short note on vineyard, and hope to be excused as it is.

No culture bears such various results as the grape-vine—owing to localities and soils—and so I will confine myself to my neighborhood or county, Gasconade. Our leading grapes cultivated mostly are Concord, Ives, Norton's Virginia, Elvira, Martha and Goethe; we have also on trial many of the newer kinds, such as Niagara, Empire State, Jewel, Moore's Early, Moore's Diamond, Montefiore and many others, all very fine grapes—however, all more or less subject to black rot. The Bordeaux mixture, copperas, lime and water, spraying the vines as soon as the berries are fairly set, and every two weeks thereafter or after every heavy rain, has met with good results. The bird is another destroyer of our grapes, and foremost of all is the Orchard oriole. The English sparrow is reported to be very destructive. We have them not as yet in our vineyards, and hope we will never have them. The red-bird and thrush does but little harm compared to the Orchard oriole. But by no means do all birds pick grapes. Such as remain all summer in our vineyards, such as blue-birds, wens and many others, are useful and are killed in the belief that they pick grapes.

To control the black rot remains our foremost object to be successful in growing grapes, and in selection of such kinds that is the least subject to black rot; such as Norton's Virginia, Ives, Elvira, Goethe, Montefiore, Delaware, Etta and Woodruff Red have been the least affected, and here I wish to report that I suggest in producing a seedling vine from Delaware that has proved itself entirely free from black rot in all the many destructive seasons. If we have one that has proven entirely free from black rot, why should we not be able to produce more that would prove entirely rot-proof? It would be a blessing to our grape-growers, and such originators would be benefactors to the grape-growers and mankind. To produce new seedling grapes is an easy matter, but to produce grapes of general value, free from all drawbacks, and especially free from black rot, will remain something rare and valuable. In conclusion, I would not forget to name a few of our old and good standard grapes which have been neglected; they are—the Delaware and Catawba; and among the newer ones Woodruff Red. This covers my main object in grape culture. Remaining your humble servant,

JACOB ROMMEL.

Morrison, Gasconade county, Mo.

VINEYARDS.

Mr. Espenlaub—We want earlier grapes that we can market before the Ohio grapes ripen. The Jewel promises to be one of the best. It has little rot and little mildew.

Mr. Kinder—I want to refer to Moore's Diamond. It is a week earlier than the Concord. The Empire State is the best white grape I have ever ripened. The Niagara is inferior.

Sam. Miller—What more could be desired than Moore's Diamond and Empire State?

Mr. Espenlaub—We have to sell all white grapes for low prices. The Ives will bring more money than Moore's Diamond. Niagara is the best white grape with us.

President Evans—I don't want to boom any grape, but if the coming grape gets there in the next few years it will be the Jewel.

Mr. Espenlaub—I have seen it growing by the acre. It shows more fruit than the Concord, ripens before the Champion, is better than the Concord, skin tough, making it a good shipper, equal in size to a medium Concord in berry and bunch, black with a heavy bloom.

J. W. Clark—The Moyer grows too like the Delaware, slow.

Mr. Kinder—We are too far south for the Moyer, Delaware and Poughkeepsie Red. Ulster Prolific is the coming red grape. It is superior to the Catawba, in sugar at least.

Sam. Miller—I have planted it twice. It won't grow. The Jewel is about as good as a grape can get, though it is a slow grower.

Mr. Turner—Which of the Rogers hybrids is the best?

Sam. Miller—Goethe, No. 1.

J. W. Clark—It is far ahead. It rots less than any of the others.

Mr. Kinder—Barry, Merrimac and Salem are the best in flavor to my taste.

Mr. Espenlaub—Massasoit is one of the best in flavor among the early ones. It is a good bearer.

J. G. Kinder—The Brighton is better and more productive.

Mr. Patterson—The Brighton, where it does well, is a splendid good grape.

THE PLUM—ITS CULTURE AND VALUE.

BY JACOB FAITH, MONTEVALLO.

Mr. President, Secretary and Members:

When young I was so good-looking that I had to take a dog on each side of me to keep the girls away. But you see my ornamental days are gone. Now I wish to make myself useful, and I don't know of a better way than to write the following paper:

No tree or fruit has received so little attention as the plum, yet few are more attractive in appearance, or more pleasant to taste.

No fruit is more tempting than a well-ripened, beautifully tinted, juicy plum. Its color is like a gleam of gold; its cheek is delicate and soft, and it breathes a delicious perfume, causing one to yield to the temptation to bite into the golden skin. No preserves are more delicious than that of well-ripened plums. Of all grains and fruits none is equal to the plum to fatten swine, proportioned to the amount of labor required to produce it. Many failures have been made by not knowing what to plant for our latitude and how to fertilize.

VARIETIES.

Caddo Chief is the first to ripen, but late frosts often kill them. Three weeks later the Wild Goose ripens, the most profitable at that time of ripening. Three weeks later, when Wild Goose is about gone, Crimson Beauty ripens. It produces a wonderful crop, much like the Wild Goose—both tree and fruit. The same may be said of Brown's Late, which ripens about one week after the Wild Goose. The Golden Beauty ripens about one week after Brown's Late. In color it is a greenish yellow. It is less subject to curculio than those mentioned before, but is subject to over-bearing, and thus the fruit is small. It is also subject to cracking or bursting like the Genetting apple, after a dry spell when fall rains come, and take a second growth.

Blue Damson, Marianna, Weaver, Miner, etc., failed to yield satisfactory crops. One cause, I do not understand with all my study and experience how to plant and fertilize these varieties.

The best way to plant plums is to alternate varieties in the plum orchard. A variety that might be a poor bearer when depending on its own pollen may greatly improve when intermingled with other sorts. Again, if the weather during the blossoming period is hot and windy, a variety may waste its pollen before the stigmas are ready, and in such the pollen of adjoining sorts may supply the want.

A few years ago I was alarmed about plum trees in my apple orchard, as I have about 300 planted between standard apple trees, to be cut out when the apple trees need the room, but I have since come to the conclusion that plum trees are profitable to an apple orchard, both for fruit and an insect catcher. The insects prefer the plum to the apple, and plums stung will fall to the ground. Only a few insects reach maturity in the plum.

KILLING THE CURCULIO.

Spray, commencing after the bloom drops. I prefer jarring early at morning. Hogs will soon learn to follow and eat more than ten times the amount of insects they do in apples. To saw off a limb will make a place to strike on, as it requires a sudden jar to bring down the stung plum in reach of the fowls or pigs, which is indispensable in a plum orchard. Where no poultry and pigs can be allowed to pasture, plums should be picked up. The curculio will remain in the plum about nine days after it falls. The curculio will deposit their eggs in both cold and warm weather, but in cold, wet weather they will seldom hatch.

This season at our Vernon county fair I had on exhibition as many as six apples on a half-inch limb. Several times I heard the remark, all on that limb are free from worms. My premiums amounted to over $14.

Six years ago we planted half gallon Wild Goose plum seeds. About 600 came up, growing to about the size of a lead pencil. We planted seventy-five, favoring in selecting for orchard those having large leaves. At three years old some commenced bearing. Most all have fruited-plums in size from a common cherry to a

medium plum. If they don't behave better within two years they will be cut down. That plums will reproduce from the seed, the same as the parent tree, is a mistake. There are several sorts of peaches that will reproduce. If I was to take time in this paper to relate my failures in experimenting in plum culture, some of you would leave the room.

Twelve years ago we planted sixty Wild Goose plum trees; forty of them were budded on seedling peach trees and twenty were grafted on seedling peach roots. For grafting plums we use whole roots, graft at the crown, using as near as possible a graft the size of root.

The forty trees budded on peach stock commenced dying at six years old and are now all dead; these twenty grafted on peach roots soon grew on their own roots and thirteen out of the twenty are yet alive and healthy. A plum tree grafted as described will throw out sprouts which certainly will bear the same fruit as the parent tree. I much prefer those sprouts of plums and Early Richmond cherries than those budded on other stock. It is true a plum budded on peach stock will come into bearing one to two years sooner, but those from the sprouts will make much the healthiest trees. Further, one-half of my Early Richmond cherry trees have been killed by gophers eating their roots off, while I seldom lose one grafted from the sprouts. I hear one say "I don't want a sprout on my place." If hogs run in a plum orchard they will eat them very readily, and cherries will sprout but little. For me they don't sprout enough to sell to my neighbors. Plum trees will get their full growth in about eight years. I planted mine twelve feet apart; should be eighteen to twenty feet apart. Plums require such land and culture as peaches, but the peach tree needs more pruning than any tree I know of. The plum tree needs the least. Pick plums for market three or four days before you would for family use.

Plums that have proved best adapted or most profitable for my locality are the Wild Goose and Crimson Beauty. No fruit nor grain pays more to the amount of work required than that of plum. One acre of plums will make more pork than five acres of corn. No business requires more care and study than that of horticulture. One mistake in agriculture can be remedied in one season, but if a tree is planted it is either a lifetime vexation or a lifetime pleasure and treasure.

For catching moths and beetles I use a simple tin lamp. The lamp is set on a stake three to four feet high, one end of which is driven into the ground. On the other end a little board is nailed for a pan to set on, which is filled half full of water and a few drops of coal oil. The light attracts the bugs, and as they dive at the light they burn their wings and thus fall into the pan of water and oil.

When death shall claim us we shall realize that a life of toil and love for God and for man, though a failure here, is not a failure above.

DISCUSSION ON THE PLUM.

Jacob Faith—I use a little cheap coal oil lamp which I set in a plate of water to catch insects at night. The insect seems to love the light. I believe that plums planted in an apple orchard save the apples from insects. Now, there is one thing I would like to know. I did very wrong in not sending some of these insects off and having them examined to see what proportion of friends and what of enemies I had caught.

Mr. Blake—I would like to ask why every plum-grower speaks so highly of the Wild Goose plum, and every woman would rather have a peck of Green Gage or Damsons than a wagon load of Wild Goose?

J. C. Evans—Farmers generally don't call the Damson a plum.

Mr. Murray—I once condemned the Wild Goose; but take the pits out and make a pie of them, and you will not want any more California apricots. Pick them before fully ripe for shipping, just as they begin to color. I have been shipping and selling them at from eight to seventeen cents per quart, averaging with the blackberry in price. One grower in my knowledge realized $250 from one-half an acre of Wild Goose plums; another $300 from one-fourth of an acre. I would not give it for all of the other varieties. The Damson don't amount to anything; don't produce. I have thrown away the Marianna. The Wild Goose is known everywhere, but the people don't know how to use it.

J. H. Logan—I have 400 trees of the Wild Goose plum, and find them profitable every year. Caddo Chief is too early, and is not worth a cent a bushel. They come in the strawberry season, so we could not find any use for them. They are too small. We shall cut them down in the spring. I wish I had 500 more Wild Goose plum trees.

Dr. Sloan—Does the cultivation of plums increase the number of insects on the apple?

Jacob Faith—Insects prefer the plum, and they will sting the plum in preference to the apple, and the hogs will eat the plum. Hogs love plums, and will eat fifty times as many insects in plums as in apples.

Mr. Turgeon—It appears that something should be done in regard to the plum. There is one thing very essential; the plum will not succeed when planted scattering. They should be planted thick in clusters or groves. Plant where chickens run.

Mr. Carpenter—How do they cultivate the Wild Goose—those who make a success of it?

Mr. Ambrose—The Wild Goose is more productive than any other we can plant in Missouri. It is nearly free from the ravages of the curculio. It is not of very good quality. We have many others that are of better flavor, but we cannot grow them for profit. Mr. Logan has made money out of plums, but you must fertilize it to be successful.

DISCUSSION ON MARKETING.

Sam. Miller—It is the duty of men in every business to put up straight goods. There have been so many badly packed cases of fruit on the market that the buyer don't know what to buy, unless you put your name on every package. So much bad fruit is shipped that it

gluts the market for all kinds of fruit. It is ruinous to the horticultural interest. Fifty per cent good fruit will bring as much money as all, good and bad shipped together. If every grower would ship only good fruit he would avoid glutting the market. This applies not only to apples but to everything else. Ship fruit of good quality rightly packed.

C. C. Bell—I believe in early picking. We sometimes pick the Genet too early. I sometimes tell my farmers to make two pickings, first selecting the largest and best ripened fruits, and leaving the others to grow. Pick the first Ben Davis the last week in August, the remainder three weeks later. The trade calls for the Ben Davis early.

Mr. Durand—The Ben Davis is green in August.

Mr. Bell—I ship them as early as the 24th of August. They are red at that date. This year was an exception. All sorts ripened earlier than usual.

THURSDAY, DECEMBER 5, 8 p. m.

A number of songs and recitations were given by the pupils of Baird college. With the assistance of Prof. Hall and the choir of the Presbyterian church, a very delightful as well as profitable evening was spent. The songs were good and the recitations were well rendered.

LOW LANDS FOR ORCHARDING.

C. T. MALLINCKRODT, ST. CHARLES.

As a rule, high, dry, porous and warm land is considered best adapted for successful orcharding, which rule will not be abandoned soon, nor should it be. Such soils are naturally best adapted to develop a healthy growth of tree, shrub or vine, without which success cannot follow.

This fact does not, however, exclude the successful cultivation of some of "Pomona's gifts" on soils devoid of the above characteristics, as far as altitude is concerned.

The apple, the Chickasaw tribe of plum, the pecan, hickory and walnut, for instance, can be and are grown with excellent results on the "low lands" (bottoms) usually found bordering rivers or large streams, provided always that either surface or under-ground drainage is sufficient to carry off the surface waters.

The only indigenous groves of pecan which I ever met with were on such bottoms. Many portions of these lands, especially the choicest agricultural parcels, are very rich and liable to cause an overgrowth of wood and foliage, to the detraction of the productiveness of the trees, and also the coloring and texture of the fruit. These evils may be counterbalanced to some extent by distant planting and careful pruning, in order to allow the atmosphere to circulate freely and to penetrate

among the branches. On such ground apple-trees should never be set less than forty feet apart each way, while fifty feet would, I think, be the more advisable distance.

The more sandy and consequently less fertile tracts produce less growth, and trees planted on such come into bearing sooner, and produce better colored fruit with denser texture of flesh, as well as of richer and better developed flavor. The best results, however, with the apple, plum and pecan, I noticed on such low lands, were on a third-class, sometimes described as waxy, black, sticky, also gumbo, only, though, after proper drainage as above referred to. This class of soil appears to be inexhaustibly fertile, but is so tenacious and uncomatable, if you will allow that term, as to cause the roots of trees a hard struggle to extract the nourishment they seek; hence the trees make no undue growth and come into fruit earlier than on either of the classes of soil above mentioned. As the tree gains strength of root it of course permeates the soil, and along the roots the air and water penetrate and set free those elements needed to maintain growth, by which means the trees are enabled to sustain large crops of fruit as well as a long life of usefulness.

I must not by any means be understood as recommending these lands as the best for the apple, etc.; only for the pecan nut I claim them as such, and the last class described is certainly the best for that. As the subject assigned me by your committee confines my remarks to the class of lands intimated, I have endeavored to impart such facts as have come under my observation, and to state in how far such fields may be safely trusted to bring forth satisfactory results to the orchardist.

I will close with a few remarks as to what I would or would not do if I contemplated embarking in fruit-growing on "low land." I would select as best the gumbo, as second the sandy, and last the very rich; on latter would set apple-trees fifty feet apart, would crop the land with corn, potatoes, or even wheat, until the trees came of good bearing size, after which would cultivate only enough to sustain healthy growth; prune to rather open heads. On the two other kinds of soil would either crop the land or not, according to growth, etc.; would, after coming to fruitage, sow an occasional crop of clover to turn under; would be governed in pruning by the growth, etc.

I would not plant before drainage; would not plant at foot of bluff nor so near timber as to impede circulation of air; would not allow weeds or brush to encumber the land, nor would I head a tree less than five feet and expect good fruit from the lower branches after the tree became of mature size. I would not venture largely on pears, peaches, cherries, or other than plums of the Chickasaw class, nor would I venture into small fruits to any extent beyond what was needed at home, before a thorough experimental test.

ESSAY ON THE ALLEGED DECEPTIONS PRACTICED BY NURSERYMEN ON THE PUBLIC.

BY J. DRACH.

We frequently hear such expressions from farmers, who have young orchards just coming into bearing, as, every nurseryman and fruit-tree agent is a swindler. I bought my trees from such a nursery; they were said to be reliable men. But look at the fruit I have got, and then say if I have been swindled or not. It is true, my friend, your fruit is not what you expected it to be, but are you so very sure that the agent or nurseryman is entirely to blame for it? Let us look at the subject in its proper light. Perhaps when you located in these parts you came from

some distant State where the conditions were entirely different from this locality. Soil, moisture, temperature and altitude were perhaps as dissimilar to this country as day is to night. Where you came from you had certain kinds of fruits, apples, pears, peaches and plums, which were standard varieties, and you knew them to be good. So when you located in this country you wished to plant the best, and what was best where you came from must also be the best where you went. Now, my dear sir, here is where you made the first grand mistake. You did not take the changed climatic condititions into consideration. The apple which in New York might be a standard, in Missouri probably was worthless. The pear which sought its equal in Pennsylvania may not be worth planting in Illinois. The peach that was unsurpassed in New Jersey might be a nuisance in Kansas. The nurseryman had all the varieties you wanted. He might have told you, they were unsuited to this climate, but you would not have believed him; and he was but human when he sold you a bill of nursery stock, and took your money for the same. My friend, we can best attain wisdom by experience. The writer of this has been there. He has been one of the fools, and he had plenty of company. His experience (like that of many others) has been profitable to him, and he has realized the fact that what may be fine fruit in one locality may be an abomination in another. He invested largely in fine plums and pears. The plums went long ago where the woodbine twineth, and his experience in pear culture had better not be told, lest it discourage the new beginner. He had an idea that this country was suited to grow the White Bellflower, the McAfee None-such, the Seek-no-further and the Winesap to perfection; that all the fine varieties of plums and pears were or ought to be natives of these parts; and when he bought his goods, the nurseryman did not say, the kinds you ordered are not suited for these parts, but pocketed his money. Now, my friend, let me say this to you: Never plant anything but what experience has shown to be good. Never meddle to any great extent with new and untried varieties, for that business consists of too many probabilities and very few facts. Common sense ought to teach you that an apple suited to the climate of New York or Canada is totally unfit for our climate, and it is only in rare instances that it is successful. Every variety of fruit has its zone where it attains its greatest perfection, and deteriorates when it is removed therefrom. Now, my dear sir, do not put all the blame on the nurseryman; shoulder some of it yourself; be honest for once in your life, and confess you were in fault yourself, and will shoulder your share of the responsibility. Resolve to do better in the future than you have done in the past, and you will have made a long step in the right direction, profitable to yourself, and instructive to your friends, neighbors and the coming generation.

RESULT OF ORGANIZATION.

A. NELSON, LEBANON.

Mr. President, etc., State Horticultural Society:

The paper assigned to me, the "Result of Organization," covers such a vast space that one hardly knows where to begin or where to stop. What great work or works is there to day but what has been brought about by organization?

The telegraph cables crossing the different bodies of water, connecting the old world with the new, were brought about through organization; the mammoth steamships running between New York, Boston and differents ports of foreign countries, were brought about through organization; the land telegraph wires running from ocean to ocean were put up and put in operation through organization; the thousands upon thousands of miles of railways of the United States as well as

foreign countries were put in existence through organization; tunnels are cut through mountains, rivers are spanned by bridges of colossal dimensions, and this has been and is being accomplished through organization; and coming nearer home, we see and know daily of what is being done by a few men through organization; the number you can count on the fingers of your hand, yet through this organization the interests of millions of people are affected. I refer to the Big 4, as so called; this handful of men, as it were, controls the meat food of this great country; and let us look for a moment at another handful of men, less even in number than the meat combine: I refer to the Standard Oil company; this is no doubt one of the richest, wickedest, most powerful organizations in the world. Think you, Mr. President, such work as has been done by these few men could be done only through organization?

We will look for a moment at what has been done through organization among the farming classes in all the Eastern, Western and Northern States, as well as recently in more Southern States; organizations for cheese making and butter making have sprung up, until now the factories for manufacturing butter and cheese can be counted by thousands, and the products of some swell into millions of dollars per annum.

But how is the horticulturist to be benefited through organization? Let us see. Let us look first at the starting point: ten men want to plant 100-acre orchards, each; they have the capital to buy the land, clean it, fence it and plant trees. They look for a location separately, but find land held at $10, $12, $15 to $20 per acre, in 100-acre tracts; each of these men, however, has heard of a party holding 1,000 acres of fruit land that can be bought in a body at $4. These ten men get together and organize a Fruit-Growers' and Shippers' association, elect officers and go to work, and they find through organization that as great, or nearly as great, reduction can be made all along the line, as in purchasing the ground to start their orchards—their labor, trees, wire for fence, railroad transportation, barrels for packing fruit, in fact everything pertaining to what they wish to buy or what they have to sell. I am not referring to the Olden Fruit company, but how should the common or every-day fruit-grower be benefited through organization. In every fruit locality or at every shipping point there should be an organization, possibly not of the same kind as referred to, but would bring about same results. These organizations could be gotten up easily where there were wide-awake horticultural societies, but nothing to hinder them where there were no such societies. Mr. President, you must understand that the county I live in has not been put down on the map of Missouri only for a few years, and we no doubt are laboring under disadvantages that other localities do not have to contend with.

In our locality we intend to get up an organization, first, to make our own barrels and boxes for shipping, and second, we hope to get up interest enough to build a cold storage for holding fruit. Those who have closely watched the fruit market from September 1st to December 1st can readily see who has made the money on fruit of the last year's crop. As usual, the farmer and local dealer have got for the fruit grown and labor in picking, packing and shipping—the farmer, I say, and local dealer, between them have got just about one-half what the fruit is selling for. This is all wrong, and may we not hope the time is not far distant when either through local or county or State organization these evils may be overcome partially, if not wholly. Thus far the fruit is not yet shipped. Now there is none of us but what well knows that companies, societies or organizations get better rates over express and rail routes than can the individual. To illustrate a case of freight: I know an individual who had 200 tons of hay; was anxious to ship; rates were $3.35

per ton (prohibitory), but as an individual, all his efforts were of no avail. He applied to the President of the Farmers' institute of his town to have him see what he could do. Note the results brought about at once through this organization. Rates were at once reduced from $3.35 to $2.25 per ton. Through this reduction the railroad got fifty cars of hay to haul and the farmer a benefit of $1.10 per ton on it all, and yet the railroad got big money for doing the work. And still this same Farmers' institute or President of it secured another reduction of 25 cents per ton. Now when we have it to go to market, any one gets a car for $2 per ton, whether one car to ship or twenty.

So much for a little organization; and so it would go, Mr. President, all along the line. Through organization, well conducted, almost any obstacle can be overcome; and I firmly believe that now, right at this time, and, as we may say, the opening up of a new fruit era to Missouri, thousands upon thousands of dollars can be saved yearly to benefit the farmers, fruit-growers, their wives and families. I do not want to be understood that I am making war upon the commission or middle man, for he is, as I believe they all are, a necessary evil, and an evil that you cannot, for a time at least, dispense with. You and I, Mr. President, may not live to see the middle or commission men dispensed with, but there are young men in this hall who will live to see them a good deal harder to find than it is to find hens' teeth.

And in closing, Mr. President, may we not look for and trust some action may be taken at this very meeting looking to the organization of fruit-growers, either of State, county or locality. Surely this is as favorable a time as will ever be had for putting the ball in motion.

HORTICULTURE IN ITS BEARING ON SOCIETY.

W. A. SMILEY, BOONVILLE.

By horticulture we do not mean simply gardening, as the word literally taken would imply, but the culture of trees, flowers and vegetables, and the artistic arrangement of them for profit and for pleasure.

When God created the first human pair, sinless though they were, he placed them in a garden "to dress it and to keep it," signifying by this that their well-being and enjoyment would be maintained and promoted by such employment.

How delightful their situation must have been when we know that this garden contained every tree "that is pleasant to the sight and good for food," and that weeds and thorns and thistles were unknown.

By disobedience man forfeited his estate and was driven out of the garden to subsist on the herb of the field and "earn his bread in the sweat of his face."

It is not the object of this essay to tell of all the woes produced by man's first disobedience—how a paradise was lost or how a paradise may be regained.

Suffice to say that man is in a condition to become happier and better, and we may say generally desires to become happier and better. Without saying that the road to happiness leads back to Paradise, it certainly leads forward to it. True religion is progressive. If "cleanliness is next to godliness," surely the beautifying of our homes, our school and church grounds, and our public highways with trees that are "pleasant to the sight and good for food," with flowers and shrubbery beautiful to behold, is, to say the least, an indication that the people doing so are refined, intelligent and progressive, and are a Christian community, or are highly susceptible to Christian influences, as we shall attempt in the progress of this article to show.

The condition of society in a savage or semi-civilized state is generally migratory, subsisting on their flocks and herds, or depending on the more precarious results of the chase for a livelihood.

Such a mode of life from its very nature precludes almost entirely even the cultivation of the soil, without saying anything about the cultivation of fruits and flowers. After a weary march under a burning sun these nomads no doubt welcome with delight the cool shade of the trees of the forest; but the glory of God, as manifested in the "Rose of Sharon and the Lily of the Valley," is no doubt unseen and unfelt by them.

God has done much to beautify the earth for man, but to the man who has not made the laws and beauties of nature a study, her beauties are like some flowers, "born to blush unseen and waste their sweetness on the desert air."

To be benefited by the productions of nature, we must try to improve on nature. We must use our head and our hands. The curse pronounced on Adam is indeed a blessing to his posterity, if we look at it aright. The ground must be prepared with labor, the seed sown with care, the growing plant must be nourished and cultivated, but notwithstanding much weariness and perhaps some disappointments, how gratifying are the results.

Nature responds readily to the magic touch of the intelligent and pains-taking husbandman. We have first the blade, then the ear, then the full corn in the ear.

He is rewarded by seeing old varieties of fruits and flowers improved and new varieties originated.

Here is exercise for the body and food for the mind. He is incited to greater attainments in the study of the laws of nature and greater diligence in the application of his knowledge.

Thus the mind is expanded and the body strengthened, and hence the individual is benefited and society, of which such individual forms a part, is correspondingly improved. Our subject, however, leads us to consider the influence of horticulture on national progress and welfare. As before stated, the uncivilized nations plant no trees, cultivate no gardens, in order to gratify a taste for the beautiful; hence it is an evidence of a civilized and refined community where such a taste is manifested. Point to any nation where horticulture receives marked attention, and you will find this the case in a high degree, while the want of it is indicative of coarseness, stolidity and improvidence.

We will take for our illustration those two empires—Russia and Japan. Travelers in Japan tell us that the Japnese have an eye for the beautiful; that in clearing their lands, they leave a tree or clump of trees on prominent or picturesque points; hence, their landscapes are never bare, monotonous or prosy.

With one hundred and fifty varieties of evergreens in the empire, there is a verdant touch in field and forest even in mid-winter. This is but a glimpse of the horticultural surroundings of a people which Joseph Cook calls the "diamond edition of humanity."

Though we are sending our missionaries to christianize them—and I may add, whose labors are attended with wonderful success—may we not receive one lesson at least from them in the art of beautifying our landscapes, ornamenting our public grounds with trees and shrubbery, and neatness in our domestic surroundings.

Where is the farmer among us who in the felling of his forest, in the arrangement of his fields and grounds near his house, has an eye to the pleasing effect it will produce to the beholder? Why, it seems to me from the crowded condition of our door-yards, the amount of weeds and rubbish in or near the roadside, the

contrary effect is intended. To put the most favorable construction on the matter, many seem to be governed in these things solely by motives of economy and convenience.

These are well enough when combined with taste, but without it are apt to lead to avarice or laziness, either of which is the bane of good society.

Now, let us take a cursory view of that other empire, great in the extent of her territory, great in her physical force, and great as the world goes in her army and all the paraphernalia of war.

What is the condition of Russia with regard to horticulture and all that adornment of home which goes far to make a happy and contented people? I quote from an article in the "Century:" "The outward aspect of a Russian village is not attractive, and there is little choice in the surrounding country between wide, gray plains with a distance of scrubby pine forests, or the scrubby pine forest with distant gray plains.

"The peasants' houses are scattered up and down without any order or arrangement, and with no roads between, built of trunks of trees, unsquared and mortised into each other at the corners, the interstices filled with mud and moss—a mode of building warmer than it sounds.

"In the interior there is always an enormous brick stove five or six feet high, on which and on the floor the whole family sleep in their rags. The heat and stench are frightful. No one undresses, washing is unknown, and sheep-skin pelisses, with wool inside, are not conducive to cleanliness. Wood, however, is becoming very scarce. Fifty years, it is said, will exhaust the present forests, and fresh trees are never planted."

Over this stolid, ignorant and unprogressive mass of human beings is placed the most corrupt set of officials to be found in the whole world, from the czar down to the lowest tax-gatherer. The subject plotting the destruction of the ruler, and the ruler seemingly only seeking his own glory and the extension of his dominions, without consideration for the well-being of his subjects, will complete the picture.

Now, whether the attention paid to horticulture has produced the delightful state of society in Japan, or the want of it has brought about the deplorable condition of society among the rural Russian population, I am not warranted in saying from the premises. Perhaps the natural temperament of the people, the facilities for education, climatic influences all combined have something to do with it; but we will, perhaps, all agree that advancement in horticulture and attention paid to the embellishment of landscapes and home surroundings are evidences to the intelligent traveler of a refined and progressive state of society. And we may conclude that the reflex influences of such surroundings must be to deepen the sensibilities of the adult population, and to fix and increase these happy conditions on rising generations. Time will not permit to call your attention to the bearing of this subject upon the health and longevity of man. Let us then, as a people and commonwealth, learn lessons of wisdom from other societies; and, while we are sending them teachers to point the way of everlasting life and happiness, let us study from them those elements which tend to the stability of government, the promotion of health and the present happiness of our people.

REPORT ON ENTOMOLOGY.

BY MARY E. MURTFELDT, KIRKWOOD, MO.

The past season was in many respects unusual. The winter months were characterized by a uniformly higher temperature than for several years. There were some very heavy rains but very little snow or ice. The spring, on the con-

trary, was very cold, wet and backward, while the heat of the summer was excessive, and accompanied by an almost unbroken drouth for two months, which was, after some slight rains, succeeded by a dry autumn.

That these climatic conditions should have had their effect upon the development of insect life is not surprising. Many species, especially those that hibernate in the larva or perfect form, were greatly reduced in numbers, the warmth of the winter months keeping them in a state of semi-activity, while there was no suitable vegetation on which they could feed, and thus be enabled to complete the cycle of their lives.

Again, many insects that are usually rather rare appeared in destructive numbers, the warmth of the winter being favorable for their continuance and multiplication. Among those to which the season was adverse may be mentioned various species of cut-worms, flea-beetles, the Colorado potato-beetle, the blister-beetles, and even that hardy and adaptive insect, the plum curculio—the discomfiture of this pest being completed by the mid-summer drouth, by which the ground was so heated and hardened that the few larvæ which had entered it from early fruits could not effect their transformations. Canker-worm moths also appeared out of due season, and many of the females perished without laying their eggs, or the larvæ hatched in time to be cut off by the severe cold of March. The chinch-bug, too, was missing, or but scantily represented in the grain fields, the cold and wet spring producing the fatal "bronchial" trouble to which, according to an entomological M. D., this insect is peculiarly liable.

But, because of these immunities, and others of less importance, let it not be inferred that the farmer and fruit-grower had opportunity to rest from their labors, so far as insect pests were concerned. On the contrary, nature took care to more than fill up the depleted ranks. If there was no chinch-bug, two species of grain aphids took its place and exceeded it in destructiveness. From Texas to Wisconsin, farmers bewailed the "blight" that had settled on their promising acres. Rye and wheat suffered very considerably, but the severity of the attack fell upon oats, thousands of acres of which were plowed under instead of being harvested. Nor were these the only species of plant-lice that were conspicuous, but it seemed that all the direct and collateral descendants of the family *Sphididæ* presented themselves at once, like one of the plagues of Egypt, taking possession of field, orchard and garden—the cold and dampness of the spring-time favoring their development, while it retarded the increase of their natural enemies, so that it was not until June that Syrphus flies, Lace-wing flies and Lady-bird beetles obtained the mastery over the minute, but innumerable hosts. And in the meantime, unless artificial remedies were employed, all plants infested were dwarfed and distorted, if not killed outright.

Among the newer insecticides which proved very satisfactory for the reduction of Aphids in the flower and vegetable garden, and for use on a small scale on young trees, was the X. O. dust—a preparation of tobacco and creosote in fine powder. Where applied thoroughly with an insect powder bellows or a "puff," it caused every insect that it touched to drop to the ground. In a short time afterward, if desirable, the powder may be blown from the plant with the empty bellows, or shaken from it by one or two sudden taps. I found it best to apply when the dew was off, as it was less disfiguring to the plants.

A dilute kerosene emulsion is also very effective against plant lice, and almost every species, except that infesting the chrysanthemum, yields to the power of the California Bubach or Pyrethrum powder. These little insects, subsisting on sap, which they obtain by the insertion of their needle-like beaks deep into the

vegetable tissues, are not affected by the arsenical mixtures, and it is of no use to spray infested plants with Paris green or London purple.

Among the larger insects which attracted much attention in different parts of the State, and were sent me from other states as well, were several species of gregarious caterpillars, which were very destructive to shade and orchard trees. Conspicuous among these were the common web-worm, the green-striped maple-worm, the willow and poplar spinner, the black-necked and the yellow-necked Datanas and the red-humped apple-tree caterpillar.

The web-worm (*Hyphantria cunea*, Drury) occurs throughout the country and feeds on the foliage of a great variety of trees. It is often called the "tent caterpillar," but it differs widely from either of the true tent caterpillars. The caterpillar of the web-worm is much lighter colored, and when full grown only about half the size of the others, and, to quote from Prof. Riley's third report, "it hibernates in the pupa state, they in the egg state; it occurs mostly in the fall, they in the spring; its eggs are deposited on a leaf and hatch before the leaf falls, theirs are deposited around a twig, because they have to pass the winter and would get lost with the leaves if deposited upon them; it feeds solely on the parenchyma of the leaf under its web, they devour the whole leaf outside of their tent."

In the New England States, where the habits of the web-worm were first studied, it is only single-brooded, its webs not being seen on the trees until August or September, hence its name of fall web-worm. In the latitude of Missouri and southward it is invariably two-brooded—the webs appearing on the trees in June and again during late summer and early autumn. This insect has a large number of natural enemies, such as birds, not including the English sparrow—toads, predaceous bugs and parasites, which mostly attack it after it has deserted its web and is wandering about in search of a suitable spot in which to effect its transformations. So long as it remained under its web it was, until recently, comparatively safe from molestation. During the past summer, however, an enemy was found "within its borders" that threatens to wage upon it a war of extermination.

I had observed that the webs, of which there were an unusual number during June, in and around Kirkwood, were unusually small, many of them never extending over more than a single tuft of leaves. As I was about to investigate the matter, I received a communication from Mr. J. C. Duffey, horticulturist at Shaw's garden, informing me that he had found the larva of a small carabid beetle living under the same tent with the web-worm and destroying the worms. Accompanying the letter was a box containing a web with its usual occupants and, besides, a number of specimens of an exceedingly active, though small, dark-colored carabid larva. Placing the insects in a cage upon my table, I was very soon able to verify Mr. Duffey's interesting and important observations. This little creature, not more than half an inch in length and one-tenth inch in diameter, would not hesitate to attack a nearly full-grown caterpillar, biting into its side or back, sometimes almost severing it in the course of its meal, the violent contortions of its victim being unavailing to loosen its fierce and relentless hold.

Desirous of learning whether it occurred in Kirkwood also, I immediately examined a number of deserted webs, finding much circumstantial evidence in favor of its presence, but none of the insects. The appearance of the second brood of the web-worm was awaited with much interest, in order to note whether there was a second brood of the attacking larvæ also. To my great satisfaction I found several in the very first web examined, and, later, very few colonies of the worms seemed to enjoy immunity from them.

In the meantime both Mr. Duffey and myself had obtained the perfect insect, a small, flattened, shining, dark-brown beetle, that was kindly determined for me by Dr. Riley as *Plochiomus timidus*—the specific name very aptly referring to its rapid, furtive movements and its habit of concealing itself during the day-time.

This larva, that is undoubtedly destined to prove such a benefactor to the arboriculturist, is, as I have said, one-half inch in length when full grown, the form being much like that of a miniature alligator. The surface is smooth, the ground color a dingy white, but with almost the entire upper surface of each joint dull black, and a row of smaller black spots along each side. The head, and two horny plates covering the tops of the first and second joints, are reddish brown, the small, strong jaws being armed with needle-like teeth. The pupa is of a transparent white color, and is sometimes found in the folds of withered leaves, in the web, and sometimes concealed under rubbish on the surface of the ground.

I have not been able to learn over how wide an area of the state it appeared this year, but from observations made in Illinois and Indiana during August, I found that it had not spread much to the eastward of St. Louis.

As Mr. Duffey wished to use the insect as the subject for a scientific thesis, I will reserve any further notes on the species until after the publication of his paper, which has recently been read before the St. Louis Academy of Science and will shortly be printed.

In some parts of the State, and especially in and around the city of Sedalia, the ravages of the green-striped Maple worm (the larva of *Anisota rubicunda*) were notably severe and extensive on the popular shade tree from which they are named. These worms hatch from clusters of small yellowish-green eggs deposited by the parent moths during the month of May, on the under sides of the leaves. They feed upon the young leaves during June, eating all parts except the midrib and some of the principal veins. When full grown they are an inch and a half in length and of the thickness of an ordinary lead pencil in the middle, from which they taper slightly in both directions. They are striped longitudinally, in alternate bands of light and dark green, and from the top of the second joint two small black horns project forward over the head.

About the first of July these worms disappear from the trees and enter the ground. Here, three or four inches below the surface, they change to a rough and characteristic dark brown chrysalis, which toward the end of the month works itself upward through the soil, and, splitting near the forward end, allows the escape of the moth. The latter expands rather more than two inches, and is very delicately colored in pale yellow, more or less banded and shaded with pink. This moth almost immediately lays its eggs for a second brood, and by the middle of August the trees are again covered with the voracious worms, which destroy all their beauty and their value as shade-producers for the remainder of the season, and, in the case of young trees, seriously interrupt their growth. This brood of worms enters the ground in September and hibernates in the pupa state, its life cycle being completed by the appearance of the moth about the first of May. The young worms are subject to the attacks of several parasites, and the latter are often so numerous on the second brood that but comparatively few survive, and consequently the insect is seldom noticeably destructive for two successive seasons. In some mysterious way it recuits its ranks every few years, probably when atmospheric or other conditions are adverse to the multiplication of its insect enemies. The soft Maples (*Acer dasycarpum* and *A. rubrum*) are the most subject to attack, but other trees, such as the Box Elder (*Negundo aceroides*) and the oaks, are occasionally defoliated. I do not know that "spraying" has ever been used again

these Maple worms, but where the trees are not too large, I have no doubt that the use of the arsenical insecticides or the kerosene emulsion would so effectually rout the first brood that there would be very few left to perpetuate the second.

There occurred also during the past summer, not only in Missouri, but in all the neighboring States, a notable outbreak of two other closely-allied species of large caterpillar, viz.: the yellow-necked and black-necked Datanas (*Datana Minestra* and *Datana Angusii*). These worms, when full-grown, are more than two inches in length, cylindrical, gaily-striped in cream white or pale yellow and black, and sparsely clothed with long white hairs. They are very gregarious, feeding side by side, clustered on the under side of a leaf, nibbling it from the edge inward, and when one leaf is devoured moving in a body to another. They also rest in companies on the limbs and branches, and assume a very peculiar position, clinging to the tree with the abdominal prolegs, with the fore and hinder ends of the body held upright at right angles or curved over the back. In moulting they partly descend the tree, all at once, and rest in a body on the trunk, to which they leave attached their cast skins when ready to resume feeding. Upon completing their growth they crawl down the trunk in procession and, one after another, enter the ground, still keeping together as much as is possible. They appear in July, feeding for about six weeks. The species *Datana Angusii Gr.* was especially destructive to the walnut, often entirely denuding the trees, no doubt seriously injuring, if not killing, many of them—the trunks presenting a disgusting spectacle, covered, as they were, with the numerous cast skins. Late in September the black-necked form appeared on the oaks in and around Kirkwood, but, as it was late in the season, the defoliation did no serious injury.

Specimens of still another gregarious caterpillar have been sent me from Southern Missouri by Mr. S. W. Gilbert for several successive years. This is rather a striking larva, and is called the Red-humped Prominent (*Œdemasia concienna*). It feeds upon apple preferably, but is also occasionally found upon plum, cherry and pear. Like the species previously described, this insect feeds in companies and rests in rows along the branch which it has denuded. The body is striped lengthwise, in fine, white, yellow and black lines, and has a double row of black points on the back and another row on each side. The head is bright red, and on the fourth joint is a hump of the same color. The hinder part of the body tapers sharply and is always held in an elevated position. When disturbed, these caterpillars emit an offensive fluid which doubtless repels their enemies, both birds and other insects, to whose attacks they would be peculiarly liable on account of their habit of congregating in large groups in exposed situations. In this State this insect is double brooded, the worms appearing in June and in August. The moth is very variable in shade, being either of a pale brown or grayish color, prettily variegated with longitudinal brown and purplish streaks, with a conspicuous eye-like spot on the lower margin of the wings. The antennæ are feathered and the legs tufted. They undergo their transformations on the surface of the ground or just beneath it. Unless very numerous, the worms can easily be kept in check by cutting off the branch on which they are congregated. If abundant, spraying with Paris green or London purple would undoubtedly break up their ranks.

SOME INSECTS WITH WHICH WE ARE THREATENED.

It is a well-known fact that many of our insect foes are immigrants from Europe and other foreign countries. Dr. Riley, in his second report on the Insects of Missouri, published nearly twenty years ago, enumerated about thirty species of destructive insects that had come to us from Europe alone. This list included such

first-class pests as the Hessian fly, the Grain aphis, the Cabbage aphis, the Codling moth, the Currant worm, the Meal worm, the Asparagus beetle, the Cabbage butterfly and others. Since that time scarcely a year has passed in which the advent of some new foe has not been registered, so that the earlier list is nearly doubled at the present time. Nor is it from Europe alone that we are receiving these unwelcome guests. Africa, Asia and Australia are beginning to contribute to our insect fauna. Some of these insects, owing to their habits and the more frequent exchange of the products they infest, are very rapidly disseminated over the entire country; while a few, from which our eastern friends have been suffering for several years, have not yet approached the Mississippi valley. But unless we take pains to guard against them, their appearance in our fields, orchards or store-houses is a mere question of time; while a most discouraging phase of the matter is that all imported insects seem to obtain new vigor and redoubled destructive power as the effect of our climate and more abundant food supplies. Many of them also acquire a taste for a variety of plants, and even if kept in check on the crops usually affected, they are enabled to perpetuate themselves on others upon which we do not suspect their presence. The imported Cabbage worm (*Pieris rapæ*) is an example of this, as it now feeds and develops upon more than a dozen cultivated plants and weeds (many of them not even belonging in the order *Cruciferæ*) which it was not formerly supposed it would touch.

Within the last two or three years two insects in particular have appeared in the Eastern states which it behooves us to guard against most carefully. One of these is the "Horn fly" (*Hæmatobia serrata*), a cattle pest of the most nefarious character. As this possesses an indirect if not a direct interest for the horticulturist, I beg permission to devote a few moments to its consideration. It is a small, dark, two-winged fly about one-half the size of the house fly. It congregates in immense swarms on the heads, shoulders and under parts of the body, having the instinct to select positions out of reach of the tail, and also from which it cannot easily be dislodged by rubbing. It derives its common name from its habit of clustering around the base of the horns in a dense mass. Its bite is very irritating, and the suffering cattle are at times almost maddened by its attacks, and dash wildly about their pastures in their efforts to escape from it, losing flesh and giving but scant supplies of fevered milk. As it makes its appearance in May and continues until frost, it will be seen that it is no insignificant enemy of the herdsman and dairyman. Horses and mules are annoyed by it to some extent, but its preference is for horned cattle. The first account of the insect was published in "Insect Life" for October, 1889, but Dr. Riley and some of his office assistants had been engaged in studying its habits for nearly two years previous, and a complete history of it is given in the department report for 1889-90. It has been identified with a cattle pest long known in Europe, and is supposed to have been introduced into this country with cattle imported from France and Holland. It was first observed in the neighborhood of Philadelphia, but is already established along the seaboard of the middle Atlantic states. It has not yet made its advent in the West, but unless the most careful precautions are taken by importers of cattle, it will surely manifest itself in our midst to make bovine life a burden and raise the price of beef.

Another insect which is supposed to have been introduced into Massachusetts with some silk-producing species, with which a gentleman was experimenting a number of years ago, has recently excited serious alarm in some portions of the State, by its wholesale ravages on the foliage of fruit and forest trees, as well as upon many kinds of herbaceous plants. This insect is the Gipsy moth (*Ocneria dispar*), one of the most dreaded pests of Europe. Prof. C. H. Fernald, Entomolo-

gist of the Agricultural college and Experiment station of Massachusetts, published a full account of it in the Station bulletin for January, 1890, proving its identity with the European species, and tracing up the history of its acclimation in this country. During the past summer its ravages were so severe and the danger of its spreading to other sections of the State and country so imminent, that especial government aid was invoked for its extermination. The moths are rather large and handsome, expanding from one and one-half to two and three-fourths inches, the females being much larger than the males. They are of a pale yellow or yellowish-white color with dark-brown cross-lines and spots, and the antennæ are prettily feathered. Prof. Fernald thus describes the caterpillars: "When full grown they are about an inch and three-fourths in length, very dark brown or black, finely reticulated with pale yellow. There is a pale yellow line along the middle of the back and a similar one along each side. On the first six segments following the head there is a bluish tubercle armed with several black spines, on each side of the dorsal line, and on the remaining segments these tubercles are dark crimson red. On the middle of the tenth and eleventh segments there is a smaller red tubercle notched at the top. The whole surface of the body is somewhat hairy, but along each side the hairs are long and form quite dense clusters."

The pupa is of a chocolate brown color about three-fourths inch long, suspended in an open net-work of silken threads in the fold of a leaf or among a cluster of leaves. The moths emerge during summer and lay their eggs in clusters on the branches and twigs of trees and shrubs. The insect hibernates in this egg state, and the caterpillars hatch the following spring.

Another insect, of especial interest to peach-growers, is not unlikely to reach us some day from the Pacific coast. This is a species of *Carpocapsa*, closely allied to our codling moth, and is one of the principal enemies of the peach in Japan. As it works in the fruit almost continuously from June to September, it is difficult to tell whether there are two or three distinct broods. The larva is much like our apple-worm, and works around the stone, causing the fruit to decay or to fall prematurely. When full-grown it leaves the fruit and spins a cocoon under any convenient shelter. In these days of rapid transit, nothing is more likely than the introduction of this insect into California, by means of the steamers entering her ports, which presumably furnish to their passengers Japanese peaches as a dessert fruit. Prof. Riley has this insect under consideration, and is in correspondence with a Japanese entomologist in reference to its life history, and the practicability of spraying with the arsenites to diminish its numbers. "Fore-warned" ought to be "fore-armed" in this case.

I will mention but one more species in the list of insects against which we must be on our guard. This one is not a foreigner, but "to the manor born." I refer to that pernicious pest the "apple-maggot," which is even more destructive to our staple fruit than the codling moth. It is the larva of a pretty little smoky-winged fly, scientifically known as *Trypeta pomonella*.

More than twenty years ago Mr. B. D. Walsh, the pioneer State Entomologist of the West, worked up the history of this insect, and proved that it occurs in all parts of the country in our native crab and thorn apples; and yet, strange to say, it is in the New England States only that it has acquired the habit of feeding on the cultivated apple—driven to the latter, perhaps, by the scarcity of its accustomed wild fruits. The fly lays its eggs upon the ripening fruit, which the larvæ, upon hatching, bore into and tunnel in all directions, until the entire apple is a mass of corruption and falls to the ground. When full-grown, the short, thick, legless maggots burrow into the earth to change, where they remain over winter and until late

in the spring before giving forth the fly. This species is but single-brooded, but is irregular in development, and so covers the entire period of the ripening of the apple. There is not much danger of its introduction among us in shipments of fruit from the East, because before the packing season arrives it has mostly left the fruit and entered the ground. In discussing this matter, not long since, with Dr. Riley, I mentioned our immunity from this insect as a matter of congratulation, but was considerably taken aback when informed that the apple-feeding race was slowly but surely advancing westward, having already appeared in certain localities in Ohio and in intermediate territory. That its migration may be interrupted by a careful watch for its advent, and the complete destruction of every fruit showing the least sign of being infected, is quite possible; but that sufficient care will be taken to do this is more than doubtful, unless the State or Station Entomologists of those States upon which it is beginning to encroach give their personal supervision to its eradication.

A single concluding word in regard to spraying. My own limited experiments, and those of others that have come under my observation, have not satisfied me that there is a sufficient per centage of gain in fruit saved to pay for the expense in labor and material, while the results of the use of acrid poisons upon the vegetable tissues cannot but be inimical to the healthfulness and longevity of the tree. The foliage of the peach, and to some extent of plum and cherry also, is always much injured by the arsenites, and even apple leaves have a dull and unhealthy look after two or three drenchings with Paris green or London purple, even when used at no greater strength than one pound to two hundred gallons of water.

I find, however, by extensive inquiry, that the process is gaining in favor with those owning large commercial orchards, but as there is usually no means of comparison, it is difficult to estimate the exact amount of fruit saved. It would seem almost useless to spray apples after they have turned down, as the moth always seeks the calyx end for the deposition of her eggs, and, in a drooping position, the larva could easily make its way into the fruit without coming in contact with the poison. With very careful management the fluid may, of course, be forced against the calyx end of the fruit, even after it has begun to droop; but unless one has for an object the eradication of the codling moth from his orchard, regardless of expense and of temporary injury to the trees, he cannot afford to spray every two or three weeks during the entire summer. And if he should be thus thorough, and his neighbors were not, it would not avail to keep his orchard clear of pests another year.

In reply to a question on this subject, Dr. Goslin writes: "The codling moth was very bad with us. Mr. Murray and myself were the only ones who attempted to spray, and we were deceived. We sprayed in May and again in June, and about July 1 we carefully examined our orchards and could find scarcely any (of the worms), and we believed it unnecessary to spray in July; but when August and September came, they seemed to increase very rapidly up to the time of gathering. The early apples were almost free from the moth, but the winter fruit was badly infested. Our enthusiasm is somewhat cooled, yet I believe if we had sprayed in July and again in August, the results would have been satisfactory. If I am spared another year, I will test this matter more fully. We must fight this pest, or apple-growing will not be profitable."

It is rather discouraging that so much doubt still remains and experience is still so conflicting as regards the utility of the arsenical spray for the fruit-feeding pests. Its value for leaf-feeders is established, but in the case of these it does not require to be used more than once or twice during the season. If it must be used

continuously every two or three weeks from May to September, the percentage of fruit saved will not cover the expense of the repeated applications. Then there is the direct danger of such frequent handling of deadly poisons to be taken into consideration; also the inevitable injury to the tree and the necessity of excluding poultry and other animals from the orchards treated. Altogether, I more than suspect that for codling moth and curculio, the remedy still remains to be found.

PERSONAL ASSOCIATION.

C. I. ROBARDS, BUTLER.

There is an ancient legend to the effect that Midas, King of Phrygia, for some favor bestowed by him upon the God Bacchus, was offered the granting of any wish that he might propose. The king's request was, so the story goes, that everything he touched might be transmuted into gold. Forthwith as he takes his seat at the table to enjoy his evening repast, the fish upon the platter becomes a solid golden fish, the bread between his fingers becomes a wedge of gold, and the rare old wine in his goblet runs down his thirsty throat a stream of liquid gold. The king, repenting of his rash and foolish choice, appealed to Bacchus, who in compassion took away the fatal gift. Moral—"'Though gold may have its uses, there are better things than gold.'

Useful knowledge that may instruct us what to seek and how to rightly use our faculties and possessions may be better than gold. The world is full of knowledge. The present times are surcharged with new and wonderful developments, and he who reads or he who listens can acquire a store of knowledge greater than he can use or apply, unless he distributes or imparts to those whom he may benefit.

While man is laboring to invent new devices and improvements, nature in these recent times startles the highest inventive genius by her unaided bestowal of unexpected gifts and magnificent developments. Only a few years since the people of this civilized portion of the earth were groping in semi-darkness at night, relieved occasionally by expensive and imperfect manufactured lights; but suddenly, without the aid of man's inventive genius, nature sends to her surface material for light, so brilliant as to eclipse the combined powers of all artificial lights. Nature is progressive. Unaided and unasked, she exceeds man's highest efforts and expectations by her gratuitous bestowal of wonderful gifts and transformations.

Ten years ago it was not generally believed or admitted that supplies of flowing water could be obtained by means of artesian wells in the valley of the Mississippi; but in answer to the bold and energetic efforts of the people of Clinton, Missouri, all the world was made to know that the water supplies of the West are inexhaustible.

Not alone in the mineral kingdom, however, do we behold wonderful developments. In the field of horticulture we find each year new surprises to convince us that He who made all things is greater than the creature; that not only can He create, but that He can perfect.

The rose that my grandmother thought the ideal of beauty in her girlhood, the rose that bloomed so delightfully all through the month of June, has gone entirely out of fashion, and no longer admits of any comparison with its high-bred successor that flashes its unequaled beauties all summer on every beholder, and scatters its perfumes on every breeze e'en up to the frosty air of mid-November. Down in the pasture where I used to go to drive the cows when I was a boy we found strawberries, and their sweet odor lingers in my memory yet; but I think the remembrance of their delightful fragrance made a more permanent impression on me

because, unfortunately, their odor was nearly all there was of them. It seems to me now it would take about sixteen of those primitive berries to make one of these latter day sorts.

There was the long-necked strawberry and the short-necked, the woods strawberry and the field berry; but where would the biggest of them stand, or how could the best of them hold up their heads by the side of a six-inch Sharpless, Gandy or Jessie?

In the memory of every horticultural reader and grower we know that Rawls Janet was a short time ago the most popular and most extensively planted winter apple in all this great Southwest, but nature set herself quietly to work and evolved an all-purpose and an all-climate apple that yet stands against all critics at the head for profit. I allude to the much-abused but triumphant Ben Davis. All these results are nature's evolutions freely offered; and it appears to me that if we would seek, accept and retain the best that nature offers, we would be sufficiently progressive. Let nature lead: it will require all our physical and mental activity to keep pace with her. If we believe then that nature is the best inventor and most generous giver, how can we best select her most useful gifts?

How may we discriminate between the values of productions so as to select only those which are most profitable? Certainly, not invariably by reading popular horticultural journals. These channels of communication and the catalogues of the land informed me that a new and remarkably valuable fruit had been discovered, known as the Russian mulberry—"fruit large, productive and sweet." The trees all grew, and the fruit excelled the leaves in number, but the birds will forever be my only pickers. Then the books informed me that a wonderful plum had recently been discovered, known as the Blackman. The tree was the finest grower I ever saw, except the Carolina poplar. I tried to discover whether the tree was trying to be a peach or plum; but to convince me of its family they sent me a remarkable picture, and that convinced me that it was to be a plum. It bloomed—I mean the tree—and its blossom was that of a plum, but it didn't do anything more except to grow, and then they told me it was a failure. But who wants to cultivate failures? I am sure I don't.

One thing I have discovered after long experience and some loss, and that is that men will not deceive face to face as they will in print. There is an influence of soul upon soul, of mind upon mind in personal association that causes men to unbosom their honest convictions, and surpasses any other means of eliciting the truth. There is, in the presence of each other, an influence of accountability that enables them to resist the influence of unlawful greed, and stand forth as honest men. In all commercial relations we find more satisfactory results by personal presence.

Correspondence by letter or communications in print, are liable to misconstruction or misrepresentation; but in the presence of each other, every gesture, every look and the indefinable influence of one's presence, bring to aid an influence to decide not only more promptly, but more satisfactorily.

By personal association with those engaged in kindred occupations, we not only obtain the benefits of practical object-lessons, but we may receive new incentives to action by witnessing the results of their successes.

We must circulate among each other if we would receive the benefits of healthful growth in our profession. We are to each other what the life-blood is to the system.

WHAT I HAVE LEARNED IN MY TRAVELS.

J. M. RICE, SARCOXIE.

What I have learned, I must confess, while much to me, will possibly be but small interest to you, for as a learner I am at best a poor scholar and story-teller. However, the Secretary may have had my horticultural experience when he placed me in the predicament of trying to tell it to you

The science of horticulture has never worried me much, but the business of it has given me an experience of late that I find is practically the experience of others all over the United States, who have found a white elephant on their hands when they thought they owned an orchard. I will venture the assertion, however, that we have all learned that the great problem that confronts the fruit-growers of to-day is that of transportation.

After two millions of horticulturists had mastered the science of fruit culture, and were ready to reach out for their reward, they saw a transportation company snatch the prize from them, and laugh at their misfortune and penury.

At the national meeting at Austin, Texas, last February, I met gentlemen thus oppressed from every section of the United States.

The corporation octopus had spread its tentacles all over the country and was choking the industry into submission, and left it fallen and prostrated mid the most fruitful fields blighted by an unholy alliance commerce had made with corporation greed, sanctioned by law and covenanted by law-makers.

Ten millions of horticultural products are wasted annually because of the lack of ample and adequate transportation facilities, and the greatest of industries, worthy of governmental protection, was partially and sometimes wholly ignored, and left to the hap-hazard methods of individual effort to market his product and realize upon the fruits of his labor.

I have had a presentiment from association with many horticulturists that they are possessed of the national sin of American agriculturists—distrust of each other by failure and refusal to co-operate for the betterment of their condition, financially as well as socially.

I believe those who, by supine inactivity, are guilty of contributory negligence of their best interests will be impressed only with their real privileges when they have learned all the bitter lessons that bitter experience—the real tutor of us all—has opened their eyes to their mistakes.

It is conceded by all that, among other things that most oppress us as producers, are exorbitant railroad rates, outrageous express rates, refrigerator-car systems, dishonest commission men, slow movement to market, improper handling and unorganized distribution. These are the giants men shrink from encountering, and, like a lot of primeval horticulturists Moses sent to possess the vineyards of Canaan, came back bearing a bunch of grapes on a pole between two men, and reported that it was indeed a fruitful land, but was owned by giants and the sons of Anak.

These sons of Anak are the giants of commerce to-day, existing because the faith of men who raise pomegranates and grapes is so small that a mustard-seed would hold ten thousand such faithless souls, and then they would rattle.

How long we will permit the sons of Anak to occupy the land the Lord hath given us, is the burning question of the hour.

THE REMEDY.

Travel with our grievances to headquarters. Let governmental legislation clothe the Interstate Commerce commission with the same jurisdiction to control rates by express companies as it does railroads, over whose highways they do business, and subject them to the operations of laws governing all transportation companies possessed of the right of eminent domain.

Enlarge the jurisdiction of the State Railroad Commissioners in this respect, or by special enactment of the Legislature, giving full and competent jurisdiction over express companies doing business in the State.

Adopt a refrigerator system of cars to all long-distant points, and grow sufficient acreage at each shipping station to load at least one car per day; thus by thorough and effective organization meet the discrimination of express companies by an active and vigorous policy, and by protests to the traffic managers of railroads; show the extent of the actual business done and prospective business to be done under a liberal support of the railroad line interested equally with us in the full development of business, mutually profitable if reciprocal.

MY EXPERIENCE.

By organization of the Southwest Missouri fruit-growers, composing several counties, last season thirty-nine cars of strawberries were handled over three different roads not prorating with each other, consigned from seven different points, shipped to Pueblo, Denver, Omaha, Lincoln, Minneapolis and St. Paul, using the California fruit-car at a cost of 25 cents per crate, or about $160 per car in addition to the freight. We succeeded in obtaining $2.12 per crate on a day when other berries were sold for the freight, and when the rains set in later in the season, when the berry shipments all over the United States were practically too soft for shipment, we averaged 66 cents net for car after car, and according to the Chicago bulletins were the only association in the United States that made a dollar. During this new experience, however, we paid the railroads $7,539.24 freight, and to the Refrigerator Car company $5,348.16; besides this obtained three-fourths of one cent per mile track charges from the roads over whose line they were run. Yet, as expensive as this was, we beat the express rate as follows: To Denver our rate $1.85, express $3.00=$1.15 per hundred, and about the same proportion to Pueblo. To St. Paul the saving was $1.30 per hundred, same to Minneapolis; to Omaha the saving was over $1.00 per hundred.

Our total receipts were $28,454.67, yet it took fully one-half this amount to market the crop, the net being $13,933.56.

We made the commission men pay the expense of the association by rebating us back 2 per cent of their commission.

A central office was maintained, where the whole business was managed, and any fair man in the association stands ready to be benefited by our experience and mistakes.

The labor of procuring rates and perfecting the details of the business devolved on an executive committee that did not cost the grower or shipper anything but $1.00 membership fee.

We have a trade-mark of the association, which is to be placed only on first-class fruit in good condition, under penalty, the object of which is to insure the association from the machinations of designing persons, and establish a reputation for our fruit that would be creditable and profitable.

Every failure has taught us the mutability of man, but we hope to see the system perfected—not too perfect—and when we see the wings sprouting on our angelic brethren, we will stop and wait for Gabriel, and will not be surprised, however, if some man who has out-kicked a mule, and who has mistaken his liver complaint for religion, to call him to time, and prance around on his hind legs if he should toot before he is ready.

THE POOR HORTICULTURIST.

L. GEIGER, BOONVILLE.

Mr. President, Ladies and Gentlemen, Members of the Missouri State Horticultural Society:

Glancing over the lines of the program of the Thirty-third annual meeting of the Missouri State Horticultural Society, which came to hand just a week from to-day, having been mismailed, and having seen it again published in the "Rural World" of St. Louis, in last week's issue, I was surprised to find a subject assigned to me to be read before your meeting in Clinton, Henry county, Missouri. What has caused all this? Are there spiteful motives underlaid, or is it to make a convert? Nevertheless, I shall try to do justice to the subject, and will exert my best efforts in treating of

THE POOR HORTICULTURIST.

A short time ago I saw a statement concerning the fruit crop of the United States and the country at large, and there it is said: "Among the fruit-growing States of the United States, poor old Missouri is taking the third rank, only superseded by the States of New York and Michigan." What good news for us all! This does not show, seemingly, poor horticulture, nor that Missouri is a State inhabited by a great number of poor horticulturists, in spite of all the slander "that life and property are insecure by Bald Knobbers and train-robbers."

Glorious Missouri! thou art able to show to the world equal to any of your sister States advantages superior to all in horticulture in producing the finest and best apple in this blessed part of America, "the United States." And how beautifully are you situated, watered by the the great rivers, the Missouri and the Mississippi and their tributaries, and stiffened by the backbone of the Ozark! No portion of your soil is unproductive; every foot of your earth is capable of bringing forth wealth and nourishment to sustain life. There is unseen wealth concealed in your bosom, awaiting the hand to extract it; happiness and riches for the tiller of your surface soil.

The art to improve, to better, to bring forth nicer flowers, better fruits and vegetables, and better implements, is called horticulture. Brain, heart and muscles combined in the pursuit to improve upon is a necessary condition to produce good results, and such is the aim of the horticulturist.

But the question is on the contrary: Whoever is not a good horticulturist must be the reverse. So we have to look to the one as well as to the other, and learn and teach as well. If knowledge is a blessing, ignorance cannot be that; and, though there are ignorant people very often more blessed than the learned and refined, contentment makes happy, and happiness is riches. But you are possessed of the best garden, or your orchard brings forth abundant profits, and you are not contented, you are not happy, and make your wife and children and all your surroundings feel the same. The poet says: "Kindness it is that shines from within and brightens and warms up and makes your surroundings cheerful."

Head and heart and hands combined must work together in your garden, orchards and fields. A fine sense of culture will and does make a good impression upon dwellers of the house, surrounded in a tasteful garment, clothed the home of the horticulturist with a carpet of bluegrass and shrubs and flowers, ornamented by stately and lofty trees.

Poor as you may be (poverty is no shame), think profoundly, work incessantly, industriously, with confident hope of final success. You must read horticultural articles of eminent writers, practical horticulturists; you must consult the most progressive and successful horticulturist in your immediate neighborhood; you must regularly attend the meetings of your friends engaged in horticultural pursuits; you must frequently visit the homes and gardens and orchards of horticulturists, inquire into mattters, and try even to excel your neighbor of such articles, commonly called "truck," or the fruit out of the orchard; keep your garden, your orchard, your berry beds, your potato land, etc., in a good state of fertilization, in proper cultivation; do your work in seasonable time; select and plant good seeds, plants, etc, before the time you need them; deal with trusty and reliable firms; plant your fruit-trees, shrubs, berries and flowers as you have been informed by your trusty, progressive and successful neighbor; do your part well and learn to wait; reward will come in a short time, abundantly, and after six days' work, rest on Sunday, go to your church and pay tribute to your Maker. If you are not possessed of any lands, do not be discouraged; if you are the right kind of a man, your landed freeholder will cheerfully assist you; he will give you all the encouragement and will furnish all the land you may need for your business and the necessary tools, and help in general.

There is another kind of poor horticulturist, and I may not be very wrong in presuming this class of horticulturists is meant in the premises, and needs to be looked after.

Not long ago, when in one of Missouri's great cities, I visited the horticultural hall and examined the exhibits. My attention was drawn to a party standing before the apple show admiring the different specimens, which were worth seeing and studying; but when it came to the final point, ordering from a slick-tongued fruit man, nurseryman, or agent or tree peddler, my best feelings revolted, knowing and being perfectly satisfied that the party mentioned is duped and cheated; now in good hope, but after fruiting time he would ask himself, is that the apple I have seen on exhibition? A worthless article.

This same party would never buy from a home nursery nor from any other acquaintance, being too high-toned to even look at his neighboring nurseryman, who would have gladly sold him stock true to name and good in order, guaranteed to be the same as furnished, and cheaper and better besides. Poor horticulturist. Sometimes and very often indeed men possessed of hundreds and thousands of acres of good fertile lands, and money besides, do engage in orcharding. Having land enough, why not set out trees enough? and money enough to bankrupt Jay Gould.

If such men are successful in horticulture, my horticultural knowledge is at an ebb. Haughtiness, vanity, selfishness, is very often the cause of poor horticulture; carelessness, negligence, imprudence, is a sign of mis-horticulture. And from such men, possessed of landed estates, or let-go farmers, or slovens, there is seldom a ray of hope of success in horticultural pursuits to be expected. They are the grumblers; they are misleading a poor—in money—horticulturist; they are the drawbacks in horticulture—the poor horticulturists.

NURSERYMEN'S TRIALS.

H. J. WEBER, GARDENVILLE.

LADIES AND GENTLEMEN—I am very sorry that I cannot be with you this time, because I have always spent some of my best hours in life with the horticultural societies.

The subject you have assigned to me, called "Nurserymen's Trials," seems to me like a high mountain, and I do not know where to start and where to end.

For the last twenty-five years that I have been in the business, I, for my part, have been tried in so many ways that it would take a long time to speak only of myself. So, in order to make short work of it, I must say that it always tried my pocket-book more than anything else. No matter how I would worry, and how much pains I would take, there always would be something that should have been otherwise had I known it before. And I see now that it will remain so until I am called away.

Take, for instance, a very wet planting season, where you cannot get a team on the land before it is too late to plant; then getting good help to do the work speedily and properly; and the fun comes in when everything is in good working order. A strike is inaugurated, and away goes your help, leaving you in a lurch. Next, as it frequently happened, a railroad strike sets things upside down.

But the worst trial comes in when you have spared no time and expense to get the very best of varieties to propagate from, and think that now you have a list that certainly will sell in three years from the time they are planted in nursery. Now, when the stock is salable, what do we hear? Only that some horticultural societies have passed the death warrant on just the kinds we were sure of three years ago.

Now, what must we do to get at least enough for that stock to dig it up and burn it in order to make room for something else to take its place, and then run the same risk again? The only way that I can see is to sell to a tree dealer who has a good chance of making just the kind people want, get the money and skip out.

If our horticultural societies could tell us just what people would want three years from now, we would be greatly relieved, because it takes no more to propagate one variety than another. All we would like to know, is what will the people want? and that is hard to tell under the circumstances.

For instance, if a variety of fruit fails to give satisfaction for three or five years in succession, it is discarded and the trees are cut away. Should, however, a specimen be left, and it would bear a full crop for several years, then the question will arise, where can I get such a variety again?

Nurserymen are not to blame if they have none in stock. I have customers who bring me specimens of fruit that I was well acquainted with when a boy forty years ago, they being turned out on account of new and better varieties. Now they are wanted again. (Like a woman's bonnet, it gets new when it gets old.)

This reminds me of a flock of geese in the spring or fall. When the weather changes you see them with one in the lead and all the rest following. They are hardly out of sight when the wind turns its course and you see them coming back in the same manner; so they go forward and backward until they reach their destination, *but not to stay.*

Several years ago the cry was, down with the Ben Davis. "I would as soon eat a sponge as a Ben Davis." What do they say now? "Dear nurseryman: Can you furnish me with 10,000 Ben Davis straight, and at what price?"

If we could have known that three, or even two years ago, we could have had all Ben Davis, and could have sold out at a profit. Now you will please excuse me if I have defined the question wrong. To my notion those are all nurserymen's trials, and the pocket-book generally tells the story.

Hoping I am not imposing on your valuable time by saying too much, I will now close and wish you all a prosperous and happy meeting.

NURSERYMEN'S TRIALS.

J. WEBER OF ILLINOIS.

[Dedicated by a brother nurseryman of twenty-five years' experience in Illinois as a local nurseryman.]

LADIES AND GENTLEMEN: The subject assigned me is bewildering; it is like counting the sands upon the sea-shore.

Nurserymen as a class have done very much to develop horticulture since the days of Noah, who was a nurseryman with a very fair record until his vineyard came into bearing. Then, history informs us, he got drunk and neglected his business, and his stock ran down, his labels got out of place, and his business went to the dogs.

Nurserymen may be divided into three great classes: the local nurseryman, the wholesale nurseryman, and the nurseryman or dealer who sells altogether through the aid of agents, pictures and fruits magnified in glass jars.

The local nurseryman is "little" and unknown. He toils early and late to have his stock correct, and to have the best that the country affords and his trade demands. He is the beacon light in horticulture to the community, although scarcely known outside of his county. The people come to him for information, but very often get their trees from the fellow with the pictures and glass jars. The local nurseryman, trying to keep just what the people want, about the time he gets a good assortment of well-grown trees, that have cost him much money and labor, his customers don't want any assortment, but all want one kind. About the time he expects to be able to let up on sixteen hours a day, seven days in a week hard toiling, he finds one-third or more of his crop of trees that has cost him two to three years' toil must go to the brush-pile and be turned into ashes.

It is generally supposed the fellow who sells through agents suffers no losses through not having varieties. He makes varieties very rapidly to suit his wants and demands. The local nurseryman is the target on which the tree man with an agency fires all his stray shot, but he has a way of doing business that the agent finds hard to adapt himself to, so he finds it necessary to lie about him and misrepresent him; to steal his trade, he seeks to destroy his good name for truth and veracity. Yet like God's worthy poor, he stays with you always.

He, too, likes wonderful new things, and so often gets wonderfully taken in with the appalling yearly supply of new humbugs. The agent makes a sale to him occasionally of a Lawver apple or a Lawson pear or a tree blackberry. He then finds it so much easier to sell in that community if he can get on the blind side of this unsophisticated rural. He then walks with much more elastic step, and says: 'I have an order from your local one-horse nurseryman."

Of course this so-called one-horse nurseryman hopes it will prove a good thing, and strains every nerve to get a small supply to sell at a few cents more than ordinary prices, but by the time he gets a small supply of this and a half-dozen other new varieties, the bubble has bursted; nobody wants them as a gift; they are all but two or three which he plants to go to the brush pile. If he chances to

sell a half-dozen and they do not prove to be valuable, he is accused of taking advantage of his neighbor's ignorance for the paltry sum of a few cents, when the fact is, he is rapidly filling up his best grounds experimenting for the community, who no doubt are calling him a crank.

When spring opens, after three days of sunshine, his customers, no matter how many, think he should be able to wait on them all the same day, and if he should fail to get their order off as soon as they desire, they will torment him with letters and telegrams telling him to ship their order at once or cancel it by returning money. They never think that he is working sixteen hours a day and half the night with all the hands he can muster to get their order to them in rotation as received, and in time. But nine out of every twelve customers will act as though he had but one customer, not stopping to think that from 60 to 160 orders were in ahead of his. If there should be one tree in twenty-five plants short, the chances are he will get a letter that will make his hair stand on end—the purchaser seldom stopping to think that the poor worked-to-death nurseryman cannot count a hundredth part of the plants and trees he ships, but must necessarily depend on his help, which is very often not of the best, but the best he can get.

Nurserymen, as in every branch of business, must buy and sell from one another. It is utterly impossible to avoid mistakes occasionally. Every man that has tried it will testify, but nurserymen are expected in their complicated business to make no errors or mistakes. If he should chance, through cions or buds purchased from a supposed reliable, careful man, to get mixed, he is often accused of substituting. Often he could substitute and give his customer something better were he permitted to do so, but his judgment is supposed to be readily warped for the paltry price of the trees he desires to sell them.

The local nurseryman never gets credit for half the good he does until dead, but he is, during a busy life, building living monuments. How sadly would we miss the vines and trees around our prairie homes. The trials of a nurseryman cannot be told. It is like trying to empty the ocean with a tea-spoon. He is a public benefactor; do try and spread a gleam of sunshine upon his pathway.

FINAL RESOLUTIONS.

Your Committee on Final Resolutions beg leave to report the following:

1. *Resolved*, That this Society tender their heartfelt thanks to the generous citizens of Clinton who have opened their doors and welcomed us most hospitably to the best the land affords.

2. That our thanks are due and are hereby tendered to the various railroad companies who have granted us excursion rates over their lines.

3. That our thanks are gratefully tendered to Baird college for the use of their piano; also, the music and dramatic recitations rendered.

4. Our thanks are also tendered to the Committee on Music, to Prof. Hall and his associates for the most excellent music rendered.

5. Our thanks are also due to Mr. Edward Barnhart for a generous collection of green-house plants and flowers for decorating the hall.

6. Our worthy President also desires to express his heartfelt thanks to Mrs. Edward Barnhart for a beautifnl basket bouquet.

7. Last but not least, we tender our most sincere thanks to the Henry County Horticultural society for their most successful effort in procuring and adorning the city hall for our meetings; also, for escorting us in a body to Baird college and a ride to the artesian well.

J. H. LOGAN,
S. W. GILBERT,
A. NELSON,
Committee.

President Evans—Miss Bettie Settle, I am requested to present you this plate of premium Ben Davis apples for your most excellent rendering of the "Mule and the Nigger."

(To the audience): As we are about to separate, I want to say that I feel very much gratified at the success of our meeting. I feel happy. Each year our last meeting is always the best.

CLOSING REMARKS.

Rev. Mr. Armstrong—I have no long speech for you to-night. I cordially thank the members of the Horticultural society, also the citizens, for the vast amount of information we have received in this session of the State Horticultural society. Some think there is no hell and no devil, but horticulturists have to fight the devil in the form of insects, rust and rot. There is a hell in the future, from analogy, as there is one in this world.

You have had the privilege of meeting with a generous and a progressive people. The people of Clinton have been happy in entertaining you, and now at the close of the program we have to part. I hope we will put new energy and resolution into the execution of our work for the next year, and that we shall have even a better report next year than we have had this. Let us every one that can sing join in singing the doxology:

Praise God from whom all blessings flow,
Praise Him all creatures here below,
Praise Him above, ye heavenly host,
Praise Father, Son, and Holy Ghost.

The blessing of God the Father, the Son and the Holy Ghost, one God, be with this State Horticultural society, with this people and with all people everywhere, forever and ever. Amen.

DEATH OF D. S. HOLMAN.

D. S. Holman, treasurer of the Missouri State Horticultural Society, died at his home in Springfield, Mo., Saturday, December 6th inst., of paralysis. He was born in Iredell county, North Carolina, November 13, 1824, and was sixty-six years old at the time of his death. His parents, Lazarno and Elizabeth Holman, moved to Rutherford county, Tenn., when he was eight years old. After remaining there a few years, they moved to Missouri in 1837, settling in Franklin county, where David was educated in the county schools. He was licensed to preach for the M. E. Church South, by the quarterly conference in the district embracing the city of St. Louis. He preached in the counties of Oregon, Crawford and Lafayette. For a time he was put upon the African mission and built a church for them. He came to Springfield, spent a year and then went to Jasper county. His health failing, he engaged in the nursery business there in 1860. In 1864 he moved to Springfield and established one of the largest nurseries in this section. On December 14, 1856, he married Miss Mary, daughter of Ellwood B. James, of Carthage, an early settler of Jasper county, who served twenty years as county clerk. Four children were

born of said marriage—Rosa E., Sudie L., David E. and Joy S. Deceased was a Royal Arch Mason, an officer of the State Horticultural Society, a Democrat, and wrote extensively for the Rural World over the *nom de plume* of "Jot." The officers of the State Horticultural Society and Mr. A. Nelson, president of the Laclede County Horticultural Society, attended the funeral.

Just as I was preparing this for the printer came the sad news in the letter following, and in a day or two the telegram telling of the death of our old friend Patterson. How few of us expected at Clinton that Brother Patterson would be called hence so soon! Our sympathy certainly goes out to the friends and relatives who have been so quickly bereaved. Every member of the society will unite in our expression of sympathy.

SECRETARY.

KIRKSVILLE, Mo., Dec. 28, 1890, 4 p. m.

Mr. L. A. GOODMAN:

DEAR SIR AND FRIEND: Father had a paralytic stroke affecting his entire right side, which he now has no use of whatever. He is unconscious, can neither see, hear nor speak at present. Was attacked yesterday evening at 6:25.

Yours truly, his son,

E. A. PATTERSON.

KIRKSVILLE, Mo., Dec. 31, 1890.

L. A. GOODMAN, Westport, Mo.

Father died at 4 p. m. yesterday. .Funeral Thursday at 10.

E. A. PATTERSON.

MISCELLANEOUS LETTERS, REPORTS, QUESTIONS AND PAPERS.

MISCELLANEOUS.

CAVENDISH, Mo., December 11, 1890.

Mr. L. A. GOODMAN:

Sir—At a meeting in the court-room in Chillicothe on June 17th, the Livingston County Horticultural society was organized, a constitution adopted, and officers elected to serve for one year. The following officers were elected; G. W. Weatherby, president, W. R. G. Humphrey, vice-president, M. L. Brooks, secretary, John Hudgins, treasurer. The regular meetings of the society are on the second Saturday in June and September, besides adjourned and called meetings. The society have had three meetings so far, which have been quite interesting; and they had the finest display of fruit at the county fair the first week in October, that has ever been made in this part of the State. But few of the fruit-growers of the county have joined the society yet, but we hope to see quite an increase in the membership at the next meeting. Our county is rapidly increasing in fruit-growing, and will soon be one of the leading industries of the county. About 20 train loads of apples were shipped from Chillicothe this fall; one buyer shipped 25,000 barrels, another, 20,000, and several others were buying. One of our leading fruit-growers estimated that the apple crop alone of this county this year was worth $600,000. A good many new orchards will be planted in the spring.

Respectfully yours,

M. L. BROOKS, Secretary.

CARTHAGE Mo., November 2, 1890.

L. A. GOODMAN, Esq., *Secretary Missouri State Horticultural Society:*

DEAR SIR—The card you sent me to fill out as "Report for October" was filled out a few days ago, but was forgotten when I went to town. I will send it this week, hoping that it may still be in time to be of some service.

In regard to writing a report for this county for this year, I must say that I don't suppose I will have time to do any writing of that kind this fall or winter. I begin work in the county collector's office this

week, and as I have not worked there before, I don't know whether I will have any spare time or not, but don't suppose I will, and without some time and comparative freedom from other cares, it is impossible for me to prepare a paper or a report that I would be willing should be read before an intelligent audience. And besides, the last year's results don't make me feel much like writing on horticultural subjects, and especially on those phases of it which are usually shown up in such bright colors. In fact, as far as berries are concerned (and they are my specialty as you know), the future looks dark and gloomy. I don't want to hear any more to the effect that "the demand is far in excess of the supply," as far as berries are concerned at least. I think it is all a mistake to try and induce more people to go into the business of growing small fruits for the market. However it may be at other places, there certainly are too many of them grown here unless we could get much better rates and facilities for handling the crop, which is by no means certain, and if we could, there is no Chicago to send them to, and there is bound to be a limit to the amount that will be taken at prices which will leave a profit to the grower, who is the last one to get his pay if there is any left for him; which there was not here this year. The shipping organization here has been a failure as far as getting good prices is concerned, and it is hard to tell whether or not it won't be the end of organized efforts in that direction here for some time to come. At present we appear to be all at sea, and know not which way to turn. Of course we have acquired some experience and learned many things that probably will be of service to us if an organization can be maintained on such a basis as to allow of their being made available; otherwise this year's costly experience must mostly go for naught. I wish I could come to the Clinton meeting, but I can not, as I must hold my position and try and make all the money I can honestly until I get in better circumstances, when I hope to attend not only all of our meetings but also the meetings of other important societies.

If you have any thoughts to offer in regard to a shipping organization here, I shall be more than pleased to receive them.

Yours fraternally,

Z. T. RUSSELL.

BEEMONT, Mo., November 29, 1890.

L. A. GOODMAN, Esq., Westport:

DEAR SIR—I sometime since received a copy of 32nd annual report of Missouri State Horticultural Society, for which please accept my thanks; it is interesting and valuable reading, and it is to be hoped

that the meetings and work of the society may bring horticulture to due prominence. I also received blank for October report, but had nothing of benefit to report.

I am only growing fruit and berries for use in my own family, and up to this time hardly enough for that, but am enlarging somewhat in that line.

There is very little fruit grown for market here; some few have a surplus of apples, but they find sale for the surplus among neighbors. As to peaches, crops are so few and far between, that few trees are planted, and these generally neglected. Small fruits and berries could and should be grown, but few seem to realize how easily they might have them in their season; but there seems at this time to be more interest in the matter. A few pioneers in the fruit business in each neighborhood would soon create a lively interest in fruit-growing.

Hoping you may have an interesting and profitable meeting, I am

Yours truly,

M. E. ARMSTRONG.

Secretary L. A. GOODMAN, Esq:

DEAR SIR—I am disappointed that I am not able to meet with you, as I have looked forward to your meeting as a pleasant and profitable occasion. First on account of the unusual wet weather, and then on account of the extreme drouth, our small fruit proved unprofitable and our early apples were almost a failure, but our fall rains brought out our late fall and our winter apples beyond all expectation; especially the Ben Davis was very fine. This variety has again furnished us more market apples than all other varieties combined; it has been to us what Horace Greeley denominated the Concord grape, "the fruit for the million."

For several years many of the young twigs on our apple and Siberian crab trees have commenced to wilt, and to gradually die back to the point of union between the present and last year's growth, and by cutting through the bark at this point an appearance is plainly observable as if the twig had been stung. It is usually denominated a "sun-blight," but I believe it to be the work of an insect. What say the society? Please pardon haste.

Yours truly,

H. A. ENSIGN.

CARROLLTON, Mo., December 1, 1890.

L. A. GOODMAN, Esq., *Secretary Horticultural Society Missouri:*

The writer was much disappointed in not meeting with you, and have a good representation from Carroll county. Some people that wanted to meet with you could not go; some should have joined that would not.

The best calculation I can make, we have shipped from Carroll county, getting statement from each railroad station in the county, and estimating evaporated fruit and canned goods (apples), we have a total of 42,000 barrels. This was not a full crop, but the price may have brought out more apples than would have been cared for if it had been less. Evaporators did much to use up culls, and all kinds were in demand, from packing to cider.

A number of orchards have paid as much as $100 per acre. Those who sprayed their trees while in blossom had almost perfect fruit; paid them a large profit for expense and labor.

We have an increase of small fruit culture; it is growing in volume, quite healthy.

Yours,

W. S. CROUCH.

MILLER COUNTY.

Our county is in Central Missouri. Has an outlet to market by a branch of the Missouri Pacific railroad, connecting at Jefferson City. The Osage river runs through the center of the county, and that part is considerably broken; but there is considerable prairie in both the northern and southern portions. The soil and locality are well adapted to fruit-growing, although as yet very little attention is paid to it—there being but little surplus fruit besides apples, while a large number of farms have but an indifferent supply.

Experience has shown that much of our land that cannot be cultivated to an advantage will grow good crops of fruit if properly managed, and much that is only considered as valuable for pasturage could be made more profitable by growing fruit. It is evident, however, from the large delivery of trees made in the last few years that farmers are taking more interest in this branch of the work; yet there is certainly plenty of room for improvement. Our county papers keep urging our farmers to plant more fruit, and some good will result.

We have no horticultural society, but have a farmers' club that meets once a month at which farm questions are discussed. J. C. Morrison is president, and myself secretary.

N. J. SHEPHERD,
Eldon, Miller Co., Mo.

November 8, 1890.

L. A. GOODMAN, *Secretary:*

DEAR SIR—In reporting the fruit crop for Andrew county, will say apples were our principal crop. The quality was poor; the prolonged drouth made them small; I think we had about one-third of a crop. I am sure we had a trust formed in St. Joe, for they were paying $1.25 to $1.50 for all apples, until eastern buyers came in and began to pay good prices; then they sent their runners all through the county and bought all they could before the farmers found out they were scarce, and I was of the number; sold the middle of August; received only $500 for 900 barrels in the orchard.

As to small fruit, there is a much larger acreage planted every spring; but I have no knowledge of number of acres of each variety. Strawberries were very fine, and were sold in St. Joe as low as $1.25 per crate. Raspberries were winter-killed some, and the first to ripen were good, but the last of the crop were damaged by the drouth. Blackberries were about the same, except they were not winter-killed. There were many acres planted last spring of all kinds of berries, and they are better cared for than they were years ago.

The good prices paid for apples this fall will stimulate heavy planting in the spring, I think. Very respectfully yours,

T. F. MILLER,
Avenue City, Mo.

LINNEUS, MO., November 17, 1890.

L. A. GOODMAN, Westport, Mo.:

DEAR SIR—I have been looking forward and expecting to attend the annual meeting at Clinton, Mo., but find it impossible on account of sickness in my family. But I hope you may have a grand meeting, and when next annual report comes out that it may eclipse 1889 (but I doubt it), for I consider that the information it contains is equal to ten years' experience saved, and I think the State should appropriate more money for the Society's use. Linn county is taking a boom in horticultural pursuits. Many thousands of trees will be planted this fall and next spring, and then the next thing is to be educated how to care for them, and we look to a great extent for information from your noble order. I hope the Society may favor North Missouri with the summer meeting. In report 1889, pages 19 and 438, regarding cider vinegar and vinegar law, I think it very important to both producers and consumers that there should be a law made compelling manufacturers to brand each barrel just what it contains. I have 100 barrels pure cider vinegar, two and three years old, but even to sell it in Lin-

neus, I have to compete against acid vinegar they claim cost them nine cents per gallon, including barrel and freight. The same is sold and even branded "pure cider vinegar." You know that pure cider vinegar made from matured and free from rotten apples cannot be made for less than fifteen cents per gallon, less barrel and freight. With well wishes, I remain, Yours truly,

CHAS. J. DRAY.

KNOX COUNTY.

I will here make a short report of the fruit interest of the northern part of Knox county:

The apple crop is rather a short one, considering the early promise of an abundant one. The trees showed a heavy bloom; a large proportion showed a strange behavior: about two-thirds of the lower portion of most varieties leaved out and blossomed properly, while the upper third did not leaf out until the lower part was out of bloom; then the upper part leaved out and bloomed as full as the lower part had done ten days or more before. In the latter end of the blossom period we had several killing night frosts, and nearly all of the bloom dropped off, and also a goodly portion of the early bloom, causing, according to locality, a very short crop, and in some cases a fair crop, owing to exemption from injury from heavy frosts.

Orchards, in this (north) part of Knox county, are mostly small, from fifty to two hundred trees—more of the former than the latter. There is plenty of fruit for home use, and some for market, although there is not one orchard in twenty that receives intelligent care, and yet our fruit is of fair size and quality, showing what could be done with proper care. The codling moth did do some work in the latter end of summer, damaging about ten per cent of apples. The round-head borer needs close watching; it will destroy seventy-five per cent of apple trees not taken care of, which is the case with eighty per cent of all set out in this part of the country. In July, all of a sudden, before a person was aware of it, a crop of caterpillars began defoliation of apple trees, and also of walnut trees; they resembled the common tent caterpillar, but made no tent. I reported the case to Department of Agriculture at Washington; they requested to send specimens, but by this time they had disappeared.

We have had longest drouth in the twenty-two years I have lived in the State. Trees have made a fair growth, and have a liberal crop of fruit-buds for a full crop. Trees that bore the best crops in my orchard are, first: Ben Davis, then Small Romanite, Winesap, Janet;

a light crop of early fruit, Early Red June, Maiden's Blush, Northern Spy, in the order named. We had about one-fourth crop of peaches; quality fine. Pears, fine crop; slightly touched by scab; no other disease. Plums, full crop; best in the order named, with me, Wild Goose, Forest Rose, Marianna—in which latter I am disappointed; it is a shy bearer and subject to rot on the tree. Grapes, an abundant crop; good quality; no black-rot on account of drouth, the fall rains filling them out to perfection. Strawberries were a fair crop, except tender varieties, like Sharpless, that were killed by late frosts. Raspberries, early sorts, fair crop; late sorts, about three-fourths dried up on bushes. I have three varieties of blackberries; first to ripen, Early Harvest, which has proved tender with me, and a very moderate but early bearer, beginning to ripen with the Gregg raspberry; not a success; Snyder, nearly all dried up on the bushes; Kittatinny matured about three-fourths of a crop of fine, large berries, but these last sometimes suffer from our test winters, which do not seem to hurt the Snyder, but kill Early Harvest to the ground.

In regard to strawberries, according to my experience, I would place the Bubach No. 5 at the head of the list of a dozen sorts that I have tried. My soil is a dark clay loam, rather heavy. A new beginner should always inquire from some man in his neighborhood, who has a similar soil and climate and exposure, and, if he be a gentleman, he will tell him what kind does best for him, and also what modes of culture and care, both summer and winter, are necessary for success. I will state an experiment I made the past season on a plum disease, viz., plum-pocket. My Wild Goose and Forest Rose plum trees have been infested with that disease, and I concluded to declare war with the knife, to try and head it off. I began, as soon as I saw its presence, by nipping or cutting off of all diseased plums or young shoots which had a resembling of the curled-leaf disease of the peach, and burned every plum or shoot that showed the disease, and I believe that I have stamped it out, for I cannot see any sign of it on any of my trees at this date, but shall watch for a reappearance, should any occur.

I would like to ask a question, and have it answered by you, or by discussion at the near meeting, in regard to strawberry plants. I have always found that a small proportion of plants were barren. No matter of what variety, those barren plants will continue to be barren, as also plants grown from them. As I grow some plants for sale in a small way, I would be glad to hear from some men of experience on that point, as my experience is rather limited, and which might easily be avoided by weeding out all barren plants that show no fruit in fruit time. All these little occurrences ought to be known and brought out

in discussion, so that parties interested could steer clear of disappointment. I would like to know the success of members who tried spraying apple trees against the codling moth; how often spraying is needed to save the crop, and what injury, if any, to trees resulted from repeated spraying, and what mixture was most effective and the least harmful to the trees.

I will bring this to a close with best wishes for a good and interesting meeting, and remain, Yours truly,

Baring, Knox Co. PETER DAILING.

ORRICK, RAY CO., MO., Nov. 16, 1890.

MY DEAR SIR: I beg permission to respond to your request, as I find it impracticable to visit your meeting at this time, which would give me great pleasure, etc.

My brother and I (J. S. Leake & Bro.) began setting our orchard A. D. 1880, '82, '83, '84 and '85. Our apples are mostly Ben Davis. We have cultivated our orchard every year in wheat, oats, rye, corn and clover. We have manured about our trees and likewise over the entire surface of the orchard. We used horse excrement mostly. Wood ashes, leached or unleached, thrown about the trees, stimulated wood growth to such an extent that they present the appearance of willow. We were forced to head back to prevent the trees from being broken off by the wind. We have been careful to remove all borers from all trees. We are now removing all rubbish from the base of trees, and whitewashing the trunks. We whitewash every fall, and wrap the trunk in summer to prevent the field mice and rabbits from gnawing the bark. We have twenty-two acres set, of apples, pears, plums, cherries, peaches, quinces, apricots, etc. We want to set blackberries and strawberries in the spring. In this short communication I can give but a brief description of our successful plan of orchard-growing. I am not an egotist when I say we have had almost unequaled success in this part of the country in growing an orchard. We have finished harvesting the fourth profitable crop of apples. This year some of our trees (ten years set) have made $9 per tree.

I wish you a good meeting and hope to become identified with any movement of this kind which may foster the best interests of fruit-raising. I may at a future time give a concise description of our proceedings. Our motto has been to "give the orchard same care you do any other valuable crop."

J. S. LEAKE & BRO.

EVERSONVILLE, MO., November 18, 1890.

Mr. L. A. GOODMAN:

DEAR SIR—I would be happy to comply with your request if I were so situated that I could, but I am in the northwest corner of Linn, within two miles of the Livingston county line. As I have been one of those terrible fellows, a tree peddler, in the past for some four years, I can give you a general description of the orchards in this part. Some six years ago we had a very severe storm through here that nearly wrecked the old orchards; some are dying from starvation, the trees all bound up in sod, and have not been properly pruned.

But there is a brighter side to it: the good prices of apples in the past two years have stirred the farmers up so that they are planting a great many trees. And the orchard of the past, with forty-nine varieties, with no salable apples, will give place to Ben Davis, Willow Twig, Jonathan, with a few of the later new varieties.

Every one is planting more or less, and in most instances they are taking care of them; the farmers have learned it is no use to plant unless they care for them. There are no small fruits here only for home use; some cherry, plum and pear are being planted. I have a small orchard of one hundred and six trees; most of them have been planted three years. I have been cultivating in a hoed crop; from now on shall cultivate without any crop. I am going to plant some four hundred more apple, mostly Ben Davis. I have some pear and plum planted also.

Many thanks for report; it seems to me that each number is better than the last. I can assure you it is eagerly read by me; I do not wish to make the mistakes I have made in the past.

If I were so situated that I could attend the meetings I would like to join the State Horticultural Society, as I am getting deeply interested in the fruit question; it is a subject I never get tired of.

The prices paid for apples here this season were 50 cents for good fall and 60 to 75 cents for winter.

Hoping you may have a good meeting.at Clinton,

I remain, respectfully yours,

T. A. HALL.

Linn county, Eversonville, Mo.

GRANT CITY, MO., November 16, 1890.

Mr. L. A. GOODMAN, Westport, Mo.:

DEAR SIR—I received your card some time ago, but laid the card away and forgot to answer it, and I commenced filling it out but

concluded to write you a letter, as I can explain things better. I filled out a card in September, and sent you about the number of barrels of apples there would be in this county. I then put it at 3,000 barrels, but I was badly fooled, for since the apples are gathered and sold the amount is near 6,000 barrels that has been and will be shipped from Grant City. Sandusky and Co., of St. Joe, have shipped 20 car-loads from Grant City; they shipped about 150 barrels per load.

P. C. Sears of Chicago has and will ship near 3,000 barrels from here; he bought my orchard in August; an orchard of about 500 Ben Davis yields him nearly 900 barrels No. 1 apples, and about 300 barrels of No. 2; he gets about 1,300 barrels in all, for $1,000. I lost fully $500 by selling when I did. I never had finer Ben Davis nor fuller trees than we had this season, but over two-thirds of my orchard did not bear to do any good. The Jonathans, Ben Davis and Winesaps were about all that bore. My cherry crop was only about half a crop; blackberries, raspberries hardly half a crop on account of dry weather; but take all together this season, my fruit crop will net me about $1,300, and our market hereafter will be better than it has been in the past. I am in better spirits then I ever was in regard to the sales of apples. I do not know if this letter will be of any benefit to you, but any time you want to know anything that I can give you any light on in regard to fruit, I will try and do so with pleasure.

Respectfully yours,

JERRY DAVIDSON.

COWGILL, CALDWELL COUNTY, MO., April 15, 1890.

Mr. L. A. GOODMAN, *Secretary Missouri State Horticultural Society*, Westport, Mo.:

DEAR SIR—Your circular informing me of the meeting of the Missouri State Horticultural Society at Clinton, on the 2d and 4th of December next, has been duly received. I hope the meeting will be profitable to the fruit-growers of our State and elsewhere.

Our apple crop here in Caldwell county was likely about a half crop. Very nice Ben Davis and Willow Twig apples sold in Cowgill to apple packers for seventy-five cents per bushel. I sold mine, including large and small apples, for forty-five cents per bushel on the tree. The oldest part of my orchard is thirty-six years old, and is now on the decline, and the apples somewhat wormy and small.

The great drouth that prevailed here last summer was broken on the 19th of July; after that time the apple crop improved very much, and many thousands of bushels have been shipped from this (Caldwell) county.

The soil in this part of Missouri is very favorable for the growing of fruits of all kinds, as the sub-soil is generally porous and rich in the chemical substances necessary for the growth of fruits and berries. A hard-pan sub-soil is very unfavorable for the growth of orchards, as the roots of the trees cannot easily penetrate such soils in search of food for the growth of the trees.

Now is a good time for persons who are suited for orchard growing to set out orchards, and take good care of them, as neglect of the orchard will surely cause a failure.

Kansas City is our great city now, and may be much greater than we now expect in the near future: in fact, we cannot tell or know what it will be fifty years hence. Wonderful changes will take place, no doubt, and the people that are coming in the great future will crave or want fruits the same as we do. All young or middle-aged people that will plant and take good care of their orchards will pursue a wise course, no doubt.

I hope the forthcoming meeting of the fruit-growers of Missouri will be profitable to all our people. Yours truly,

WILLIAM MCCRAY.

SEYMOUR, MO., December 7, 1890.

MR. L. A. GOODMAN:

DEAR SIR—The program for the December meeting at Clinton, Missouri, sent to my son, E. Beazley, received, and as he was not here, and it was not so as he or myself could attend the meeting, I thought I would write you something in regard to this part of the country about fruit-raising to be read at your next meeting, if you think it worth anything to the fruit-raisers of Missouri.

In the first place, will begin with the whole-root graft business. There are agents here selling what they call whole-root apple trees at fifty cents each; these agents argue that a piece-root graft is not worth planting. As for myself, I do not believe a word of this whole-root process, and will give an instance of it that happened fifty years ago. My father set out an orchard of ten acres of apples fifty years ago in Boone county, Missouri; the trees were grown of piece-root grafts, set two rods apart, with peach trees set between the apple rows; about one-third of the orchard sloped to the north, and two-thirds sloped to the south; the trees on the southern slope lasted from fifteen to twenty-five years, while the ones planted on the northern slope were good bearers when forty years old. Is not this instance proof enough that piece-root trees are good enough for the average fruit-grower of Missouri? I think this will be a very fine fruit county some day, when the

many young orchards that are now being raised come into bearing. I commenced the fruit business here two years ago, by starting my own nursery; bought the grafts from C. H. Fink, Lamar, Missouri, and my trees are now two years old, and average about five feet high, large and thrifty, and have as fine roots as any I ever saw.

So I will urge on the fruit-growers of Missouri to buy their grafts and raise their own trees. I have also planted my own peach seed, and have budded them myself; by so doing, they will not cost me more than two or three cents each if I had hired all my help. By starting as I have, many could go into the fruit business that could not otherwise do so. I expect to continue growing and setting out fruit-trees, until I have out 100 or more acres, for I see from my neighbors around that more can be made out of fruit than out of stock-raising or general farming.

But I will continue farming and stock-raising in connection with fruit-raising, as I find they are profitable carried on together. In some of the most thrifty orchards in this part of the country, sheep or hogs are permitted to run at will, and eat the grass and fallen fruit. So the manure is all left on the ground to enrich it. I know of some orchards here a part of which is cultivated and a part mulched, and the mulched seemed to be doing the best.

Some of the finest trees I know of only have a pile of rocks around them, and that kind of mulch is so plentiful in this part of the country it would be profitable to put our rocky land in apple orchard.

In regard to fruit lands in this (Webster) county, will say, they can be bought very cheap; wild land from $1.25 to $5.00 per acre, and improved farm from $5.00 to $25.00 per acre; and we have two main lines of railroad through the county, and grain and fruits of every kind bring good prices.

Yours respectfully,

R. E. BEAZLEY.

REPORT FROM PLATTE COUNTY.

The fruit crop of Platte county was fair, over 50 per cent; quality an average one; in many localities, wherever trees existed, peaches bore well.

Our older orchards are fast passing away, and with younger and more vigorous trees, a thorough warfare for the extermination of all insect enemies, a better and more approved method of culture, it is to be hoped that our fruit in the future may be better, as near perfect, if possible, as can be.

The soil of our county is very rich, fully adapted to grow every agricultural product in the highest excellence.

As a fruit region, the soil in all its formations is suitable; the situation of its valleys and hills for the production of first-class fruit is all that can be desired, besides the presence of large bodies of water and flowing streams, necessary for the production of good fruit and constant crops, which we have in good supply: in the northwest part of the county, two large lakes are sending up their vapory moisture; the broad Missouri flows along our western boundary; the Platte winds its tortuous course from north to south, while many minor streams flow through every part of it.

Our market facilities are good; four large cities surround us, with our local towns, while the great West will be always ready for our surplus.

J. A. DURKES.

STOUTLAND, Dec. 1, 1890.

L. A. GOODMAN, *Secretary State Horticultural Society*, Westport, Mo.:

Camden county is west of the central part of Missouri and mostly south of the Osage river; contains about nineteen (19) congressional townships, with a population of about (11,000) eleven thousand, with an assessed valuation of $995,000. Lying principally south of the Osage river, it is beautifully interspersed with rivers and streams, and contains large caves or caverns, and some of the most romantic natural scenery in the world. It has some wonderful mineral deposits, such as lead, zinc, precious stone (onyx).

Camden county's diversified surface, her soil and her products tell plainly and truthfully of her immense agricultural as well as horticultural resources. Messrs. Adams and Halloway have a young nursery in the eastern part of the county, and John Letcher has a small nursery in the western part of the county. Many trees have been planted in the last year with a view to commercial orchards. Camden county has a large acreage of land that could be devoted to the cultivation of fruit with profit; and more attention is being paid in the last two years than before. We may look forward to the day that fruit-raising will be a leading feature of this county.

We must learn from experience and give each other our views, as well as success or failure, for each is worth knowing to all interested workers.

I will close, wishing you all who attend the State meeting at Clinton a good time, and in the hope of meeting with you at some future meeting is the wish of

Respectfully yours,

J. W. BURHANS.

ILLINOIS STATE HORTICULTURAL SOCIETY.

At Cairo, December 9th to 11th, 1890.

[Report by Chas. Patterson, Kirksville.]

Mr. L. A. GOODMAN, *Secretary Missouri State Horticultural Society:*

DEAR SIR—Thanks to your kind instructions and outfit, I again had the pleasure of attending the annual meeting of this active and progressive society, and was as well received, as horticulturists always know how to make visitors share each other's pleasures. As this was my fifth visit in that succession of years I begin to feel almost as much at home there as in my own State, and nothing short of a calamity will prevent me from repeating it next year and indefinitely. The fruit consigned to me in care of Secretary A. C. Hammond was already in good place for display when I arrived. The usual comments on Missouri fruits would indicate that as a matter of course they should make a better showing than theirs, but I think we should consider that their exhibits generally come from the north central parts of the State and above, and scarcely any from the southern parts, while ours generally come from the southern and western parts. What they might do if the southern part of the State should make as much effort to exhibit as the central part now does, I am not so confident of. However, if I had a museum orchard, as some of them seem to have, I would have the courage to compete with any of them, if I do live near the northern border.

I will not attempt a detailed statement of instructive papers and discussions, but rather refer to such as I think would be of general interest to our members. One of these was a paper by Prof. Trench on a new insect pest called the Fruit-Tree bark beetle, which it was estimated would destroy all the cherry, plum and peach trees in Southern Illinois in five years, if not checked. A specimen section of tree and branches was exhibited, some one to three inches in diameter, closely perforated with small holes through the bark and sapwood, which seemed to fully justify the estimate. I did not catch the scientific description of it, nor any other remedy than to cut and burn the tree as soon as discovered. We must keep a close look-out for it. The Gipsy moth, which I think has been described in some paper, was also brought to notice. Spraying raspberries and blackberries with blue-stone solution before leaves come out, against fungii similar to or identical with *antrœnosi*, was indorsed by Prof. Burrill and others.

Prof. Burrill gave a very interesting lecture on "Influence of Root on Trees as regards Health and Hardiness." While such a lecture from him is always highly instructive, this was evidently intended to settle

the mooted question of so-called whole-root grafting, which, I think, has been given far more prominence in the last five years by that society than such a humbug deserves from such a body of men. It is due to say that very few, if any, well-informed members ever undertake to defend it, and that the only object of the discussion is to meet the prolix 5x9 nonpareil literature scattered broadcast to catch gudgeons: but it should be remembered that these gudgeons seldom, if ever, attend such meetings or read the reports, and that the skillful anglers will be very sure to change their bait long before common reports can reach their victims—as instance budded trees, French crab stocks, etc. If there has ever been an improved variety or method introduced through these nibblers, and sustained by experience, I am not aware of it, but the gudgeons are as numerous and as gullible as ever. It is very humiliating to see some of our well-informed men lending themselves to spit on the baits, presumably for very small favors.

A committee of three was appointed to place the society in communication with the Division of Pomology.

I did not hear if any action was taken on the Columbian exposition, but it seemed to be left with the executive board. By inquiry I learned that they expected to ask not less than $50,000 appropriation from the State, with no misgiving that they would be beaten down. Will our officers and Legislature please govern themselves accordingly?

Mr. J. Webster, Centralia, was re-elected president, as well as A. C. Hammond, Warsaw, secretary. Next place of meeting will be Olney, also in southern part of the State.

On my return I stopped over one day with friend Webster, at Centralia, and had the pleasure of inspecting as many strawberry fields and orchards as the weather and short time would permit. These fields and orchards, and appliances for handling the crops, show not only that they mean business, but that they are actually doing an immense amount of it, in both these lines, on correct business principles. The early decline of sod-bound orchard trees is not likely to afflict that section very soon—at least, not as a rule. We must keep the plows, harrows and cultivators going in our orchards if we will not be outdone by sheer physical force and intelligent energy.

HUGO, MONTGOMERY COUNTY, MO.

Montgomery county is beginning to come to the front, to a great extent, as a good fruit county. While at present there are not a great many large commercial orchards in bearing, there will, in a few more years, be a great many. This will especially be the case in the south-

ern part of the county. Eight years ago the vicinity of Hugo was almost an unbroken forest. It was soon found out that the land was well adapted for fruit. A horticultural society was organized and the fruit interest taken up in dead earnest. A great many commercial orchards have since been set out, and in the coming spring more trees will be planted than ever before. In the first plantings some mistakes were made in setting out varieties not suited for our land, though otherwise good market sorts. Nearly all of these will be grafted over the coming spring. At least three-fourths of the trees that will be planted from now on will be Ben Davis, the balance Jonathan and Willow Twigs. The Ben Davis seems to outgrow any other tree; it bears young and constantly, and there is always a good demand for the apples. A good number of our members have also planted pears quite extensively. Clapp's Favorite, Howell and Keiffer I find among the best. The Bartlett do not seem to do well; too much of the fruit is deformed and knotty. Pound is the largest pear that I have seen grown here. I had a specimen last year that weighed 28 ounces. I also had 27 specimens that weighed 30 pounds (half bushel). Size, however, is about the only good quality that this pear has. Doyenne d'Ete and LeConte are absolutely worthless here on account of blight. Cherries and plums do well here, but cannot see that there is much profit in growing them.

A great interest is also taken in strawberry culture. Our land seems to be especially adapted to their growth. One of our members, two years ago, has raised 170 gallons on 1-5 of an acre. I had myself helped to measure the ground, and the party had a list, telling where every gallon had been sold. Our last crop of berries, however, was nothing to brag of. The late frosts had greatly injured the crop, while the continued wet weather made the balance too soft to handle. Cumberland, Crescent and Captain Jack are still giving the best results. A number of other new and promising sorts will have a chance to show themselves the coming season, such as Michel's Early, Warfield No. 2, Bubach No. 5, etc.

Jessie I find to be absolutely worthless. I do not see how it can be recommended as a good fertilizer, from the fact that it blooms a week or ten days sooner than any other variety. For extra late I find Gandy, W. Chief and Cornelia among the best. For quality alone, however, I yet claim the banner for Piper.

Blackberries do well here and generally bring a good price. Kittatinny takes the lead so far, and will continue to do so, unless it finally succumbs to the rust, as I hear it does in other sections. Lawton and Western Triumph are also good.

Hugo and vicinity has a great many inducements to offer for new settlers, especially fruit-growers. There is yet plenty of good fruit land that can be bought cheap. We have a good school, two churches, a postoffice and a daily hack line to the railroad, a distance of four miles. The time is not far distant when there will be some business houses put up. Such will certainly be the case as soon as our young orchards will begin to bear, for then storage buildings for barrels and the box material, large evaporators and cider mills will become a necessity.

Respectfully submitted.

F. LIONBERGER.

HOLT COUNTY.

I received your card of October 20, 1890, and I will try and comply with your request as best I can. To-day I received program, for which I am obliged.

As the object of this Society is to better the condition of the human family, you desire nothing but facts. I will try and give facts, as a misrepresentation might worse the condition of some people.

The late frosts last spring and the unusual drouth cut our small fruits and stone fruits somewhat short. Some strawberries made $200 per acre; raspberries, $100 per acre; blackberries, $100 to $200; cherries and plums, half crop.

We estimated our apple crop about 60 per cent this year. The unusual drouth caused the apples to ripen early and drop off, which was a great loss.

Mr. E. P. Loomis & Co., of New York, shipped $45,000 worth of apples out of Holt county this fall. As near as I can get at it, the apple crop of Holt county amounted to $100,000 in cash. This is certainly a good help to the county. Besides, many of these orchards afforded nearly or quite as much pasture or hay as if the trees were not there.

I believe when our State authorities will see what an immense revenue there is in the fruit crop of Missouri, they will appropriate at least as much money for horticulture as they do for agriculture, so that the fruits of Missouri can be duly represented at the World's fair in '92, without so much expense to a few of her citizens. Every citizen in this State is benefited by such an exhibit, and this is the true and honest way to advertise the products of the country. Then the world can see with their own eyes what our State can do. So let every citizen bear his part of the expense, and the exhibit can be made a credit to the State of Missouri, with but little expense to each citizen.

Holt county is admirably adapted to fruits of all kinds, or anything we wish to put in the ground and give it some work. The better we cultivate, the better it pays. Apple trees will pay in fruit in seven or eight years from setting. We can raise any kind of vegetables or corn in the young orchard. This cultivates the trees, and no loss of ground till the fruit pays. I prefer corn. This protects the trees from the hard wind and from the hot August sun and the cold in winter. My trees have always done better in corn than anything else.

Celery can be raised here as profitably as anywhere; in quality it surpasses any that has been shipped into our market. All other vegetables can be easily grown and of good quality, as our soil is very productive, with a natural under-drainage, which makes it very easily cultivated.

Timber land for the purpose of fire-wood or for the timber and cord-wood don't sell any higher than it did 35 years ago, while all the improved farms have advanced very much. Improved land can be bought from $25 to $75 per acre—owing to the improvements and location; unimproved land from $10 to $25 per acre—owing to the location. The land in Holt county is all very productive. In a summer day the waving fields of grass and golden grain present a beautiful view to the passer-by.

We usually have rain-fall enough to mature any crop we may plant.

Nearly all the Christian denominations are represented here, and their doors are always open for new-comers and strangers. Anyone seeking for a home to locate would do well to look at Holt county before they locate.

Our county is out of debt; our taxes light—75 cents to $1.

Missouri has mountains of wealth untouched. When fully developed, it will make her the greatest State in this Union. We have good water and good health, which is above all else. There are seventy-six school districts in the county, all with good houses and fixtures; besides there are six graded schools where from two to eight teachers are employed for two-thirds of the year. The county has a school fund of nearly $100,000, which increases every year—the interest of the sum amounting to nearly $8,000 yearly, which is applied to the support of the schools of the county. Besides this, a large sum is received annually from railroad and telegraph assessments. We have young men and young women in the county that are competent to fill any station in life with credit to themselves and credit to the county, that have not been taught in any school outside of the county, and without costing the student one cent. Our schools are free to all, from the age of six to twenty.

Wherever I have met with the Society in different parts of the State, I could see the same intelligence manifested, especially in the young folks, by their well-written and well-read essays. I believe Missouri is settled with as good, honest and intelligent people as any State in the Union, and it has as good society.

Had I been a king or President of the United States, I could not have wished for better entertainment than I received from the citizens while attending these meetings. I am only too sorry I could not meet with you at Clinton. I don't know as anyone could learn anything from me, but I have always been benefited very much by meeting with you.

WM. BRODBECK.

Mr. L. A. GOODMAN, *Secretary Missouri State Horticultural Society:*

There has, in Oregon county, Mo., no extensive progress been made yet in fruit culture, although there is sufficient proof that as fine fruit in all the various varieties can be raised in Oregon county as in any of her sister counties in South Missouri.

The soil contains every essential element that is required to produce size, color and fine flavor to the fruit; and as Oregon county is wholly located on the southern slope of the Ozark mountains, and therefore protected from the rough and cold wind-storms that occasionally blow from the west and north, it makes it a favorite location, especially for the raising of peaches. There are fruit orchards in this county that are over forty years old, and many of the trees are as sound as a dollar. There are pear trees forty years old, and show no decay and bear nearly every season. There are a number of old orchards in good condition and bearing fine apples, though but little care has ever been given them—at least, not the care that the young orchardists of to-day are learning to give the trees that are now planted.

Of the late planted fruit orchards of any note in this county may be named the S. W. Gilbert and Clinton Barnard and Dr. P. F. Carter, all of Thayer, who will in the near future reap lucrative rewards for their enterprising features in the good work. Mr. Gilbert is drifting into berry-growing, and Mr. Carter has started an extensive vineyard of many of the leading varieties of grapes, of which some are now two years old, and have already brought him good returns for his labor, and he feels encouraged to plant more grape-vines every year. Mr. Carter tells the writer that the stone-covered hill-sides are the best for the grapes. Such land as many would pronounce worthless will prove the most profitable to him.

It may not be out of place to state that the owners and managers of the well-known Olden fruit farm, in Howell county, have laid the foundation to encourage the planting of millions of fruit-trees all over the adjoining counties east and west of Howell. The founders of that grand fruit farm—now talked and read about all over the United States, and even reached Europe—have not only laid the foundation for a fortune to themselves, but also for many others who are willing to profit by these enterprising men's experiment and gigantic undertaking. Thousands of others can now, without risk or fear, follow their example, and if not on as large a scale, on a less one, according to each one's means and circumstances.

The writer is buoyant with good hope that every land owner in Oregon county, being one of the best counties on the southern slope of the Ozarks, will try to imitate the ones who are now taking the lead in scientific manner of raising trees and fruits, and that every effort made in that direction will be crowned with success, not only for health and satisfaction, but also to help to fill the purse.

What we need and must do in Oregon county is, to organize a county horticultural society, as by this means a great amount of good would be accomplished in encouraging fruit-raising, which would in the near future bring a great amount of revenue to the farmers of Oregon county; in fact, every county in Southern Missouri should, without delay, organize a horticultural society. Not too many fruit-trees can be planted all over this vast region of country on the southern slope of the Ozarks, which is so especially adapted to the raising of the different fruits and berries.

The writer of this, though past sixty years of age, but having gained encouragement and valuable information by attending a few meetings of the Missouri State Horticultural Society, will now begin to plant fruit-trees in Oregon county. However, this will not be his first venture in planting fruit-trees—having in his day planted fine apple orchards in Illinois, but was not much crowned by success, as Central Illinois has not proved to be a fruit country to give encouragement to the planters of trees.

I will here give a list of a few Oregon county farmers who are the owners of the most noted orchards: Capt. S. Greer, James Powell, the Judge Woodside farm, Thomasville; Benj. Gunn, Mrs. Groves, A. Coppenhagen, and a few others whose names I am not able to mention.

Yours truly,

SAM'L KAUFMANN.

VERNON COUNTY HORTICULTURAL SOCIETY.

Mr. L. A. GOODMAN:

DEAR SIR—In making a report of the workings of our county society, I am forced to confess that there has been some falling off in membership and in the interest taken in the meetings. There have been several causes tending to this result. One cause, perhaps more prominent than any other, is that it is hard to make such meetings interesting when it is left to a few to keep the interest alive; to get up in a horticultural society and rehash the facts that every one recognizes as settled, becomes somewhat tiresome. Upon a correct count, our Society has recommended the Crescent Seedling and Miner's Prolific as the two most profitable strawberries to plant just seventeen times in succession; and in order to have a slight change in the programme, some of us are seriously thinking of having this recommendation set to music, so that members can either sing or whistle it at future meetings. I may have lied a little in the above, but still there is enough truth in it to be worthy of serious consideration. The remedy I would suggest, and one that perhaps would be found beneficial in all local horticultural societies, would be the appointment of a committee to formulate a comprehensive plan of experiments to determine many questions that are as yet unsolved, and to detail members who appear best qualified to conduct these experiments and report results. Then in the course of the meetings, these reports could be read and discussed, and would very likely bring out new and correct information that it is unlikely would ever come to light without some such well-directed system. We want to know more of the fertilization of the blossoms of fruits and berries. We want some reliable facts as to the value of commercial fertilizers. We want to know when and how to trim our trees and vines to give best results. We want to know the value of a tap-root to a fruit tree. It would be interesting to note the difference between two peach trees, one grown from a seed planted where the tree is to stand and to never cut off any of its roots, and a tree taken from a nursery with its tap-root and all others cut off.

There are thousands of questions that can be advanced that nothing but a systematic test can ever determine. This is the labor lying before the members of our horticultural societies, and it requires the performance of some such labor to make them interesting and to bring out a full attendance. Our past season has been rather trying to our small-fruit growers, and the formation of a shipping association occu-

pied as much of the time during the berry season as they could spare to such matters. Our experience of shipping fruit in refrigerator cars gave rather unsatisfactory results. There were many causes for this that circumstances made it impossible to avoid—frequent rains during the strawberry season, making the fruit too soft to put on the market in good condition; but the principal cause of failure was because of being unable to secure the fruit of some of our principal growers, and the consequence was the cars had to be held sometimes two and even three days before sufficient fruit could be had to fill the cars. Had not these same growers encouraged the formation of just such an organization, and assisted in its formation up to that point where their assistance would have been of some benefit to it, then no harsh judgment could justly be brought against them, but as it was, it only gives added proof of the old Indian's assertion, that "white man mighty onsartain;" and this same uncertainty is the mill-stone around the neck of all organizations formed to benefit mankind.

Our raspberry and blackberry crop gave fair returns. Plums and peaches were almost a total failure. Our apple crop was large, the fruit of fair size, but badly affected by the codling moth. Prices were unusually high, ranging from twenty cents per bushel for the poorest all the way up to one dollar for choice. Two evaporators and one canning establishment took large quantities of the more inferior fruit and did a successful business. Our apple crop is estimated at about three hundred and fifty thousand bushels.

On the whole, our horticultural interests are on the advance all along the line, and is tending toward less perishable fruits. Some large pear orchards are being planted—one of 600 Duchess pear. The English morrello cherry is also being planted extensively.

There are several apple orchards of over a thousand trees each, will be set the coming spring, and of our most reliable varieties, the Ben Davis and Jonathan being largely in the lead. As an illustration of extensive farming, I herewith give the past season's crop from a plat cultivated by Mr. Per Swainson, treasurer of our county society. The plat contains one-tenth of an acre, and consists of what we consider our very poorest land, because of being underlaid at the depth of fourteen inches with a tough putty-like gumbo. He manured heavily and had hydrant water to assist during the drouth of about six weeks: 40 quarts strawberries, 76 quarts gooseberries, 3 quarts beans, 10 head cabbage, 5 head cauliflower, 20 head kale, 6 bunches rhubarb, 5 dozen cucumbers, 1 peck onions, 12 quarts peas, 15 dozen salsify, 100 gladiolus bulbs, 200 tube rose bulbs, ½ bushel carrots, 400 stalks of celery, 500 pounds parsnips, 1,500 pounds beets, 150 pounds Concord and Iona

grapes, 4 bushels potatoes, 2 bushels tomatoes, and summer and winter radishes for family use. Among these vegetables are growing 12 young grape-vines, 24 raspberry and blackberry bushes to bear another year. A list of these articles gives but a slight idea of the quality and sizes: celery stalks weighing over a pound, and winter radishes over four pounds. The entire 1,500 pounds beets growing on just four rods; all the celery was grown as second crop on the potato ground, etc., the whole crop being a proof that Americans, as a rule, are cultivating all the way from ten to ten thousand times too much land, and that one acre in celery, under the very best conditions, will sell for more than the average prodect of an hundred and sixty acre farm.

J. G. KINDER.

RAY COUNTY.

ORRICK, November 30, 1890.

To any person seeking a permanent home, or an investment of funds, there is no county in this State, or in the West, that offers better opportunities than this.

The resources of almost every kind are almost boundless. The opportunities for business of almost every kind are good. The facilities for spiritual enjoyment, mental improvement and social opportunities are as good as elsewhere. The county, on the south, is one continuous broad belt of flat lands, broken at one place on the east end, where the high lands touch the river. This belt consists of the finest agricultural lands in the world. The cereals of all kinds bless the labors of the farmer with an abundant product. This belt consists of three distinct varieties of soil. The black loam constitutes the larger part, and on this are some of our finest farms. The sandy loam consists of land intermixed with alluvial deposits. The gumbo or waxy soil seems to have been the bottom of lagoons; the subsoil to this is a hard-pan. The cereals all produce abundantly on each of these soils. Hemp succeeds well. Potatoes do better on the sandy and black loam.

The north side of the county consists of hills interspersed with beautiful table lands, much of the soil of which equals the fine bottom lands. The most broken part of the county, by the free use of clover, can be made to produce abundant crops of all kinds. I have known the poorest clay hills to produce crops of corn which actually sold for twice as much as the land would sell for at the same time. It is not an absolutely unknown thing to have a crop here to sell for more than the farm will bring on the market.

I hope I shall not be considered egotistic when I say that my crop this year is worth more on the market than I have ever been able to get offered for my entire farm. The north and northeast part of the county consists of beautiful, rich prairies; the south and southwest of fine timber. There is an abundance of timber for all practical purposes. The entire county is underlaid with a good article of coal, the mining of which gives employment to more than a thousand people.

The mining industry gives a good home market to truck farmers, and all surplus farm produce, such as vegetables, poultry and butter, at a remunerative price. The mining industry is extending. New mines are being opened, and the present outlook indicates a continued extension of this industry. I may here mention the prospects for an early development of petroleum. Some efforts have been made and capital expended on this line, and a first-class article of lubricating oil developed, but not in sufficient quantity yet to pay a dividend.

Our railroad accommodations are all that one should desire. We have direct communication with all of the best markets of the country—Chicago, Kansas City, St. Louis, and many metropolitan towns. Our county is permeated by four different roads, and the fifth is in process of construction. I may add that there is strong apprehension that lead and silver are both existing here in paying quantities, and that prospecting has been carried on to a limited extent.

Our towns are in a thrifty condition, and manufacturing is being carried on with a good prospect for a broader continuance. We have flouring mills which vie with the best establishments in the country. Our metropolis has introduced the electric light on its streets. It has four newspapers and three banking houses. There are several other papers in the county and quite a number of banks. The town of Orrick, on the Wabash railroad, has two banking houses. One was established this fall, with good prospects of success. The other house is well established, and has been doing a lucrative business. The educational advantages are unsurpassed. We have good country schools. We have a college in the town of Richmond which is doing a grand work. In the same town there is in process of building an institution by the Methodist denomination for the education of females, which is expected to rank high as a literary and scientific institution.

Last but by no means least of these grand and good advantages is the strong religious influence at work in the county. The Mission Baptists would seem to have the lead; the Methodists, Presbyterians, Disciples of Christ, Christian Union, Catholics and Iron-Jacket Baptists all are struggling on and up. I come now to conclude my brief report by calling attention direct to the raising of fruits of various kinds.

Apples of all kinds succeed most admirably here, and there seems to be a general observation of the importance of more extended interest in the raising of fruits of all kinds. The raising of apples, however, takes precedence of all other fruits. I can hardly say that there are as yet any particular apples or apple which takes the lead in popularity among our farmers. Old prejudices seem to prevail generally in the setting of orchards, and farmers rather seek those varieties which they prefer for their own use, or the kinds which their fathers have raised. The consequence of all this is that the man who has made careful selections exclusively for market finds himself in a dilemma, and gets no more for his apples than is given for the entire crop, although his crop may be superior to the entire crop of the community. The orchards consisting of careful selections for market are so few and far apart that the speculator and buyer take advantage of these conditions to give the specialist and industrious orchardist the same price for extra well-assorted varieties that he gives for common varieties, thereby making good the losses sustained in handling the fruit of the slip-shod orchardist by realizing largely on the extra varieties. This condition of affairs is very humiliating to the man who raises fruit as he would any other crop, expecting to realize in ratio to the labor expended. How this can be remedied or prevented, to me is an open question.

Of all the varieties raised in this county, notwithstanding the deep-rooted prejudice to this variety, the Ben Davis is the most sought after by apple buyers. This apple deserves a large place in the esteem of every orchard grower. With us it comes into bearing early and bears regular and remunerative crops. This year I sold $9.00 worth of apples off of one Ben Davis tree which had been set ten years. The rapid growth and hardiness of the trees, the tendency to bear early and regularly, the beautiful appearance of the fruit, combined with extra good qualities as a sauce, make it one of our most desirable, if indeed it is not the best apple we have.

Other varieties rank high. The Missouri Pippin and Jonathan are highly praised and much sought after. The Winesap does well here, but unfortunately it is much inclined to shed its fruit prematurely.

The culture of the pear has been greatly neglected in this county. It seems to be the general opinion of the people that pears will not succeed so far north, and hence such a thing as a pear orchard is seldom seen. I know of but one pear orchard, except my own, in this county. Why such a deep-rooted prejudice to the growing of this valuable and appetizing fruit should exist is more than I can comprehend. I have a promising young orchard of pears, which is growing as thrifty as the apples. The trees appear to endure the cold and heat

quite as well as other orchard trees. I have raised some fine specimens of pears of the Bartlett and Flemish Beauty. My Keiffer is growing well, but has not come to bearing age. Cherries and plums do well here. Strawberries, blackberries, raspberries, currants and gooseberries succeed well. We have many small vineyards, all of which succeed well. Grapes have never been raised here to any extent for market.

I regret that I am in truth compelled to say that our climate is not adapted to the production of the peach. The cold, damp winters kill the fruit and often the trees. The consequence is that we have only an occasional crop of this fruit. Peaches are very profitable, however, and often sell for a remunerative price. To the person who desires to seek a home, for the production of fruit or otherwise, I would say, come to Ray county. We have room for industrious, sober people, and I feel sure a better location for the same money can hardly be had. The Methodist presiding elder, the Rev. Mr. Obryant, made the following remark at Orrick last week: "I have traveled in thirteen States, and I have never seen a better country than this." The home-seeker can get land for almost any price. Good fruit farms which, under the care of the industrious farmer, may soon be made to "blossom as the rose," can be had for $12.50 to $25 per acre. Some of the finest and best farms in the county have recently changed hands at $35 per acre.

Respectfully submitted.

JAMES S. LEAKE & BRO.

MARKET FOR HORTICULTURAL PRODUCTS.

MR. L. A. GOODMAN:

DEAR SIR—Yours at hand, and in reply will say that the subject you allude to has a wide range for study. I must confess that I have not been able to bring forth all the facts as to the best methods to dispose of our surplus products at good living prices at some seasons of the year. As for myself, I have been in the gardening business for twenty-five years; twenty years in this city. I started here when the town was small, about twelve or thirteen hundred people. My means were small, and the demand for what I grew was small also, but I thought I would try again. I rented a house and four acres of land for three years, at $150 per year, cash. After that I bought land close to town, paying to the tune of eleven hundred dollars for five and one-half acres. I began to raise vegetables and small fruits, and retailed them out about town; I have at times shipped small lots of vegetables

from here; I always had the horrors when the express company had anything to do with it, as the margin was small after it had been through their hands. As a rule there has never been enough small fruit raised about here to supply the home demand. My land was too costly to put it all into that kind. I think the time will not be long before there will be more in the business. I always contend that a home market is best for this reason, there is one saving in boxes and crates. At many places where I sell my berries I can get the boxes and crates and use them again without cost of time in going and coming to market, the many times of going back and forth for the many things that are necessary for garden use. I cannot see it in the same light that some do, in flooding the markets and running down to starvation prices. There are markets some distance from here where strawberries sold as low as four cents per quart by the crate. At that time we were getting eight and one-third. What can the grower get out of that, if you count boxes, crates and two cents per quart for picking? Then there is commission and rent of land. The profit must be slim indeed.

The demand for small fruits at this place is getting better every year, as our city grows. Ten years ago we had 2,264 population, now we have 4,534 people. Our prices vary with the season. We had a very dry spell of weather in May and June, that cut our crops short. I have taken the trouble to ascertain, as near as possible, the amount of berries shipped to this place this season over and above what was raised here; it amounts to 750 crates, and not any were shipped out; this, of course, means raspberries, blackberries and strawberries. We have a thriving city and a fine farming country here; farms with good improvements on them can be bought for $40 per acre near town, and less in proportion as you get farther off; my land has doubled in value since I bought it, but land fifteen miles off is not increased three per per cent. I have not been doing a land-office business, but I have planted out this year five acres of berries and one hundred and thirty pear trees on new land; I have two green-houses, some nursery stock and vegetable garden.

Any person wishing to correspond with me as to locating in this part, I will gladly answer every question in regard to horticulture, as far as I know.

In concluding, I would say, locate near a market if you want to grow small fruits to sell, so that the good Lord may deliver you from all express companies.

JOSEPH GAMBLE,
Brookfield, Linn Co.

[The following report in German is from a German horticultural society at Hugo, Montgomery county, which is the only German county organization in the country that I know of. They are doing good work, and have hundreds of acres in fruit and thousands of fruit trees planted where five or six years ago there were scarcely any. I wish we had many more such workers in our State.—SECRETARY.]

Mitglieder der Hugo Obſt- und Gartenbau-Geſellſchaft:

Als Report über die den Obſtbäumen ſchädlichen Pilze ſei Folgendes geſagt: Wie es allen Mitgliedern dieſer Geſellſchaft leider gut genug bekannt iſt, haben die genannten Pilze letzten Sommer wieder viel Schaden gethan in den einheimiſchen Kernobſtſorten. Beſonders war dies der Fall mit den Roſtflecken (Fusicladium dendriticum) mit welchen etliche Aepfelſorten ſo behaftet waren, daß dieſelben zu keinem Zwecke benutzt werden konnten. Dieſe ſchädlichen Pilze befinden ſich jetzt noch im allerbeſten Zuſtande in den kleinen ſchlechten Früchten, die nicht eingeſammelt wurden, ſo wie auch an den auf dem Boden liegenden Blättern. Hier bleiben dieſelben in gutem Zuſtande durch den Winter, um im Frühjahr ſogleich wieder bereit zu ſein, weiteren Schaden anzurichten. Die kleinen Samenkörperchen, (Mikroben genannt) ſind ſo klein (blos 10 bis 20 M.) daß dieſelben mit unbewaffneten Augen nicht geſehen werden können. Dieſelben ſchweben im Frühjahr in der Luft herum, ſetzen ſich auf die friſch geformten Aepfel, wo dieſelben, wenn die Witterung günſtig iſt, ſogleich anfangen zu wachſen und ſo ihr verheerendes Werk fortſetzen Ich glaube, ein guter Plan iſt, ſo viel wie möglich durch den Winter den Baumgarten rein ſo halten, und allen angeſammelten Unrath zu verbrennen. Ferner würde ich rathen, keine Sorten von Kernobſt zu pflanzen, die dieſer Pilzkrankheit unterworfen ſind. Wo viele von ſolchen Sorten in einem Baumgarten ſind, ſollten die betreffenden Bäume umgepfropft werden, das iſt wo die Bäume noch geſund ſind, im anderen Falle aber iſt es beſſer dieſelben auszugraben und zu verbrennen. Solches war kürzlich meine Arbeit geweſen So Jemand geſonnen iſt, Bäume umzupfropfen, möchte ich noch bemerken, daß es von der größten Wichtigkeit iſt, die Pfropf- und Oculir-Reiſer nur von ganz geſunden Bäumen zu ſchneiden. Ich glaube, daß ehe wir obige Maßregel befolgen, es nicht viel nützen wird, von Hilfsmitteln Gebrauch zu machen, welche meiner Anſicht nach nur in den Händen ſolcher Baumzüchter gute Reſultate haben werden, die gute Beobachter ſind, denen die ganze Lebensgeſchichte der Pilze bekannt iſt. Wo Solches nicht der Fall iſt, muß natürlich blos auf das Gerathewohl gehandelt werden.

Ergebenſt,

F. Lionberger.

An den Präſidenten und die Mitglieder der Obſt- und Gartenbau-Geſellſchaft:

Die Hugo Obſt- und Gartenbau-Geſellſchaft lebt immer noch, trotzdem ſie wenig Mitglieder zählt. Sie beſchränkt ſich noch immer auf den Hugo Schul-Diſtrikt. Doch ich denke, wir werden bald unſer Gebiet erweitern, unſere Nachbarorte ſind erſtaunt über die Frucht, welche wir ziehen; wir werden hin und wieder gefragt, wie iſt

oder wie kommt es, daß Ihr solch schöne Frucht ziehen könnt, und wir nicht? Unsere Antwort ist gewöhnlich: warum schließt Ihr Euch nicht der Horticultural Society an; Ihr würdet dann bald erfahren, auf welche Art schöne und gute Frucht gezogen werden kann. Unser Society hat letztes Frühjahr Berry Boxes und Crate-Material im Großen für unsere Mitglieder gekauft, was ein guter Vortheil für uns war.

Der diesjährige Ertrag von Erdbeeren war ausgezeichnet, aber die Preise waren niedrig, fünf Cents das Quart im Durchschnitt. Berry Patches sind in guter Ordnung und versprechen einen großen Ertrag für nächstes Jahr. Aepfel hatten wir nicht viel dieses Jahr, etwa 50 Buschel Ben Davis auf meinem Obstgarten; alle andere Sorten waren mehr oder weniger den Rostflecken unterworfen. Fast alle unserer Obstgärten sind jung, ein großer Theil zu jung um zu tragen. Tausende von Bäumen sind letztes Früh- und Spätjahr gepflanzt worden, und die Aussicht ist, daß noch viel mehr gepflanzt werden. Der Fortschritt, der gegenwärtige Stand und die zukünftigen Aussichten unserer Horticultural Society sind sehr zufriedenstellend. Eine wichtige Eisenbahn, die Wabash, durchkreuzt das County von Südost nach Nordwest. Das County hat wenig oder gar keine Schulden und die Taxen sind niedrig. Genug ausgezeichnete Schulen und Kirchen. Der Boden ist fruchtbar und eignet sich am allerbesten für Obstzucht. Wir haben Platz für mehr Ankömmlinge, namentlich für solche, die sich der Obstzucht widmen, und heißen sie herzlich willkommen.

Christ. Hauser.

Mitglieder der Hugo Obst- und Gartenbau-Gesellschaft:

Als Comite über die durch Pilze verursachten Krankheiten des Kernobstes, habe ich Folgendes zu berichten:

Sehr großen Schaden verursachten die sogenannten Rostflecken an den Aepfeln (Fusicladium dentriticum). Das kalte, feuchte Wetter letztes Frühjahr war sehr günstig zur Entwicklung und Keimung der kleinen Samen-Körperchen, welche überhaupt so klein sind, daß sie mit dem nackten Auge gar nicht gesehen werden können. Laut letzten Vermessungen beträgt ihre Größe 1–2500 Zoll Breite und 1– 250 Zoll Länge. Diese Körperchen fliegen im Frühjahr in der Luft herum und setzen sich auf die kleinen frischgeformten Aepfel, wo dieselben sogleich keimen, das ist wenn die Witterung günstig dazu ist. Ganz wenige davon keimen bei warmem und trockenem Wetter. Es scheint, daß etliche Aepfelsorten dieser Krankheit ärger ausgesetzt sind als andere. Meine Missouri Pippin, Lawver, Red June und Sweet June waren noch nicht größer als Kirschen, als schon die grünen sammetfarbigen Flecken bemerkbar wurden, welche sich so schnell vergrößerten, daß die Aepfel klein und werthlos blieben.

So viel ich vernehme, sind in den letzten Zeiten chemische Mixturen empfohlen worden, um die Bäume damit zu bespritzen und das Keimen der kleinen Samen-Körperchen zu verhindern. Es ist natürlich leicht zu begreifen, daß curative Mittel keinen Werth haben können, sondern daß nur präventive erfolgreich sein können, und müssen dieselben nicht zu stark sein und während der günstigsten Zeit angewendet

werden. Meine Anſicht darüber iſt, daß ein Mann ein guter Beobachter ſein muß, um von der praktiſchen Anwendung dieſer Mittel gute Reſultate erzielen zu können. Ich kann nicht ſehen, warum man ſich viel mit denjenigen Aepfelſorten, die dieſer Krankheit am meiſten unterworfen ſind, quälen ſoll. Mein Rath an die Mitglieder dieſer Geſellſchaft deßhalb iſt, dieſelben Sorten umzupfropfen, wo die Bäume geſund ſind, andernfalls ſie auszugraben und unbedingt keine ſolche Sorten mehr zu pflanzen. Es iſt leicht zu begreifen, daß je weniger dieſer unbrauchbaren Aepfel im Baumgarten liegen bleiben, je weniger Samen im Frühjahr vorhanden ſein kann. Folgende Sorten finde ich am wenigſten dieſen Roſtflecken ausgeſetzt zu ſein: Wine sap, B. Davis, Jonathan, W. Twig, Grimes, M. Blush, Benoni, Baldwin, Duchess, R. Astrachan und Yellow Transparent.

Eine andere durch Pilze verurſachte Krankheit iſt der ſogenannte Roſt oder Roestelia. Die Lebensgeſchichte dieſer Pilze iſt ſehr intereſſant, beſonders dadurch, daß man dieſelben in einem Stadium an den rothen Cedern (virg Jimiphus) findet, währenddem in einem anderen Stadium die wilden Crabs (Pirua coronaria) und die cultivirten Aepfel damit behaftet ſind. Da jedoch dieſe Krankheit hier noch keinen Schaden gethan hat, ſo iſt es nicht nothwendig, viel darüber zu ſagen. Der Soulard Crab iſt die einzige Sorte, woran ich dieſe Pilze bemerkt habe.

Eine andere ſehr ſchädliche Krankheit iſt der Sonnenbrand an den Birnen (Pear Blight), und es ſcheint dieſelbe immer noch ein Räthſel für die hervorragendſten Naturforſcher. Ich verlor dadurch letzten Sommer drei Bäume, Doyenne und Ella, die ich hatte von dieſer Sorte, zwei Bäume Le Conte, einen Clapp's Favorite und einen halben Baum Bloodgood. Das einzige Mittel, das ich weiß, iſt, was überhaupt ſchon lange bei Baumzüchtern bekannt iſt: die angeſteckten Theile des Baumes etwa ſechs Zoll unterhalb der krankhaften Stelle abzuſchneiden und zu verbrennen. Es ſei jedoch noch bemerkt, daß es abſolut nothwendig iſt, das Meſſer oder die Säge gut zu reinigen, bevor dieſelbe an geſunden Bäumen gebraucht werden.

Ergebenſt,

F. Lionberger.

MONTGOMERY COUNTY HORTICULTURAL SOCIETY.

At the December meeting of Hugo Obst and Gartenbaugesellschaft, held at the residence of Fred Utz on December 23, among other business the following proceedings were had:

The minutes were read and adopted, after which Mr. F. Lionberger annnounced the death of D. S. Holman, late Treasurer of the State Horticultural society, at the same time making a motion that a committee of obituary be appointed.

Motion adopted, and the following committee was appointed: F. Lionberger, Fred Utz and W. Loane.

The Committee on Orchards then reported trees in fine condition, with wood well ripened. Serious complaints were made about the damage done by the codling moth the past season. The life history of the insect was then explained by F. Lionberger, as well as the mode of destroying them by spraying, after which a general discussion followed. It was further reported by the committee that the apple had been very much affected by scab, especially Mo. Pippin, Lawver, Red June, Sweet June and Early Harvest.

Mr. Utz—My Winesap were even more affected than Mo. Pippin; they all cracked open.

Mr. Gutmann—My experience with Winesap is the same; I have not got a perfect Winesap in my cellar.

Mr. F. Lionberger — I did not get any Winesap at all, and so could not compare them.

Mr. Utz—Ben Davis was less affected than any other.

The cycle of the life of the fungus in question was then explained by F. Lionberger; also, the remedies giving the best results to prevent the spreading of the disease.

The above caused a lengthy discussion. It was finally agreed upon that in order to meet with any success in spraying, it was necessary to become better acquainted with the life-history of the fungus.

Mr. Lionberger—How about the borers?

Mr. F. Gutmann—Plenty of them, that is the round headed species, but no flat-heads were noticed.

It was agreed that a wash with soft soap (not too strong), with a little sulphur or carbolic acid, would keep them off.

Mr. Lionberger—It is very important to see that the wash is applied at the proper time.

Mr. Gutmann—I lose a good many trees from a disease at the collar. It seems to commence below the ground, working upward, causing the bark to decay. I think that we ought to make some inquiries about the disease.

The subject of small fruits was then taken up:

Mr. Utz—Cumberland looks better at present than any other variety I have.

F. Kimmich—Crescent looks best at my place.

F. Gutmann—Michel's Early is the fastest grower I have; it looks the best of any I have at present. Bubach No. 5 is a slow grower; however, the plants are very stocky. Sharpless and Jersey Queen show the least vigor of any.

F. Lionberger—While I admit that a good strawberry should be a fine grower, yet it must not be understood that the slow grower cannot be profitable. The feeble growers I think should be planted closer

For instance, Jersey Queen planted at ten inches would not mat over the ground any more than Michel's Early at three feet. At my place Michel's Early shows the most vigor; next, Crescent, Warfield No. 2, Gandy and Haverland. Cumberland and Bubach No. 5 I find to be slower growers, but they make fine stocky plants, forming nice stools. Jessie and Harts' Minnesota I expect to drop from my list by another season.

A member—What about blackberries?

F. Lionberger—Kittatinny is my best. In sections where it is not subject to rust, it is yet ahead of others. Western Triumph and Lawton are also good. Snyder is the most hardy, and is valuable where most others fail.

A few remarks were then made on vineyards.

F. Gutmann—I do not think that we prune close enough in the spring. We ask too much from our vines. I also believe in training the bearing canes up high. Fruit that is high up on the trellis does not seem to rot so badly with me. Elvira rotted the most for me the past season, while Ives and Missouri Riesling were the most exempt.

A few remarks were then made on ornamentals by F. Lionberger.

A report by the Committee on Injurious Fungi was next read, after which a short discussion was had. This subject had received considerable attention at the beginning of the meeting.

Next was a short lecture on practical Botany by F. Lionberger, explaining the cell structure of the trees, circulation of the sap, manner of growth, etc.

W. Loane next announced the serious illness of J. J. Gentry of Big Spring, who is an honorary member of the society. It was agreed for some of the members to visit him.

Committee on Obituary then reported the following resolutions:

WHEREAS, Again the horticulturists of the State of Missouri are reminded of the uncertainty of life and called to mourn the loss of one of their co-workers in the person of the late Treasurer of our State Horticultural society, D. S. Holman;

WHEREAS, Mr. Holman was one of the oldest members of our State Horticultural society, and a life-long horticulturist; he was a man of marked ability and one whose acquaintance and friendship was held in high esteem by all who were fortunate enough to possess them; be it therefore

Resolved, By the Hugo Obst and Gartenbaugesellshaft, that in his departure we have lost a faithful co-laborer, and that we will attempt to continue the work he has left behind him by emulating his virtues and practicing the good example he set for our imitation.

Resolved, That we will extend to the mourning friends our heartfelt sympathies for their loss.

Resolved, That a copy of these resolutions he transmitted by our corresponding secretary to the family of our departed brother.

F. LIONBERGER,
FRED UTZ,
W. LOANE.

The resolutions after being read were unanimously adopted.

Mr. Lionberger then spoke of the importance of holding regular meetings, to revise the list of standing committees; he was also in favor of holding a fruit show during summer and fall, and above all, see that our Society is properly represented at the next winter meeting of the State Horticultural society, to be held at Sedalia. We must send one or more delegates with a good display of fruit, in order to show to the State what we are doing. It will not be long until we will have apples to ship in quantities, and I can see no better way to advertise our fruit than to make exhibits whenever there is a chance for us to do so.

After the transaction of some important business, the Society adjourned.

F. LIONBERGER,
Corresponding Secretary.

HENRY COUNTY HORTICULTURAL SOCIETY.

CLINTON, MO., November 1, 1890.

MR. L. A. GOODMAN, *Secretary of State Horticultural Society:*

I herewith submit a partial history of the Henry County Horticultural society and Henry county resources.

The Henry County Horticultural society was organized March the 8th, 1884. For a time its progress was slow. The attendance of fruit-growers and others was limited, yet this society, with its few members, continued its monthly meetings; by hard work added a few members each year. June the 9th, 1887, we adopted a constitution. We now commenced to have summer meetings at the country homes of our members. The meetings were more of a success, as it seemed more like a picnic and social gathering. All would bring their baskets filled of the many good things to eat and feast on what our horticultural ladies had prepared for these occasions. Each meeting became more interesting. Essays were read on horticulture, floriculture and remarks for the good of our society. We, as a society, concluded to make a display of our fruits and flowers at our county fair. Committees were at once appointed. The best, nicest and most nearly perfect

fruits were gathered, such as apples, peaches, plums, grapes, pears, quinces and other kinds of fruit. All were arranged in floral hall on fair grounds. All that saw the exhibit could hardly believe such an exhibit could be made of fruits gathered in Henry county. Besides this much other fruit was exhibited by private parties. This society was awarded first premium. This exhibit did not only show that our county could raise a few varieties, but many varieties of all kinds of fruits of the best quality. This exhibit has commanded the attention of many of our best citizens. They now are taking a commercial view of it. Getting interested in one thing, and not, is another. When they see the thousands of barrels of apples shipped from this county, at good prices, this year and other years, the question is asked, what kind of apple tree to plant for profit; how to keep rabbits off, and borers out of trees. In the first place, we would say to one wanting to plant a commercial orchard, to take the experience of those who have had experience, of those nearest to him, if he has had no experience. It is a mistaken idea to plant many varieties. Any one who plants an orchard for profit expects to make money by so doing, and it is very essential that he plant right. He need not make any serious mistake; in fact, there should be no mistake with one having experience by which he has profited. With the new planter it is different, as he has access to the experience of him who has planted many kinds of fruit trees. If he is a close observer and up to snuff, he will see at once which is hardiest, best bearer, and for market; he would say, I always see apples on the Ben Davis apple trees every year, and shippers want them and pay the highest price in this county for them. Yes, we say the Ben Davis grows in every part of this county.

This county lying directly in the great famous fruit belt of Missouri, its soil and climate are adapted to the Ben Davis. Next best is the Limber Twig in the southwestern part of the county. So far as known, the Jonathan does as well in same sections. Success surely will follow the man that will plant a Ben Davis orchard in this county, if he does not neglect it.

Second question—How to keep rabbits from eating the tree. This is easy. Use a strip of fly screen around the tree; cheap and effective, and the same is used to keep the borer beetle from depositing her eggs in the trees, yet the trees each year should be examined for borers; if found, gouge them out with a gouge.

I am now taking too much time aside of a report of our Society. I will get back to our fruit exhibit at the fair. Our premium fruit was packed in barrels, nine in all, and sent to Southwest Missouri Immigration society, to Secretary J. K. Gwynn, in Exposition building, St.

Louis. Our winter meetings were held in Clinton, as usual, in the court-room or some office. The following summer our meetings were held at the members' houses, giving premiums at all of these meetings for best display of all kinds of fruit, honorable mention for best vegetable display, also bouquets.

Last fall our meeting was just before the State meeting, to be held at Lebanon. I was instructed to correspond at once with Mr. Goodman, State Secretary at Lebanon to have the State meeting at Clinton next time, assuring them a pleasant time, and that the citizens of Clinton would be as liberal as on other occasions.

This Society felt as though she needed help, and this is what they wanted—a State meeting to receive instructions from the best horticulturists in and out of the State. We in due time got notice that the State meeting would be held in Clinton, Henry county. We, as a society, entertained the idea of having a good time at this meeting when in session here. Our last summer's meetings were a success all the way through; giving premiums for best display of fruits of the different kinds; we also gave fifty cents for best bouquet, and ten cents each for the next four best. All bouquets exhibited were sold before the close of the meeting to the highest bidder, and the money turned over to the treasury. The essay reading has been improved over other years. We have generally been so situated at the places of meeting to have both instrumental and vocal music during these meetings. Our membership again increased this year. Our treasury always has had some funds in it, yet nothing to boast of.

Now we are in the midst of the State meeting, and I hope our members and citizens will entertain the officers and delegates from every quarter of the State. We ask all to examine into the resources of Henry county while here. Her farming lands, both prairie and timber, for stock raising; nearly all her lands are adapted to fruit-growing; her coal fields, churches, college and academy; her public schools are not surpassed in the State; the convenience of three railroads and water-courses throughout the county. Clinton has some attractions—the great artesian wells, street railway, gas, electric light, potteries and pressed brick factory; her large mills, and another is being erected with a capacity of 500 barrels per day, its elevators, etc. Henry county people are a church-going people. This means a social and generous people. We, as a society, have tried to make this State meeting a grand success, and one of the best, or at least as good as any ever held in the State. We hope all officers and delegates to this meeting have made many warm friends while here.

Yours respectfully,

J. M. PRETZINGER, Secretary.

DRYING LARGE FLESHY FLOWERS.

There are some parts of plants that lose a great deal of their beauty, not to say characteristic shape, by the ordinary process of drying for preservation between paper under pressure. For example, the leaves of the various kinds of pitcher plants are no longer the round long sacs for holding water that they were when growing, and the large blossoms of fantastic shapes so conspicuous, strange and beautiful in the orchid family lose nearly all, in ordinary drying, that made them attractive while fresh. Many persons with conservatories wish to preserve some of the floral specimens in a dry state, but usually give up in despair after one or two attempts in the ordinary dry way or by means of the various solutions that have been recommended from time to time.

During the past two years some experiments have been made with a view of finding some cheap and convenient way of preserving the tender parts of plants or those of peculiar shape in their normal form. Nothing has been found that is better than hay-seed. For a body like the pitcher of a cephalotus, timothy seed is excellent. The pitcher may be placed in a vessel containing the seed, the cavity or "pitcher" being filled with the same material. I have simply hung the pitchers up in the open air filled with the seed, and had them dry in perfect form. With the tender fantastic orchid flowers for example, some of the lighter grass seeds, as those of red-top, are better. The main point is to have a light and absorbent substance that will fill up the cavities and at the same time be of some weight to hold the slenderest part in place. I have had some of the orchid flowers with long slender floral parts several inches long dried in this way, that is, packed in grass seed, and they have held their shape and much of their color for a year pinned to a door casing in the laboratory.

The method is so simple that any one can practice it. The material is cheap and the results are satisfactory. Simply have a large-mouthed vessel—I used straight-sided glass jars, holding a half-gallon—and fill in the seed around the specimens carefully, and let them stand in a dry warm room.—*Byron D. Halsted.*

FUNGI.

This year it has been urged that fungi may be the cause of a widespread and complete failure. This generalization explains many of the obscurities which others do not, and it is abundantly supported by facts. It is no doubt true that fungi spread more rapidly than for-

merly, because of the greater number and continuity of orchards, just as contagious diseases spread faster in cities than in the country. In the small and isolated orchards of former days, fungi and insects were confined within closer areas. This phenomenon of rapid distribution, due to greater extent of host-plants, may be termed *communal intensito.*

The fungi which have been connected thus far with this breath of destruction are the scab fungi, as apple, pear the quince scab, the curl-leaf of the peach and the fruit-rots of the cherry and plum. They spread with marvelous rapidity in certain cool and wet springs, and as they exist year after year in nearly all localities to a greater or less extent, it is not strange that under favorable conditions they inflict wide areas. All this suggests a broader study of these fungi than mere life histories. Meteorological conditions, the general method of their transport, the kind of cultivation and the varieties in the orchards, and the relations of extent of orcharding to the injury done, demand thought.

But we doubt if the failure of the apple crop as a whole this year is due entirely to any one or all of these causes. Even the forest trees in many regions are unproductive, although they were not injured by frosts, nor by insects, and we know of no fungi which could cause the failure. In short, considered in the broadest sense, we do not yet know why fruit crops simultaneously fail over many states. The injuries to fruit after it has fairly set can be seen and traced, but this wholesale death of flowers and very young fruits is an obscure problem. The causes which we have discussed, except possibly in the case of frost—which is easily observed—are evidently too local or insufficient to admit of universal application. Who is the philosopher to enlighten our ignorance?—*American Garden.*

WHO IS THE THEORIST?

"Those theoretical fellows," the experimenters and professors, cut a strange figure in the minds of many good people. It is the especial function of certain speakers at the winter meetings to ridicule them and their "hobbies," even while commanding their hearers to plant squashes in the old of the moon in June, and to pick geese only when the moon is on the increase, lest the feathers shrink! Even before one of the great horticultural meetings of the year, a prominent speaker characterized the experimenters as "theoreticians" who would not be likely to see the difference between varieties of plants? We had not supposed before that even the theorist is deficient in powers of direct observation!

This much-abused word theory is used by these persons to designate any wild, absurd or impracticable notion. Time was that hypotheses of doubtful character were projected by the teachers; but even then they were far fewer than is commonly supposed. And even those theories which have died of their own frailty have served an essential purpose in the discovery of facts. Truth is, the teachers are in advance of the practice and thought of their time, and their work is never appreciated until it is seen in retrospect. This is necessarily so, for the teacher's function is to lead.

But who, at the present time, is the theorist, in the common meaning of that word? Who plants his crops "in the moon?" Who fears to touch the heart of the tree, else he will kill it? Who washes his apple trees to close the pores and keep out germs? Who will not hoe his beans when the dew is on, for fear of blasting them? Who puts sulphur into the pear trees to kill the blight? Who carries pumpkin seeds in his trousers pocket to make the vines productive? Who sows turnips on the "25th of July, wet or dry?" A person can hear more "theory" at one farmers' institute than at all the agricultural colleges combined.—*American Garden.*

"Popular Science News" gives a report of the meeting of the British Association for the Advancement of Science, held recently at Leeds, from which it appears that a large part of one day was devoted by the biologists to a consideration of the subject of teaching botany in schools, introduced by an able paper by Professor Marshall Ward. Botany, he urged, should be taught, not in order that names and facts may be committed to memory, but that habits of accurate observation may be acquired by the pupil, and great principles and laws grasped which in future may be applied under any special conditions. In these views he was supported by the eminent biologists present, who, one and all, agreed that it is time to leave the blind worship of facts, and, instead of measuring a scholar's progress by the amount of dogmatic information imbibed and put into an examination paper, to look to his understanding of the relation between facts and the intelligence with which he describes what he sees.

ROSE-BUDS ON A MISSION OF CHARITY.

In a large hospital a young girl has wasted away day by day with consumption. Visiting ladies supplied her with books, delicacies, etc. She always had a pleasant "thank you" for these kindnesses, but seemed unusually reserved as regards her religious feeling. One morning I

cut some of my lovely rose-buds, and tied them with a few sprigs of mignonette, and wishing that the poor child might really believe a loving Heavenly Father had sent them, I wrote on a card and fastened it on the stems, "Come unto me all ye that labor and are heavy laden, and I will give you rest." I went to her bed, but her face was hidden, and her slight form convulsed with sobs. In her hand she held a tract, and my eyes glanced at these words: "Whatsoever thy hand findeth to do, do it with thy might, for there is no work nor device in the grave whither thou art hastening;" and underneath that, "Ye serpents! how can ye escape the damnation of hell?" The lady that gave her the tract was probably a Christian, but a stern and cruel one. "Look here, dear child," said I. She took the lovely flowers, read the comforting text, laid her cheek against them and murmured: "God is good, He loves me; I am not afraid." The flower mission is a beautiful charity. Let us carry these lovely blossoms to the sick, the sorrowful and the erring instead of these dreadful tracts. The flowers will always teach a heavenly lesson. The tracts may do real harm and cause positive suffering.—*Sister Gracious in Am. Garden.*

Roses need a good stiff clay soil, well enriched. If the soil is sandy, clay should be used with it. Daily attention should be given to the slug pest during the early part of the summer; but tobacco has at last shown its useful side. If a strong decoction is frequently applied it will soon exterminate these molluscs, and besides act as a useful stimulant to the plant.

At the approach of winter bank earth about the roots of your roses, some six inches or more; and after the first light freeze or just before, add further protection in the shape of leaves fastened about the tops with brush or stakes. Evergreen boughs are still better, as they let in the air and do not hold dampness. In the spring, after removing the outer protection, cut back to the green wood. Often the entire plant will come out green and healthy, but it should be pruned severely, if young, healthy flowering shoots are desired. The mound of earth may be removed later.

Among the most hardy, best flowering roses, are La France, Louis Van Houtte, Hermosa, Glorie de Dijon, Perle des Jardins. These bloom all the summer long, especially if well pruned, and this is best done by cutting the roses, bud and bloom, as fast as they appear. The stingy florist saves the first flowers, and thereby loses many later ones —not heeding that wherever one rose is cut with plenteous stem, two or three will appear in its place.

To the lover of flowers no one kind can afford more pleasure or profit with so little labor as the rose. It bids fair to become the favorite among all our summer and autumn flowers. Even the popular chrysanthemum cannot in our autumn days quite eclipse the equally popular rose.—*H. K., Germantown, O., in Am. Garden.*

FRUIT-GROWING IN MISSOURI.

An address by B. S. Miles, of Gray's Summit, Missouri, before the Farmers' Institute of Missouri, 1891.

I have been engaged in the business of fruit-growing, and especially apple raising, for the last forty years, and have now growing on my farm in this county, apple orchards containing about seven thousand trees, of ages ranges from seven to forty years.

I would say to the beginner that the first thing to be considered in planting out an orchard is the selection of a locality. Don't fail to select the best piece of ground you have on your farm. There is not half so much depending on the lay of the ground as there is in the quality of the ground. Almost any ground in this county that will produce a good crop of corn will be suitable for an apple orchard.

Select thrifty young trees (not over two years old). Plant the trees not nearer together than thirty feet each way. Plant either late in the fall or early in the spring. Be sure that the roots of your trees neither get dry nor frozen after being taken from the nursery and before planting in the orchard. Be very particular about planting; plant in the orchard about two inches deeper than the trees grew in the nursery. See that the dirt is well pulverized and well filled in among the roots and reasonably well packed down, but not too hard, with the roots in their natural position.

As soon as the tree is planted, prune it. Always remember that there is very much depending upon the proper pruning of an apple tree. Commence right and attend to it often, and you will never have very much pruning to do. At the first pruning (at the time the tree is planted) it is absolutely necessary that the top be cut back as much as the roots have been cut back in taking the tree from the ground in the nursery, and often more than that. Never plant a forked tree.

If the tree was forked in the nursery, be sure that you take off one of the prongs when you plant it in the orchard. After the first pruning—which should be done when the tree is planted—there is more danger of pruning too much than too little. If properly pruned while the tree is young and small, it will very seldom be necessary to cut out

large limbs from trees when they get older. There is often serious harm done in cutting out large limbs from bearing apple trees. If a large limb is all taken off entirely back close to the body of the tree or back to a larger limb, the wound thus made will nearly always make a dead place, and in a few years it will rot out and make a hollow place, which injures the tree far more than the living limb ever would have injured the tree if left on.

If at any time you decide that a large living limb must be taken off, don't cut it off entirely back to the body, but cut it off far enough from the body so that there may be some living limbs on the stub to keep it alive. As to the best time in the year to do pruning, I think there is not likely to come any harm from taking off small limbs at any time of the year, but where heavier pruning is to be done, the proper time is in the fall, after the leaves have fallen, or early winter. A few words on the cultivation of the orchard, and I will close. As soon as or before you plant out your orchard, build a good strong fence around it, and never at any season of the year allow any stock of any kind in it, except to cultivate it, or to haul out the fruit. For the first five years plow and cultivate the ground well up to the first of July each year, but don't stir the ground later than that, lest you keep the trees growing too late in the season. The trees need rest after the first of July to ripen up the young wood and prepare for winter. After the orchard has been planted five years, sow it down to clover and plow under the clover once a year, late in the fall or early in spring. Never cultivate any crop in the orchard except apples.

FERTILIZERS FOR ORCHARDS.

From Prairie Farmer.

Replying to Mr. Yout's query as to the proper manurial element to supply to his orchards, I would advance the following as the result of my experience and study of the subject:

Mr. Y. leaves it to be inferred that on the plat from which nursery stock was taken no manure whatever had been used, hence we can be nearly certain that the original elements in the soil, such as were suitable for tree growth, must be to a certain extent exhausted. A little reflection will show that a study of the constituents of wood ashes will be a reliable guide as to the material taken from the land by a crop of young trees. I will again refer to this after the second part of his question has been noticed.

What element of fertility should be given an old orchard after bearing many apple crops may be disclosed by a consideration of the orchard as a whole: what do the body, foliage and fruit of the trees respectively take from the soil? and of the elements so required, only such as are entirely removed from the orchard need be considered at this time, as it is only by the permanent loss of fertility that ground is impoverished. We readily understand that the trunk and branches of an apple tree, although using much plant food, yet alone could not occasion loss, as the essential part, or sap, is to a great extent returned to the roots; even the sap which sustains the leaves is largely restored to the tree before the leaves fall. The portion which remains in the leaves when they reach the ground is given to the soil by their decay, especially where the surface is protected from sweeping winds. Where the leaves are blown away or gathered for bedding some loss of fertility occurs, but it is so inconsiderable that many years would not greatly rob an orchard. It is plain, therefore, that it is to a study of the fruit and its constituent elements that we must look for the cause of the infertility of Mr. Yout's old orchard, especially as he mentions that many crops of fruit have been taken off; here is a continued drain with no return. An analysis of the apple shows that in each ten pounds of fruit there is but .008 pound of nitrogen, hence we see that this element is but little needed in an apple orchard. Of phosphoric acid in the same amount of fruit there is still less, or only .001 pound, which goes mainly to seed formation, hence there is no real necessity for applying this element except as it naturally exists in combination with other fertilizers.

There is in ten pounds of apples a large quantity of potash, being .013 pound, and in an average crop of 15,000 pounds per acre, there would be had nineteen and a half pounds, the whole of which would be absolutely and totally removed from the orchard soil; in ten similar average crops almost two hundred pounds of this fertilizing material would be taken from each acre, and the most natural result is that the orchard ceases to bear, simply because there is nothing whatever to make fruit of. Owing to this robbery even the trees do not remain vigorous, and who can blame them?

The above is a simple statement of a condition of things all over the country, where the owners, like our correspondent, cannot understand why the old orchard, which formerly yielded enormous crops, does not now pay for the pruning. I have tried to make plain and clear the cause, and will now give the remedy, which is equally simple and is only this: Apply manure containing the proper ingredients, and your orchards will again become productive and your young plantations will be kept in thrifty, vigorous condition.

Now, the most natural and in many respects the most economical manure that can be applied to an orchard is unleached wood ashes, especially if they can be obtained near at hand, or purchased at any price less than a half cent per pound. In a ton of ashes there should be about 140 pounds of potash in a form most readily available by the tree roots, besides sufficient phosporic acid and a small quantity of nitrogen. Responsible dealers quote good ashes at $10 per ton, including freight, and this is about as cheap as any commercial fertilizer that can be secured, and one knows just what he is applying.

The main objection to the application of barn-yard manure is that it contains such a preponderance of elements which go to forming a rank, woody growth at the expense of the fruit; but of course it is far better than none, applied as directed by the editor in the January 17th issue.

Returning to the question of the fertilizing substance removed by the nursery stock, we must understand that in this case it was the trunk or tree which was entirely removed. Now, if instead of being sold these young trees had been burned, what would have been left? Ashes certainly, and as we have found that fifty pounds of these ashes contain nearly three and one-half pounds of potash, this must have been the substance most largely taken from the soil, and this was done just as effectually as though the trees had been taken away and burned instead of being sold. Ashes then, as with fruit, is indicated as the proper fertilizer.

As it is possible that for many western orchardists it is more convenient to secure other fertilizing elements instead of ashes, I give a formula which will give nearly a perfect manure for an apple orchard. For other fruits it would be necessary to change the quantities of the ingredients somewhat, in order to give them just the food most suitable:

COMPLETE MANURE FOR APPLES.

75 lbs. nitrate of potash	$2 75
10 lbs. acid phosphate	1 25
25 lbs. nitrate of soda	1 00
Total	$5 00

Here at the highest retail prices we see sufficient manure for an acre of orchard will cost only $5, and at ton prices less than $2.50, so that on the score of cost no one can allow his orchards to run out. Moreover, if the above quantity is applied every three years out of five, it will amply supply all demands likely to be made upon the soil.

An objection to the use of fertilizers like the above is, that they are so concentrated—that is, make so little bulk—that it is not an easy matter to get them evenly applied over the entire area. In consequence, the above materials should be mixed together, and then several hundred or more pounds of dry earth added and thoroughly mixed, as this will make the proper distribution far easier. Land plaster may also be used in place of the earth, but the application should be made immediately after the mixing, not allowing the mixture to stand in a mass for any length of time. ELMER E. SUMMEY.

BETTER COUNTRY ROADWAYS.

L. Bryant, before Northern Illinois Hort. Society.

The best road is a raised, hard roadway, the center of gravel, macadam, or similar material, with a side track on one or both sides for light driving and travel in dry weather. Good drainage is an essential feature, and drains should be of sufficient capacity. The ideal roadway should be seeded to grass where not used, evened up, weeds kept down, all noxious ones being cut out by the roots, with the sides having an easy slope. Shade trees should be planted close enough to keep out the fierce sunlight, but not near enough to prevent a growth of grass. Refuse should not be dumped in the streets. Weeds when pulled up should not be thrown into the streets to dry, and their seeds distributed by passing vehicles. This matter of weeds should be attended to by highway officers. The mowing of grass may be left to individual taste. The old system of road districts and district overseers should be abolished, and the work left to three road commissioners, one of whom should have the necessary time and ability to personally supervise the work. Go to the town meetings and see to it that the highway commissioners are instructed to destroy noxious weeds, and put the roads in order. Local highway improvement societies covering a certain definite portion of road should be formed, and meet once a month, and a committee appointed who should advise property owners as to needed operations. Pasturing in highways, if carried out systematically, is not hurtful, though general ranging should not be allowed.—*O. Judd Farmer.*

LONGEVITY OF PEACH TREES.

The short duration of the peach of late years has attracted more attention than the apple. There are many casual observers who jump to the conclusion that the practice of budding is the cause of this, and to those who only look at the outside there is much to support this view. From the window where I write I can look out on a lot of seedling peach trees, whose age I can only guess at, but which cannot be less than twenty-five years. They are pictures of health. Budding is not, *per se*, responsible for the failure, I think, but rather the carelessness of our nurserymen in growing stocks for budding. All over the land there has been an insane sort of impression that peaches must be budded upon stocks raised from southern natural seed. These seeds are collected by country store-keepers in Virginia, North Carolina, Tennessee and elsewhere—and are almost invariably saved from half-ripe peaches cut for drying. They are not only half ripe, but from the stunted, starved trees one sees all through this country. The constant use of seed of such poor vitality is largely the cause of the short life of the tree budded on these stocks. The late Col. Edward Wilkins, of Maryland, at one time the largest peach-grower in the state, had a theory that much of the trouble of orchardists came from the trees being budded on dissimilar stocks—a late peach on seed from an early one, etc.

He once raised a large orchard in accordance with this idea. He saved seed from the earliest to the latest peaches, and budded them with similar sorts. The seeds were all from budded trees, yet this orchard was one of the longest lived and most successful orchards in the peach district. Many of the trees grew to an enormous size, and when Col. Wilkins built the present mansion at Peach-tree hall, the newel post of the grand stairway, a very large and ornamental one, was turned from the solid heart-wood of a giant peach tree. This newel post, in its finished state, if I remember right, is nearly one foot in diameter. The members of the American Pomological Society who attended the meeting in Baltimore in 1877, visited this place, and many will doubtless remember the peach-tree stairway. I firmly believe that if our nurserymen would select their seed from healthy trees, without any regard to their being seedlings, the success of budded trees would soon be equal to the seedling ones.—*W. F. Massey, North Carolina Experiment Station.*

PRESERVING FRUITS.

To every gallon of water use two teaspoonfuls of powdred sulphur. Lay the sulphur on a dish. Place your fruit, water and sulphur in a tightly closed box. Set fire to the sulphur, close the lid of the box, and allow the articles to remain in four or five hours, when they will be sufficiently processed. Then take out your fruit, place it in jars and cover with the processed water.

All articles to be preserved must be sound and free from blemish; bruised or broken skins would keep, but be water-soaked. Only thick-skinned fruits and vegetables are to be used. Any water-tight vessel, covered sufficiently to exclude dust, may be used. Barrels are advised for green corn, and large-sized stone jars, holding several gallons, for tomatoes. Two or three inches of water must always be over and above the fruit. For use, rinse off the sulphured water and cook, or use as if fresh from garden.—*Mrs. K. T. G. in American Garden.*

In his paper on Horticultural Education, Henry L. Clapp begins with "children's natural love for digging in the earth," but which is obliterated as they grow older, and hence the abandonment of farms. They leave the occupation of producers, and seek that of middlemen or non-producers. The country at large is greatly overstocked with middlemen. He cites as an example the report from Wayne county, N. Y., where there are no less than four hundred empty houses. One named town has more than fifty deserted houses, and another has thirty or more. The population here as elsewhere is slowly drifting into the larger towns, and many are going West. Horticultural education is the proposed remedy—not merely the education of books, of which there are already too many pointing toward teaching pupils to be traders and making bargains. Some of the European countries, with all their disadvantages in other respects, have exceeded us in this. In France there were in 1867, 20,000 schools in which teachers and pupils found recreation and profit in garden and fruit culture. There are now 28,000 of these schools. In Sweden, 22,000 children are instructed in horticulture and tree-planting. Germany appropriates annually for agriculture, $2,850,000; France, $8,000,000. Secretary Rusk hopes to get $1,359,000 from our government.—*Prairie Farmer.*

GLASS STRUCTURES DEFINED.

One subscriber asks why a correspondent should have spoken of a "cold" greenhouse last month, when every one knows that a greenhouse is for warmth. This shows that some confusion prevails in the minds of the public regarding the names of different kinds of glass structures. We take pleasure in throwing some light on the subject. A cold greenhouse is one in which no artificial heat is used, and answering in the Southern States, to winter many tender plants; in the North the cold greenhouse may have indirect heat similar to the one described last month. A cold grapery is similar to a cold greenhouse. A greenhouse is understood to be a glass structure provided with means for artificial heating, to a temperature ranging from 45° to 55° at night. A hot-house, or stove, is a structure in which night heat of 60° and upward is uniformly provided in cold weather. Sometimes the stove is supposed to be distinct from the hot-house, or signifying the latter when heated uniformly at above 70° at night. The warm grapery is analogous to the hot-house. A conservatory is an adjunct to other glass houses, and into which plants, after they have reached a showy stage, are brought for display. It is a place where plants are shown rather than grown. The forcing house is a highly-heated structure, often with the glass near the benches, and into which plants are brought temporarily for inducing their bloom. A retarding house is a kind of cold or cool greenhouse used for retarding plants. A cold pit is of the same class as the cold greenhouse, but is usually built into the ground and with glass only overhead. A cold frame is a shallow bed covered with sash, and unprovided with artificial heat. A hot-bed is similar to the last, but is heated by means of fermenting manure, or sometimes by flue, water or steam pipes.

A TALK ABOUT HARDY GARDEN PLANTS.

(J. W. Manning, Jr., before the Society of American Nurserymen.)

We are by no means confined now to the plants of the old-fashioned gardens, many of which, though, are indispensable even now, but the number of all hardy kinds well worthy of culture is an astonishing list.

This list includes some of the finest of foliage plants, which equal and even rival many tropical forms, while variety of form and color in the flowers is not rivaled perhaps except in Orchids.

Many beautiful forms are in cultivation and found hardy and desirable, which are natives of the snowy Himalayas, the Siberian plains, while China and Japan contribute long lists of beautiful novelties which are much sought for, which, together with the long list of desirable kinds from all other temperate parts of the globe, contribute to make a flower garden a most beautiful spot and a fascinating study.

There are some places where bedding plants can and probably will be used to advantage for some time, but the plants for the millions are no longer these. They demand something that will require less care and expense in cultivating, that will be hardy, permanent and showy, and of sufficient variety in foliage and flower effect to suit all demands of soil, situation and individual desire.

The use of perennials is not confined to the flower garden alone, for many valuable kinds are finely adapted and actually used in connection with shrubbery, both among the plants and about the edges, adding beauty that is at once appreciated by the public. Again, many beautiful plants are being used to beautify semi-wild situations, known as wild gardens, while parks, public gardens, etc., are now being largely planted with this stock, and the fact that our best landscape gardeners are using the plants in quantity is of itself a sufficient guarantee of their value.

A good sample of such use can be seen in Central park, while other and more striking examples are to be seen in Newport, R. I., where the use of these plants is becoming general.

We now have plants for beautifying rocky places, ledges and dry banks, flowers which will flower and thrive to perfection in partial to deep shade; bog plants for reclaiming spots hitherto considered detrimental to any fine flower effects, while ponds, brooks and streams are the best situations for some beautiful plants which cannot well be dispensed with when known.

The garden proper is enriched by an immense list of kinds presenting greater variety of form, foliage and flower than ever before known. I have shown there is no dearth of material in this class of plants, and that they are already used to a considerable and increasing extent. The question as to whether all nurserymen should catalogue these plants is one that requires a careful answer.

To mention a list of the more commonly known and best kinds for general use, we would quote the following among the best: Achilleas (in variety), Aconitums adonis, Vernalis, Alyssums, Anchusa Italica, Anemones (in variety), Anthemis tinctoria, Anthericums (in variety), Aquilegias (in variety), Arabis Alpina, Amerias (in variety), Asters of the dwarf kinds, Campanulas (in variety), of strong growth, Centaureas,

Clematis (in variety), Coreopsis, especially lanceolata, Delphiniums or Larkspurs, Dianthus (in variety), Dicentra spectabilis and exima, Pentstemons (in variety), Dictamnus, Erigerons (in variety), Funkias or Day Lilies, Gaillardias, Spireas (in variety), Silene Pennsylvanica, Silene Virginica, Violets (in variety), Yuccas, Geraniums or Cranes Bills (in variety), Gypsophila paniculata, Heleniums, Helianthus, of the least weedy sorts, Hemerocalis (in variety), Hollyhocks, Iberis or Hardy Candytufts, Iris (both German and Japanese), Liatris, Lilies of the thriftiest kinds, Lychnis (in variety), Martensias, Monarda, Myosotis or Forget-me-nots, Œnotheras or Evening Primrose, Peonies (in variety), Papavers or Hardy Poppies (in variety), Phlox (in variety), Platycodons, Polemoniums, Pyrethrums, Rudbeckias (the less weedy kinds), Sedums (of the shrubby sorts), Tradescantias, Trilliums, Veronicas (in variety), Vincas or Periwinkles.—*American Florist.*

EXPERIENCE WITH SMALL FRUITS.

Six years ago I began growing strawberries, raspberries and blackberries in a small way. Have since increased my plantation to acres. Will give you my experience with varieties. The Crescent was my first love, and I have never fully abandoned it. Have tried it with Sharpless and Captain Jack and May King, and find it at home with any variety. The Jessie was my next hobby, having planted it quite largely. I find it a most delicious berry, but not as prolific as Crescent. The Bubach surpassed anything on my place and sold readily in market at top prices. Having it properly fertilized with Jessie, I shall never fear a dull market. Warfield No. 2—For beauty, earliness and firmness is the fruit-grower's friend. The earliest to ripen and the last to bear, make it very desirable and profitable. Haverland—We have not fruited only on spring-set plants. The berry was beautiful, and expect a fine crop next season. Gandy—Did not make as much growth as desired, but plants are looking fairly well. Winner and Eureka were planted late, and cannot expect many returns. If I were planting for profit I would plant Bubach, Warfield No. 2, Haverland, Crescent, and fertilized with Jessie, and I do not think any one would be disappointed with a full crop of berries every year.—*J. W. Cogdall, Sangamon Co., Ill.*

THE BEST WAY TO VENTILATE.

Eight persons out of ten will try to rid a room of its noxious gases by making an outlet for the air near the top of the inclosed space. The result is that the room is cooled, but the impurities remain practically where they were. The reason is this: As the air of a room is heated it rises, but the impure gases, being generally heavier than ordinary air, settle to the bottom of the room. A great amount of harm has been done, in school-rooms particularly, by lowering the upper sashes in windows, thus causing cold drafts upon the overheated heads of the pupils. A room is best ventilated when the heavy and impure air is drawn gradually away from the lower part of the room through an opening into a chimney, the heated walls of which cause an upward current. An open fireplace is thus one of the best ventilators known. When this is not convenient, an opening covered by a grate should be made in the chimney near the floor. Low rooms become frequently so overheated as to require an outlet near the top, but this should be used simply to cool the room, not to ventilate it. In close buildings, occupied by animals, ventilation can be secured by a close shaft six or more inches square, according to the size of the room, extending from within about twelve inches of the floor up through the roof of the building. The wind blowing across the top of this will cause an upward current, which will draw off the impure air.

Interesting experiments can be made by testing the effectiveness of various kinds of ventilation. Let the doors of a room be closed to keep out drafts; then with delicate tissue paper cut in long strips and held by one end, or with a lighted candle, note the outward current of air through an opening near the floor into a heated chimney, or from the room into an open fire. Note also the outward current of the upper air when a window is lowered, and at the same time the downward rush of cold air to the floor near the window. If a sleeping room has been closed all night, as too many sleeping rooms are, go out into the pure air for fifteen minutes, then go back into the closed room and note the unpleasant change. The first seeds of disease are too often sown in unventilated bed-rooms.—*Webb Donnell in Am. Agriculturist.*

THE MISSION OF FLOWERS.

It seems strange at first thought that young children and women and old people should care more for flowers than do boys and middle-aged men, yet it is not strange. The spirit of flowers belongs to the calmer and tenderer virtues, and it is foreign to the restless boy who

is fired with indefinite aspirations, and it is apt to find little room for lodgment in the mind of ambitious manhood. But when the years begin to soften passions and ambitions, the first love of the flowers begins to return, and it returns the more completely the more tender and careful the disposition. Youth and old age meet in many ways. It is a fond ideal of artists to picture the child upon the grandfather's knee or frisking by his side through the calm and shady fields. Nature speaks to both, to one in some unknown and strange emotion which inspires a wonder of what the great world is and what it means, to the other with the sweetness and nearness of a friend. Both love the flowers because they appeal to their sentiments and emotions. Life begins and ends at the same point, in purity, emotion and love. To women flowers always appeal, because in them the fundamental affections are less obscured by ambitions and sin. It is a hopeful sign if some of the tenderness and sweetness of childhood remains in the man, if the flowers and nature still retain of their old-time fragrance and wonder. "It is character that counts, after all."—*American Garden.*

THE DISCIPLINE OF DIFFICULTIES.

"I regard the yellows as one of the greatest blessings which ever fell to the lot of peach-growers. It has checked the recklessness and inflation which follow uniform success." This bit of heresy was given us recently by a peach-grower of large experience and observation in the Chesapeake peninsula. We had ourselves taught that diseases and difficulties which can be readily overcome or can be checked without great sacrifice, are directly beneficial to any community, because they drive out the shiftless and incompetent growers, and because they lessen production, and, therefore, aid in keeping prices within the limit of profit. But we had hesitated to make the same declaration in regard to such serious and obscure diseases as pear blight and yellows, and we had never thought of the discipline of difficulties in checking the recklessness of success. This, our informant assures us, has been true in many parts of the Chesapeake country. It is almost an axiom that the most staid and honest people are found in regions where greatest effort is demanded.

It will be interesting to carry our friend's remark to its logical conclusion. In the first place, difficulties, wherever we find them, are moral goads. The man who does not overcome them must turn out of their way. Therefore, they drive from any business those men who are not staid and courageous enough to oppose and overcome them; they rid the business of an uncertain and therefore unstable element.

Again, difficulties engulf most seriously those who are ignorant of the details of the business or who lack perception and alertness. As a rule, other things being equal, the most competent men in any business are those who have confined their attention to a comparatively small field. Difficulties, therefore, tend to drive out the general or old-style farmer, and the greater the difficulties the greater must be the exodus.

We cannot escape our friend's conclusions: the difficulties of any business drive out the incompetent and careless, and tend to make specialists. And the more serious the difficulties, the more intense must be the specialization. General and mixed farming, in connection with fruit-growing, is constantly becoming less satisfactory.

Specialization is the salvation of our agriculture, for whether we wish to throw the responsibility of present depressions upon politicians or upon the moon, it is still true that the man who is most skillful in a special line is bound to be the most successful. A prominent educator recently remarked to us: "The agricultural colleges are bound to attract more attention from the farmers, for the difficulties of farming are constantly becoming greater. The boys want help."—*American Garden.*

FIGHTING THE GROUND MOLE.

Wherever the common ground moles take possession of light soils, free from stone, they become a great nuisance, and do an immense amount of injury to lawns as well as small plants in the vegetable and flower garden. If we scatter barnyard manure in drills or trenches made for the reception of peas, beans or other seeds, a mole is pretty certain to find it, and burrow under the entire row, lifting up or breaking off the roots of the young plants, causing their destruction. If a forkful of manure is dropped in a hill for melons, a mole will soon show us that he knows it and how to work in a circle until every seed has been dried up, or plant destroyed, and if the manure is spread broadcast, then the moles travel in the same way, producing broadcast destruction.

It does not help us to be informed that the moles are only seeking their natural food, and have no desire or inclination to be mischievous; but they are all the same, and the food they seek is generally the harmless angle-worm and not the larvæ of insects, as many writers have claimed to shield the moles from total condemnation. If a mole was very hungry and there were no angle-worms to be had, he would no doubt make a meal of white grubs; in fact, I have tested his taste for

different kinds of food and have found that he preferred the angle-worms, and would root up several square yards of lawn in seeking his breakfast.

Traps are generally recommended as a very satisfactory means of destroying ground moles, and if well made and of the right pattern, and then properly set, the mole stands but a poor chance of escaping a thrust from the steel points. Unfortunately, my grounds are surrounded by farms that seem to breed moles as freely as they do the ox-eye daisy, and so I have to defend myself against trespassing moles as well as against the natural increase of the home stock. It is now about twenty years since I first began to use the modern mole-traps, and I may say with fair success, for the number of moles caught every summer with them will average for the years named about twenty-five, or say five hundred in all, but this slaughter has not exterminated the pests, for we caught and killed thirty-three during last season. I have tried poisons of various kinds but with no apparent beneficial results, and even bi-sulphide of carbon poured into their burrows only drives the moles to new grounds a few yards distant. The noxious insects have never given me half the trouble nor proved as great pests in the garden as the ground moles, and while I shall probably continue to use traps in order to keep the pests in check, I am anxiously looking for some better and more rapid mode of extermination.—*A. S. Fuller, New Jersey, in American Agriculturist.*

EDITORIAL NOTES AND COMMENTS.

Is fruit-growing profitable?—This question has been and is repeatedly asked many times, and always requires a conditional answer. The conditions are: 1, a suitable climate; 2, a favorable soil; 3, fertilizers adapted to the soil; 4, varieties adapted to climate, soil and market; 5, management suited to these conditions; 6, a combination of influences which will give fine and handsome fruit and plenty of it. These requirements can be secured only by much attention and long-continued experience. If mainly for market, a thorough knowledge of the best markets is necessary; if for home use, a great variation in kinds may be made according to personal preferences and for daily use. But less knowledge and experience is required for raising fruit for home use than for market, for if any failure is made the loss is not formidable, and does not involve the loss in packing, selection, rail freight, express charges and commission.

Planting pond lilies.—L. B. Rice describes in the Canadian Horticulturist his successful method of raising pond lilies (*Nymphæa*). A tub, made by cutting an oil cask in two across the middle, has six inches of clay loam placed in the bottom, and on this three inches of lighter muck or mud. In this set the lily roots with the buds partly exposed. Sink the tub on the lawn where it will receive plenty of sunshine, the top a little below the surface, the turf just covering the edge of the tub. It is then filled with water. A small portion of dead leaves is thrown in. Before freezing it is covered with boards and straw.

Trees with tap-roots.—"Orchard and Garden" publishes Dr. Stayman's account of the results of removing the tap-root from apple trees and then setting them on flat stones, comparing the results with trees retaining the tap-roots. An orchard was set out near Uniontown, Ill., with the tap-roots cut off and the trees set on flat stones, and another at the same time and place with the tap-roots remaining and not on stones. Forty years afterward the first mentioned were still bearing, and the last mentioned orchard was all gone. Other similar cases were named. Doubtless much would depend on the character of the soil, hard-pan and surface, and in other places the result might be quite different.

Wild flowers.—F. H. Horsford of Massachusetts gives to "Garden and Forest" a statement of his mode of collecting and transplanting wild flowers to his garden. He takes the plants when in bloom, lifting them with plenty of earth on the roots, keeping them moist and shielded from the sun for a week or two. We have adopted a mode for many years which appears to be an improvement. The plants are noted when in bloom and allowed to stand until growth has ceased and the flower fallen, but with the leaves still remaining to show where the plants are. A small stick or label is thrust into the ground at each plant, and if in the borders of woods the bark is shaved on the nearest small tree or sapling facing the locality. In the course of a few weeks the place is again visited with trowel and basket, and the roots secured without difficulty. Less care is required than when the plants are growing; they meet with no check by the removal, and are ready to bloom freely another year. Quantities of flowering perennials are thus easily and safely secured, from the earliest in spring, such as the Hepatica, Trillium, Erythronium, Sanguinaria, Phlox, Arethusa and others, and the later, native Lilies, Cypripediums, Gentians, Calopogon, Pogonia and many more. Many of these require to be grown in the shade as in their natural localities, and thus supply a want not often met in plants obtained from nurseries.

Repelling borers and rabbits.—A western correspondent of the "Rural World" describes a wash which will prevent moths and beetles from depositing their eggs in fruit trees, for excluding apple borers and peach grubs: Slake fresh lime with old soap-suds, making it as thick as common whitewash, and add half a gallon of crude carbolic acid for each peck of lime, and four pounds of sulphur and a gallon of soft soap. Wash with this mixture the trunk and limbs with a flat brush, the first of June. To keep rabbits off, and to prevent sheep from girdling, wash late in autumn, using half a gallon of gas tar instead of the soft soap. These washes are similar to those used by orchardists in former years, with some variation in ingredients.—*Country Gentleman.*

THE GREATEST BATTLE FIELD.

The bravest battle that ever was fought!
Shall I tell you where and when?
On the maps of the world you'll find it not;
'Twas fought by the mothers of men.

Nay, not with cannon, or battle shot,
With sword, or nobler pen;
Nay, not with eloquent word or thought,
From mouths of wonderful men.

But deep in a walled-up woman's heart—
Of woman that would not yield,
But bravely, silently bore her part—
Lo! there's that battle-field.

No marshaling troup, no bivouac song;
No banner to gleam and wave;
But, oh! these battles, they last so long—
From babyhood to the grave.

Yet, faithful still as a bridge of stars,
She fights in her walled-up town—
Fights on and on, in her endless wars,
Then silent, unseen—goes down.

O ye with banners and battle shot,
And soldiers to shout and praise;
I tell you the kingliest victories fought
Are fought in these silent ways.

Oh, spotless woman in a world of shame;
With splendid and silent scorn;
Go back to God as white as you came:
The kingliest warrior born.

JOAQUIN MILLER.

Dr. Schlich's statement of the destructive tendencies of private forest ownership in India might with equal truth have been made as a general proposition. It is the salient fact which the history of the forests of the earth seem to reach; but nowhere have the proofs of its truth taken such giganic proportions as in the United States to-day. Even in Germany, where the state has done its utmost to surround them with every possible safeguard, the wood-lands of private proprietors are steadily decreasing, both in area and in quality. A second great fact, which is of equal and immediate significance to us in America, is that the countries which have been successful in forest preservation have been so along the lines of forest management. The first and most evident function of the forest is to produce wood, and no scheme which leaves out of account the imperative and legitimate demand for forest produce is likely to meet with the support of a people as practical as our own. The forests which are most profitably used are the forests which are best preserved. These truths have never had the currency with us which their importance has deserved, and as a result we have been hastening along a road whose end is painfully apparent. We are surrounded by the calamitous results of the course that we are now pursuing. It fact, it seems as though there were almost no civilized or semi-civilized country in either hemisphere which cannot stand to us as an example or a warning. To this great truth they bear witness with united voice. The care of the forests is the duty of the nation.—*Gifford Pincho in Garden and Forest.*

ORNAMENTAL HEDGE.

In answer to the inquirer who asks for a good or the best shrub for an ornamental hedge on his grounds, we may name any species which has a thick natural growth, and is sufficiently hardy and vigorous to hold its ground. Among the best is the Japan quince, which in addition to its stout growth possesses great beauty when in flower, but requires some care to keep it in shape. Unlike it and equally valuable is the purple barberry. For low growth are *Deutzia gracilis* and sweet-scented shrub. Taller shrubs may be employed if kept pruned within bounds, such as Philadelphus, Cornelian cherry, Tartarian honeysuckle, and others. Strength may be given to any of them by stretching one or more barb wires lengthwise through the center as they are growing up.

PEACHES IN ST. LOUIS COUNTY.

Some of the Old and New Varieties and How They Did in St. Louis County in 1888-89.

Editor Rural World—The following list of peaches I have fruited in St. Louis county. I have one orchard in bottom land on the river (Mississippi), another two miles from the river on upland, on or about twenty-five hundred in all—trees from seven to eighteen years old.

Amsden, Alexander, Gov. Garland, Arkansas Traveler, very much alike and are to peaches what Hartford Prolific is to grapes. I would not plant many of them, as they come in competition with finer ones from the South.

Early Beatrice, a good little peach, fruit too small.

Early Rivers, cracks and is subject to moss blotches; does not sell well in St. Louis.

Hale's Early, buds very hardy, fruit perishable on tree and off.

Mountain Rose, very good.

Amelia—First-class peach, the first really good peach we have.

Foster—This has been a disappointment to me and in this neighborhood. It may do better East, where it came from. Will grub out sixty trees of it.

Large Early York—A sure old peach.

Crawford's Early—I have what seems to be two strains of this; one I got from a Bloomington nursery, back in the seventies, is a first-rate peach for home market, rather tender for shipping. The other strain I got from another party is more tender in bud and don't color up as well.

Moore's Favorite, looks like Old Mixon, but larger.

Reeves' Favorite—This with me comes always fine, yellow freestone, almost round; I think it one of the best.

Old Mixon, free, variable with me, does best with me on poorish ground.

Susquehanna, very shy bearer, could do without it.

Crawford's Late, always fine when well grown.

Stump-the-World—This is also a variable peach with me—some years very fine, while other years on the same ground it is very indifferent.

Ward's Late—This drops from the tree before ripe, seems to hold its fruit when grown in orchard grass.

Beers' Smock—This does not belong to the Smock family, as it is an upright grower, whereas the Smocks are drooping; a good peach and a free bearer, profitable; yellow, free.

Shipley's Late—Red, fruited this two years, one of the best, white flesh, a fancy peach.

Nanticoke—Yellow freestone, a free bearer, runs even, upright grower. This is the most profitable peach I ever grew. I got six dollars a bushel box by the wagon load in St. Louis in 1889; got buds of this peach sent to me by a party in South Kansas eighteen years ago. It was labeled a cling, but is a decided freestone.

Brandywine—Fruited this in 1889; looks like Crawford's Late, but is not as round, and ten days later. Very large, yellow freestone, a fancy peach.

Christiana is also a fine, yellow freestone, round; sells well in St. Louis.

Freeman's Late is an improved Smock, later than the Smock by a week, and larger and better colored than Smock. Very profitable.

Picquet's Late—Another fine one.

Heath Cling—I have seen lots of what passed for Heath Cling, but the true Heath, when well grown, won't go begging for a purchaser.

Gold Dust—I got this from Judge Miller, a yellow cling, very large and firm, quality not so very good, a good one for pickling, for which there seeme to be quite a demand.

LaGrange, always fine with me.

Red Cheek Melocoton—Sets too much fruit; has to be thinned to have the fruit large enough to be salable and the color, is not bright enough.

Moore's White, small, dull white; unattractive; discarded it.

I have a good many more of the newer kinds that I did not fruit long enough to pronounce on.

A. LAVELLE.

January 2, 1891.

ROSE NOTES.

Autumn Blooming Varieties.—No variety surpasses the old Souvenir de Malmaison as an autumn bloomer. In many of the Northern States, where our winters are a constant succession of hard freezing and complete thawing, this and many other out-door roses are so crippled by the sudden changes as to have little chance to show us their best points. They may often be seen in really fine form in localities of extreme cold, but this is where they are not subject to these trying thaws; in both situations, however, a judicious winter protection, which allows a good circulation of air about the plant, will usually be found of great benefit.

In the milder climate of England and in the more favored areas of our own country, especially in the Ohio valley and southward, the Malmaison, with Sombreuil for a lovely companion, are beautiful beyond description. Cave Hill cemetery, at Louisville, is a garden of roses, and it is seldom seen to greater advantage than when these two varieties, with Hermosa for a modest third, are in the full flush of their autumn bloom. Not a stray rose here and there, but roses in the greatest profusion and on every side.

Of the hybrid Teas, La France is often noticeably beautiful in the autumn, but this entire section of the rose family, notwithstanding that it contains some of our most delightful varieties, is rendered almost unfit for out-door planting in the North, owing to its susceptibility to the ravages of that dreaded disease, black spot. I cannot refrain from calling attention to a near and lovely relation of La France, the Viscountess Folkestone. One of the late Mr. Bennett's pedigree seedlings, it is not surpassed in beauty by any rose extant. There are many locations through our Middle States where it winters finely, and seems a rose absolutely without fault. The flower is of grand size and the most finished form; the texture is like satin; the color is white, shading to a soft flesh tint at the base of the petals, giving it a bright illumined appearance.—*E. G. Hill in Garden and Forest.*

Richmond, Ind.

The following summary is taken from the Ohio Station bulletin:

(1.) To meet the wants of strawberry growers, a variety ought to have sufficient health and vigor to adapt itself to widely varying conditions and to possess one or more marked characteristics. It is not worth while to seek to find varieties that are adapted to particular soils, since varieties that have a limited range are generally found to be variable and untrustworthy. The most valuable varieties are the least variable, and are easily suited as to soil and climate.

(2.) The following varieties have been thoroughly tested and are suited to the wants of those who grow berries for market: Bubach, Eureka, Haverland, Crescent, Warfield.

(3.) Where large berries are desired rather than quantity, the following can be recommended for home use or for market: Cumberland, Crawford, Gandy, Louise, Lida, Miami, Pearl.

(4.) The new varieties that seem to be the most promising, are: Enhance, Farnsworth, Ivanhoe, Middlefield, Muskingum, Michel's Early, Parker Early, Shuster's Gem, Waldron.

(5.) Those that have good points, but are doubtful and need further testing, are: Cloud, Lady Rusk, Stayman's No. 1, Daisy,

(6.) The following will no doubt be dropped soon: Hoffman, Jessie, Logan, Pineapple.

(7.) The most productive varieties are those that have a long season: *i. e.*, give a comparatively large number of pickings.

(8.) Very early and extremely late varieties are less fruitful than the medium early.

(9.) Perfect-flowered, as a rule, are less productive than the pistillate or imperfect-flowered varieties.

THE QUEEN OF FLOWERS.

BY JOHN N. MAY.

Read before the Massachusetts Horticultural Society, January 24, 1891.

Having been requested by your honorable committee to read a paper on this subject, I have in the following endeavored to say enough at any rate to open a discussion whereby your essayist trusts to learn more than he can ever hope to teach by anything that can be said. As this subject has been so well and ably presented to this body so many times before, by men much better informed and more able to present it to you intelligently than myself, I feel that I am almost an interloper here, and would certainly much rather be a listener than a talker on this subject; however, I will give my experience with the rose, and trust you will be lenient with your criticisms.

This, the queen of all flowers, has always reigned supreme for me, and will till the end of time. My first experience with the rose dates from the time I was about 8½ years old, when I borrowed (without permission) three eyes of Souvenir de la Malmaison, then a new rose. I am sorry to have to confess it at this late day, but a clear confession is good for the soul, so it is said, anyway. Having watched an elder brother doing considerable budding, and wishing to try my hand at it, I borrowed, as above stated, three eyes from my father's garden and took them to a neighboring hedge, where I found a wild rose on which I budded them, one of which grew and the next season produced three fine flowers; and from that day on the rose (and this variety in particular) has always held a charm for me.

During all these years I have seen many, very many changes in them, though some of the varieties that were then in their glory are not yet eclipsed and still retain their places in the front rank. Among many I may mention General Jacqueminot, Giant des Battailles, and many others too numerous to mention here. Among the tea roses, Niphetos, Lamarque, Glorie de Dijon and others still rank as first favorites; the same may be said of all the other branches of this family. But no one can gainsay that there are not many great improvements in the family, introduced within the last ten or twenty years; take, for instance, the magnificent Ulrich Brunner, Mrs. John Laing, Earl of Dufferin, T. W. Girdlestone, and many others of the same family. Among the teas, the most graceful of all, combining as it does elegance of form, beautiful

color and fragrance, stands pre-eminently Catherine Mermet, and her offspring the Bride, which to-day is recognized all over the civilized world as the finest white tea rose in cultivation; and of this year's introduction, the glorious Waban, now before you, and its mother and sister, grown and produced at the celebrated Waban conservatories here in your own State, which clearly demonstrates the fact that the cultivation of the rose has wonderfully advanced within the last decade.

It may not be out of place at this time to give a few remarks on the cultivation of the rose here. Twenty years ago the principal roses grown for our markets were Bon Silene, Safrano, Lamarque and a few others of like character. The only roses of any size then grown were Marechal Niel and Cornelia Cook; to-day they are almost entirely supplanted by much superior varieties, such as you now see before you, and many others of a like size and beauty. To attain this end, considerable skill has been brought to bear on their cultivation. Twenty years ago possibly five thousand roses per day was the limit of the supply for New York city; now as many as fifty thousand roses per day can often be found there, and according to my own estimate, based on the most careful calculation, I think I am quite within the limit to say that often it reaches in the spring of the year to nearly one hundred thousand per day, which speaks volumes in itself for the growth, advancement, refinement in taste and development of horticulture. To meet the demands of the public, many changes in the cultivation have been brought about; where with the old system one rose was cut, ten at the present time are cut from the same space. Perhaps you will ask how this has been brought about; my answer is, largely by superior cultivation. Formerly they were all grown in the solid bed of the green-house, now they are grown on raised benches, beds, etc., and with the greatly improved style of green-houses now at the command of the grower, they are enabled to produce large quantities with comparatively little expense to what they formerly did.

When I began cultivating roses under this system, many growers predicted failure; to-day ninety per cent of the florists in this country are growing their roses on that principle, with of course some modifications which experience has taught. It was formerly the practice to plant a house of tea roses, grow them on for years till they actually died from overwork; now the general practice is to replant fine, healthy, new stock every year, or at most, every two years; originally the prevailing idea was that the roses must have a deep rich border ranging from 12 to 24 inches deep to produce good roses; now the finest roses in the country are produced on benches, etc., with from 2½ to 4 inches of soil.

To keep plants in such a shallow bench constantly bearing, they must, of course, have liberal treatment; after they are planted, say in July, and get fairly started into growth, they need a mulching of the best manure they can have. This induces surface root action, which roots should never be disturbed, and in the course of eight or ten weeks the plants will have absorbed the above coat of mulching. Our practice is to then give a light dressing of pure fine ground bone, covering the same with another thin coat of manure; this is feeding the plants where it will do the most good and at the same time keep up their roots where they get all the benefit of the fresh air circulating through the house. This process is repeated as often as required, and where the plants are growing very strong, careful application of other stimulants, such as liquid manure, nitrate of soda, etc., is of great benefit to them, providing, of course, due care is used in its application. To apply such strong stimulants injudiciously simply means ruin, not only to the flowers but the plants also. I do not hesitate to say that more plants have been killed by over-feeding than all other causes put together. One thing should always be borne in mind in reference to plant life, and that is that they are almost identical to animal life so far as their requirements go. To maintain a plant in health and vigor, it requires careful and judicious feeding, just as an animal does, and the harder it works the more care it requires. Those who treat their plants or animals otherwise than reasonably, will pay dear for their pains and reap the harvest for which they have sown.

Possibly some may doubt the soundness of such a doctrine and say, as many have done to me, "How can you reconcile this statement with our practice of growing roses in the open ground, where we use immense quantities of manure, and the more we use the better our roses grow and bloom?" Very true, they do, but the conditions are so totally different that there can be no comparison whatever. In the open ground the action of the air, the wonderful power of absorption of the soil of unlimited depth, dews by night, rains and sun by day, all tend to produce such a vast difference to the conditions of a green-house, where every drop of water or particle of manure has to be brought into direct contact with the roots of the plants, that it would seem almost an absurdity to make any comparison whatever.

For the successful cultivation of the rose under glass there are a few simple rules to follow: First, to procure a suitable soil, which should be, if possible, fresh sod from an old pasture; that having plenty of grass-root fibre in it is generally the best. If very heavy, the addition of a liberal proportion of sharp sand will improve it, but if of very light sandy nature, the addition of some of a clay nature will for most

roses be beneficial. When carting together in the spring, mix with it one part good clean cow manure to six, eight or ten of soil, according to quality of the soil. Turn it over two or three times and it is ready to put into the rose-house.

The next is good, strong, clean and healthy plants, for without such no one need expect the best results; and the next is to keep the house, after the roses are planted, in a good condition as long as they are in it, which means all the year round. This is more important than many suppose, as no plant can reasonably be expected to thrive where dirt, mud and decaying vegetable matter are allowed to lie unmolested for weeks or months together.

And, lastly, the watering and general care of the plants. On the subject of watering there is a wide diversity of opinion, mainly brought about by the different conditions of soil. The only safe guide is a careful study of the nature of the soil one has to deal with, and use water in proportion to its requirements. As a general rule, a rose in full growth should never be allowed to become dust dry, neither should it be flooded with water till it becomes almost the nature of mud; but for nearly all soils it is better to water the plants immediately the soil shows the least indication of getting solid or turning slightly light in color.

For the general care and management I am afraid I should tire you all if I even attempted to describe it in detail, but even if I did not do that I think it entirely unnecessary here, as much so as it would be for a stranger to go to Rome and tell the Romans what to do; but, in conclusion permit me to say, that although I think and honestly believe that in the past twenty years greater strides have been made in the cultivation of the rose than was ever done in double that time during previous years, yet I as earnestly think much greater advancement will be made in the next ten years than has been done in the past twenty. Evidence of this is very clear to any one visiting the different parts of this country, and I trust after we have all passed away the "Queen of Flowers" will still have as great a charm for our successors as it has for us. Long may she reign supreme, and this hospitable city remain the seat of her throne, to which pilgrims will ever come from all over this broad land to do homage to her majesty in all her golden glory.—*American Florist.*

THE GREAT NEW YORK FLOWER SHOW.

The Pitcher and Manda Flower and Plant exhibition in Madison Square garden during Thanksgiving week was a noteworthy event in the floricultural world. The enterprise and pluck evinced by this firm,

in undertaking single-handed to furnish a flower show of rare excellence and gigantic dimensions, is deserving the highest praise and merited success. It is safe to assert that never before has so magnificent and valuable a display of flowers and plants been brought together from a single establishment.

The arena of the "garden," which comprises the entire square bounded by Madison and Fourth avenues and Twenty-sixth and Twenty-seventh streets, where only a week before the great horse show was held, was transformed into a charming garden with broad, curved avenues and narrower walks, bordered at the edges by growing moss, and back of these were rows of small ferns. Large beds were filled with chrysanthemums, roses, orchids and other plants in great variety, and all in full bloom. Graceful palms and Australian tree ferns with the curious unfern-like *Platycerium grande*, or the Grand Elk's-Horn fern, of North Australia, standing out from their trunks, were interspersed with grand effect between other shrubs and trees in various plots and thickets. Then, in the center of this luxuriant garden, redolent with fragrant flowers, stood two pavilions, one entitled "Home Wedding Decorations," and the other entitled "The Wedding Breakfast." These two proved to be especially attractive features to the young people. The first pavilion was fitted up as a parlor; at the upper end stood the reading desk, or altar, for the clergyman, the chairs and lounges being comfortably arranged around the room. The mantel-piece at the right was decked in a wealth of roses and other flowers, with sufficient foliage behind to bring out their delicate tints; at the left, near the corner, airy ferns and slender palms grouped together completed the simple but charming decoration. The second pavilion was fitted up as a dining room. The large round table had a bank of pink roses in the center, while all around were arranged the glittering silverware and cut-glass decanters, goblets and bowls, in striking contrast with the cheerful, yet quiet and subdued appearance of the first pavilion.

Passing these attractions, the largest palm in the garden was reached—a Chinese Fan palm, one hundred years old. Around its base were grouped smaller palms and other plants, as well as the interesting *Monstera deliciosa,* with its large, graceful perforated leaves and creeping stems. Near by pine-apples were growing, some of them almost ripe enough to cut, and a solitary banana just behind hung its drooping fruit in plaintive loneliness. Fine specimens of various species of cactus were on exhibition also, and a brilliant lot of scarlet-spathed Anthuriums were to be seen not far from the entrance. The array of orchids, especially Cypripediums, was large and interesting. Many valuable specimens were on exhibition. One new Cypripedium,

a hybrid of *C. maserulianum*, labeled as a $1,000 plant, excited considerable comment. The flower was nearly four inches in diameter; the upper petal white, with rich lined and dotted striæ of brown madder, and the sac below was green, tinged rather strongly at its sides with brown madder also.

When it is considered that all these plants had to be brought in wagons from the United States nurseries, Short Hills, N. J., a distance of twenty miles, and had to be securely protected against frost on the way, one can partly imagine the difficulty and immensity of the undertaking. We are glad to learn that the admission fees have been sufficient to pay for all expenses, which have been considerably over $2,000. The unstinted expenditure of money has, of course, furnished the basis of the undertaking, but its principal success was mainly due to the indefatigable and well directed efforts of Mr. W. A. Manda, and Mr. John Thorpe.—*American Agriculturist.*

PRESIDENT DWIGHT: "The knowledge of botany gives a joy which should be in the possession of every educated man, and should be gained, as it easily can be, in the early youthful season. Science everywhere brings us into a close relation with nature."

WANTED—Five hundred thousand American artisans, mechanics, business men and their wives and children to understand that the pleasures of gardening, unlike many other pleasures, are of a lasting nature, as well as full of intellectual enjoyment. Plant a tree and you plant for the ages. The economic and health-giving side of raising and using fruit and vegetable products freely as food, also must not be overlooked.

HARDY ORNAMENTAL TREES.

At the fourth annual meeting of the American Cemetery association Mr. O. C. Simonds, of Graceland cemetery, gave a list of a few very desirable trees to plant, etc. Speaking for a climate like the West and Northwest, he gives first on the list as the American elm, with a good word for the English elm and varieties. He has a good word for the Silver or White maple when properly handled.

The Norway maple is perfectly hardy. The Tartarian maple does fairly well. The Sycamore maple is not always hardy. The Negundo or Ash-leaf maple is good for its distinct foliage. The Red maple seldom exhibits the fine autumnal tints it does East. The oaks he has a good word for. If dignity alone was sought for, the Burr oak would head the list. The White oak is a grand tree. The objection that the oaks often cause trouble from falling leaves in the winter, he says is compensated for "by the little tufts of pink and white leaves that come out in May, worth many times the cost of raking up the dead leaves." The Burr, White, Swamp White, Red, Black and Pin oaks are found in the immediate vicinity of Chicago, and are of course perfectly hardy. The Scarlet oak was Dr. Warder's favorite tree, and was planted by him for his own monument. The English oak does fairly well. The Black, White and Green ash trees he has a good word for. The Linden is a common native and one of our best trees. Even the Cottonwood is not to be despised in certain quarters. Our native Aspen he likes to see trembling in a thicket of shrubs and low trees. The Lombardy, he says, is not hardy, which is not the fact.

The Laurel-leaved willow, with its dark, glossy foliage, is an excellent tree. The Wisconsin weeper is a good tree to plant on the borders of lakes. The Golden willow is useful for its color in winter.

Among other native trees that should receive more attention than has been given them is the Hackberry, a tree that attains good size. The Juneberry is the most attractive of all trees early in the spring. The Blue beech, an ironwood, is beautiful in foliage and fruit; the Pepperidge is the most brilliant of our trees in autumn; and the Sassafras, with its green bark and rich-colored leaves, is much admired.

The Sycamore and the native Beeches do not thrive well. The Tulip tree, the Catalpa, the Honey locust, the Magnolia acuminata, and the Coffee tree are mostly hardy and desirable. The Buckeye, the Chestnut and Red-bud grow with us, but sometimes the edges of the leaves turn brown and look unhappy.

Of the foreign trees, besides those mentioned, the Horse chestnut, the Ailanthus and the Paulownia are effective but not always hardy. The European Cut birch is good. Young's Weeping birch is excellent. The European Alder does well in low ground. The Salisburia or Ghinko is good on account of its interesting foliage.

Mr. S. is an enthusiast in both tree and shrub-growing, and has good examples of what he writes about.—*Prairie Farmer.*

PERFECT AND IMPERFECT FLOWERED VARIETIES COMPARED.

A list, comprising eight each of the leading perfect and imperfect flowered varieties of strawberries, was sent to several prominent strawberry-growers, requesting them to mark the different varieties as to productiveness, on a scale of 0 to 10. The averages agree very closely with the grades given at the station before the lists were sent out. Below are the averages for each variety and for the two classes:

Perfect flowered varieties (average)—	
Sharpless	4.1
Cumberland	5.4
Wilson	6.6
Sucker State	6.0
Jessie	4.5
Pearl	7.6
Gandy	4.8
Capt. Jack	7.6
Average of perfect flowered varieties	5.8
Imperfect flowered varieties (average)—	
Crescent	9.2
Haverland	9.8
Bubach	8.2
Warfield	9.0
Ohio	5.0
Champion	7.0
Eureka	8.0
Manchester	7.8
Average of imperfect flowered varieties	8.0

It will be understood that these grades are not based upon actual yields, but are simply careful estimates; yet it is not improbable that they represent the standing of the varieties quite closely. One thing is clear: *i. e.*, the most prolific varieties are found among those having imperfect flowers. Nearly all of those named in this class are very prolific, the Ohio being the only exception. Among those having perfect flowers none are found that are extremely prolific, the Wilson and Capt. Jack being possible exceptions under favorable conditions. Taking averages for the two classes, we find that the varieties having imperfect flowers stand thirty-eight per cent higher than those having perfect flowers. If we take four of the most prolific in each class, the imperfect flowered sorts stand thirty per cent higher than those having perfect flowers.

There can be no doubt that the production of pollen is an exhaustive process, hence the varieties having perfect flowers are at a disad-

vantage. No doubt some of the perfect flowered sorts are very nearly equal to any in fruitfulness, and under certain circumstances may be fully equal, but the chances are against them when unfavorable conditions occur. Given two varieties of equal vigor and productiveness, one having perfect the other imperfect flowers, the extra tax of pollen bearing on one will so weaken the plants as to render them more subject to the evil effects of fungi, insects, dry weather, frost, etc., than those that produce no pollen.—*Ohio Exp. Bulletin, Vol. 3, No. 7.*

THE WINTER VOID.

Active farming extends through scarcely more than half the year in the Northern States. With winter comes comparative inactivity, and the cultivator draws upon the results of the summer for his support. The farmer should be one of the best read of men, with so much time at his disposal as the long winter season brings.

It is a wonder that farming returns even a livelihood when one half of it is a consumption of the other half. It is only a good business which can be followed even with a scant profit with so long an intermission each year. The closeness and depression of the times must tend to fill up this wasteful void of winter. The farmer must extend his energies over the whole year, and he has ample opportunity to do so in the management of his stock. The horticulturist especially, who is supposed to pursue intenser methods, should contrive to carry his business throughout the twelvemonth. Winter should mean only a change of occupation, a shifting of methods and energies. The changing seasons are inspirations to the thoughtful cultivator. They relieve the monotony, and should train to more complete and skillful methods. At present, the cultivator bends his energies to the utmost to provide for the winter, while the winter should provide for itself. The ideal farming is one which brings in a more or less continuous return the year round, rather than the whole of it in one month.

Horticultural industries often allow the growing of crops that mature at nearly all seasons, from asparagus in April to celery in November, and many of these crops are eminently adapted to farm conditions. Asparagus, for instance, is a farm crop in some regions, and it requires less labor than wheat, with much surer profits. The most promising secondary field for horticulturists in easy reach of good markets is the forcing of plants under glass. Certain crops are easily and cheaply grown, and with good management the profits are nearly always satisfactory. This vegetable gardening under glass is sure to increase in

extent and importance every year. But it demands a certain alertness and painstaking which are not common among horticulturists. It requires a good training, and the difficulties of it become greater each year, as new competitions, new conditions and new enemies arise. Such industries are the ones that pay.

But we cannot advise particular methods or occupations in a general discussion. We only wish to impress the fact upon those who live by tilling the soil that a business cannot long remain profitable which is followed but four or five months out of twelve. Reform your rotations, combine stock or poultry with your business, or in some way contrive to make the winter months pay for themselves at least.—*American Garden*

NOTES UPON METHODS OF HERBACEOUS GRAFTING.

My attention has been called a number of times to the unsatisfactory records and directions concerning the grafting of herbaceous plants. There appears to have been very little attention given to the subject, and the scant discussions of it are mostly copied from one author to another. A few years ago I made some attempts at herbaceous grafting, but it was not until last winter that experiments were seriously undertaken. The work was put in the hands of J. R. Lochary as a subject for a graduating thesis.

The experiments were undertaken primarily for the purpose of learning the best methods of grafting herbs, but a secondary and more important object was the study of the reciprocal influences of stock and cion, particularly in relation to variegation and coloration. This second feature of the work is still under way, in one form or another, and we hope for definite results in a few years. As a matter of immediate advantage, however, herbaceous grafting has its uses, particularly in securing different kinds of foliage and flowers upon the same plant. There is no difficulty in growing a half dozen kinds or colors, on geraniums, chrysanthemums or other plants, from one stock of the respective species.

Six hundred grafts were made in our trials last winter. It was found that the wood must be somewhat hardened to secure best results. The very soft and flabby shoots are likely to be injured in the operation of grafting, and union does not take place readily. Vigorous coleus stocks three months old gave best results if cut to within two or three inches of the pot, and all or nearly all the leaves removed from the stump. Geraniums, being harder in wood, made good unions at almost

any place except on the soft growing points. The stock must not have ceased growth, however. Most of the leaves should be kept down on the stock. Cions an inch or two long were usually taken from firm growing tips, in essentially the same manner as in the making of cuttings. Sometimes an eye of the old wood was used, and in most cases union took place and a new shoot arose from the bud. The leaves were usually partly removed from the cion.

Various styles of grafting were employed, of which the common cleft and the veneer or side graft were perhaps the most satisfactory. In most instances it was only necessary to bind the parts together snugly with bass or raffia. In some soft-wooded plants, like coleus, a covering of common grafting wax over the bandage was an advantage, probably because it prevented the drying out of the parts. In some cases, however, wax injured the tissues where it overreached the bandage. Sphagnum moss was used in many cases, tied in a small mass about the union, but unless the parts were well bandaged the cion sent roots into the moss and did not unite; and in no case did moss appear to possess decided advantages. Best results were obtained by placing the plants at once in a propagating frame, where a damp and confined atmosphere could be maintained. In some plants, successful unions were made in the open green-house, but they were placed in shade and kept sprinkled for a day after the grafts were made. The operation should always be performed quickly to prevent flagging of the cions. Or, if the cions cannot be used at once, they may be thrust into sand or moss in the same manner as cuttings, and kept for several days. In one series, tomato and potato cuttings, which had flagged in the cutting bed, revived when grafted. And cuttings which had been transported in the mail for three days grew readily, but they were in good condition when received. The mealy bugs were particularly troublesome upon these grafted plants, for they delighted to crawl under the bandages and suck the juices from the wounded surfaces.

Although it is foreign to the purpose of this note, it may be worth while to mention a few of the plants upon which the experiments were made. Sections were taken of many of the grafts, and microscopic examinations made to determine the extent of cell union. Coleuses of many kinds were used, with uniform success, and the cions of some of them were vigorous a year after being set. Even iresine (better known as *Achyranthes Verschaffeltii)* united with coleus and grew for a time. Zonale geraniums bloomed upon the common rose geranium. Tomatoes upon potatoes and potatoes upon tomatoes grew well and were transplanted to the open ground, where some of them grew, flowered and fruited until killed by frost. The tomato-on-potato plants bore good

tomatoes above and good potatoes beneath, even though no sprouts from the potato stock were allowed to grow. Peppers united with tomatoes and tomatoes united with peppers. Egg plants, tomatoes and peppers grew upon the European husk tomato or alkekengi *(Physalis Alkekengi)*. Peppers and egg plants united with each other reciprocally. A coleus cion was placed upon a tomato plant, and was simply bound with raffia. The cion remained green and healthy, and at the end of forty-eight days the bandage was removed, but it was found that no union had taken place. Ageratums united upon each other with difficulty. Chrysanthemums united readily. A bean plant, bearing two partially grown beans, chanced to grow in a chrysanthemum pot. The stem bearing the pods was inarched into the chrysanthemum. Union took place readily, but the beans turned yellow and died. Pumpkin vines united with squash vines, cucumbers with cucumbers, muskmelons with watermelons, and muskmelons, watermelons and cucumbers with the wild cucumber or balsam apple *(Echinocystis lobata)*.

Another interesting feature of the work was the grafting of one fruit upon another, as a tomato fruit upon a tomato fruit, or a cucumber upon another cucumber. This work is still under progress, and it promises some interesting results in a new and unexpected direction, reports of which may be expected later.—*Bulletin Cornell Experiment Station.*

THE PEACH YELLOWS.

The yellows of the peach is spreading in Western New York, and it is becoming a very serious menace to peach culture. Investigations into the nature of this disease have been carried on for the last three or four years by the Department of Agriculture at Washington. Little has been said concerning these investigations, and people are not aware of the extent to which they have been carried. In order to learn something of their scope, I visited the Chesapeake peninsula in October and examined the field experiments under progress. Dr. E. F. Smith is the special agent of the Department of Agriculture who is investigating the disease. In this region he has eighty acres of orchard under direct experiment, forty of which, scattered through twelve orchards in Delaware and Maryland, are devoted to fertilizer tests. These fertilizer tests are above a hundred in number, and comprise treatment with nitrogen, potash and phosphorus, and many combinations of them. He has tried all the fertilizer remedies which have been recommended for the cure of the disease and for its prevention.

These have been tried upon all kinds of soils, and upon trees of all ages. They have been used with exceeding care, and they comprise the largest field experiments of this nature, upon diseases of plants, yet made in this country. It is evident upon examining these orchards that there is no fertilizer or combination of fertilizers which will either cure or prevent the yellows. Many of the fertilizers, especially those rich in nitrogen, have a wonderful effect upon the vigor of the tree, but they do not prevent the yellows, nor cure it. All the investigations so far made go to show that yellows is a specific disease, entirely independent of soil or surroundings.

Many investigations in other directions have been made, and many important facts have been obtained concerning the nature of the disease, but so far its cause has not been determined. The disease is an exceedingly obscure one, much more so than pear blight or any other disease with which we are familiar.

The New Jersey, Delaware and Maryland orchards are being rapidly decimated with the yellows; in fact, the upper portion of Delaware is practically devastated of peach trees, and the upper part of the Chesapeake peninsula in Maryland is no longer a profitable peach region. There are acres upon acres of orchard in which more than every other tree is visibly diseased, and in large areas it is almost impossible to find a single healthy tree. There has been very little united attempt toward controlling the yellows in these regions, and for that reason this present destruction threatens the industry. It is useful to compare the results in this region with those of the Michigan peach region, where a definite law was early enacted, and which has been enforced vigorously. In Michigan the yellows is on the decrease and the planting of orchards is on the increase. In Maryland and Delaware, the yellows is rapidly on the increase and orcharding is mostly on the decrease. The only remedy so far known is eradication of the tree as soon as the disease is seen. The disease is constitutional, and even when we have found the cause it will probably remain incurable. Yet there is no reason for undue alarm in the matter, because the experience of the Michigan growers has proved conclusively that radical measures will keep the disease in check or almost eliminate it from any country. The New York law is essentially the same as the Michigan law, and if it is rigidly enforced by healthy public sentiment, there is no reason why peach culture should not flourish. Otherwise, sooner or later our peach industry must perish.—*Bulletin Cornell Experiment Station.*

EXPERIENCE IN CROSSING CUCURBITS.

The limits and results of crossing among cucurbitaceous plants—pumpkins, squashes, melons, cucumbers—are little understood. The common notions are exceedingly vague. It is nearly everywhere supposed that all the species intermingle indiscriminately, and any statement to the contrary is likely to meet with incredulity. Yet there is reason to believe that many of the common observations concerning these plants are incorrect. All the species are exceedingly variable, and it is easy to select fruits from large plantations which bear some external resemblance to fruits of other species, and it is natural to suppose, in the present confused state of our knowledge of hybridity, that such fruits are hybrids.

I began definite experiments in crossing cucurbits in 1887, and selections and close observations were begun before that time. The work has been continued upon a large scale, and I have now made fully 1,000 careful hand pollenations, and have obtained no less than 1,000 types of pumpkins and squashes never recorded. The plantations of selections and crosses covered some eight acres this year.

The experiment is only begun. The main results of it can not be announced until further work has been done. But some of the incidental features of the research can be stated from time to time.

1. *Immediate effect of crossing.*—The "immediate effect of crossing" is a term used to denote any change which may occur in the fruit the same year the cross is made, as a result of the influence of pollen. Whatever effect the pollen may have is usually shown in the offspring of the crossed fruit rather than immediately, the same season, in the fruit itself. There are but few plants in which an immediate effect of crossing has been proved, and of these Indian corn is the most familiar. It is commonly said that it occurs in pumpkins and squashes also; but it certainly does not. There has never been any immediate influence whatever in any of our crosses, except such as was due to imperfect development caused by insufficient or impotent pollen. In other words, the effects of the cross are seen only in the offspring of the fruits. It is easy to prove, without the aid of artificial pollenation, even among the most variable squashes, that there is no immediate effect. If there were an immediate effect, all the fruits upon a vine would be likely to be different, as every one would probably receive a different pollenation. This diverse pollenation would almost inevitably result if many varieties were planted close together, for the flowers of pumpkins and squashes are imperfect and cannot pollenate themselves. But the fact

is that all the fruits on any vine are alike, with some trifling exceptions in rare cases due to arrested development or the like: the essential characters of the fruits are the same. This shows that the character of the vine is determined by the character of the seed from which it comes. My observation shows that this is invariably the case.

There is no reason, therefore, to suppose that there is ever any immediate effect of crossing in pumpkins and squashes. *

2. *Do pumpkins and squashes mix?*—No one appears to doubt the indiscriminate mixing of pumpkins and squashes. Before considering the question, it is necessary to divide the fruits called squashes into two groups. One group includes the summer and fall squashes, like the scallops, common crooknecks, cocoa-nut, Bergen, and the like; these belong to the same species as the field pumpkin, *Cucurbita Pepo*. These squashes cross with the ordinary field pumpkin and with each other, although the mixing even here does not appear to be indiscriminate. The other group includes the Hubbard, Marblehead, turbans, and the so-called mammoth squashes and pumpkins like Mammoth Chili and Valparaiso; these belong to a distinct species, *Cucurbita maxima*. Many careful pollenations have been made between these two classes of fruits, and in no case have seeds been procured. Sometimes the fruit will develop for a time, and in two or three instances a summer crookneck pollenated by a turban squash has developed until half-grown, and has then persisted until the end of the season, but it was seedless. All our experiments show that *Cucurbita Pepo* and *C. maxima* do not hybridize.

It is an easy matter to find fruits in any large assortment of pumpkins or summer squashes which might be taken for hybrids with the Hubbard or turbans by a casual observer. But none of these fruits which have come under my observation— and I have seen hundreds— possess any marks of hybridity, and they have occurred in our experiments among pedigree stock which had no *Cucurbita maxima* blood in it. These so-called hybrids are nothing more than incidental variations of *Cucurbita Pepo*, and they may appear anywhere at any time.

Our experience and observation show, therefore, that the field pumpkins and the summer and fall types of bush squashes do not mix with the running squashes of the Hubbard, Marblehead, Boston Marrow, turban and mammoth types.

*The same observation can be made with reference to blackberries and raspberries. Over 250 successful hand pollenations were made this year between blackberries, raspberries and dew-berries in many combinations, and there were no immediate effects.

3. *Impotency of individual pollenations.*—In pumpkins and squashes the flowers are either wholly staminate or wholly pistillate, and they cannot, therefore, pollenate themselves. But the two kinds of flowers are borne upon the same plant. Pollenation between two flowers upon the same plant I have termed individual pollenation, in distinction from close pollenation, or pollenation of the flower by itself, and from cross-pollenation, or pollenation between flowers on different plants. It has been shown by Darwin and others that pollen is sometimes impotent upon the pistil of the same flower, and I have been much interested, therefore, in the relation of pollen to pistils upon the same plant in monœcious species (those in which the sexes are borne in different flowers upon the same plant). My attention was first called to this subject in 1889, when some twenty or thirty squash flowers were pollenated from flowers on the same plant. A number of fruits grew to maturity, but they invariably produced poor seeds. This year the subject was carefully examined; 185 squash and gourd flowers of some fifty varieties were individually pollenated; 163 of these did not produce fruit; the remaining 22 carried fruits to maturity, but in every case the seeds were thin and worthless. These 22 fruits represented 13 bush summer squashes of various kinds, five small ornamental gourds, and four crosses between bush squashes and gourds. In cross pollenations made during the same time and in the same manner, a large part of the crosses were successful, indicating that the failure of the individual crosses was due to the inability of the pollen to fertilize the ovules rather than to incidental methods of operation. The experiment indicates that pollen of squashes which cannot produce fertile seeds may still cause the development of the fruit. This influence of pollen is well attested in other instances, but it is not impossible that squashes may sometimes develop without any pollenation whatever. At any rate we have found this to be the case in some other cucurbits, and it is a point upon which we are still working, and concerning which we have much data.

This impotency of individual pollen is a matter of immense importance to originators of varieties. It is commonly held that the best way in which to "fix" or render permanent new varieties, so that they will reproduce themselves by seedage, is to in-breed or close pollenate them, but the above trials indicate that this is impossible or practically so in pumpkins and squashes. An instance in my own experience is suggestive. From stock which was crossed in 1887, I obtained in 1889 one squash of great excellence. It appeared to combine more good qualities than any squash of its type that I have ever seen. To procure as many plants of it as possible, in order to cross and fix it, I

planted all the seeds from the best fruit in the spring of 1890. These seeds, all from one squash, produced 110 distinct varieties, and only one plant was like the parent! The only thing to do was to pollenate the flowers of this one plant with pollen from itself, but it soon became evident that all of these individual pollenations would fail. It was then necessary, late in the season, to pollenate the remaining flowers from some other plant which bore fruit the nearest like the one under experiment. Fortunately, two or three other plants bore similar fruits, and by the use of their pollen two good fruits were obtained.

It appears, therefore, that in squashes and pumpkins the pollen is impotent upon pistils on the same plant, and that true in-breeding does not occur in them. The experiment will be extended to all varieties.

4. *Do cucumbers spoil muskmelons?*—If any dogma finds general acceptance among horticulturists, it is the opinion that muskmelons are rendered insipid and worthless by cucumbers growing in their vicinity. Most growers suppose that this influence is immediate, but a few hold that it appears only in the offspring of supposed crosses between the two species. Several years ago my observations led me to doubt this influence, but definite experiments were not undertaken until last winter, when a house of forced melons and cucumbers gave a good opportunity to make cross pollenations. In these trials we failed to produce melons when the flowers were pollenated either by the common white spine or the English forcing cucumbers.

Last summer the work was undertaken in the garden under the best of opportunities. Ninety-seven muskmelon flowers of various varieties were pollenated by cucumber pollen of many kinds. No fruits developed. Twenty-five cucumber flowers were pollenated by muskmelon pollen. Only one fruit developed, and that was seedless. These figures certainly indicate that melons and cucumbers do not cross, and therefore that the influence of one upon the other is fictitious. It has been suggested by one who has followed this experiment that even if the cucumber pollen will not fertilize the muskmelon, it may still exert a sort of secondary influence if applied along with muskmelon pollen. But if the cucumber pollen does not even possess the power of developing the fruit walls, as our experiments show, it is inconceivable that it should exert any influence whatever. The single seedless fruit of cucumber which developed in the muskmelon pollenations, does not prove that muskmelon pollen will cause the development of the fruit walls of the cucumber, for our experiments have shown conclusively that cucumbers will often develop to full size without any pollenation

whatever.* Those who make experiments in the pollenation of muskmelons must bear in mind that some varieties bear perfect flowers, and the anthers must be removed before the flower opens.

Our experience indicates, therefore, that the common opinion that cucumbers spoil muskmelons is, at least, exceedingly doubtful.

5. *Progression of flowers.*—When I first began to cross the cucurbits I noticed that all plants produce far more staminate than pistillate flowers, and that the staminate flowers appear much earlier in the season than the pistillate. A study of Hubbard and Boston Marrow squashes in 1887 showed that pistillate flowers rapidly decreased in numbers during a prolonged drouth. Records were also kept of the number and time of appearing of the flowers of each sex in other cucurbits, but as those records were not published, I have had similar ones made this year. All the flowers were counted as they appeared upon two muskmelon plants, one watermelon and one cucumber plant. These plants were all treated to ordinary garden condition; no pollenations were made upon them, and no flowers were removed, so that their characteristics as recorded below are entirely normal. In forcing cucurbits in winter, such as cucumbers, muskmelons, summer squashes and benincasa, I have invariably noticed this same disposition to form staminate flowers first and most abundantly.

RECORD—1890.

	Muskmelon.				Watermelon		Cucumber.	
	No. 1.		No. 2.					
	Staminate.	Pistillate.	Staminate.	Pistillate.	Staminate.	Pistillate.	Staminate.	Pistillate.
July 29	1	.....	3	.....	.....	.....	4	.....
30	1	.....	—	.....	.....	.....	2	.....
31	1	.....	—	.....	.....	.....	3	.....
Aug. 1	1	.....	1	.....	.....	.....	3	.....
2	3	.....	2	.....	2	.....	6	1
3	3	.....	—	.....	1	.....	7	1
4	2	.....	1	.....	—	.....	9	.....
5	7	.....	3	.....	1	.....	10	.....
6	4	.....	5	.....	1	.....	16	.....

* The matter of cucumber pollenation, together with notes upon the forcing of cucumbers, will form the subject of a future bulletin.

RECORD, 1890—Continued.

	Muskmelon.				Watermelon.		Cucumber.	
	No. 1.		No. 2.					
	Staminate.	Pistillate.	Staminate.	Pistillate.	Staminate.	Pistillate.	Staminate.	Pistillate.
Aug. 7	4	.....	3	.....	1	1	18	.....
8	2	.....	2	.....	2	.....	14	1
9	11	.....	5	.....	5	.....	11	2
10	8	.....	4	.....	3	2	17	.....
11	9	.....	4	1	3	1	21	2
12	18	.....	3	.....	5	.....	33	1
13	10	.....	2	.....	2	.....	27	1
14	12	.....	3	.....	6	3	16	.....
15	8	.....	6	.....	6	.....	23	.....
16	17	.....	5	1	5	1	18	.....
17	17	.....	1	1	9	4	24	.....
18	15	.....	4	3	7	1	20	.....
19	16	.....	2	.....	12	1	29	.....
20	8	.....	4	.....	5	.....	37	.....
21	7	.....	2	.....	3	.....	14	.....
22	31	.....	8	.....	10	1	18	1
23	6	.....	1	1	5	.....	20	.....
24	7	.....	2	.....	6	.....	22	.....
25	10	.....	2	.....	6	2	13	.....
26	4	.....	2	.....	5	.....	21	.....
27	14	2	1	2	10	2	15	.....
28	11	4	5	2	9	.....	21	.....
29	16	2	8	.....	14	.....	23	.....
30	6	1	4	1	5	1	15	.....
31	8	1	3	.....	10	2	10	.....
Sept. 1	1	1	3	.....	9	1	15	1
2	3	.....	4	1	2	.....	12	.....
3	13	.....	4	.....	10	.....	6	.....
4	24	.....	7	1	15	.....	30	2

RECORD, 1890—Continued.

	Muskmelon.				Watermelon		Cucumber.	
	No. 1.		No. 2.					
	Staminate.	Pistillate.	Staminate.	Pistillate.	Staminate.	Pistillate.	Staminate.	Pistillate.
Sept. 5	7	.....	6	1	9	.....	17	.....
6	15	.....	12	1	3	.....	9	1
7	18	.....	12	3	1	.....	13	.....
8	29	.....	2	3	2	.....	18	.....
9	24	4	18	2	.....	.....	8	1
10	30	2	12	3	.....	.....	13	.....
11	35	1	23	3	.....	.....	12	1
12	3	.....	—	—	.....	.....	3	2
13	10	.....	1	1	.....	.....	4	1
14	47	3	15	3	.....	.....	5	3
15	28	2	26	3	.....	.....	11	3
16	17	1	8	1	.....	.....	6	2
17	21	3	4	3	.....	.....	3	2
18	19	1	7	1	.....	.....	6	1
19	7	Plant begins to fail.	2	1	.....	.....	6	3
20	6		3	4	1	.....	4	8
21	6		5	2	.....	.....	6	5
22	5		19	—	.....	.....	5	4
23	4		20	1	.....	.....	13	3
24 Frost	.....	.....	5	1	.....	.....	6	1
25	.....	.....	1	—	.....	.....	4	.....
26	.....	.....	—	1	.....	.....	8	.....
27	.....	.....	1	1	.....	.....	2	.....
28	.....	.....	.....	.....	.....	.....	1	.....
29	.....	.....	.....	.....	.....	.....	1	.....
Totals	670	28	316	53	211	23	807	54

These figures are full of significance. They show that the staminate, or male flowers, are more numerous in each case than the pistillate, or fertile flowers, ranging from six to twenty-four times as many. They show that the pistillate flowers make their appearance later in the season—from five days in the cucumber to thirty days in one of the muskmelons. They also show that as a rule the staminate flowers continue to appear later in fall than the pistillate. Muskmelon No. 1 was a weaker plant than the others, and it began to fail by the middle of September. It is, therefore, instructive to observe that in this plant the proportion of pistillate flowers was the smallest, and that they appeared later and ceased earlier than the other plants. And the figures illustrate the common observation that the cucumber is more precocious than the melons. The figures show forcibly the necessity of starting melons early in our short seasons.

L. H. BAILEY.

USE OF FUNGICIDES ON THE APPLE, POTATO AND GRAPE.

Experiment No. 55—Illinois Experiment Station.

The Apple.—The corroded, dark-colored spots or patches very frequently seen on apples are the result of a parasitic fungus known to botanists as *Fusicladium dendriticum*. The disease itself is called "scab." We say the apples are "scabby." It is often a very injurious disease. The apples so affected are unattractive in appearance, are often less in size than they would have been, are misshapen, and do not keep well. Rot sets in at these corroded spots, and the whole fruit soon perishes.

Upon closer observation it may be seen that the central part of the affected spot is covered during the growing season by a dull, dark green, velvety coating, wholly unlike the polished skin of the healthy fruit. Around the margin of the spot there is a narrow whitish band. The greenish part is producing a dense crop, and the velvety appearance is itself due to the multitudes of spores covering the surface at the time. The white rim is the dead and somewhat upturned edge of the epidermis, which is destroyed little by little by the slow-growing fungus. At first the scab is a mere point. From this point the fungus radiates in every direction, and the scab grows larger in consequence. Then the varnished natural protection of the inner tissues having been destroyed, the latter are much more subject to other rots.

The same fungus lives upon the green leaves and twigs of the tree, and really does much more serious damage here than by the more conspicuous injury to the fruit. The leaves become more or less distorted, often thickened in places and bulged. Finally these affected parts die outright, leaving the leaf ragged or entirely destroyed.

Trees thus affected in midsummer cannot mature a good crop of fruit, neither can they properly prepare themselves for winter. It will therefore be seen that the disease is really a bad one, and that any method of successfully treating it is of much importance.

The experiment of testing the value of fungicides was begun on apples in 1888. The apple trees and fruit in the experimental orchard planted in 1872 had for several years been infested with scab, to such an extent that on many varieties little or no perfect fruit could be found, while none of the varieties were entirely free from the disease. This orchard furnished as good a place as could be desired in which to test fungicides on apple scab. As there was nothing later at hand for a guide, Scribner's report on "Fungus diseases of the grape vine," 1886, was followed in the preparation of *eau celeste*. According to his formala a preparation was made of 1 lb. of copper sulphate (blue vitriol) to 10 gallons of water and one pint of commercial ammonia, and it was applied May 24th to one side of each of seven apple trees. The same trees were again sprayed lightly with a weaker solution (1 lb. to 15 gall. water) May 31st. The first spraying had injured the leaves very decidedly, so much that two of the trees lost half their leaves within a few weeks. The trees were again sprayed June 25th with *eau celeste* of the weaker solution, and this time an additional tree was sprayed to see whether the preparation of this strength would burn the leaves and fruit. Examination of this tree a week later showed some damage to the leaves, but not enough to make any of them fall.

A solution of sulphate of potassium was made (5 oz. to 10 gallons of water), and four trees were sprayed with it May 24th and 31st, and June 25th; one tree, May 31st and June 25th; and three trees June 25th. The sulphide of potassium produced no injurious effect that could be seen.

All the trees and varieties of apple that year, whether sprayed or not, were practically free from scab, and the only thing gained was the knowledge that *eau celeste* of the strength used would injure the apple.

In 1889, four Winesap trees, planted in 1879, were sprayed on one side with *eau celeste*, and three other Winesap trees on one side with the Bordeaux mixture. *(Formula on p. 435.)* The spraying was done June 5th and 17th, and July 3d. The fruit when picked was divided for comparison into scabbed and not scabbed, all those being put in the latter list that were so free from scab as to be uninjured for market The following table shows comparative results:

	Whole number.	Not scabbed.	Scabbed.
Apples from sides of trees sprayed with *eau celeste*...	148	61	78
sides of same trees not sprayed.....	133	12	121
sides of trees sprayed with Bordeaux mixture	137	72	65
sides of same trees not sprayed.....	152	16	136

There were not only more good apples in proportion to the whole number on the sprayed sides of the trees, but the apples picked out as not scabbed were larger on the side sprayed than on the other.

In 1890, six Winesap trees were sprayed with a preparation of carbonate of copper. *(Formula on p. 435.)* Four Winesap trees were left unsprayed as checks. The spraying was done May 20th and June 18th and 26th. London purple, at the rate of 1 lb. to 160 gall. of water, was applied with the fungicide May 20th. It has been reported that the application of London purple with the fungicides is more likely to damage the foliage than if they are used separately. No damage coming from the spraying was noticed in this case. The apple crop for the season of 1890 was, as all know, almost a complete failure. The six trees sprayed yielded, when picked, September 30th, 58 lb. of apples—less than one bushel; and the trees not sprayed yielded 12.9 pounds of apples—less than 1-4 of a bushel. Even with the very small crop, the effect of spraying was very clearly seen, the apples from the sprayed trees being more nearly free from scab and averaging much larger. Fifty-eight apples from the sprayed trees were equal in weight to 100 from the trees not sprayed.

The table below shows results:

	Wt. apples produced...	Wt. 100 apples.....	No. apples produced...	No. apples not scabby..	No. apples scabby.....
6 trees sprayed with carbonate of copper.	58 lb.	15.1 lb.	383	115	268
4 trees not sprayed.....	12.9 lb.	8.8 lb.	147	2	145

It seems desirable in this connection to notice the work of others in the same line.

Some work done in 1889, in Wisconsin, under the direction of Professor E. S. Goff, horticulturist of the Wisconsin Experiment station, gave excellent results with the preparation of carbonate of cop-

per and very favorable results with potassium sulphide, soda hyposulphite, sulphur powder and liquid sulphur preparation. The carbonate of copper gave so much more favorable results than either of the others that Mr. Goff seems inclined to recommend that alone. The test showed that of the apples sprayed with the carbonate of copper 75 per cent were entirely free from scab, while of the apples not sprayed 23.3 per cent only were free from the scab.

In a similar set of experiments made by Professor L. R. Taft, horticulturist of the Michigan Experiment station, the best results were obtained from the use of a modified form of *eau celeste (Formula on p. 435)*, though results nearly as favorable were obtained from the use of the preparation of carbonate of copper. In Professor Taft's trials 12.5 per cent only of the apples on the trees not sprayed were free from scab, while on the trees sprayed with the modified *eau celeste* 68.8 per cent, and on those sprayed with carbonate of copper 51.2 per cent of the apples were entirely free from scab.

The Potato. To test fungicides on potatoes a tract of 10 rows, 80 ft. long, was used. This was subdivided so that the plats sprayed each consisted of 10 rows, 20 ft. long. The plats lay adjoining each other, and appeared to be as nearly equal at the beginning of the experiment as could be desired. June 23d and July 5th, plat 1 was sprayed with the Bordeaux mixture, plat 2 with *eau celeste*, and the third plat with carbonate of copper. At the time of the first spraying the potato vines and leaves were perfectly free from disease, but they began to show it within a week, and within three weeks most of the leaves were dead.

The plat sprayed with Bordeaux mixture appeared to remain green longer than the rest, while the plats sprayed with the other two preparations showed no positive results until time of digging, when the

Plat sprayed with Bordeaux mixture yielded	86¾ lb.
Plat sprayed with *eau celeste* yielded	66¾ lb.
Plat sprayed with carbonate of copper yielded	68¾ lb.
Plat not sprayed yielded	33¾ lb.

Although the yield in all the plats is small, the difference between the plat not sprayed and those sprayed is very marked.

The Grape. The black rot of the grape is by far the worst of the American vine diseases, though these are very numerous. It may be called *the* rot of the grape berries in most portions of our country Though it affects both leaf and fruit, it is upon the latter that it is com-

monly observed. As in the case of the scab of the apple, this, too, is the work of a parasitic fungus *(Physalospora Bidwellii)*, but a widely different species from that previously described. The extreme outer layers only of cells are killed in the apple, but the whole substance of the grape is destroyed. On the green grape berry may be seen at first a minute brown point which rapidly enlarges into a broad brown spot, sharply bounded by the healthy green substance of the fruit. Within a few days' time the small affected area enlarges until it covers a half or more of the berry, which so far preserves its shape. Soon, however, this affected part shrinks, the skin becomes wrinkled; then the whole berry dries up into an irregularly angular, and comparatively small mass. It usually adheres a long time to the stem with perhaps all the others belonging to the same bunch or cluster. After the skin has become considerably wrinkled, close looking will reveal a dusty, white powder breaking up from minute openings in the shriveled fruit. This dust is made up of spores, each exceedingly minute in size, but capable of starting the same destruction in a fresh berry. Rains and dews favor the development of the rot, because the spores require water for their germination, when they fall from the wind currents upon the skin of the berries.

On the leaves the fungus is found in small dead spots, distributed over which may be seen with a magnifier little dark-colored pustules. From these latter are poured forth the same kind of minute white spores that form the powdery substance on the rotting berries. However, the vine itself does not usually suffer severely. It is the fruit that is mostly affected.

The shriveled berries at length fall to the ground, where they lie during the winter and spring, and in them during this time another kind of spores is formed, which perpetuates the fungus for another year's destruction. The total loss of grapes in our country by this disease amounts to a great proportion on the average of the whole crop. It is exceedingly fortunate that we can attain so much of success in combating it by spraying. Testing fungicides for black rot on the grape was begun in 1888. The vineyard used for the test is one belonging to the University farm, in which the fruit had several times been badly damaged or nearly destroyed by black rot, though the year before spraying was begun, the fruit had been almost perfect, there being so little rot that it was not noticed.

The vineyard is on a flat piece of ground, not well drained; it contains about 1¼ acre in 14 rows. Four rows were sprayed with sulphide of potassium and four with the strong *eau celeste,* the same as first used on the apples. The spraying was done May 31st, June 25th and July

9th. The grape leaves were slightly burned by the application of *eau celeste*. Some more than half the grapes rotted on all the vines, whether sprayed or not sprayed, and a careful estimate of results the latter part of August, and weighing the fruit when gathered, failed to show any difference that could be attributed to spraying.

During the summer of 1889, the four rows of grapes referred to above were sprayed with the *eau celeste* and four others with the Bordeaux mixture. The spraying was done May 20th, June 5th and 17th, and July 3d. The grapes began rotting by the 5th of June, and the rot kept spreading, almost without stopping, until the few grapes left were beginning to turn. Many of the vines by that time bore no perfect fruit. The four rows sprayed with the Bordeaux mixture were the best, bearing 38½ pounds of sound berries, but no perfect bunches. The four rows sprayed with *eau celeste* bore 27 pounds of sound berries. The six rows not sprayed bore 32¼ pounds of sound berries. The percentage of grapes rotted was not estimated.

In 1890, summer pruning in connection with spraying was tried:

Two rows were sprayed with Bordeaux mixture without pruning.

One row was sprayed with Bordeaux mixture and kept pruned all summer.

Two rows were sprayed with *eau celeste* without pruning.

One row was sprayed with *eau celeste* and kept pruned.

Two rows were sprayed with carbonate of copper.

Two rows were kept pruned and not sprayed.

Four rows were neither pruned nor sprayed.

The spraying was done May 20th, June 18th and June 23d, and July 5th.

No rot was found on the grapes by the examinations made up to June 10th. It was the intention to spray again on the 11th, but rains prevented that day, and for several succeeding days. A careful examination made June 17th showed that at least half the berries had begun to rot, the diseased spots varying in size from mere points to spots one-eighth inch in diameter. The number of grapes rotting continued to increase after the spraying of the 18th, and a few apparently started to rot after the spraying of June 23d. The rot did not appear to spread to new berries during July or August, but a few second-crop berries rotted during the damp weather of October.

The subjoined table of results indicates that, while the spraying may not be a specific, it is at least a partial remedy for the black rot; it also shows that on vines kept summer-pruned and sprayed, the grapes rotted less than on those sprayed and not pruned; while on those pruned and not sprayed the grapes rotted much worse than on those

neither pruned nor sprayed; that grapes on vines not cultivated, the weeds being occasionally mowed off, rotted more than on those kept clean by cultivation:

	Per cent rotted, estimate	Per cent good, estimate	Av. yield per vine, pounds
Two rows vines not sprayed or pruned	82.	18	1.14
Two rows sprayed with Bordeaux, not pruned	67.5	32.5	3.9
One row sprayed with Bordeaux, pruned	43	57	4
One row sprayed with *eau celeste*, pruned	55	45	3.05
Two rows sprayed with *eau celeste*, not pruned	63.5	36.5	2.67
Two rows pruned, not sprayed	90	10	.53
Two rows sprayed with carbonate of copper, not pruned or cultivated	84	16	.9
Two rows not sprayed, pruned or cultivated	93.5	6.5	.33

The place in which the carbonate of copper was used does not give a fair test of its efficiency as a preventive.

The advantage of summer pruning vines to be sprayed seems to come from the greater certainty of getting the fungicide upon the berries. Grapes pruned and not sprayed rot worse than those not pruned nor sprayed, because the dew forms on the exposed fruit and not on that covered over with leaves, the dewdrops affording the proper condition of moisture for the growth of the spores of the rot. The berries can be reached properly by the spray without summer pruning, if the spray-nozzle is thrust in among the vines instead of being held on the outside. The pruning of itself does harm rather than good.

As a result of the work done here it is recommended that vineyards be kept well cultivated, and that where they have been previously subject to black rot they be thoroughly sprayed with the Bordeaux mixture or with *eau celeste* as often as the season may demand. If the season continues dry all the time, there is little chance for the rot to develop; but a spell of warm, rainy weather, coming at any time from the setting of the fruit to the time of ripening, may start the disease into active work. The disease cannot be cured but must be prevented. The first spraying may be done in the spring as soon as the first leaves are developed, and it is commonly recommended to repeat it three to six times.

The Bordeaux mixture leaves a greenish sediment on the fruit, and when applied in large amount or late in the season, injures it either for market or home use. The sediment may be removed by dipping the berries in a wash made of one quart of cider vinegar to five gallons of water. The other fungicides leave no apparent sediment on the fruit.

The work done at other places, and especially that under the direction of the U. S. Department of Agriculture, has been so successful that there is no room to doubt the profitableness of spraying grapevines when they are infested with either the black rot or downy mildew. In a recent report issued by the Department *(Journal of Mycology, Vol. VI, No. 3)* is given an account of an experiment in spraying, in which a vineyard, so badly infested that it had been abandoned for five years, after being pruned and cleaned up, was divided into five plats, four of which were treated with different fungicides, and the fifth left as a check.

On plat one, sprayed eight times with Bordeaux mixture, 99.2 per cent of the crop was saved.

On plat two, sprayed eight times with ammoniacal carbonate of copper, 97.5 per cent of the crop was saved.

On plat three, sprayed eight times with carbonate of copper in suspension, 93.64 per cent of the crop was saved.

On plat four, sprayed three times with ammoniacal carbonate of copper, 97.27 per cent of the crop was saved.

On plat five, which received no preventive treatment, not a single bunch was produced which was fit for market.

Reports nearly as favorable come from several other sources. It would appear from all accounts that to attain satisfactory results persistent application is necessary.

FORMULAS.

The following formulas for fungicides are taken from the Horticulturists' Rule Book, edited by Professor L. H. Bailey:

Ammoniacal carbonate of copper—Into a vessel having a capacity of 2 qts. or more, put 1 qt. of commercial ammonia (strength 22 deg. Baume); add 3 oz. carbonate of copper; stir rapidly for a moment and the carbonate of copper will dissolve in the ammonia, forming a very clear liquid. This concentrated liquid may be kept indefinitely. For use, dilute 22 galls.

Bordeaux mixture—Dissolve 6 lbs. of sulphate of copper in 16 galls. of water. In another vessel slake 4 lbs. of quick-lime in 6 galls. of water. When the latter mixture has cooled, pour slowly into the copper solution, care being taken to mix the fluids thoroughly by constant stirring. Prepare some days before using. Stir before applying.

Eau celeste—Dissolve 1 lb. of sulphate of copper in 2 galls. of water. When completely dissolved and the water has cooled, add 1½ pt. of commercial ammonia. When ready to use, dilute to 22 galls.

A second method of preparing *eau celeste:* Dissolve 1 lb. sulphate of copper in 2 galls. of water. In another vessel dissolve 1 lb. of carbonate of soda. Mix the two solutions, and when chemical action has ceased, add 1½ pt. of commercial ammonia. For use, dilute 22 galls. A modification of this latter method is 2 lbs. sulphate of copper, 2½ lbs. carbonate of soda, and 1½ pt. of commercial ammonia, prepared as before.

The Bordeaux mixture is more difficult to use than either of the others, and in the hands of some of our best experimenters, has given little if any better results.

MACHINES.

For spraying in a small way, some one of the forms of knapsack pumps is most convenient. For work on a larger scale, a machine mounted on wheels is better. We have been using the past year the Eureka sprayer, and it has given excellent satisfaction. Good machines may be found advertised in almost any agricultural or horticultural paper.

GENERAL CONCLUSIONS.

The various compounds of copper offer efficient protection to many cultivated crops against the exceedingly destructive ravages of fungous parasites. Without treatment, these rots, rusts, mildews and blights frequently destroy a large proportion of or even the entire product of fields and fruit plantations. The applications in the shape of watery sprays are made so readily and with so little expense in money and labor, that every one interested should at once undertake the work. The practical results already attained constitute the greatest advance made in recent times in the application of science to horticulture. A little well-directed effort may be confidently expected to return a hundred or a thousand times its cost. Still there is need for much vigilance and careful attention to every detail. Mistakes may be made even then, and sometimes failures may occur for which existing knowledge may offer no explanation. But we should persevere, gain all possible information upon the subject, and watch well the effects in every test. In this way every one may hope to conquer, practically, these insidious and heretofore invincible foes.

If the readers of this paper desire further information concerning the subject, write to the Agricultural Experiment station, Champaign, Illinois.

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HISTORY AND PUBLICATIONS

OF THE

STATE HORTICULTURAL SOCIETY.

BY F. A. SAMPSON, SEDALIA, MO.

Previous to 1859, Hon. N. J. Colman, then editor of the "Valley Farmer" at St. Louis, in editorials in the tenth and eleventh volumes, urged the formation of a society for the promotion of fruit-growing, and on the 5th of January, 1859, a few persons met in Jefferson City "for the purpose of advancing and directing the fruit-growing interests of Missouri and the west."

The meeting organized by calling Prof. G. C. Swallow to the chair, and the appointment of Mr. F. R. Elliott, afterward Secretary of the American Pomological society, as secretary. The name "Missouri Fruit Growers' Association" was adopted, and Mr. Colman was elected President; F. R. Elliott, Recording Secretary, George Husmann, Corresponding Secretary, and John Garnett, Treasurer. The Vice-Presidents were Dr. McPherson, Prof. G. C. Swallow, George M. Horner, Dr. McGuire, Eldridge Burden, William C. Price and John Dedrick. Among others taking part in the meeting were Hon. W. B. Morris, of St. Louis; Mr. C. C. Manwaring, of Hermann; Mr. Richter, of Jefferson county; Hon. R. W. Wells, Gen. Minor, Gen. E. L. Edwards and others, of Jefferson City.

Twenty-one years later the Society again elected Mr. Colman as its President, and in his address at the annual meeting in 1880 he thus refers to the early years of the Society:

At the time of its organization the golden era of horticulture was dawning in this State. The Society flourished and horticulture flourished. Enthusiastic horticulturists, not only from all parts of this State but from our neighboring State of Illinois, became members. The meetings were awaited with interest, and the attendance was large. The discussions were interesting and instructive, and the publications of the proceedings were eagerly sought by horticulturists from all parts

of the Union. The tables were loaded with the finest specimens of fruits and wines, and their merits were extolled over the broad land. The cause of horticulture flourished like a green bay tree. At this period in the history of the society no State horticultural association in the nation stood higher. Such high repute did our society and the horticulture of our State enjoy, that a meeting of the American Pomological society was held here, and it proved to be one of the largest and most attractive ever held by that society. Tables encircling the immense hall and cross tables were inadequate to hold the samples of fruit and native wines that were exhibited. Fruit-growers from the East were unable to recognize varieties with which they had been familiar at home from their boyhood, on account of their superior size and richness of coloring.

A called meeting was held at the Fair grounds at St. Louis on the 27th of September, 1859, when Dr. L. D. Morse was made Recording Secretary in place of Mr. Elliott, who had moved from the State, and various kinds of fruits were exhibited and discussed.

The first annual meeting after the organization was held at Jefferson City on the 27th of December, 1859, and Mr. Colman was re-elected President; Vice-Presidents, Dr. A. W. McPherson, Prof. G. C. Swallow, Geo. M. Horner, Dr. McGuire, E. Burden, W. C. Price and John Dedrick; Corresponding Secretary, Dr. L. D. Morse; Recording Secretary, Wm. Muir; and Treasurer, Dr. C. W. Spalding. It was decided to publish a pamphlet containing the proceedings of this and all prior meetings, and an essay on grape culture, by Mr. George Husmann. For a number of years Mr. Muir filled the office of Secretary, and is afterward described by Mr. Mudd as "a devoted and intelligent horticulturist, understanding all our terms and phrases, familiar with our nomenclature, his reports got up in such manner as to be of interest to all, and it is believed, contributed, in great measure, to create that zeal and devotion in our members which enabled us not only to maintain our organization, but to increase the interest in and attendance on our meetings through the period of a civil war, which destroyed all similar organizations in all the other slave-holding states."

A called meeting was held on the 7th of September, 1860, at Hermann. The next annual meeting was held at St. Louis on the 8th of January, 1861. At the former annual meeting no fruits except grapes were exhibited; but at this and all succeeding meetings many varieties of fruits and wines were shown. By-laws were adopted at this meeting, and Dr. C. W. Spalding was elected President; Vice-Presidents, Dr. A. W. McPherson, Prof. G. C. Swallow, Geo. M. Horner, W. L. Irving, Eldridge Burden, Wm. C. Price and W. S. Jewett; Recording Secretary and Treasurer, Wm. Muir; and Corresponding Secretary, Dr. L. D. Morse.

The next annual meeting was held in St. Louis on the 14th of January, 1862. It is said that the address of the President was "most

beautiful and forcible," but unfortunately it was not printed in the proceedings. It was at this meeting that the name was changed, on the suggestion of Dr. Spalding, to that which it now bears, in order that the society might have a "wider range of purpose, embracing all the objects of horticultural design and improvement." Dr. Spalding was re-elected President; the Vice-Presidents were Dr. A. W. McPherson, Prof. G. C. Swallow, Geo. M. Horner, W. L. Irving, Eldridge Burden, Wm. C. Price and W. S. Jewett; Corresponding Secretary, Dr. L. D. Morse, and Recording Secretary and Treasurer, Wm. Muir. A committee was appointed to see if the transactions of the society could be published in the same volume with the transactions of the Illinois Horticultural society, but this does not seem to have been done.

The next annual meeting was held at St. Louis in January, 1863. The following officers were elected: President, Henry T. Mudd; Vice-Presidents, Dr. B. F. Edwards, George Husmann, O. H. P. Lear, Isaac Snedeker and William Hadley, the two latter of Illinois; Corresponding Secretary, Dr. L. D. Morse, and Recording Secretary and Treasurer, Wm. Muir. An essay on the grape was read at the meeting by Mr. George Husmann, and was published on pages 38–43 of "An Essay on the Culture of the Grape in the Great West," by the same author, published at Hermann in 1863. In the Proceedings of the meeting of January, 1864, I find the active members included Henry T. Mudd, N. J. Colman, George Husmann, Dr. L. D. Morse, Dr. H. Claggett, Dr. B. F. Long, Dr. B. F. Edwards, Wm. Muir, John H. Tice and others well known in later years.

The report for 1864 gives a list of 133 members. Only a part of the later reports give lists of members, but the number varied greatly from year to year, in 1873 it being only 29. The membership fee has been a mere nominal amount, and this is sufficient reason for the great variation in the number. Perhaps the present plan of giving a list of the members and correspondents is the best, without making any special effort to have a large membership, the work of the society in any event being done by a few members.

The first list of life members was given in the Proceedings for 1872. The following are all of the names found in the different published lists:

Henry T. Mudd,	Charles Peabody,	J. C. Evans,
A. E. Trabue,	John H. Tice,	L. A Goodman,
Hezekiah Claggett,	Daniel L. Hall,	D. M. Dunlap.

Honorary members were first given in the Proceedings for 1884, and the list to the present time is made up of the following:

George Husmann,	C. W. Murtfeldt,	Marshall P. Wilder,
T. T. Lyon,	N. J. Colman,	Charles Downing.

In 1883 the constitution was amended so as to especially provide for lady members, and since that time they have made a part of the society, and joined in the proceedings at the annual meeting.

The society has made exhibits of fruit at various places, and accomplished much in this way by directing the attention of the people of other states to Missouri as a fruit state. At the meeting of the American Pomological Society, at Rochester in 1879, several medals were awarded to it—one for the largest and best display of apples made by any society, another for the best display of grapes, and another for the best display of pears. Again in 1883 it made an exhibit of fruits at the meeting of the same society, and also at the Grand Rapids meeting in 1885. In February, 1883, it showed 85 varieties of fine fruits at the meeting of the Mississippi Valley Horticultural Society at New Orleans. In 1884 it took various premiums at the Exposition in New Orleans—a gold medal and $200 on 200 varieties of apples; a silver medal and $100 on 100 varieties of apples; a silver medal and $75.00 on 50 varieties of apples; two other silver medals and twenty smaller premiums. At the St. Louis Fair, the St. Louis Exposition and other places it has made exhibits with similar results.

In 1882, the society having an appropriation from the Legislature of $2,500 for two years, decided to establish an experimental orchard and garden at the Agricultural College grounds, for testing new fruits and vegetables; and the reports of the committee in charge of the work show valuable results.

The first report of the present secretary was that of 1883, and it, as well as the succeeding ones, contains not only the original papers read at the meetings, but selections from the horticultural journals published during the year. The twenty-eighth report has the "Flora of Missouri," by Prof. S. M. Tracy, taking up 106 pages, the first catalogue of the plants of the state published since that by Geyer in 1842.

I will not notice in detail the different meetings, or the contents of the Proceedings. Each volume contains much of interest, and if the practical horticulturist had a complete set of the Proceedings and would read them all through carefully once a year, he would learn much that would help him to do more intelligent work, and to reap more abundant reward for work done. Each volume has many papers which would teach him new ideas to be put in practical operation or which would assist in educating the mind, and at least enlarge the capacity of enjoyment, and widen the scope of vision—the tiller of the soil too often contenting himself with simply living an animal life, with mind but little more developed than those of the animals with which his work brings him into contact.

The following table shows the officers of the society from its organization to the present time. After 1868 the offices of corresponding and recording secretary were united in the same person, and since 1881 the constitution has provided for a vice-president, instead of one for each congressional district as was the case previous to that time. The table also gives the time of each meeting, its serial number and the number by which it is known in the published proceedings:

OFFICIAL RECORD OF THE MISSOURI STATE HORTICULTURAL SOCIETY.

Time of meeting.	President.	Corresponding Secretary	Recording Secretary.	Treasurer.	Annual meet.	Publ'd No. of meet.
January, 1859	N. J. Colman	Geo. Husmann	F. R. Elliott	John Garnett	1	
			Dr. L. D. Morse[1]			
December, 1859	N. J. Colman	Dr. L. D. Morse	Wm. Muir	Dr. C. W. Spalding	2	1
January, 1861	Dr. C. W. Spalding	Dr. L. D. Morse	Wm. Muir	Wm. Muir	3	2
January, 1862	Dr. C. W. Spalding	Dr. L. D. Morse	Wm. Muir	Wm. Muir	4	3
January, 1863	Henry T. Mudd	Dr. L. D. Morse	Wm. Muir	Wm. Muir	5	4
January, 1864	Henry T. Mudd	Dr. L. D. Morse	Wm. Muir	John H. Tice	6	5
January, 1865	Henry T. Mudd		Wm. Muir	John H. Tice	7	6
January, 1866	Henry T. Mudd	C. M. Saxton	Wm. Muir	John H. Tice	8	7
January, 1867	Henry T. Mudd		Wm. Muir	John H. Tice	9	8
January, 1868	Chas. Peabody	R. S. Elliott	Wm. Muir	John H. Tice	10	9
November, 1868	Chas. Peabody	C. W. Murtfeldt	Wm. Muir	John H. Tice	11	10
January, 1870	Dr. H. Claggett		Wm. Muir	John H. Tice	12	11
November, 1870	Henry M. Vories		Wm. Muir	John H. Tice	13	12
January, 1872	Henry M. Vories		Daniel L. Hall	John H. Tice	14	13
	Chas Peabody[2]					
January, 1873	Henry T. Mudd		Daniel L. Hall	Isador Bush	15	14
January, 1874	Henry T. Mudd		Daniel L. Hall	Isador Bush	16	15
January, 1875	T. R. Allen		Wm. Muir	S. M. Tracy	17	16
January, 1876	Jos. C. Evans		Wm. M. King	C. V. Riley	18	17
December, 1876	Jos. C. Evans		R. J. Lewis	C. V. Riley	19	18
	N. J. Colman		Daniel L. Hall		20	
January, 1879	N. J. Colman		S. M. Tracy	G. C. Swallow	21	21
January, 1880	N. J. Colman		S. M. Tracy	G. C. Swallow	22	22
December, 1880	Z. S. Ragan		S. M. Tracy	J. C. Evans	23	23
December, 1881	L. A. Goodman	Vice-President	S. M. Tracy	J. C. Evans	24	24
December, 1882	S. M. Tracy	C. M. Stark	L. A. Goodman	J. C. Evans	25	25
December, 1883	S. M. Tracy	A. W. St. John	L. A. Goodman	J. C. Evans	26	26
December, 1884	J. C. Evans	E. P. Henry	L. A. Goodman	Z. S. Ragan	27	27
December, 1885	J. C. Evans	J. A. Durkes	L. A. Goodman	Z. S. Ragan	28	28
December, 1886	J. C. Evans	N. F. Murray	L. A. Goodman	D. S. Holman	29	29
December, 1887	J. C. Evans	N. F. Murray	L. A. Goodman	D. S. Holman	30	30
December, 1888	J. C. Evans	N. F. Murray	L. A. Goodman	D. S. Holman	31	31
December, 1889	J. C. Evans	N. F. Murray	L. A. Goodman	D. S. Holman	32	32
December, 1890	J. C. Evans	N. F. Murray	L. A. Goodman	D. S. Holman	33	33

[1] *Vice* Elliott, removed from the State. [2] *Vice* Vories, resigned.

The organization of the Horticultural Society was prior to the incorporation of the Missouri State Board of Agriculture, which was by act of the Legislature approved December 1, 1863, though previous to that time there existed the Missouri State Agricultural Society, to which, by an act of November 23, 1855, county societies were required to report. The act of 1863 provided that there should be printed each year 3,000 copies of a volume containing the report of the Board of Agriculture and the proceedings of the Horticultural Society, the volume to be issued under the direction of the presidents of the two bodies.

This was afterward changed so as to make the number of copies 6,000, and that section of the act was again amended March 24, 1875, providing that the volume should be issued under the direction of the President of the Board of Agriculture, without joining with him the President of the Horticultural Society, and providing that 14,000 copies should be issued, 2,000 of these being in German, and that the volume should not exceed 500 pages. Provision was afterward made for the State to publish the proceedings of the Horticultural Society in a separate volume, and 3,000 copies of this are now issued.

President Mudd, in his annual address in 1865, recommended a library for the Society, to embrace horticultural, pomological and agricultural works and periodicals. The recommendation does not seem to have been acted upon, and should the society now wish to do so, it would find much difficulty in getting a set of its own Proceedings, or even that part of the set which has been published since the date of that address. Had each Secretary saved from immediate distribution a hundred copies of the Proceedings of every year, it would now have not only a supply for itself, but the means of completing sets for such libraries as would care for and preserve its publications.

Previous to the law of 1863 the proceedings were published by the Society itself, and as the annual dues of its members were but $1.00 before 1866, special contributions had to be made by the members to provide the funds for publication.

In numbering the reports the first meeting was not counted, so that when the Society issued what it called the proceedings of the eighteenth annual meeting for 1877, it had met in annual meetings 19 times. The Proceedings of the meeting in January, 1879, were called the twenty-first, there having been but one meeting between these two. I have not a copy of that report, but presume the explanation was made in it, that there was a change in the numbering so that the volumes would correspond with the years. The Proceedings of the January, 1874, meeting were published in the Agricultural report for 1873, and

as that report was only a pamphlet of 72 pages, copies soon became destroyed, so that I have never seen but one copy of it, though I have searched for it a long time in different parts of the State. It furnishes another proof of the fact that an unbound book or pamphlet is soon destroyed, while the bound one is not.

In my library I have nearly a complete set of the Proceedings of the Society, and wishing to see those I have not got, I wrote the principal libraries in the State to find which of them had the copies wanted. The replies were as follows: The State Historical Society had none, and did not know that there was such a society which published its proceedings; Mercantile library, St. Louis, has none of those wanted, its set being very deficient, but hopes to be able to fill it up; Public library, St. Louis, has no reports whatever of the society; Academy of Science, St. Louis, has none of those wanted; Agricultural College of the State University, Columbia, "the University library does not contain the horticultural reports;" the State library, Jefferson City, has none of those wanted. These replies suggest various thoughts, perhaps the most striking being that the State Historical Society does not know of the existence of this Society, and that the horticultural department of the State Agricultural college has none of the publications of the State Horticultural Society. Is the state of facts shown the result of negligence on the part of librarians, or because the publications are not worthy of preservation? No one would intimate the latter, and to partially overcome the former, the Secretary might put the different libraries in the State on his list to receive copies of the proceedings.

The following bibliograpy of the publications of the Society will show the exact title of each report, the time and place of holding the meeting, the number of pages of each volume, and the publication of which the proceedings formed a part, when they were not in separate books in themselves. The number I have given each shows its numerical order of publication:

I

Proceedings of the Missouri Fruit Growers' Association, for 1859, and the Proceedings of the Annual Meeting for 1860, to which is appended an Essay on Grape Culture, By George Husmann, of Hermann, Mo. St. Louis: T. W. Ustick, Printer, 78 Pine Street. 1860. 64 pp.

The report of the Meeting at the Fair Grounds in September, 1859, contained in this, was furnished by the Secretary to the "Valley Farmer," and is in Volume XI, pp. 350–1, Nov., 1859.

2

Proceedings of the Missouri State Horticultural Society, at their annual meetings, in 1861 and 1862. 65 to 116 pp.

The report of the meeting of January 1861 is also contained in the "Valley Farmer," Volume XIII, pp. 89-90, 118-9, 152-2, and 182-4, March to June, 1861.

The report of the meeting of January 1862 is in Volume XIV, pp. 87-9, 117-9, 149-50, 247-8, 310-12, 275-8, 342-5 and 372-5.

3

Proceedings of the Missouri State Horticultural Society, at their Fourth Annual Meeting, held at St. Louis, on Tuesday, 13th January, 1863 and three following days. Saint Louis: Printed at the "Valley Farmer" office. 97 Chestnut street. 1863. 58, (2), pp.

4

Proceedings of the Missouri State Horticultural Society, at their Fifth Annual Meeting, held at St. Louis, on Tuesday, January 12th, 1864, and three following days. Saint Louis: George Knapp & Co., Printers and Binders. 1864. 148 pp.

5

Proceedings of the Missouri State Horticultural Society. [Sixth Meeting, Jan. 10, 1865.] <1st Agricultural Report, 1866, Appendix pp. 267–391. <Senate Journal, Appendix, Adj. Sess., 23rd Gen. Assy, 1865, Vol. 11, pp. 267–391 of Appendix to Agricultural Report.

6

Seventh Annual Meeting of the Missouri State Horticultural Society. [Jan. 9, 1866.] <1st Agricultural Report, for 1866, Appendix pp. 392–470. <Senate Journal, Appendix, Adj. Sess., 23rd Gen. Assy, 1865, Vol. 11, pp. 392–470 of Appendix to Agricultural Report.

7

Proceedings of the Missouri Horticultural Society. [8th Meeting, Jan. 8, 1867.] <2nd Agricultural Report, for 1866, pp. 339–507. <House Journal, Appendix, 1st Sess., 24th Gen. Assy., 1867, Vol. 11, pp. 389-507.

8

Proceedings of the Missouri Horticultural Society at its Ninth Annual Meeting, held in the Supreme Court Room, on the 14th January, 1868. <3rd Agricultural Report, for 1867, pp. 347–429.

9

Proceedings of the Missouri State Horticultural Society, at its Tenth Annual Meeting, held at Columbia, November 24th, 25th, and 26th, 1868. <4th Agricultural Report, for 1868, pp. 485–536.

10

Proceedings of the Missouri State Horticultural Society, at its Eleventh Annual Meeting, held at St. Louis the 11th, 12th, 13th and 14th of January, 1870. <5th Agricultural Report for 1869, pp. 1–123 and I.

11

Transactions of the Missouri State Horticultural Society, at its Twelfth Annual Meeting. Held at St. Joseph. On the 29th November, and the following days. Jefferson City, Mo.: Horace Wilcox, Public Printer. 1871. <6th Agricultural Report, for 1870, pp. 1–34 and 101–103.

12

Proceedings of the Missouri Horticultural Society, at the Thirteenth Annual Meeting. Held at Kansas City, January 9–11, 1872. <7th Agricultural Report, for 1871, pp. 39–112.

13

Proceedings of the Missouri State Horticultural Society at the Fourteenth Annual Meeting. Held at Jefferson City, January 7–10, 1873. <8th Agricultural Report, for 1872, Part 11, pp. 35–170 and 1–7.

14

Proceedings of the Missouri State Horticultural Society, at the Fifteenth Annual Meeting. Held at Hannibal, January 13, 14, and 15, 1874. By D. L. Hall, Secretary. <9th Agricultural Report, for 1873, pp. 19–72.

15

Proceedings of the Missouri Horticultural Society at its Sixteenth Annual Meeting. Held at St. Louis, Missouri, January 12, 13, 14 and 15, 1875. <11th Agricultural Report for 1875, pp. 103–162 and I–V.

16

Proceedings of the Missouri Horticultural Society at its Seventeenth Annual Session. Held in the City of St. Louis, on the 11th, 12th, 13th and 14th days of January, 1876. <11th Agricultural Report for 1875, pp. 163–251 and I–V.

17

Proceedings of the Missouri State Horticultural Society, at its Eighteenth Annual Session. Held at Kansas City, on the 19th, 20th, 21st and 22nd of December, 1876. <12th Agricultural Report, for 1876, pp. 135–215 and vii.

18

(Not seen.)

19

Proceedings of the Missouri State Horticultural Society, at its Twenty-first Annual Session. Held at Jefferson City, Mo., January 28–30, 1879. <13th Agricultural Report, for 1879, pp. 235–351 and ii–v.

20

Proceedings of the Missouri State Horticultural Society at its Twenty-second Annual Meeting. Held at St. Louis, Mo., January 19–21, 1880. By the Secretary, S. M. Tracy. <14th Agricultural Report, for 1879, pp. 191–260.

21

Report of the Missouri State Horticultural Society, for the years 1880 and 1881. Edited by the Secretary. Jefferson City: Tribune Printing Company, Printers and Binders. 1882.

(Half page title:) Missouri State Horticultural Society. Twenty-third Annual Report. <pp. 1–150, and I–III of volume containing this and the next.

22

Proceedings of the Missouri State Horticultural Society, at its Twenty-fourth Annual Meeting, Held at Columbia, Mo., December 20 and 21, 1881. <pp. 151–229 and I–III of volume with preceding.

23

Report of the Missouri State Horticultural Society for the year 1882. Edited by the Secretary. Jefferson City: Tribune Printing Company, Printers and Binders. 1883. 92 pp., 5 plates.

24

Report of the Missouri State Horticultural Society for the year 1883. Being a report of the workings of the society for the year, together with the papers and discussions at the 26th Annual Meeting, held at Carthage, Mo., Dec. 11, 12, 13, 1883. Containing also

a constitution for the workings of local or county horticultural societies, and "Secretary's Budget," being choice clippings from the best horticultural papers. L. A. Goodman, Sec'y, Westport, Mo. Jefferson City: State Journal Co., State Printers. 1884. 354 pp.

25

Report of the Missouri State Horticultural Society, for the year 1884. Being a report of the workings of the society for the year, together with the papers and discussions at the 27th Annual Meeting held at St. Joseph, Dec. 9, 10, 11, 1884. Also, a report of the Semi-annual Meeting held at Springfield, June 10 and 11, 1884: containing also, a constitution for the working of local or county horticultural societies, and "Secretary's Budget." L. A. Goodman, Secretary, Westport, Mo. Jefferson City: Tribune Co., State Printers. 1884.

26

Report of the Missouri State Horticultural Society, for the year 1885. Report of the 28th Annual Meeting held at Warrensburg, December 9, 10, 11, 1885, also a report of the Semi-annual Meeting held at Butler, June 10 and 11, 1885, and "Secretary's Budget." L. A. Goodman, Secretary, Westport, Mo. Jefferson City, Mo.: Tribune Printing Company, State Printers and Binders. 1886. 468, V, 506 pp.

27

Twenty-ninth Annual Report of the State Horticultural Society of the State of Missouri. Report of the Twenty-ninth Annual Meeting held at Lexington, December 7, 8 and 9, 1886; also, a report of the Semi-annual Meeting held at Louisiana, June 10 and 11, 1886, and "Secretary's Budget," for the year 1886. L. A. Goodman, Secretary, Westport, Mo. Jefferson City, Mo.: Tribune Printing Company, State Printers and Binders. 1887. 431, VI, pp.

28

Thirtieth Annual Report of the State Horticultural Society of the State of Missouri. Thirtieth Annual Meeting held at Boonville, December 6, 7 and 8, 1887. Semi-annual Meeting held at West Plains, June 7, 8 and 9, and "Secretary's Budget." L. A. Goodman, Secretary, Westport, Mo. Jefferson City, Mo.: Tribune Printing Company, State Printers and Binders. 1888. 488, IV, pp.

29

Thirty-first Annual Report of the State Horticultural Society of Missouri. 1888. Thirty-first Annual Meeting held at Nevada, December 5, 6 and 7, 1888, also, Semi-Annual Meeting held at Oregon, June 5, 6 and 7, and other papers. L. A. Goodman, Secretary, Westport, Mo. Jefferson City, Mo.: Tribune Printing Company State Printers and Binders. 1889. 501, IV pp.

30

Thirty-second Annual Report of the State Horticultural Society of Missouri. 1889. Thirty-second Annual Meeting, held at Lebanon, Dec. 4, 5 and 6, 1889: also, Semi-Annual Meeting held at Brookfield, June 4, 5 and 6, and other papers. L. A. Goodman, Secretary, Westport, Mo. Jefferson City, Mo.: Tribune Printing Company, State Printers and Binders. 1890. 467, II pp.

OUTLINES OF ENTOMOLOGY.

PREPARED FOR THE USE OF FARMERS AND HORTICULTURISTS, AT THE REQUEST OF THE SECRETARY OF THE STATE BOARD OF AGRICULTURE AND THE STATE HORTICULTURAL SOCIETY OF MISSOURI,

BY MARY E. MURTFELDT, KIRKWOOD, MISSOURI.

PART FIRST.

GENERAL STRUCTURE OF INSECTS.

Illustrated by electrotypes from drawings by Prof. C. V. Riley, Washington, D. C., and zinc process work done under the supervision of Mr. Joseph Bridgham, of Providence, R. I.

CHAPTER I.

INTRODUCTION.

What is an insect? This does not seem like a question difficult to answer, and yet how few either of grown persons or children would be able to define an insect otherwise than as "some sort of a bug." Now it is true that all bugs, properly so called, are *insects;* but it by no means follows that all insects are *bugs.* On the contrary, genuine bugs form but a small proportion of the fluttering, buzzing, crawling myriads to which the term is generally applied.

Insects are among the most familiar of natural objects. They are met with in all climates and situations, and in greater or less numbers at all seasons of the year. They claim our attention in a thousand different ways. We admire the beauty of form and color in some, and shrink from the grotesque ugliness of others. Many species injure and annoy us personally or damage or destroy our property, while on the other hand a few, like the honey-bee, the silk-worm and the cochineal insect, produce some of our choicest luxuries. Is it not well then for us to endeavor to learn something of the structure, habits and differences of a class of animals with which we unavoidably have so much to do?

How few people realize that there are as wide differences between insects and some of the animals that are usually classed with them—for example, spiders, millepeds and earth-worms—as there are between cows and chickens and serpents; and there are far greater distinctions between butterflies and beetles and grasshoppers than exist between

horses, cows and sheep. This may seem strange to one who has given the subject no attention, but a little careful observation will convince him of its truth.

It is impossible to obtain a definite idea of the structure of insects, and their place in the scale of being, without comparing them critically with other kinds of animals and noting the points in which they differ. To obtain this knowledge without the aid of books would involve a wide field of observation and a great deal of labor in systematizing the information gained. Therefore, to aid and direct the observations of the student, we will glance hastily over the outlines of the classification of the animal kingdom as arranged by the great French naturalist, Cuvier, after whom it is called the "Cuvierian system." According to this system all the animals, on or in the earth, monstrous or minute, are arranged in the *four* following Sub-kingdoms:

I. BACKBONE animals (Sub-kingdom VERTEBRA), such as have an internal bony frame termed a *skeleton*, the axis of which is a spinal column composed of a number of peculiar joints called *vertebræ*. Examples—Man, Birds, Fishes and Reptiles.

II. RINGED or ARTICULATE animals (Sub-Kingdom ARTICULATA), having an external tough or horny framework composed of rings or articulations enclosing the muscles and other soft tissues. Examples—Insects, Spiders, Millepeds, Crabs.

III. MOLLUSKS (Sub-kingdom MOLLUSCA), soft-bodied animals usually enclosed in shells. Examples—Snails, Slugs, Oysters.

IV. STAR or RADIATE animals (Sub-kingdom RADIATA). These are formed somewhat upon the plan of a star or asterisk, with all the members branching out from a common center. Examples—Starfish, Sea Urchin, Coral animal. This division includes mostly marine animals.

Each of these Sub-kingdoms is divided into several very distinct *classes*. Passing over the classes of BACKBONE animals, we will confine our attention to the ARTICULATA in which insects, although by no means the largest representatives, occupy, on account of their more specialized structure, the highest rank. The classes of ARTICULATA are *five* in number, viz.:* Insects *(Insecta)*, Thousand-legged worms or Millepeds *(Myriapoda)*, Spiders *(Arachnida)*, Lobsters and Crabs *(Crustacea)*, and True Worms *(Annelida)*.

*According to Cuvier, whose plans will answer our present purpose.

For convenience this classification may be tabulated thus:

Animal Kingdom.	Vertebra.	
	Articulata.	Insecta.
		Myriapoda.
		Arachnida.
	Mollusca.	Crustacea.
	Radiata.	Annelida.

In proceeding to separate true insects from the other members of their sub-kingdom, the most obvious distinction is that they alone among articulates ever possess *wings*. There are, however, some insects, mostly of the worst repute, such as fleas, bed-bugs, lice and a few others, that never acquire wings. We have, therefore, to seek in some other organ, or set of organs, a characteristic by which we can distinguish *any* insect from other articulates, and one which will, if possible, have a peculiar development in each of the classes. Such a distinction is found in the *number of the legs*. Thus insects, in their perfect or adult state, always have *six* legs, neither more nor less—although in some butterflies the front pair of legs, not being used, are of diminished size, and are tucked up out of the way. Millepeds, as the name denotes, have *numerous* legs, from thirty to four hundred; spiders and mites have *eight* legs; crustaceans from *ten* to *fourteen* legs, while the true worms have *no legs* at all in any stage of their existence. We have, therefore, only to count the legs of an articulate animal to find out in which of the preceding classes it belongs.*

The term "insect," which is derived from two Latin words, *in* and *seco—cut into*—in reference to the ring-jointed or *insected* body, was, by some of the earlier writers on natural history, applied to the entire group of the articulates, and the various classes were distinguished as "six-legged insects," "eight-legged insects," "many-legged insects," and so forth. But as the structure of these animals was more thoroughly studied, they were found to be more widely separated than was at first supposed. The term "insect" was restricted to the six-legged class, and other names, more suitable, applied to the remaining classes. Insects are further distinguished from other articulates in having the external framework composed apparently of *thirteen* or fourteen rings or joints, which are separated into *three* regions, the first joint forming the *head*, the succeeding three the *thorax*, and the remaining nine or ten the *abdomen* and its appendages.

In the millepeds the number of rings varies from *ten* to *two hundred*, and the head alone is distinct from the abdomen. In the spiders the joints are so closely consolidated that *two* only can be perceived, the first forming the combined head and thorax *(cephalo thorax)* and the second the abdomen. In the crustaceans the number of joints is

*Except in the case of the young of some Mites, which also have only six legs

variable, and in some species the division is into three regions, as in insects, while others bear some resemblance to spiders in the arrangement of the joints. In the framework of the worms we find numerous joints, but no distinct head, thorax or hind body.

Another and very interesting peculiarity of insects is found in their *transformations* or *metamorphoses*. Insect life begins with an embryo contained in an *egg*. From this egg hatches the first active form, which is called a *larva* (plural *larvæ*), the term signifying a *mask*, because the true form of the insect is considered to be *masked* or *concealed* at this stage of life. All caterpillars, grubs and maggots are larvæ. When the larva is full grown it changes, in most cases, to a very different object, and is then termed a *pupa* (plural *pupæ*), from a word meaning a *doll* or *mummy*, in reference to its quiescence and the swathed or bandaged appearance of its members. From the pupa in due time emerges the *perfect insect* or *imago* (plural *imagines*), which is the final form and the one in which it possesses wings, unless it belongs to the few wingless species.

The chief office of the perfect insect is to develop and lay the eggs from which another generation of larvæ will hatch, and, in the case of some species, to provide food for their young.

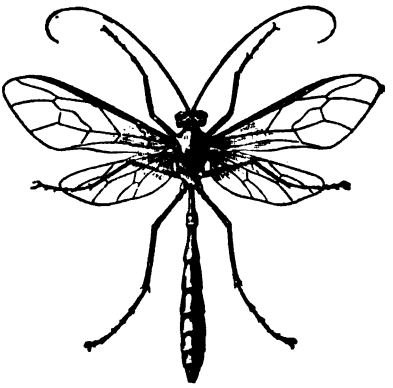
To briefly recapitulate, in answer to our opening question: An insect is an articulate animal having the external skeleton composed of a number of rings or joints, which are separated into three groups to form a distinct *head, thorax* and *abdomen*. It has *six legs*, and, in its perfect state, has *two* or *four wings*, and is further characterized by changes of form and habit called *metamorphoses*.

The science which treats of the structure, habits and classification of insects is called *Entomology*, a term composed of two Greek words which signify a "discourse on insects."

Economic Entomology has for its object the investigation of the habits of injurious insects, with a view to the better preservation of our persons and property from their attacks. It also includes experiments with such species as are or may prove to be valuable for their products or properties, and endeavors to ascertain which are indirectly useful to man on account of their parasitic and cannibalistic habits.

CHAPTER II.

EXTERNAL STRUCTURE OF INSECTS.



Ichneumon fly (*Ophion macrurum, L.*) after Riley.

In our introductory chapter were noted some of the differences between insects and vertebrate animals, and also between insects and other articulates. Now in order to comprehend these distinctions still more clearly, and to understand how the various parts and organs are modified to produce the almost innumerable diverse forms, it becomes necessary to examine the general structure still more critically.

The external crust or skeleton of an insect forms a many-jointed tube in which, as has already been mentioned, are enclosed and protected all the softer vital parts, such as the muscles, nerves, the air and blood vessels, etc. The most common form of this tube is more or less cylindrical, but in some insects it is shortened and flattened so that the outline is oblong, oval or nearly circular. This body-wall is composed of fourteen ring-like sections or segments which are more or less closely connected. Of these joints the first, forming the head,* is most distinct. The three joints forming the thorax have the appearance of being firmly soldered together, and it is often difficult to trace the divisions. In the abdominal region, on the contrary, the rings are loosely connected by a flexible and elastic membrane, which allows them to move freely in any direction. Two or three of the terminal joints of the abdomen are changed from their original shape to form and support stings, piercers, forceps, and the like, so that we are seldom able to distinguish more than six or seven distinct rings in this part of the body.

It must not be supposed that the fourteen joints are the only divisions of the insect skeleton. If this were the case we should never have occasion to admire the grace of the butterfly's flight or the surprising agility of various beetles and bugs. The fact is that each joint, although it may appear like a simple ring, is composed of from six to nine variously shaped pieces, each piece, however closely fitted to the others, being capable of independent motion by the muscles within. Otherwise an insect would never be able to move a wing or leg or other organ

* Dr. Packard considers the head as composed of four joints.

separately. On the thorax of many smooth, hard-shelled insects, like wasps and beetles, we can readily trace the divisions of each joint by means of fine impressed lines.

The insect crust varies greatly in texture and thickness. In some insects, and especially in many larvæ, it is very thin, easily bent and easily broken; in others it is hard and brittle like shell, or dense and impenetrable like metal. Examples of the shelly texture are found in the pupæ—termed *chrysalides*—of butterflies and moths, while the metal-like covering may be seen in the cases of the beautiful Brazilian beetles, often used by jewelers in the place of gems, which are so hard that they can only be pierced by a drill.

The majority of insects have the head separated from the thorax and the thorax from the abdomen by deep incisions, or the contraction of the connecting joints. This will be understood by a glance at the illustration at the head of this chapter, or better still by examining the body of a bee, a butterfly or a fly.

The back or upper surface of the body of an insect is termed the *dorsum* or dorsal surface, or *tergum*, the sides the *pleurites* or lateral surfaces, while the under side is the *venter* or ventral surface. The top of the thorax is sometimes further distinguished as the *notum*, the under side, or breast, being correspondingly termed the *sternum*.

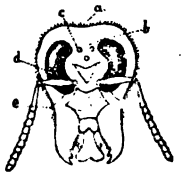
In exact scientific description a number of other terms are used to indicate the various divisions of a segment, or to refer to precise localities on the body, but these are not necessary to a general apprehension of the structure, and would only confuse and discourage a beginner.

CHAPTER III.

THE HEAD AND ITS APPENDAGES.

As with the higher animals, the head of an insect is more especially the *sensorial* region, because it contains the organs of *sight*, *touch*, taste, smell, and possibly in some species, of *hearing* also. The sense of feeling is not, of course, confined to the appendages used by the insect for touching objects—which in this sense correspond to the human hand—but extends over the entire surface of the body.

Fig 2.



Head of Wasp: *a*, occiput; *b*, epicranium; *c*, ocelli; *d*, compound eyes; *e*, jaws.

Certain localities on the head are frequently referred to in descriptions of insects. The more important of these are:

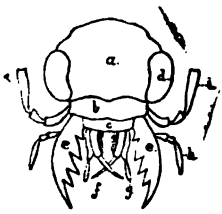
the *Occiput*, which is the back upper part (Fig. 2, *a*); the *epicranium*, the front upper part (Fig. 2, *b*), and the *Clypeus*, which occupies the space between the epicranium and the mouth. The top of the head is also sometimes called the *Vertex;* the front, the *face* or *Frons;* the sides, the *cheeks* or *Genæ*. The manner in which these parts are developed varies greatly in different insects.

The principal appendages or organs of the head are the *Mouth*, the *Eyes* and the *Antennæ*.

The mouth presents a variety of forms, being adapted in different insects to the kind of food upon which they subsist, and also to the various offices, besides those of mastication or suction, which are performed by it.

All the variations in structure, however seemingly diverse, are made upon *two* plans, viz.: *jaws* for biting and *beaks* or tubes for sucking.

Fig 3.



Head of Tiger beetle: *a*, frons; *b*, epistoma; *c*, labrum; *d*, eyes: *e*, mandibles; *f*, maxillæ; *g*, maxillary palpi; *h*, labial palpi; *i*. antennæ.

The mouth of a biting insect consists of *six* distinct parts, collectively called *Trophi*. These parts are the lips—upper and under—and two pairs of strong, horny organs which form the jaws and move from side to side and not up and down like the jaws of the higher animals. The upper lip is called the *Labrum* (Fig. 3, *c*), and the under lip (not shown in the illustration), the *Labium*. These parts are subject to great changes in shape, and seldom bear much resemblance to the lips of Vertebrates. The upper or principal jaws are termed *Mandibles* (Fig. 3, *ee*). They are strong and sharply toothed, and are the chief instruments for seizing and tearing the food.

The lower jaws (Fig. 3, *ff*) are called the *Maxillæ* (sing. *maxilla*), and are usually more slender and flexible than the mandibles and terminate in a point.

Besides these six principal mouth parts, most insects have from *one* to *three*, generally *two* pairs of slender-jointed organs, called *Palpi* (sing. *palpus*) or *mouth-feelers*. One pair is attached to the lower jaws, and are termed the *maxillary palpi* (Fig. 3, *g*), the other pair, connected with the lower lip, are the *labial palpi* (Fig. 3, *h*). Their office seems to be to aid in the selection of food and to brush impurities from the face and antennæ.

The sucking or *haustellate* insects have the same number of mouth parts, but they are developed on an entirely different plan. In some species, such as the true Bugs, most of the parts are united to form a stiff, jointed *beak*, with which the leaves of plants or the skins of ani-

mals are punctured and the juices or blood extracted. In others, like the Butterflies and Moths, the combined parts form a long, flexible tube, usually called a *tongue*, through which the nectar of flowers and similar fluids may be drawn. In others still, the lower lip and the maxillæ together form a sort of tongue for collecting sweets, while the mandibles are not altered. Bees and Wasps have this kind of mouth.

The organs of vision are situated upon the epicranium in front or near the top of the head.

They consist of a pair of prominent *compound* eyes (see Figs. 2 and 3, *dd),* composed of a great number of six-sided lenses. In shape these compound eyes are round, oblong or reniform (kidney-shaped). In addition to these, many insects are provided with three small single eyes, called *ocelli* (sing. *ocellus),* situated upon or near the apex of the head, in a triangle, as shown in Fig. 2, *c.*

All these eyes are fixed in their sockets, but protrude so much that some of the lenses face in each direction, and the insect has no need to turn its eyes to obtain warning of approaching danger, or in its search for food. It has been suggested that the compound eyes serve the ordinary purposes of vision, while the ocelli are used upon objects that are near and minute; but this is mere conjecture. Some of the best observers and most careful investigators assert that with all the provision that has apparently been made for sight in insects their vision would seem to be very imperfect, especially for objects at a distance.

Black and brown are the colors most commonly seen in the eyes of insects, but many species have eyes that gleam with the tints and brilliancy of jewels, and add not a little to the beauty of the species.

The most striking appendages of the head of an insect are the *Feelers* or *Antennæ* (sing. *antenna).* These are many-jointed organs in which the sense of touch is thought chiefly to reside. Many experiments go to show that they are also the organs of smell. They are of a great variety of forms, a few of which are represented in Fig. 4. The different shapes are distinguished as *knobbed, capitate, laminate, pectinate, filiform,* etc. They are usually attached a little below and between the eyes, as shown in figures 2 and 3.

A knowledge of the form and position of the antennæ is very important in the classification of insects, especially in such orders as the *Coleoptera* (beetles).

All the functions of the antennæ are probably not yet known; but it has been ascertained that besides serving the purposes already mentioned, they are also indispensable in guiding the flight of all winged

Fig 4.

Antennae of insects, adapted from authors. 1 and 3, lamellate ant. of beetle; 2, capitate ant. of beetle; 4, pectinate ant. of beetle; 5 and 6, filiform ant. of beetle; 7, bristle tipped ant. of fly; 8, knobbed ant. of butterfly; 9, feathered ant. of moth.

species, and are, to a large extent, the instruments of communication between individuals of the same kind, as among ants, and no doubt aid the perception of insects in many ways that are beyond our comprehension.

The sense of hearing in insects is not considered to be as generally developed as in the higher animals. Yet unquestionably many insects do hear, although the special organs of this sense have been located in comparatively few species. Such ears as have been discovered are not found on the head, but on the front legs and at the base of the abdomen. These will be more particularly described in a succeeding chapter.

CHAPTER IV.

THE THORAX AND ABDOMEN.

The three segments immediately back of the head constitute the *Thorax* or chest of an insect. This division of the body is very compact and usually somewhat globular, or barrel-shaped. Each of the segments or joints composing it has received a special name; the anterior one—next the head—is termed the *Prothorax;* the middle one, the *Mesothorax*, and the third or posterior one the *Metathorax.* Each of these divisions, though apparently entire, is in reality, as has already been observed, made up of several irregularly shaped pieces, which are connected in such a way as to afford free play to the strong muscles within.

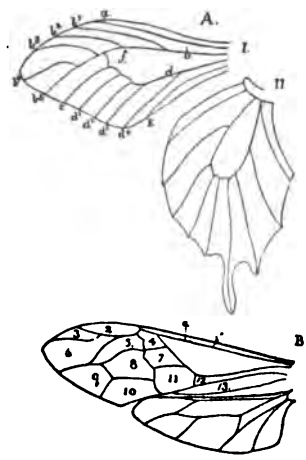
The appendages of the thorax are the wings and legs. The wings of insects are their most conspicuous members, upon which the beauty and, in a great measure, the safety and enjoyment of most species depend.

In their adult and perfect state nearly all insects possess these organs, the only exceptions being the members of a few small groups, such as fleas, bed-bugs, lice, some of the ants, and the females of a few moths and beetles.

In their general structure the wings of insects show a number of very distinct plans or types, which have been made the basis for the system of classification commonly adopted.

The wings are attached to the mesothorax and metathorax, and where present are always four in number, except in the order of the two-winged flies *(Diptera)*, where only the upper pair are fully developed, the lower pair being represented by little hammer-like organs, called *Halteres* or Poisers.

Fig 5.



A, I and II, upper and under wings of a butterfly; B, upper and under wings of wasp, adapted from authors.

Wings are composed of membrane, more or less transparent, stretched over a framework of horny tubes, termed *veins* or *nerves*. The number and arrangement of these tubes constitute the *Venation* or *Neuration* of the wings, to which frequent reference is made in descriptions of insects. There are usually from three to five principal veins in each wing. These branch and intersect very differently in the types of different families. The spaces between the veins are called cells, which are also named and numbered in regular order.*

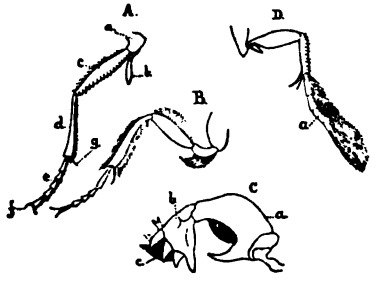
The first or upper wings are variously designated as the *Anteriors*, the *Superiors* or the *Primaries*, while to the lower or under pair are applied the opposite terms of *Posteriors* or *Secondaries*. Many of the best writers use the simple terms of *fore* and *hind* wings.

These organs exhibit an almost endless variety of outline, texture and ornamentation. The wings of butterflies and moths, for example, are broad and of rather frail texture, and are covered with minute scales and hairs of rich and varied colors. The upper wings of beetles

* The outline and veination of the wings of insects are made great use of in classification, and for the convenience of any that may be interested, I append the terms applied to margins, veins and cells as follows: On the wing of an insect the upper edge, from where it is joined to the body to the most distant point, is the *costa* or *costal edge*. The extreme point is the apex. (In the figure A, just above b^4.) The outer edge extends from the apex to the *inner angle* at d^4, and the *inner edge* from this point to the insertion of the wing. The veins are the costal vein, just below *a*; *b*, sub-costal vein; *d*, median vein; b^1, b^2, b^3, b^4 and b^5, sub-costal veinlets; d^1, d^2, d^3 and d^4, median veinlets; *e*, internal vein; *f*, discal cell. The other cells bear the names of the veins which enclose them and are numbered from the costal vein. In, B *a* is the costal vein; 1, 2, 3, costal cells; 4, 5, 6, sub-costal cells; 7, 8, 9, median cells; 10, 11, 12, sub-median cells; 13, internal cell. The veins and cells in the under wings correspond to the principal ones in the upper.

are comparatively small, being modified into simple sheaths, often of metallic hardness and luster, beneath which the longer and broader membraneous lower wings are compactly folded, except during flight. In the majority of other insects the wings are translucent or transparent, more closely veined, and not clothed with scales or hairs. The other organs of locomotion are the legs. In fully developed insects these are invariably six in number. Some of our most conspicuous butterflies, it is true, seem to have but four, but the absence of the front pair is only apparent, and close examination will reveal them folded close against the breast and perfectly formed, though small and useless. The legs of insects are modified in many ways to adapt them for running, leaping, burrowing and swimming, according to the habit of the species. Each leg consists of six parts: a large flattened joint called the *coxa*, which is attached to the body; this is succeeded by a joint which is very variable in form, usually small, but in some species large, and having the appearance of an ornamental appendage, and is termed the *trocanter* (plural *trocanters*); next to this is a long and often very stout *thigh* or *femur* (plural *femora*), succeeded by the *shank* or *tibia* (plural *tibæ*), to which is attached the *foot* or *tarsus* (plural *tarsi*), consisting of from two to five small joints, and in many species terminating in a pair of sharp claws, sometimes with a pad-like cushion, termed a *pulvillus*, between them.

Fig 6.



Legs, original and adapted; *A*, leg of predaceous beetle; *a*, coxa; *b*, trochanter; *c*, femur; *d*, tibia; *e*, tarsus; *f*, tarsal claws; *g*, tibial spur; *B*, leg of bee, clothed with hair for collecting pollen; *C*, front leg of mole cricket, fitted for burrowing in the earth: *a*, femur; *b*, tibia; *c*, tarsus; *D*, leg of water beetle adapted to swimming.

The *abdomen* in insects is composed of ten remaining segments. In most species, however, the hindermost rings are modified into the apparatus for reproduction and are drawn more or less within the body, so that only from five to seven joints can be clearly distinguished. It is in this part of the body that the form of the typical ring can be traced with greater accuracy than in any other region, as the segments are not apparently consolidated as in the thorax, but are held together quite loosely with elastic membrane.

Along each side of the body is a row of more or less conspicuous orifices. These are the openings through which the insect breathes, and are termed *stomata* or *stigmata* or *spiracles*. They conduct to air-tubes, to which more particular reference will be made in a succeeding

chapter. There are nine or ten, sometimes eleven pairs of them, two on the thorax and the others on the abdomen.

The only appendages of the abdomen are the *organs of reproduction*, which, in some species, as the bee and the wasp, are connected with those of defense, in the form of *stings*. They consist, externally, of various sorts of *forceps* or *claspers* in the male, and of *saws*, *augers*, *swords*, and more commonly, *piercers* and *stings* in the female. All of these instruments are very ingenious in their construction and admirably adopted to the work for which they are designed. They will be described in detail when the species to which they pertain are under consideration.

CHAPTER V.

INTERNAL STRUCTURE OF INSECTS.

The internal structure of insects consists of the *Muscular*, *Nervous* and *Circulatory* systems, together with the organs of *Respiration*, *Nutrition* and *Secretion*.

The examination of these parts is a work of great difficulty, owing to their extreme delicacy and minuteness. Much of it requires a high power of microscope and the skill of a hand experienced in dissecting; consequently the descriptions—as with the characters of external structure—cannot be easily verified by the observations of the tyro. Only a brief account, therefore, will be attempted in this chapter.

The Muscular system lies just within the external crust, or body-wall, to which it is closely attached. Its use is to hold the segments and their various appendages in place, and to move them according to the pleasure or necessity of the insect. It consists of a great number of distinct fibers, not gathered into bundles like those of higher animals, but spread out in thin layers over the parts requiring their action. In their arrangement the muscles correspond to the jointed structure of the body. Each segment has muscles that stretch from its front edge to the front edge of the one succeeding it, and others that in like manner connect the hinder edges. There are also bands of muscular fibers passing around the body and others still that extend obliquely from one joint to another. The muscles of insects are a pale yellow color and of a soft, jelly-like consistence. But, although so delicate in texture, their contractile power is surprising. Thus, many insects, of which the flea is a good example, are enabled to leap more than one hundred

times their own height, or to sustain, without injury, weights several hundred times that of their own. The lofty and long-continued flights of some species, the capacities of others for running, burrowing, boring into hard substances, and for carrying or dragging heavy burdens, all attest the wonderful strength and elasticity of their muscles.

The Nervous system consists of two delicate cords which extend longitudinally, the one above the other, along the ventral side of the body. Insects have no brain, properly so called, but the lower or external cord has a series of swellings or nerve knots called *ganglia*, varying in number from two to ten, from which nerve fibers are distributed in various directions. The ganglion in the head is, in many species, larger than the others, but does not differ from them in any other particular. Next to that the ganglia of the thorax are most developed, especially in perfect insects, since from them the supply of nerve-force for the wings and legs must be derived. The upper or internal cord is a simple thread without nerve knots or branches. It lies very close to but scarcely in contact with the ganglionic cord. We find in this nearly equal distribution of nerve force the reason why many insects can live for a considerable time after a part of the body has been crushed or severed, and why the separated parts seem to be alike endowed with vitality.

The Circulatory system of insects is as yet but imperfectly understood. The blood is cold and colorless, or with a slight yellowish tint. It does not flow through tubes corresponding to our arteries and veins, but seems to bathe the other tissues without being confined to special channels. There is, however, a long, narrow membranous sac, situated near the upper surface of the body, which forms a sort of *heart*, the pulsations of which can be distinctly seen in many thin-skinned insects, especially in larvæ. This tube is called the *dorsal vessel*, and is divided into several chambers by valves which permit the blood to pass only in a forward direction. The blood enters the dorsal vessel through openings in its sides, and, flowing toward the head, is expelled through a large artery called the *aorta*, from whence its course can no longer be traced. In its progress it is aerified by contact with the air vessels and mixed with chyle from the stomach, and is thus prepared to nourish the organism. It is scant in quantity compared with the blood of vertebrates, and the circulation seems to be slow.

Respiration or breathing in insects is performed, not through a single trachea or air-pipe communicating with a pair of lungs, as in most of the higher animals, but through a series of delicate tubes which divide and subdivide so as to permeate all parts of the body. The openings to these tubes are in most insects on the sides of the seg-

ments, and are termed the *spiracles* or *stigmata*. They vary in number from two in some water insects to eleven, usually nine, pairs, and are often quite conspicuous, especially in larvæ. In their perfect state insects breathe mainly through the first four or five pairs of orifices, and consequently most species may be easily suffocated and killed by a sharp pinch or continued pressure on the thorax. Many insects have large vesicles connected with the trachea which they inflate when about to fly, thus lessening their specific gravity and enabling them to continue long on the wing with less muscular exertion than would otherwise be necessary. The breathing organs of aquatic insects are termed *branchia*. They are analogous to the gills of fishes and present many very singular forms.

The organs of *Nutrition* are few in number and simple in structure. They consist principally of the mouth, already described, by which the food is seized and masticated, and, internally, of a large, long tube in which digestion takes place. This tube is the alimentary canal, and occupies a central position in the body of the insect. In the more lowly species it is simply a straight duct or sac extending the whole length of the body; but in the highly organized forms it is contracted at intervals so as to form several chambers, each of which has a distinct function. It terminates in a convolution of minute tubes that are supposed to represent the liver and the small intestines of higher animals. The æsophagus or gullet opens into the first chamber or cavity of the central canal, which is analogous to the crop. This in turn communicates with a smaller cavity, which is ridged internally or covered with hard, tooth-like points, and performs the office of a gizzard, from which the food passes into the largest alimentary division, representing the true stomach. In the latter are secreted the gastric and pancreatic fluids, which, mingling with the comminuted food, prepare it to nourish the system. The digestive powers of insects are enormous in proportion to their size, many species of herbivorous larvæ being capable of digesting more than twice their own weight of leaves in the course of a day.

The organs of secretion, aside from those that elaborate the fluids necessary to digestion, consist mainly of the *salivary*, *odoriferous* and *poison* glands. The salivary glands, so called, are greatly developed in such insects as the silk-worm, and the bee and wasp. They consist of two tubes, running parallel to the anterior portion of the alimentary canal. In the silk-worm and other larvæ of the same family these glands secrete the gum which, when drawn out through a little pointed tube beneath the mouth, becomes the beautiful and valuable fiber known as *silk*.

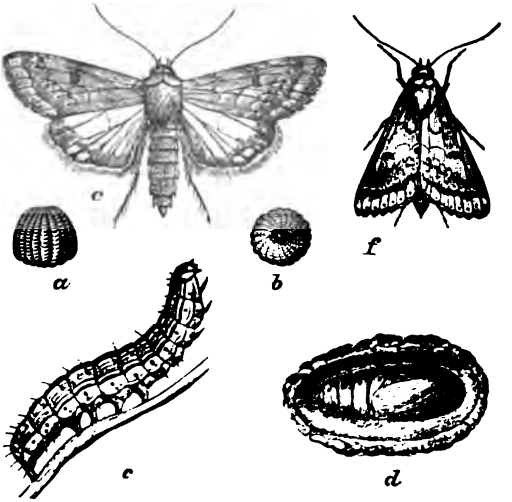
The salivary fluid is used by the bee and wasp to moisten and cement the particles of sap and wood from which the brood and honey cells are made.

The odoriferous organs are of various construction, and are located in some species in one part of the body, and in others in another. They are designed in some cases as a means of attraction between the sexes; in others to repel the attacks of their enemies.

The poison glands are situated sometimes in the mouth, but more frequently at the tip of the abdomen. The poison is of the nature of an acid, and is injected into wounds made by the jaws or by the piercer or sting. Its use is to ward off or revenge the attacks of foes and to paralyze or kill the prey required by the insect for its own food or as food for its young.

CHAPTER VI.

TRANSFORMATION OF INSECTS.



Transformations of a lepidopterous insect, the corn worm or boll worm *(Heliothes armigera)*, after Riley; *a*, *b*, egg, magnified; *c*, larvæ; *d*, pupa; *e f*, imago or moth.

The *transformations* or *metamorphoses* of insects have been already alluded to as one of their most peculiar and interesting characteristics. These are certain changes of form and habit by which the life of every insect, after hatching, is divided into three more or less distinct periods or stages.

Transformation may be either *complete* or *partial*. It is *complete* when the appearance and general habit of the insect is so different at each stage of its existence, that only experience enables us to recognize the various forms as pertaining to the same individual; and *partial* when the insect retains essentially the same form and habit during life, its

successive stages of development being marked only by the acquisition of certain organs and appendages.

The most familiar example of complete transformation is afforded by an insect which in its first active state is a sluggish, worm-like caterpillar, feeding voraciously on herbage, and changing in due time to the inactive, casket-like chrysalis, which bears as little resemblance to the larvæ that preceded it as to the imago that shall ultimately escape from it, viz., the broad-winged, bright-hued butterfly, instinct with graceful activity, as it hovers over the flowers from which it sips is sole nourishment, a dainty draught of nectar. Examples of partial transformation are found in such insects as grasshoppers, locusts, true bugs, etc.

The life of an insect begins with the embryo contained in an egg. Instinct guides the parent insect in the placing of her eggs, so that her progeny, as soon as hatched, find themselve surrounded with the kind of food they require. The eggs of insects are of various forms—round, oval, conical or disk-like. They are deposited singly or in clusters; sometimes openly exposed on the surfaces of leaves or stems, sometimes concealed with the utmost ingenuity. Those of many species are beautifully colored or elegantly sculptured. The eggs of some small insects which produce but few are proportionately large, while on the other hand many large insects lay very minute eggs, but make up in number what is lacking in size.

The insect in hatching from the egg enters on its larval stage of existence. This is the form in which all actual growth takes place, and in which, as a consequence, the insect requires most food. It may, in succeeding stages of development, assume different forms and acquire additional members, but it never really increases in bulk.

The larvæ of the various kinds of insects differ so much in appearance, and in many other respects, that it is difficult to give a list of characters that are common to all. The typical form is more or less worm-like: *i. e.*, cylindrical and elongate; but the variations from this type are exceedingly numerous, even among insects whose transformations are complete; while those that undergo only partial transformation do not conform to it at all.

In the majority of larvæ the thorax and abdomen are not distinct, except that the first mentioned region is often provided with the rudiments of legs. The latter are of a shelly texture, small and pointed at the extremity, with three or four joints. They are six in number, and are termed the *true* or *thoracic* legs, to distinguish them from the fleshy disks called *false legs* or *prolegs*, which in many species support the hinder part of the body.

Many larvæ, such as those of bees, flies and some species of beetles, have neither legs nor prolegs—their movements, in consequence of this lack, being much restricted.

In their habits larvæ are either *active* or *inactive*. The former—including by far the larger proportion of the young of insects—are capable of sufficient exertion to enable them to provide for their own necessities.

Inactive or sedentary larvæ, on the contrary, are hatched in cells or chambers, which they never leave, and subsist upon food previously stored for their use, or, as in the case of bees and ants, they are the objects of constant attention from the mature insects.

In the course of their growth all larvæ *molt* or shed their skins several times. This singular process becomes necessary at intervals, because the external covering will only admit of stretching to a limited extent. A new skin is constantly forming under the outer one, and when the latter becomes too tight it is—after some preliminary fasting and other preparation—ruptured and cast off, and the larvæ appears in a new and for a time, more elastic dress. The usual number of molts is four or five. A few insects of the lower orders molt but twice, while others, especially certain aquatic species and others whose larval life is long, molt from ten to twenty times. Sedentary larvæ shed their skins in shreds and by degrees.

The length of larval life varies with the different species. Many complete their growth in a very short time, often within a week, while some continue to grow from one to several years. The average length of larval life among herbivorous insects is about four weeks.

When the limit of growth is reached the larva ceases to feed, and, guided by instinct, prepares for its first transformation. Inactive larvæ spin a slight web around their delicate bodies, and some kinds are sealed up in their cells by the mature insects.

Active larvæ take various measures to secure themselves from observation and injury during the time when they shall be powerless to escape from or defend themselves against their enemies. Some creep into crevices of stones or bark, or hide ingeniously among crumpled leaves. A large proportion burrow into the earth; others spin for their protection thick, silken or parchment-like cocoons, while some require nothing more than a retired nook in which to suspend themselves by slender but strong cables of silk. After a longer or shorter rest in their various retreats, the larval skins are cast off for the last time, and each insect appears in a new and entirely different form and is termed a *pupa*.

In the pupa state most insects are quiescent and apparently lifeless, and while it continues are incapable of taking food or performing any of the active functions of life. Pupæ that are enclosed in cocoons or cells are termed *folliculate.* A pupa destined to give forth a butterfly is designated a *chrysalis*, from a Greek word meaning *golden,* in reference to the gilded ornamentation of many chrysalides.

There are two forms of quiescent pupæ, the *obtected* and the *coarctate.* In the first mentioned form the legs, wings and antennæ of the future imago are shown, each enclosed in a separate sheath. The pupæ of bees, wasps, beetles, etc., are obtected. In coarctate pupæ a continuous shell encloses the members as well as the body of the insect.

The pupæ of insects not subject to complete metamorphosis are *active,* and do not differ much either in form or habit from the full-grown larvæ, except in the greater development of the rudimentary wings.

After a certain time, varying with the nature of the insect and with the season of the year, the second transformation takes place and the insect issues from the pupa shell in its mature or *perfect* form.

In this stage of its existence it is, with a few exceptions, characterized by the possession of fully developed wings. It has also large, compound eyes, conspicuous antennæ and various other organs which did not appear in its preceding forms. The head, thorax and abdomen are now well-defined regions, and the sexes can usually be distinguished with ease. In most species the females are larger than the males, and the latter, besides being more slender in body, are often more gaily colored and have the antennæ longer or more ornamental than those of the female.

The abdomen of the female is furnished with an ingenious instrument called an *ovipositor*, through which the eggs are conducted to such situations as will be most favorable to the future larvæ. It serves not only to place the eggs, but is used by many insects to drill holes or saw slits or otherwise prepare suitable receptacles for them. In such species the ovipositor is usually a very conspicuous appendage. In others it is, when not in use, drawn entirely within the body.

As previously remarked, after insects have acquired their wings *they never grow.* Thus the idea that little flies or gnats develop into "house-flies" or "blue-bottles," as some people suppose, or that *little* beetles or bugs or butterflies ever grow to be *large* beetles or bugs or butterflies, is seen to be entirely erroneous.

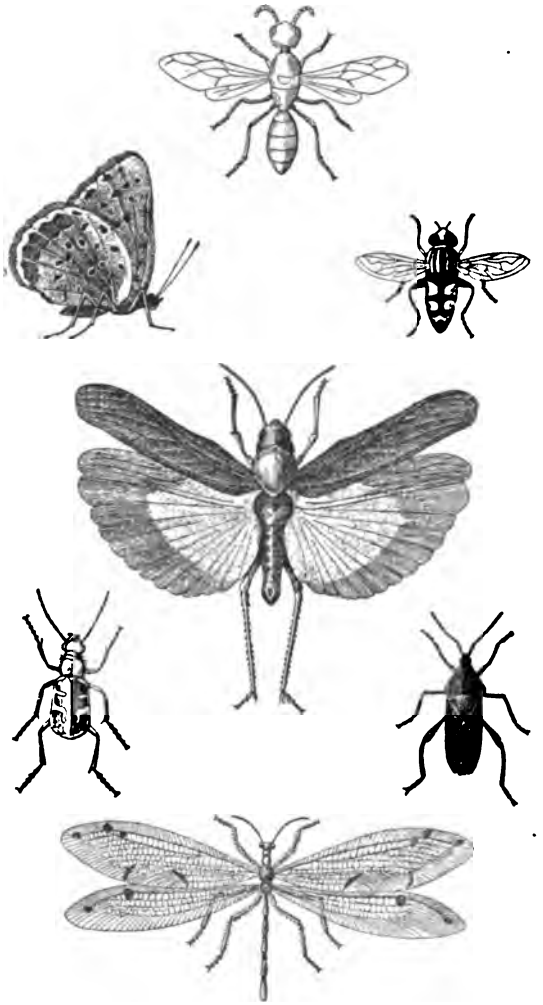
Since perfect insects do not grow, it follows that they require but little food; some are incapable of taking even a sip of dew or nectar.

Others, like the butterfly and wasp, have a very different diet from that upon which they subsisted as larvæ. Some species, however, such as locusts, leaf-eating beetles, etc., retain their voracious propensities throughout life.

Hyper-metamorphosis, which attends the development of a few species of parasitic beetles and some flies of the Ephemera family, is the assumption of more than the usual number of forms in the process of growth. The transformations of such species are not invariably from a lower to a higher organization, but some of the intermediate stages are often of a retrograde character. This anomalous mode of development will be illustrated in succeeding chapters in connection with the history of the Blister beetles, Bee parasites and Nerve-winged flies.

Such is an outline of the history, continually repeated, of all insect life; but the number of species is so vast, and their forms and habits so different, that the careful observer finds an infinite variety of detail which gives continual novelty and interest to the subject.

Illustrations of the Seven Principal Orders of Insects.



Wood-boring Wasp, Order I.

Butterfly, Order III. Syrphus fly, Order IV.

Locust, Order VI.

Beetle, Order II. Bug, Order V.

Ant-Lion, Order VII.

CHAPTER VII.

CLASSIFICATION AND NAMES OF INSECTS.

Having in preceding chapters considered the characters by which insects are distinguished from all other animals, we shall now proceed to notice those by which they may be distinguished from each other.

As a preliminary to such observation it will be a good plan for the student to collect for an hour or two in various situations—field, wood and water-courses— all the insects that he can find. When these are examined he will perceive at a glance that they are not all alike—that they differ in form, size, color, and in many points of structure. He may then proceed to assort them, placing together those that appear to be exactly alike. The next step will be to compare the different lots, when it will be found that several of these closely resemble one or more of the other lots, and such may be arranged side by side. Still other combinations may be made with these compound groups, until finally the entire collection will be embraced in a few comprehensive assemblages. These groups may be considered to represent *Species, Genera, Families* and *Orders*.

Classification consists in a systematic arrangement of specimens according to their place in each division, thus showing their near and their remote relationships. By means of it we are enabled to consider a multitude of organic forms under a few general heads.

A *Species* comprises all individuals that are supposed to have had a common parentage, and are exactly alike in all essential points of structure and habit.

A *Genus* (plural *genera*) is an assemblage of species that are not the same in all particulars, but have more points of resemblance than of difference.

The characters upon which genera are based are different in the different families of insects, and even concerning insects in the same family the opinions of entomologists differ as to what constitutes a character of generic value.

A *Family* includes all the genera that have in common a few important peculiarities of form and habit.

A *Tribe* is an assemblage of families whose relationship, though remote, is inferred from the similar structure of a few organs.

An *Order* includes all these groups and is founded upon agreement in general structure and mode of development.

With insects, as with all other organic beings, the *species* is the *root* of classification—the only group defined by nature. All other associations of forms, though based upon natural affinities, have been devised by man, and, being in a sense artificial, are liable to rearrangement, restriction or extension whenever new discoveries, or the adoption of new theories of classification, make such changes seem desirable.

In classifying insects we first group them according to their general structure: *i. e.*, arrange them in their proper Order, Tribe, Family etc., which is ordinarily quite easy, after which we proceed to look up the more difficult matters of genus and species.

The first step, then, is to determine in which Order a given specimen belongs. This can usually be decided without difficulty by an examination of the *wings*, for in the system of classification most generally adopted, the Orders—*seven* in number—are mainly founded upon the character of these conspicuous and important organs, and the names of these Orders are Greek compounds of which the termination *ptera* means *wings*, while the prefix describes the *kind* of wing.

There is some difference of opinion among writers as to the relative rank of the Orders, but the following arrangement seems most in harmony with the development of the insects included in each Order, and has the sanction of a majority of the best authorities:

I. HYMENOPTERA (membrane-wings), bees, wasps, ants, etc.
II. COLEOPTERA (sheath-wings), beetles.
III. LEPIDOPTERA (scale-wings), butterflies and moths.
IV. DIPTERA (two wings), house-flies, mosquitoes, gnats, etc.
V. HEMIPTERA (half-wings), true bugs, cicadas, plant lice, etc.
VI. ORTHOPTERA (straight-wings), grasshoppers, katy-dids, crickets, etc.
VII. NEUROPTERA (nerve-wings), dragon-flies, lace-wing flies, etc.

Two of these orders, COLEOPTERA and DIPTERA, were defined according to the type of wing, by the Greek philosopher Aristotle, more than three hundred years before the Christian era. Thus it will be seen that entomology is one of the most ancient of the natural sciences, although for many centuries it made little or no true progress.

Adopting the idea of Aristotle, Linnæus (or Linne), a Swedish naturalist, and the most celebrated one of the eighteenth century, proposed five additional orders. In his system, however, the ORTHOPTERA were included with the HEMIPTERA, and the seventh order APTERA was devised to contain all insects which, in their perfect state, lacked wings. But as it was long since discovered that wingless species and wingless females exist in each of the orders, from which it would be extremely inconvenient to separate them, the order APTERA was dropped and its number made good by a very necessary separation of the ORTHOPTERA from the HEMIPTERA.

Recent authors have multiplied and rearranged the orders of insects on various other plans, founded in many cases on very obvious natural distinctions, but the arrangement here presented forms a very good basis for subdivision, and meets with continued favor from a majority of our naturalists.

In science the name of every animal and plant is a double one: First, the name of the genus to which it belongs, called the *generic* name; and second, the name of the species which it represents, called the *specific* name. These scientific names are usually derived from the Greek and Latin or have their terminations from those languages.

The names of tribes often refer to the style of that particular organ in which all the species included in them agree. The names of families are usually adapted from that of the leading genus. The generic name may refer to some prominent characteristic of the typical species, or may be entirely fanciful. It is always a proper noun and should be written with a capital.

The specific name is sometimes from some attribute of the species, or from the plant or other substance on which it feeds, sometimes from a resemblance it bears to some other object, and not infrequently from the name of the discoverer or some person whom the describer wishes to compliment. It is either an adjective or a noun in the possessive case, and is now seldom written with a capital, not even when it is derived from the name of a person.

It often happens that the same species is described by two or more authors, and although the name first published is considered to be the correct one, it is not always easy to discover which this is. To prevent confusion, therefore, as well as to give each author credit for his work, it is customary to add after the name of the insect that of the author who bestowed it, thus: *Dynastes tityrus* of Linnæus, or *Papilio asterias*, Cramer. The names of the authors are commonly abbreviated as Linn. for Linnæus, Cram. for Cramer, Fabr. for Fabricius, etc.

Besides their scientific names, many insects have common or popular names. For instance, in this country we have the "Red Admiral" butterfly, the "Devil's riding horse," the "May beetle or June bug," the "Chinch bug," the "Weevil," and many others. Some of these names are known and correctly applied everywhere; others are very local, and in other sections of the country people would not know to what insect they pertained.

Another advantage in the use of the scientific name is that it is perfectly intelligible to educated people in all countries, and, when given in accordance with established rules, there is seldom any question

as to the species designated. Whenever, therefore, exactness is required, the scientific name should accompany the popular one, and in these cases it is enclosed in parenthesis. For example: The Golden Tortoise beetles *(Cassida aurichalcea,* Fabr).

CHAPTER VIII.

Order I. HYMENOPTERA.

[Fig. 9.]

Bald-faced Hornet *(Vespa maculata)*, after Riley.

This Order includes the Bees, Wasps, Ants, Ichneumon flies and other four-winged parasites, Gall flies, Saw flies, and a few Wood borers. These are not by any means the largest or most conspicuous of insects, but they occupy the highest rank on account of their perfection of form and the remarkable intelligence which many of them display. The three leading groups have from time immemorial attracted the attention of man by their interesting social relations, their industry, their mechanical skill, and their tender care for their young—in these respects displaying a wonderful analogy to the traits and enterprises of the human race.

Another reason for giving this Order precedence is that among its members we find the most complete metamorphosis—the larvæ being far more helpless and dependent on the personal care or the most painstaking prevision of the mature insects than is the case of the young of other Orders. In this, also, there is an interesting correspondence to man, who in infancy is utterly incapable of taking care of himself, far more so than any of the lower animals.

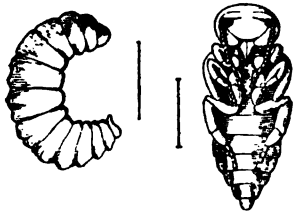
The frame of hymenopterous insects is, in most of the species, very hard and compact, especially on the thorax. The surface is, in some, smooth and polished, and often brilliantly colored; in others it is densely clothed with short hairs, giving it a resemblance to plush or velvet.

The head is comparatively large, and is attached, vertically, to the thorax by a short, slender neck, upon which it can be freely turned in any direction. The mouth is provided with apparatus for both bit-

ing and sucking, but the upper jaws (mandibles), though large and sharply toothed, are but little used in mastication, but serve instead as tools, of which very skillful and effective use is made in various mechanical enterprises. The lower jaws (maxillæ) and lower lips (labii) are greatly changed from the typical form, to adapt them for taking up liquid nourishment, upon which the perfect insects mainly subsist. The compound eyes cover a considerable portion of the head, and are either round, oblong or kidney-shaped (reniform). Upon the top of the head three small simple eyes (ocelli) can in most species be plainly seen. The antennæ are short and stout or long and slender (filiform), or flail-shaped: *i. e.*, bent in the middle and thickened more or less toward the tips.

The first joint of the thorax (the pro-thorax) is very narrow and on top crowded down almost or quite out of sight; but the second and third joints (the meso-thorax and meta-thorax) are large, and together form a compact and nearly globular division of the body. The legs vary considerably in form in the different groups, but are usually long and rather slender, and terminate in five-jointed feet (tarsi). The wings are composed of glassy or mica-like membrane, supported by a few strong veins. In a majority of the species they are quite narrow, the under pair being smaller than the upper, and during flight are attached to the latter by the row of minute hooks which may be seen on their upper (costal) edges, which catch into a ridge made for that purpose on the lower (inner) margin of the upper pair. In a great number of species of Hymenoptera the abdomen swells out in the middle, tapering to a point at the posterior end, and in the opposite direction to a slender joint, of greater or less length, called the *pedicel* or *petiole*, by which it is attached to the thorax. From six to eight rings or segments only can be distinguished in the abdomen. Each of these appears to be composed of *two* plates, an upper and a lower (a dorsal and a ventral), the former overlapping the latter on the sides. The tip of the abdomen of the female is always modified into an *ovipositor*. If this organ is connected with a poison gland and drawn within the body when not in use, it is called a *sting;* but if it is a conspicuous appendage and not capable of emitting poison, it is termed a *piercer*.

[Figs. 10 and 11,]



Larva and pupa of Wasp.

The larvæ of the higher Hymenoptera are, for the most part, soft, fleshy, footless grubs, confined during the whole of the growing period to the cells of wax, paper or mud in which they are hatched. Some species subsist upon food stored in their cells at the time the eggs from which they hatch are laid; others require constant feeding and care from the mature in-

sects that have them in charge. The larvæ of some of the lower families in the Order are more independent. The mother insect having placed her eggs upon the leaves or in the wood on which her instinct teaches her her young will thrive, the latter are, upon hatching, able to provide for themselves.

When full grown most of these larvæ spin a thin, oblong, silken cocoon, within which, after a short rest, they change to pupæ. The pupæ are quiescent and of the obtected form, each leg, wing and antenna being enclosed in its own sheath, which fits it as neatly as a glove finger fits a finger of the human hand.

All the members are closely applied to the body and remain immovable until the time of the second transformation. As a rule, eight or ten days only are passed in the pupa state. Then the membranous covering splits on the top of the thorax, the head, legs and embryo wings are drawn out of their coverings, and the insect gnaws open the end of its cocoon and lifts the covering to its cell—unless the latter is opened for it by one of the mature "worker" insects—and after a period of hardening and general preparation, varying from an hour or two to one or two days, it lifts itself by its strong new wings and sails away into the sunshine. The Hymenoptera are mostly diurnal insects, and are seldom seen upon the wing, except during warm, pleasant weather. The primary division of the Order, founded upon peculiarities of structure and habit, is into two sections:

1. *Stinging Insects* (ACULEATA), comprising the Bees, Wasps and Ants.

2. *Piercing Insects* (TEREBRANTIA), comprising several families of Parasitic Flies, Gall-flies, Saw-flies and Wood-borers. In the first section the sexes are distinguished by a difference in the number of the joints of the antennæ and the abdomen—the antennæ of the males having *thirteen* joints and the abdomen *seven* apparent segments, while the antennæ of the females have but *twelve* joints and the abdomen only *six* distinguishable segments. All the females belonging in this section have the ovipositor (the organ by which the eggs are placed) connected with two poison glands; and whenever this instrument is used as a *weapon*, a minute portion of the acrid fluid is forced into the wound made by its point and causes a burning and stinging pain.

This poison is used by certain wasps to paralyze other insects and spiders which they collect and store in cells as food for their young. In this case it does not *kill*, but produces in the victims a state of helpless torpor in which they continue until devoured by the wasp larvæ.

The Stinging Hymenoptera are separated into four very distinct tribes:

1st. Bees (*Anthophila*—flower-lovers).

2d. True Wasps (*Diploptera*—double-wings).

3d. Wood and Sand Wasps (*Fossores*—diggers).

4th. Ants (*Heterogyna*—different females).

Each of these tribes includes several families, the peculiarities of which will be noticed in succeeding chapters. The Piercing insects composing the second division of the Order are distinguished chiefly by the absence of the poison gland. In the higher families the form of the body and the venation of the wings are much like those of bees and wasps, the most obvious difference being the more lengthened abdomen and the *excerted* and often conspicuous ovipositor. The more lowly forms of the Piercing species have the abdomen joined to the thorax by a wide base instead of a slender pedicel, the wings are more net-veined, and in their immature stages they approach certain groups of the Lepidoptera. The section is subdivided into two comprehensive tribes:

1st. Four-winged Parasites (*Entomophaga*—insect-eaters).

2d. Saw-flies and Wood-borers (*Phytophaga*—plant-eaters).

The Plant-eaters include almost all the insects in the Order that are seriously injurious. All the others are either beneficial—some of them in a very high degree—or neutral in their relations to man.

CHAPTER IX.

Order HYMENOPTERA. Section ACULEATA.

BEES (*Anthophila*).

[Fig. 12.]

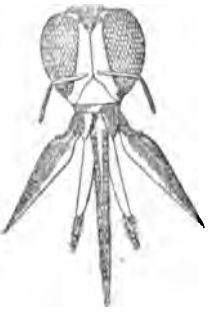
Honey Bee.

The Bees are very appropriately termed the "Flower-lovers," since they are, in all stages of their lives, wholly dependent upon the floral products, nectar and pollen, for their food. And in the economy of nature this dependence is, to a great extent, mutual; for while the Bees are seeking sustenance for themselves and their young from flower to flower, they are at the same time unconsciously assisting the latter to produce good seed as a result of cross-fertilization, the pollen from the stamens of one plant or blossom being carried by them to the pistils of another.

Thus we see that while Bees could not live without flowers, many flowering plants would soon cease to exist but for the agency of Bees in assisting them to a vigorous development.

It is said there are over two thousand species of bees, the majority of which are small-sized and plainly-colored insects. They are distinguished from other Hymenoptera by the structure of the mouth and legs, which are peculiarly adapted for collecting and conveying nectar and pollen. The mouth of the Honey Bee, for example, is quite different from that of other biting insects. To the naked eye it appears like a bundle of flat, pointed bristles, but when examined under the microscope these take the forms represented in Fig. 13. The outer jaws are large and strong, adapted for use as tools, such as scissors, knives, trowels, and so forth. The inner or lower jaws (maxillæ), of which there are two pairs, consist of long, slender jointed blades, which are used for piercing and probing, while the under lip (labium) is prolonged into a sort of hairy tongue, very flexible, with which the nectar of flowers is lapped up, and with the aid of the maxillæ drawn back and deposited in the "honey crop" or *provenculus* where, by some mysterious chemical process, the crude nectar is transformed into the delicious substance known as honey. Such proportion of it as is required by the insect for food passes onward through the digestive tubes, while the surplus is regurgitated into cells and stored for food for itself or the young of which it has the care.

[Fig. 13.]



Head of Bee.

When not in use, all these lengthened mouth parts are drawn close together and bent under the chin.

The modification of the legs, especially of the hinder pair, is to adapt them to the work of gathering and carrying pollen. The shank (tibia) is broad and somewhat hollowed out on the inner surface, and has a rim of stiff hairs, thus forming a sort of basket in which the pollen is piled when it has been gathered by the feet, the basal joints of which are enlarged and otherwise especially adapted for the purpose, and when also it has been brushed by the front and middle legs from other parts of the hairy body on which it has accumulated in the repeated divings of the insect into the cup of flowers.

The sting is a slender tube formed of three blades, which may be protruded from the abdomen, the tip of which has a needle-like point and in some species is barbed. It serves not only as an ovipositor, but at the will of the insect, as a weapon, in the latter case conveying into the wound made by it a minute portion of an acrid fluid—the pediceled

abdomen enabling the insect to thrust its sting with considerable force. The poison is of an acid nature and may be neutralized with an alkali. An important secretion of many bees is the product known as *wax*. This is an exudation from the under surface of the abdomen, which Prof. Cook describes as "a solid unctuous substance and is, as shown by its chemical composition, a fat-like material. * * * It is formed by the secreting membrane, and there are four "wax pockets" on each side."

[Fig. 14.]

Front Leg of Honey Bee.

The front legs of honey bees are provided with an ingenious contrivance for dressing the antennæ. It is a movable spur at the end of the thigh which closes over a notch in the base of the tibia, the antennæ being drawn through the aperture thus formed. Several other functions for this contrivance have been suggested.

In consideration of a difference in the length of the mouth parts, the bees are separated into two families:

APIDÆ—long-tongued bees; and
ANDRENIDÆ—short-tongued bees.

They are further distinguished, according to their relations with each other, as *Social*, *Solitary* and *Parasitic* or *Cuckoo* bees.

In this country there are but two genera of social bees, namely, the genus *Apis*, which contains but one species—*mellifica*, the well-known Hive or Honey bee, and the genus *Bombus*, containing about fifty species of the almost equally well-known Humble or Bumble bees.

All social bees, as well as other insects of the same habit, live together in larger or smaller communities, and have a regular system of government and labor—a sort of ideal communism—in which no individual is independent, but each performs certain duties for the common good. Among the bees each colony contains three sorts of individuals: one or more perfect females, or *queens*, which are the mothers of the swarm; a considerable number of males or *drones*, only permitted or developed in the hive or nest at certain seasons, and a great number of smaller, imperfect females, most appropriately termed "*workers*," since upon them devolve all the labors of the colony.

The typical species of this group is the Hive bee, celebrated from time immemorial in sacred as well as classic literature, for the delicious and useful products of its industry, honey and wax; for its intelligence and mechanical skill, and its various peculiar developments and adaptations. Although an introduced species, it is now thoroughly natural-

ized in this country, and is often found wild in forests, where it inhabits hollow trees. It is said, however, that it never occurs far from the habitations of men, which fact caused the Indians, in earlier times, to call it the "white man's fly." It may be considered, indeed, like the silk-worm, a thoroughly domesticated insect; and though so familiar to us, the study of its habits has never lost its fascination nor its reward in the discovery of some remarkable attribute or power.

The form of the worker bee, with its compact, hairy body, its strong wings, its large but widely separated eyes, its long proboscis, and its sharp sting—which has the peculiarity of being barbed, and of causing the death of its user by its loss, if thrust too vigorously into the skin of the offender—is familiar to every one who has ever walked in field or garden. The queen bee is less frequently seen, even by the careful observer, although, where glass hives are used, she can occasionally be noticed in her promenades among the brood cells. She has a much longer body than the worker, and her proboscis and the pollen baskets on the hinder tibiæ are not so well developed. But one perfect queen mother is permitted in a hive at one time, and when the colony grows too large for its quarters, the mature queen goes with the migrating swarm, and her place and office in the hive is assumed by one of the young queens, of which, in the swarming season, there are always a number at the point of development. At this season, too, the males or *drones* are found in the hive in greatest numbers. These are stouter bodied than the worker bees, and have the mouth parts and legs less perfectly developed, while the eyes are larger and almost meet at the top of the head. They are hatched from unimpregnated eggs laid by an occasional fertile worker, or by an unmated queen, or, most remarkable of all, by a fertile queen, when she chooses to allow an egg to pass through the oviduct without contact with the sperm cells stored, after pairing, in her *spermathica*. In view of this we learn that the queen bee possesses a power not shared, so far as known, by any other animal, viz.: that of controlling the sex of her offspring at will. The queen cells are more than twice the size of those built for the rearing of workers, and are placed here and there on the edges of the brood comb and at right angles to the worker cells. The egg and embryo are of the same nature as those designed to produce workers, and the queens or perfect females result from their more spacious cells and the more nitrogenized food called "royal jelly" on which they are fed. The average life of the queen is from two to three years, and instances are on record of her attaining the age of five years. During the ordinary period of life she lays between one and two millions of eggs. The life of the worker seldom exceeds eight or nine months and that of the drone two or three.

The period of development, from the laying of the egg until the capping of the cells by the workers, when the larvæ are full grown, is said is said to be eight days. During this time they are regularly fed and attended by the younger workers, on which devolves the office of nurses. After the cell is covered the larva spins around itself a very delicate cocoon of silk, within which it transforms to pupa. The latter has all the members and the form of the mature insect, but all in a very soft state and closely appressed to the body. After a repose of about three weeks the young bees emerge, but remain in the hive for a few days, until the wings and other members are sufficiently hardened to be ready for duty. The hive bee is not torpid during winter, although many of its activities are suspended. It appropriates large quantities of honey and generates heat in proportion to the degree of atmospheric cold. On the other hand, in every hot weather in summer, the bees, by the vibrations of their wings, are able to cool and ventilate their hives.

Next in popular interest to the Honey bee, although they do not contribute directly to our luxuries, are the large, clumsy, noisy Humble bees. They are the largest insects in their tribe. In color they are black or black banded with yellow, and the entire body is densely covered with short, stiff hair. The wings, instead of being transparent, are of a purplish or smoky hue. The tongue and maxillæ are longer than those of the Honey bee, but constructed on the same plan, and the added length enables these insects to extract the nectar from and thus be the means of cross-fertilizing many flowers—among them the red clover—in which the sweets are inaccessible to the former species. The jaws are broad and strong, adapted for digging in the earth. The nests of the largest species, *Bombus pennsylvanicus*, De Geer, are usually, if not invariably, made underground, sometimes in little caves made for the purpose, but often in the deserted burrows of field mice or similar cavities for the sake of economizing labor. Only the queens or fertile females live over winter, and in the spring each one of these founds a separate colony. Her mode of procedure is as follows: After she has selected and prepared her home, she gathers a quantity of pollen and honey, which she kneads into a mass, and upon which she deposits a number of eggs. From these the larvæ hatch in a few days and eat their way into the ball of bee-bread in different directions, growing, meantime, very rapidly. The rude cells thus formed are from time to time strengthened and extended with wax by the mother bee, until the larvæ are sealed up for transformation. The first brood are all workers, and as they mature the queen relinquishes her outside labors to them, and devotes herself exclusively to increasing the numbers of the colony. About the middle of the season drone and queen

cells are built, and upon the emergence of the occupants the two sexes take their marriage flight together, after which, upon the approach of cold weather, the colony disbands, and all except the perfect females soon perish. The latter seek shelter about buildings, in hollows of trees, and possibly some return to the nest and remain dormant through the winter, reviving when spring returns to repeat the annual process of founding new colonies and reproducing the species.

The Humble bees are far less skillful and exact in their mechanical efforts than the Honey bee. The cells are oval instead of hexagonal, and very irregularly placed, and honey and brood-comb are intermixed without much order. The honey is very sweet, but somewhat rank-flavored, and in many persons produces headache, while the wax is dark, coarse-grained and doughy.

The economy of the Solitary bees, belonging in the family APIDÆ is quite different from that of the social species. Each pair, or more properly each female, builds and provisions a separate nest, which consists of from a half-dozen to a great number of cells. A quantity of food, prepared mainly from pollen, is stored in each cell, in which a single egg is also deposited. The cell is then closed and the mother insect takes no further care for her young.

The most interesting and conspicuous of the Soliary species are the Carpenter, the Mason, the Upholsterer and the Leaf-cutter bees.

The Carpenter bees (genus *Xylocopa)* contain a few species which rival the Humble bee in size, and in many other respects closely resemble them. They may, however, be distinguished from the latter at a glance by the smooth top of the abdomen, which is entirely of a glossy black. Upon closer examination, the jaws (mandibles) are found to be very powerful and sharply toothed. The basal joint of the hind feet is very long and clothed with long stiff hairs, appearing much like a bottle brush.

These bees bore holes in solid, but not growing, wood, being often found at work in the cornices of houses and other buildings, in which they make tunnels a foot or more in length. The entrance, for the depth of an inch or more, is cut direct across the grain of the wood, but the tunnel proper is at right angles to this, with the grain of the wood. In this, numerous cells are partitioned off, the walls being built from the chips or raspings, cemented with a sticky fluid from the mouth of the little artisan. Beginning at the end farthest from the entrance, each cell is finished, provided with a quantity of the usual bee food, and the egg laid, before the partition wall is put up. It follows that there is a considerable interval of time between the com-

pletion of the first and last cells, and whether the first laid eggs are last to hatch, or whether, upon development, the young bees in the more remote cells, remain quiet until those nearest the entrance open open a passage-way, has not been ascertained; but at all events, they do not emerge until their younger brothers and sisters have passed out before them.

The Mason bees (genus *Osmia)* are a group of small, handsome bees of a metallic bluish or green color. They derive their name from their habit of using clay, or a peculiar mortar which they prepare from fine gravel, in the construction of their variously shaped cells. These may often be found plastered against the sides of buildings, upon the branches of trees, and sometimes even upon leaves, or within oak-galls, separately, or in small groups. They are rough on the outside but smooth and polished within. A few species belonging to this genus are said to excavate tunnels in soft or decayed wood in which to protect their cells. Dr. Riley says of *Anthopora sponsa*, an allied species, that it "builds mostly in steeply inclined or perpendicular clay-banks, and, in addition, extends a tube of clay from the entrance. The burrow has usually two branches, which decline about an inch from the surface of the bank, and (in them) six or eight cells are arranged end to end. By means of saliva the inside of the cell is rendered impervious to the moisture of the honey and bee-bread stored in it for the young."

The Upholsterer bees *(genus Ceratina)* resemble the Mason bees in form and color. They build their nests on a plan very similar to that of the Carpenter bees, but instead of boring into solid wood they select that which is soft from decay, or confine themselves to the pithy stems of such shrubs as the elder or blackberry, or the stalks of the more robust weeds. The walls of the cells are lined and the partitions made of a delicate silken web—the "upholstery" from which they derive their popular name.

The Leaf-cutter or Taylor bees *(genus Megachile)*, also in most instances excavate the pithy stems of shrubs in which to build their nests. In other cases they select tough leaves, which they contrive to roll into cylinders and fasten firmly for the protection of the cells. Within these tunnels they prepare a number of cells, forming the partitions and covering the walls with sections of delicate leaves or of the petals of flowers. One species, *M. centuncularis,* is a serious pest to the flower garden, always, with rare good taste, selecting the most delicately colored of the roses, geraniums and other choice flowers for her curtains and coverlets. This is a rather stout, short-bodied bee of a dull black color, banded with yellowish gray. The head is broad and the scissors-like jaws are very strong, and the swiftness

with which they cut out the circular pieces of leaf or petal is something astonishing. The cells are over half an inch in length, nine or ten in a row, placed end to end. As, in the latitude of St. Louis, these bees may be seen at work from May until September, there are doubtless several broods in a season.

Bees belonging in the family *Andrenidæ* are distinguished by having the tongue short and rather broad, and the most characteristic genus *(Andrena)* can be recognized by a lock of long curled hair on each trocanter. The colors are dark, banded with dull red. This family of bees includes a large number of small, prettily colored insects which make their nests in tunnels excavated horizontally in banks or perpendicularly in level ground. The tunnels commonly consist of a straight gallery into which the separate cells open on all sides.

Many species of both *Apidæ* and *Andrenidæ* are sorely annoyed by Parasitic or Cuckoo bees. These build no nests for themselves, but when one of them discovers a Carpenter or Mason or other bee at work, she constantly hovers about the spot, and as fast as the cells are completed she slips in and deposits her eggs, always choosing her time when the builder is absent. The larvæ from these eggs usually kill the rightful tenants of the cells, or the latter perish from starvation because the intruder has devoured the lion's share of the food. A few of the Cuckoo bees are rather guests than parasites, living very amicably with their hosts, on whose bounty their young are reared. This is the case especially with those that choose their homes with the social species. A certain large species of *Apathus* is said to live in this way in the nests of Humble bees, and the mature insects, which are similar in appearance, are often seen together, harmoniously sipping nectar from adjoining flowers.

The habits of all wild bees are extremely interesting subjects for study, and have not by any means been thoroughly investigated.

CHAPTER X.

Order HYMENOPTERA. Section ACULEATA.

TRUE WASPS AND DIGGER WASPS.

[Fig. 15.]

Digger-wasp, *stigus speciosus*.

The True wasps are termed DIPLOPTERA (double wings), because when not flying the upper wings are always longitudinally folded. This manner of carrying the wings is the most obvious structural distinction between this group and the Fossorial or Digging wasps. In this tribe of insects the body wall, or external envelope, is harder, and, as a rule, smoother, than that of bees, although some species have parts of the body clothed with a velvety pubescence. The neck is very short and the head wide at the top, giving a somewhat triangular shape to the face. The jaws are broad and strong, with sharp teeth, while the inner jaws and tongue, though shorter than those of bees, are not so flexible, still admit of the extraction of nectar from the more open flower cups. Both pairs of palpi are well developed, and on each side of the tongue is a similar supplementary organ called a *parraglossa*.

The eyes are large and hollowed out in the middle (see Fig 2, pt. 1st), and the ocelli are unusually prominent. The legs are mostly smooth and cylindrical, but the shanks are provided with long, thorn-like spurs, and the joints of the feet are also spiny. The females have a formidable sting, but the males, as with nearly all other insects, are unarmed.

The larvæ are much like those of bees, except that they are somewhat larger on the anterior end. They are reared in cells of paper or mud, for wasps are incapable of excreting wax, and are fed mainly on animal food—such as the soft bodies of flies, larvæ, bits of fresh meat and the like—few, if any, being fed on the honey and pollen that form the sole nourishment of the mature insects.

Like the bees, this tribe of wasps has its social and its solitary species.

The best representative of the former is the Bald-faced Hornet (*Vespa maculata*, Linn.,) an insect with whose large gray paper nests—often eight or ten inches in diameter—and whose fierce sting every school-boy is familiar. The habits of this species are much like those of the Humble bees. The perfect females, only, hibernate, and when the spring is well advanced each one forms a few cells, mainly from a glutinous secretion from the mouth, but apparently mingled with a little woody fiber. These are attached by a slender pedicel, with the opening downward, to a branch of some low tree or similar and secluded support. The eggs are glued into the cells, and the young larvæ, with heads down, are at first fastened in the same manner, but as they grow the swelling of the segments next the head serves to keep them in position.

These first larvæ speedily develop into workers and release the queen from her labors. The tier of cells is added to on all sides, and over it is built an umbrella-like roof, the materials being mainly fibers of weather-beaten wood, collected from old fences and unpainted buildings. This is masticated and mingled with the fluids from the mouth, and when thinly spread dries into a strong water-proof paper.

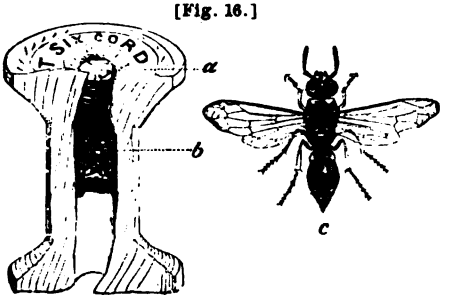
As the season advances and workers increase, successive tiers of cells are built, attached by strong silken pillars to those above, with galleries between, through which the wasps can easily move when caring for the young. The outer envelope too is enlarged and brought down at the sides, and finally made to completely enclose the nest. Late in summer a brood of perfect males and females is produced, and upon the approach of cold weather the ingenious little home is deserted, the mature insects, it is said, first stinging to death any larvæ or pupæ that remain, dragging them ruthlessly from their cells and casting them to the ground.

Some species of the genus *Vespa*—for example, the smaller and more brightly colored "Yellow jackets"—have their homes, like the Humble bees, underground.

The nests of the species belonging to the genus *Polistes* consist of a single tier of from ten to twenty or thirty cells, built in some sheltered situation and without any external enclosing wall. The species are more slender in form than the hornets, and are mostly of rust-red or brown colors. From their habit of attaching their clusters of open, gray paper cells under the cornices or window sills of our dwellings,

and from the familiarity with which they enter our rooms, especially in the autumn when the colonies are disbanding, scarcely any one can fail to have more or less knowledge of their appearance and habits.

[Fig. 16.]



Potter wasp—after Riley. Colors black and yellow; *a*, clay cover to cell; *b*, larva; *c*, wasp.

The few solitary species belonging to the group of "Double-wings" differ more in habit than in structure from the social species. No so-called "neuters" or workers exist among them. Each mother wasp builds her own series of cells, stores each with the requisite amount of food, carefully places her egg on the side of the cell, seals it up and leaves the larva to develop without any material supervision or care.

Among the most interesting of these is a small species, of a black color, banded and ornamented with pale yellow, which has a great partiality for building its mud cells (for these solitary species do not make paper, but are all masons) in key-holes and crevices indoors. On one occasion which came under my observation, one of these wasps took possession of some spools of thread standing on the sill of an open window, and built her cells in the spindle holes, as figured above. As fast as one spool was filled another was supplied, and in the course of three days nine spools, averaging three cells to a spool, had been completed. The food stored consisted of various small caterpillars, including several larvæ of the Codling moth, which had been stung with sufficient severity to produce paralysis but not death.

The cells were scarcely more than half an inch in depth. but into this small space six or seven or more larvæ would be crowded, packed with a deftness that was impossible of imitation by human fingers. The wasp larvæ developed rapidly, the young wasps appearing in less than two weeks.

The Digging wasps (tribe FOSSORES) contain the largest and most beautiful insects in the Order. (See Fig. 15.) Most of the species are easily distinguished from the True wasps by their spiny legs, their oval or roundish eyes, and especially by the wings not being folded in repose. All the species are solitary in their habits, and as a matter of course only males and perfect females are developed. A few of the species bore holes in dry or decayed wood, or excavate the stems of pithy plants, in which to construct their cells, while others, like the Mud-dauber *(Pelopœus)*, build a cluster of pipe-like cells plastered against a beam in some shed or out-building. The great majority, how-

ever, burrow into the earth, especially in sandy or gravelly situations, loosening the soil with their strong jaws and scrabbling it out with incredible rapidity with their spiny legs.

A separate hole is dug, six or seven or more inches deep, for each egg, at the bottom of which the latter is laid, after the nest has been provisioned with one large or several smaller insects or spiders reduced to torpor by the poisoned lance of the wasp. The shaft is then filled up, the earth smoothed over, and even bits of gravel so placed as to completely obliterate all trace of the excavation.

The Wood wasps (family CRABRONIDÆ), which bore into wood, feed their larvæ on plant lice, a great number of these tiny insects being required to provision a single cell. Species of the genus *Ammophila*—easily recognized by the very spiny legs and the long, slender pedicel gradually widening backward into the rather small abdomen—provide each nest with but one large caterpillar.

The elegant wasp known as the "Handsome Digger" (*Stizus speciosus*, Drury), represented in Fig. 15, a very large species of a black color gaily banded and otherwise marked with yellow, provisions its nest with harvest flies (Cicadas), making use of the seventeen-year species when they appear, as well as of the annual "drummers." A still larger species (*Pompilus formosus, Say*), of a dark blue color, common in the Southwestern States, is called the "Tarantula-killer," because it makes the large and venemous Tarantula, the most formidable of our spiders, its especial prey. The Digger wasps are a great terror to the insects upon which they prey, the latter seeming to recognize them instinctively as enemies from which there is no escape. Observers have noticed that even the Tarantula above mentioned, large and savage as it is, is seized with a violent tremor and appears to lose all courage as soon as it finds itself pursued by the fierce *Pompilus*.

A small black wasp belonging in the genus *Tiphia*, common in the north and west, is distinguished as one of the few insect enemies of the destructive White grub, its tough, brown, silken cocoons being frequently turned out by the plow in the spring from meadows and corn land.

All wasps, whether social or solitary, may be considered among beneficial species, for although the perfect insects feed only on honey and pollen, yet in providing for their young they destroy vast numbers of leaf and fruit-feeding larvæ as well as various grasshoppers, cicadas and flies. In preparing these insects to nourish their young the attending wasps of the social species thoroughly masticate and partly digest them before they regurgitate the pulp into the open mouths of the larvæ. The Solitary species, as we have seen, have a provision for

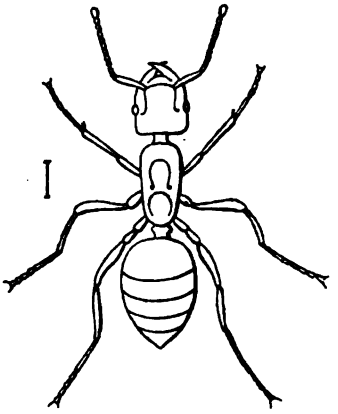
rendering the insects upon which their young are to feed helpless to escape or resist, and yet not fatally injured so that they would spoil before being required for food.

CHAPTER XI.

Order HYMENOPTERA. Section ACULEATA.

ANTS.

[Fig. 17.]



Worker Ant. *Formica.*

All the typical ants (composing the tribe HETEROGYNA) are social insects which rank next to and in some respects exceed the bees in their manifestations of ingenuity and intelligence.

A colony—termed a *formicarium*—as in the case of other social insects, always contains *three* and occasionally *four* distinct forms, males, females, workers, and sometimes *soldiers* or some other distinct class. The males and females at a certain period in their development acquire wings and arise from the nest. After sporting together for a time in the open air the females return to the nest or perhaps originate new colonies, and divest themselves of their wings, as these appendages in the retired life they henceforth lead, would be not only useless but cumbersome. The male ants, which are much smaller than the females, having once left the nest never return to it, and are usually short-lived. The workers and soldiers, which are imperfectly developed females, never acquire wings, and differ from the perfect individuals in having the joints of the thorax less compactly united, and the basal and sometimes the succeeding joint of the abdomen formed on top, into a sort of scale or node. The head is generally more or less triangular, the antennæ are long and elbowed, and seem to be the organs of communication

between the individuals of a colony. The jaws are strong and sharply notched, except in the slave-making species, in which they become almost useless as tools.

Some species are armed with a sting, and all secrete a peculiar acid, called *formic acid*, which has very characteristic properties, and produces a slight burning sensation upon the skin. This acid is attractive to certain insects which penetrate to the ants' nests to obtain it from their bodies. It is thought to have medicinal qualities, and in Switzerland a highly prized vinegar is made from it by boiling the insects in water. It is said that the lumbermen in our northern forests, in the event of a failure of their fruit supply, use these acid insects as a substitute.

Ants build their *formicaries* in various ways, according to their species. Some erect conical dwellings above ground from mortar of clay or sand; others, including a majority of the species, burrow into the earth; while others still inhabit hollow trees or excavate decayed stumps and logs. The nests are marvels of mechanical art, containing store-rooms, nurseries, galleries and other compartments, and are sometimes several stories in height, each story being supported upon pillars, arches and cross-beams.

Not only are these little creatures skillful artisans, but they seem to have quite complex social and governmental systems. When about to make war on a neighboring colony, they sally forth in regular columns, and appear to have a corps of officers who take turns in directing the movements. Several species of red and yellow ants capture and enslave various black species. The slaves are obtained by making war on the "negro ants;" and after the victory which they gain in a majority of the battles, they carry off the pupæ of the vanquished colony and rear them in their own nurseries. When the captives are mature, they do not attempt to escape, but seem entirely willing to procure food for their owners and to serve them in any capacity required.

The larvæ of ants are short, white cylindrical grubs, with small heads which are bent forward. These larvæ receive the most assiduous care from the workers. They are daily carried about to those parts of the nest where the temperature will best promote their growth. When the weather is pleasant, they are brought in the morning to the upper apartments, that they may receive the benefit of the sun's rays, and at evening they are again removed to the lower chambers where there is less exposure and more warmth. The food with which they are supplied must first be chewed and submitted to a process of partial digestion by the nurses before it is fed to them, and in all other ways they are the objects of the tenderest interest and attention.

In case of an accident to the nest, the safety of the larvæ and pupæ seems to be the first consideration, and the workers may be seen running hither and thither in great distress with their delicate white charges in their jaws, and which they will sacrifice their lives in the effort to protect.

Ants feed upon a variety of animal and vegetable substances, and while very fond of sweets, are not, like bees and wasps, restricted in their mature state, to a diet of pollen and nectar. Some species are quite valuable as scavengers, rapidly disposing of carrion.

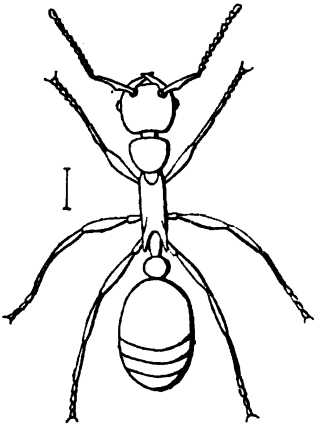
A very good way of obtaining a perfectly clean skeleton of a bird or other small animal is to place it near a large ants' nest. Every particle of flesh will soon be removed in the neatest manner. There are no species injurious to vegetation north of Florida, but in that State a certain species *(Solenopsis Xyloni*, McC) is said by Mr. Henry Hubbard to "seriously injure the orange by gnawing away the bark and causing an exudation of gum which seems, at certain seasons of the year, to become one of its principal sources of food supply." In other sections of the South this species makes reparation for such injuries by its attacks on the cotton-worm, of which there is no room to doubt that it kills great numbers.

The Leaf cutters are mainly Mexican and South American species, and are often very destructive to the foliage of the orange and other valuable trees. Among these appears the singular form of workers, distinguished as "soldiers," with enormously large heads and other peculiar adaptations. These are the protectors of the nest in time of danger, and take no part in other labors. Dr. McCook has also described most entertainingly the habits of the Agricultural ant, which clears the ground around its nest, sows it to a sort of grass which it in due time harvests, storing the seeds in its nest. In Texas and Mexico also occurs another very interesting species whose habits were investigated and published by the same gentleman, viz., the Honey ant. In the formicaries of this species, certain workers have the power of secreting honey from their food. This collects in the abdomen until the latter becomes enormously enlarged and the insect is incapable of dragging the heavy weight, and has to be fed by the less distended workers. This honey is not disgorged into cells, but is taken direct from the insect by the other inmates of the nest, and when the secretion is entirely exhausted the creature perishes.

Instead depending on members of their own colony for their sweets, some of our indigenous species domesticate in their nests certain root-feeding plant lice *(Aphides)*, which have been called the "ants' cows," because of the sweet fluid which they yield from their nectar tubes when caressed by the ant's antennæ. Indeed, all these nectar-

yielding aphids are great favorites with the ants, which take various measures for their protection, even when they cannot transport them to their nests.

The great majority of our ants belong in the genus *Formica*. These have no sting, but will sometimes bite severely if they have access to the tender skin. They have but one node between the pedicel and abdomen. Our largest species is *Formica pennsylvanica*, which is black, and three-fifths of an inch long. It is a wood-borer and may often be found in hollow trees and decaying stumps. *Formica sanguinea*, a medium-sized red species, is the most common slave, making ant.



Red Ant (*Myrmica*), greatly enlarged.

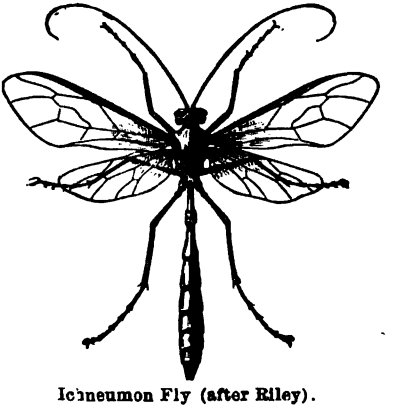
Ants belonging to the genus *Myrmica* are mostly small, bright-colored species, with two nodes or scales between the abdomen proper and the thorax. One of the species, *Myrmica molesta*, Say, is the small "red ant," often so troublesome to housekeepers.

CHAPTER XII.

Order HYMENOPTERA. Section TEREBRANTIA.

PARASITES AND GALL-FLIES.

[Fig. 19.]



Ichneumon Fly (after Riley).

This division of the HYMENOPTERA includes both the species that are of most service to man, and those that are most directly injurious. They are grouped in the same section because in all, the ovipositor is a *piercer*, adapted for penetrating either hard or soft substances. It is

usually a conspicuous appendage of the abdomen, and is of a variety of singular forms, but is not connected with any poison gland, and while that of some species may inflict a sharp prick, it is in no case a true sting.

Among the PIERCERS are found those species that vary most from what is considered the type of the Order, many of which, in points of their general structure, and in the forms of their larvæ, seem to be closely allied to the Lepidoptera.

The Piercers (TEREBRANTIA) are very conveniently separated into two tribes:

1. Insect eaters (ENTOMOPHAGA), Parasitic flies, and also Gall-flies, and a very few other vegetable feeders.

2. Plant eaters (PHYTOPHAGA), Saw-flies and Wood-borers. The first tribe includes a vast number of species, some with bodies, including the ovipositor, two inches or more in length, others so minute that their different parts can only be distinguished with a lens, the office of all of which seems to be to keep in check those members of its class which prey upon vegetation, and which, but for them, would multiply to such an extent as to threaten extinction to many of our most valuable food plants.

The Parasitic species may be readily separated into three families, ICHNEUMONIDÆ, PROCTOTRYPIDÆ and CHALCIDIDÆ. Some authors separate various species from these groups, for which they define several more families, but those mentioned include all the more important species.

Among the members of the first-named family may be found some very large species, a great number that are of medium size—with a wing expanse of from one-third to one-half inch—and some that are extremely small. The typical *Ichneumon* flies have long and rather slender bodies, usually terminated by an exserted ovipositor, which is composed of several thread-like stylets, and which varies in length from three or four inches in *Thalessa*, to a scarcely noticeable point at the tip of the abdomen, as in *Microgaster*.

The head is somewhat square, the antennæ thread-like and many-jointed; both pairs of palpi are well developed, but the biting organs are rather small and weak. The thorax is compact, but the different parts are often outlined by deep grooves. The veining of the wings is much like that in bees and wasps, but the membrane is more delicate and transparent. The legs are smooth and cylindrical. These insects lay their eggs in or upon the bodies of other insects, usually caterpillars, piercing the skins with their sharply pointed ovipositors. Sometimes but a single egg is laid; in other cases the dorsal surface is thickly

punctured and a great number of the little grub-like larvæ hatch and burrow back and forth in the fatty tissue of their victim, avoiding at first its vital parts; and when it is fatally injured, though perhaps it does not die for several days, they emerge in an erect position and cover the back of the caterpillar with their small white cocoons attached at the lower end and standing up like grains of rice all over it. Most of the larger species weave their cocoons inside the body of their victim. The internal parasitic larvæ are said to breathe through *branchia* similar to those of water insects, which are situated at one end of the body and communicate with the air tubes of the insect they infest.

[Fig. 90.]

Sphinx larvæ with cocoons of parasites (after Riley). Color, white.

The large species represented in Fig. 19 is *Opihon Macrurum*, Linn. The abdomen broadens toward the tip and is compressed laterally. The entire body and wing-veins are of a honey-yellow color. It quite frequently enters our lighted rooms on summer nights, and if taken into the hand will administer so sharp a thrust with its ovipositor that the captor involuntarily releases it. It is parasitic on the large caterpillars belonging to the family of our native silk worms.

The PROCTOTRYPIDÆ is a family of exceedingly small flies, most of which are "Egg parasites." Their bodies are rather slender and the wings almost without veins, but in some species are fringed with fine hairs around the edges. They breed, as a rule, in the eggs of larger insects, of which they destroy great numbers. The family of the CHALCIDIDÆ is also composed mainly of very small species, some of which also breed in eggs, but usually in the bodies of other insects, especially in those of Aphides. They are often of beautiful metallic colors. The antennæ are elbowed and have from six to fourteen joints. A considerable number have the thighs of the hinder legs very much thickened for jumping. The wings have very few veins and no enclosed cells. In the male the abdomen is seven-jointed, while in the female it has only six joints. Except in a very few species the ovipositor is entirely withdrawn into the body except when in use. They are not infrequently parasitic upon other parasites, and, therefore, to be reckoned among injurious species. In this group, also, we find the destructive "Joint-worm flies" (*Isosoma hordii Har. tritici* and *I. grande*, Riley), which puncture the stalks of small grain at the joints in depositing their eggs, the larvæ afterward feeding upon the sap, and where they are numerous, preventing the growth of the stalk and the filling of the head. Mr. F. M. Webster of Indiana made the discovery that many of the females of *I. grande* were wingless. As most of these insects hibernate in the straw, burning the latter after threshing and

also burning the stubble is the best preventive of their increase. This fly differs very slightly in structure from the parasitic species.

One family included in this group—the *Cynipidal*—while resembling the Chalcids very closely in structure, are vegetable feeders, causing on Oak, Rose and other woody plants, the singular fruit-like and nut-like growths called "galls." The females differ from the parasitic CHALCIDIDÆ in their larger size, and in the shorter and more compressed abdomen and in the notch on the under side of the latter. The antennæ, also, are straight and slender, with the joints all equal.

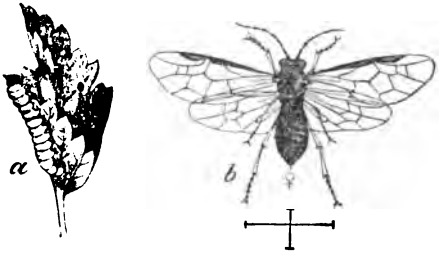
The abnormal plant growth is supposed to be caused by the deposition of a minute quantity of a peculiar fluid, along with the egg, by the parent fly, the tissue resulting forming a more suitable kind of food for the larvæ than ordinary wood fiber or leaves. The gall makers are all more or less injurious to the plants they attack, but one species makes a sort of reparation in producing on a European oak the "nut galls," used in the manufacture of the best ink.

CHAPTER XIII.

Order HYMENOPTERA. Section TEREBRANTIA.

SAW-FLIES AND HORN TAILS.

[Fig. 21.]



Native Currant Saw-fly.

Colors—(*a*) green and black; (*b*) black and honey-yellow.
Native Currant-worm—*Pristophora grosulariæ*—after Riley.

The insects of this Order, included among the true Plant-eaters (PHYTOPHAGA), differ very much in all stages of their development from those described in preceding chapters.

The perfect insects have rather heavy bodies, upon which the three principal divisions are not so distinct as in bees, wasps and ichneu-

mons. The head is broad, connected with the thorax by a very short neck, and the abdomen is *sessile*: *i. e.*, joins the thorax by a wide base instead of a slender stalk.

The larvæ are much more independent than those of the higher families of the Order. They are not confined to cells or chambers, and the only provision made for them by the parent insect is the insertion of her eggs in the kind of leaves or wood which her young require for food. They subsist entirely upon vegetation, and are separated into two families:

1st. Saw-flies (TENTHREDINIDÆ), and

2d. Horn-tails or Wood-borers (UROCERIDÆ).

The Saw-flies are easily recognized by their broad, thin wings, which are divided into numerous cells by fine veins or nervures, and by the soft and yielding integument of the body. The antennæ are usually short and simple, varying in the females in the number of joints. A few species have these organs knobbed at the tip or toothed or feathered on one edge. The ovipositor, from the peculiar structure of which these insects derive their popular name, consists of two saw-like blades, the sides of which are ridged and the lower edges finely serrated or notched. The blades are strengthened by a back so grooved that they can slide back and forth upon it. When not in use they are protected by a sheath and concealed in an opening on the under side of the abdomen. With this most ingenious instrument the insect saws little oblique slits in the cuticle of leaves or in the principal veins, in which she places her eggs. There are some exceptions to this rule, found among species that are very prolific and destructive: *e. g.*, the Imported Currant-worm, in which the eggs are attached externally to the veins of the leaf and kept in place by a sticky fluid which is exuded with them. In such species the ovipositor is found to have lost, in great measure, its saw-like character. The Saw-flies are slow and heavy in flight, sluggish in all their motions and easily captured.

The larvæ are called "slugs" and "false caterpillars," and are classed with the most destructive of insect pests. The Imported and the Native Currant-worms, the Rose slug, the Pear slug, the White Pine and the Larch false caterpillars are some of the most pernicious species. They are of elongate, worm-like form, with large, roundish, glossy heads, on some of which are seen a pair of antennæ-like processes. The thoracic legs are well developed, and the hinder end of the body is supported upon six to eight pairs of fleshy points or props, which differ from the pro-legs of genuine caterpillars, not only in their greater number, but in lacking the little circle of hooks by which the latter can so firmly attach themselves to any surface. In some of these

larvæ the surface is smooth and glossy, in others spiny or mossy or covered with a slimy exudation, while others excrete a powdery or cottony substance that gives them a very peculiar appearance.

Some species, such as the White-pine worm, have the habit of elevating the head and tail when at rest, others keep the body coiled when not feeding, while a few construct leafy cases which they carry about with them or to which they retire for repose.

A few species are gregarious, feeding in large companies or spinning large gummy webs in which they cluster in masses. When full grown many of these larvæ drop to the ground and form tough oval cocoons among the fallen leaves and rubbish, or they burrow into the earth and enclose themselves in cells thinly lined with silk. Most species hibernate in the larva state, without changing to pupæ until the following spring.

The family of the Horn-tails (UROCERIDÆ) contains comparatively few species. They are mostly large insects with stout cylindrical bodies, characterized by a long straight horn extending from the abdomen. In the males this appendage is at the tip, but in the females it arises from the middle of the underside of the abdomen and constitutes the ovipositor. It is more auger-like than saw-like in its form and use, and is used for boring into the trunks of trees, especially the elm and pear, to which the boring larvæ are often very destructive.

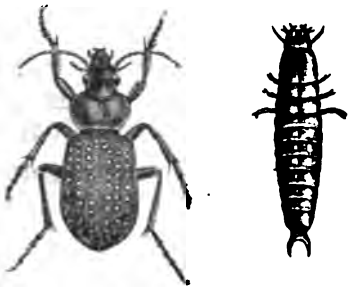
The wings are narrow but strong, expanding more than two inches, and in flight making a loud buzzing sound. The length of the body including the horn is also more than two inches.

The species known as the Pigeon Tremex (*Tremex columba*, Linn.) is one of the most injurious. Its multiplication is, however, very much checked by a large ichneumon fly which runs its long ovipositor into the auger-holes of the Tremex, leaving in each one an egg, from which hatches a deadly enemy and devourer of the first Horn-tail larva which it meets.

CHAPTER XIV.

Order II. COLEOPTERA.

[Fig. 22.]



A Carabid, *Calosoma calidium* with larva (after Riley).

This Order of insects—the Beetles—includes a far greater number of described species—more than one hundred thousand—than either of the other primary groups. And while among this vast assemblage we find an almost infinite variety in size, form, color and the adaptation of certain organs for certain functions, a single glance is sufficient to enable us to recognize a member of the Order, except, perhaps, in the case of a very few rare and unusual forms.

On account of the ease with which specimens may be collected and preserved, and the accuracy with which the external structure may be defined, these insects have always been favorites with entomologists, and the student will find them most interesting and convenient subjects upon which to begin his studies of insect anatomy.

The popular term "beetle" is said to be derived from an old English word signifying a "biter," and is most appropriate for this group of insects in which the organs for biting are so complex and so perfect.

Beetles are chiefly characterized by the peculiar structure of the upper wings, which are transformed into a pair of horny or leathery cases, or sheaths meeting in a straight line down the back, and covering not only the abdomen, but two joints of the thorax (the *mezo* and *meta thorax*). These are called the *elytra* (sing. *elytron*). They are not used to any extent in flight—their office appearing to be mainly that of armor for the protection of the softer parts of the body. The true membranous wings, when not in use, are snugly folded beneath them, not only lengthwise, in fan-like plaits, but, by means of a hinge or joint in the supporting veins, a little beyond the middle, crosswise as well, so that

in most species they may be completely covered. This wing structure can be most satisfactorily studied in the common May beetle, one of the species which few people have any repugnance in handling.

The frame-work or body-wall of most beetles is very hard and firm compared to that of many other insects. This is very necessary to preserve them from the varied dangers incident to their terrestrial habits.

The mouth of beetles is considered as presenting the typical form of that important organ. The six principal parts, mandibles, maxillæ, labrum and labium, described in chapter III, Pt. 1st (in which see Fig. 3), are always present, together with other appendages of less direct use.

The eyes are usually prominent and of various forms, round, oblong, kidney-shaped, curved, and in one group of water beetles entirely divided in the middle, so that there would seem to be two on each side. The ocelli are not usually present, though a few species have a single pair, or perhaps only one.

The antennæ present a great variety of forms, some of which are very singular and beautiful, as may be seen by referring to Fig. 4, Pt. 1st. They are mostly eleven-jointed. Only the pro-thorax, which is usually very wide, is visible on the back, with the exception of a small wedge-shaped section of the meso-thorax, termed the *scutellum*. The abdomen joins the thorax by a wide base, and, in a great majority of beetles, is almost, if not entirely covered by the wing cases. Many of the leaf-feeding species and a few of those that are predaceous, fly with great ease and rapidity, but as a rule, the legs are the principal organs of locomotion. They are horny and strong, and of various shapes to adapt them for running, leaping, swimming and other uses. The apparent joints of the feet vary in number from *three* to *five*, and the foot terminates in most cases in a pair of sharp claws.

The larvæ of beetles are commonly called "grubs." Most of these are soft, clumsy looking objects, with horny heads and three pairs of sprawling legs on the thoracic segments. Some species have in addition a sort of pro-leg at the hinder end of the body, or one or two rows of tubercles (fleshy points) along the sides, or on the upper or under surface, by which they are enabled to move with ease in the situations in which they are found. The larvæ of Water-beetles have numerous oar-like processes along the sides and are capable of swimming very rapidly.

Besides these forms are others which, living enclosed in the fruit or wood upon which they feed, have no use for legs of any kind, and consequently do not possess them. Of such are the Curculios and many kinds of wood-borers.

Coleopterous larvæ feed upon almost all kinds of vegetable and animal substances, from the petals of the most delicate flower to the most rank smelling carrion, from fruits and nuts to the most pungent spices to be found at the grocer's or druggist's. A considerable proportion are cannibals, and prey upon members of their own class. Larvæ of such species are usually very active, while the vegetable feeders are, as a rule, awkward and sluggish in their movements. In this Order the transformations are *complete*. The larvæ molt or change their skins several times, and their growing period varies in length from a few weeks to two or three years. They transform either upon or beneath the surface of the ground, or upon the leaves or within the fruit or wood upon which they have fed. The pupæ are *obtected*, resembling those of Hymenoptera in having each member encased in a separate sheath.

In the matter of classification, this Order is so comprehensive, that it is impossible within the limits of this little work to include any system that will enable the tyro to determine every species of which he may find an example, except as to the primary divisions. Beyond this the most that will be attempted will be a definition of such groups as contain conspicuously injurious or conspicuously beneficial species. When we learn that in North America alone, exclusive of Mexico, we have more than nine thousand named species, representing upwards of seventeen hundred genera and about eighty distinct families, it is evident than volumes are required for anything like adequate description and definition.

Following the system of the recognized authorities, the primary divisions of the Coleoptera are as follows:

Sub-Order I. The True Beetles (COLEOPTERA), in which the mouth parts are all present and the front of the head is not elongated.

Sub-Order II. The Snout Beetles (RHYNCOPHORA), in which the front part of the head is more or less prolonged into a beak, the labrum not distinguishable and the palpi reduced to minute, jointless points.

The first of these Sub-Orders is then separated into two sections, based upon the correspondence or lack of correspondence in the number of tarsal joints.

1st. ISOMERA (Similar joints) species which, with rare exceptions, have the same number of joints in all the feet.

2d. HETEROMERA (Different joints), including species which have five joints in each of the front and middle feet, and only four joints in each of the hinder pair.

Beetles belonging in the ISOMERA are sub-divided into five tribes:

I. ADEPHAGA (carnivorous beetles), Land and Water Tigers, hunters and trappers of other insects for the most part, although a few species subsist on vegetation. In these the antennæ are thread-like, cylindrical, with the joints distinct.

II. CLAVICORNIA (Club-horns), having the antennæ thickened gradually or abruptly toward the tip; feet with from one to five joints; small beetles of various habits.

III. SERRICORNIA (Saw-horns), having the antennæ toothed or serrated (in some few species also enlarged at the tip, much as in the preceding tribe, but the species in other respects agreeing with the members of this tribe). This group includes a great number of small borers.

IV. LAMELLICORNIA (Leaf-horns), having the knob of the antennæ composed of several leaf-like or blade-like parts, which the insect can unfold or close up at will. This Tribe includes the largest insects in the Order, most of which feed, often in the perfect as well as the larvæ state, upon vegetation, foliage, roots and decayed wood.

V. PHYTOPHAGA (Plant-eaters), mostly with thread-like antennæ, in some species very long, in others short and slightly thickened toward the tip; fourth and fifth joints of the feet consolidated, the former minute. All the species feed on vegetation and many are extremely destructive.

Neither the Section HETEROMERA nor the Sub-Order RHYNCHOPHORA requires division into tribes for convenience of study.

CHAPTER XV.

Order COLEOPTERA. Tribe I. ADEPHAGA.

CANNIBAL BEETLES.

In this group of beetles we find mainly carnivorous species, many of which prey especially on insects destructive to vegetation, and on this account claim recognition as among our best friends. They also merit consideration by their great beauty of form and color, and by the grace and agility of their movements. The most important families are the Tiger-beetles (CICINDELIDÆ), the Caterpillar-hunters (CARABIDÆ), the Water-tigers (DYTISCIDÆ), and the Water-whirligigs (GYRINIDÆ).

The Tiger-beetles received their popular name on account of their ferocious habits, their swift movements and the stealthy manner in which their larvæ lie in wait for their prey. They are diurnal insects of

medium or rather small size (three-fourths inch and under in length), of elegant form and often of brilliant metallic color. Their chosen haunts are sunny path-ways, hard beaten roads and the sandy shores of streams, lakes and the ocean.

The head of a Tiger-beetle is broader than the thorax. It is provided with a very complete mouth, of which the most important parts are the long, sharply-toothed and curved jaws, which cross each other when closed. The eyes are large, round or somwhat oblong and protruding; the antennæ long and slender, arising from the face just above the base of the mandibles. The prothorax is nearly square, the scutellum very small, and the wing cases, which are rather narrow, widen slightly toward the hinder end of the body. The under wings are well developed, and the insect rises easily into the air for short flights. The legs are long and slender and the joints of the feet spiny. The dark metallic color is in some species varegated by dots and zigzag lines of yellow or cream white. The larvæ live in perpendicular holes in the ground and are extremely ugly in appearance. They have a broad head and immense jaws, and long sprawling legs. On the middle of the back is a large double hump, terminating in backward curving hooks, of which these creatures make use in climbing to the entrance to their holes and sustaining themselves there while lying in wait for their prey. Any unlucky insect happening to stray within reach of those terrible jaws is seized with a grasp from which there is no escape, dragged into the hole and devoured.

More than sixty species of *Cicindelidæ* are found in the United States. (See beetle on plate.)

The Ground-beetles or "Caterpillar-hunters" include a great number of predaceous species, which may occasionally be seen running over the ground in fields and gardens, but are usually hidden under stones, boards, fallen leaves and the like during the day. They are easily distinguished from the Tiger-beetles by the head being narrower than the prothorax, and the latter somewhat more constricted or tapering toward the base of the wing covers. They are also, with a few exceptions, of plainer coloring, and the most conspicuous species are of larger size than is the rule among the Tiger-beetles. One of the chief structural characters of these beetles is the peculiar eardrop-shaped trochanter of each of the hinder legs. (See Part 1st, Fig. 6, A, b.)

They are, as rule, *nocturnal* in their habits, running out of their hiding places at nightfall, and exploring field and garden, even climbing trees in the search for their six-legged game, tearing in pieces caterpillars and grubs, and even other beetles, wherever found. They are often

attracted to lamplight, and I have, on several occasions, seen the sidewalks around the electric light posts almost covered with dead and disabled specimens of the beautiful, metallic-green *Calosoma scrutator*, Fabr. As they are very swift runners, most species make but little use of their wings; indeed, the latter are in some cases entirely undeveloped, and the elytra are firmly joined at the suture on the back.

The larvæ are elongate, somewhat flattened grubs, having the body protected on top by horny plates, and in some instances terminated in a pair of branching spines or forceps-like appendages. They burrow back and forth just beneath the surface of the earth, and destroy many of the soft larvæ of fruit and leaf-feeding species that have entered the ground for transformation.

Among the most beneficial species is the Fiery Ground-beetle (*Calosoma calidium*, Fabr.), a large and elegant beetle of a black color, with elytra (wing covers) thickly dotted with shining, impressed, coppery spots (see Fig. —). This beetle preys upon cut-worms, and its larvæ, having the same habit, has been called the "Cut-worm lion." Another smaller species, *Lebia grandis*, with a red-brown thorax, and legs and dark-blue wing covers renders us good service in destroying the larvæ of the Colorado potato-beetle.

One species, a little larger than the above, but closely resembling it in form and color, is called the Bombardier beetle (*Brachinus fumaus*), as it has the singular power of discharging a volatile and pungent fluid from the tip of the abdomen, which rises in the air like a little puff of smoke. It is a means of defense against its enemies.

The Water-tigers are quite common in ponds and sluggish streams. The beetles are easily recognized by their broad, flat, ovate, polished bodies, often an inch and a quarter in length, and by the hairy, oar-like shape of the hinder legs. When disturbed these beetles dive deep under water, carrying with them a bubble of air which sustains respiration until they again rise to the surface. Their larvæ are long and cylindrical, with a pair of breathing tubes at the posterior end that can be protruded above the surface of the water. The head is armed with powerful, scissor-like jaws which are kept in almost constant motion. They are very savage and greedy, feeding upon other aquatic insects, tadpoles and small fish, in some streams proving very destructive to the latter. When full grown they crawl upon shore and enclose themselves in earthen cells within which they change to pupæ. The perfect insects make their way into the water as soon as they emerge.

The "Whirligigs" are another family of preying water-beetles which, though allied to the Water-tigers, are distinguished from them

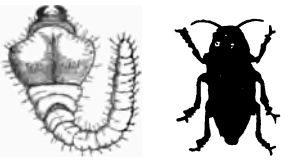
by their smaller size, their round blue-black bodies, long front legs and very short swimming legs. The eyes are bilobed, giving them the appearance of two on each side. They usually appear in groups on the surface of the water, sporting and circling about in great apparent enjoyment. The larvæ look like myriapods, having a pair of long, spiny processes on each abdominal segment.

CHAPTER XVI.

Order, COLEOPTERA. Tribes, CLAVICORNIA and SERRICORNIA.

CLUB-HORNED AND SAW-HORNED BEETLES.

[Fig 23.]



Flat-headed Apple tree borer *(Chrysobothris femorata)*, with larva (after Riley.)

In the first of these Tribes we find a large number of quite distinct families and genera of beetles in which the principal point of agreement is found in the antennæ, which in most of the species are "clubbed," or rather thick and gradually and slightly enlarged toward the tip. But even in this character there is some variation—*Ips fasiata* and the species of *Nitidula*, for example, having antennæ that are distinctly *knobbed* at the end.

Among the Clavicorn beetles the number of joints of the feet ranges from one to five, most species having the same number in the hind tarsi as in the others.

The representative Families of this subdivision of the Order are the Burying beetles (SILPHIDÆ), the Rove beetles (STAPHYLINIDÆ), the Lady-bird beetles (COCCINELLIDÆ), and the Museum pests and Carpet beetles (DERMESTIDÆ).

The Burying beetles or Sexton beetles are so called from their habit of first burying the dead bodies of other insects, birds and small animals upon which their larvæ feed, before placing their eggs upon them; and one is sometimes astonished upon coming across such small car-

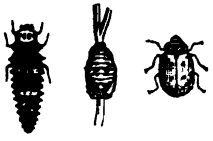
rion to find it being moved by some unseen force. If taken up or turned over, several species of large beetles that were at work digging out the earth beneath it will be disclosed. Many of the species are easily collected by means of such unsavory traps.

These beetles differ considerably in size and color, but all have rather broad, flattened bodies, five joints in all the feet, which end in long claws. The antennæ are rather abruptly enlarged at the tips. The prothorax is expanded into a broad plate used as a shovel in the digging operations. *Necrophorus americanus*, Oliv., is our largest species, frequently measuring one and one-fourth inch in length by one-half inch in breadth. It is of a glossy-black color, with a large red-brown spot in the middle of the head, the prothorax being almost entirely of red-brown, and there are two large patches of the same bright color on each wing cover. The black antennæ end in a leafy knob of golden brown, and the joints of the front feet are covered on the under side with silky hairs of a similar color. The pointed tip of the abdomen protrudes about one-fourth inch beyond the squarely cut wing covers.

In the genus *Silpha* the body is very flat and almost orbicular, the prothorax being expanded into a wide, thin flange, and is usually of a brighter color than the broad, roughened wing covers.

The Rove beetles have long, slender, black or dark colored bodies, with very short, square wing covers which leave more than one-half of the abdomen unprotected. The head is usually somewhat broader than the prothorax, the sharply pointed jaws crossed in front, and the rather small, oval eyes are wide apart. Some species are an inch or more in length, while others are very minute. Like the preceding tribe, they are carrion feeders, but prefer the carcasses of the larger animals, such as dogs and horses.

[Fig. 24.]



Lady Bird beetle (*Hippodamia convergens*), with larva and pupæ — after Riley.

The Lady-bird beetles include a group of small, handsome beetles of an oval or hemispherical form, with three-jointed feet and short antennæ. The surface is polished and usually ornamented with round or oval spots of black on a rose-red, brick-red or orange ground, or with red spots on a black ground. The Lady birds are among the best known of their order, and deserve to be the popular favorites which they are, on account of the excellent service which they render in ridding our gardens and orchards of plant-lice, bark-lice and other small insect pests. The larvæ are ugly, alligator-shaped creatures, generally of a dull, black color, in some species banded with yellow. Some have the surface covered with spines, while others are simply ridged and hairy.

Megilla maculata, one of the most familiar, is about one-fifth of an inch long, of oval shape and pink color, marked on head, thorax and wing covers with large, black spots. *Hippodamia convergens* is somewhat larger, of a dull orange color, with very small black dots. *Chilocorus bivulneris* is hemispherical, about one-sixth inch in diameter, shining black, with a conspicuous blood-red spot on each wing cover, near the base. It is an especial enemy of all sorts of bark-lice or scale insects, and may be found on trees or shrubs infested with the latter. *Vedalia cardinalis*, which resembles the above species in size and shape, but is of a bright red color, with four black spots on the wing covers, is at present the most celebrated member of its group, having been imported under the instructions of Dr. Riley, U. S. Entomologist, from Australia into California, in 1888, for the purpose of keeping in check the Fluted scale of the orange *(Icerya)*, and having in less than two years almost exterminated the pest.

About one hundred and forty-five species of Lady-birds are known in North America, all of which, so far as known, are carnivorous, except one species (*Epilachna borealis*), the Northern Lady-bird, which is a vegetarian and occasionally quite destructive to squash and cucumber vines.

The Museum Pests—*Dermestes*—are also mostly small species, which are not only the special pests of museums, derstroying very rapidly the contents of entomological and ornithological cabinets when they have once found entrance to them, but they are very destructive, also, to furs, woolens, feathers and similar animal products, and some species even invade the pantry. In these beetles the head and prothorax are short, the latter having grooves for the reception of the eleven jointed antennæ; the eyes are round and between them is a single *ocellus*. The legs are short, with five jointed feet. The larvæ are very active, hairy grubs, some of which have a tuft of bristles at the tail, and most species shun the light, although the beetles of one or two kinds have been taken on flowers.

Dermestes lardarius, one of the larger species, black with broad gray bands at the base of the wing covers, is sometimes destructive to dried meats and similar articles of food. *D. vulpinus*, one-third of an inch long and entirely dull black, attacks stored hides and manufactured leather. *Anthrenus varius*, the worst of the museum pests, is round oval in form, only about one-tenth inch in length, bright chestnut brown with the wing covers crossed by three wavy bands of pale gray, between which are dashes and flecks of black. *A. scrophulariæ*, the "Buffalo bug," or carpet beetle, is still smaller than the above species, is black with markings of pale red and white. It was introduced

some years ago in imported carpets from Europe, and has already become a widely disseminated pest. Among the beetles classified as SERRICORNIA are found many very beautiful and interesting insects, as well as some that are exceedingly pernicious. Most of the species have rather short serrate antennæ, are of oblong or elongate oval form, with five-pointed, or in a few species, four-pointed tarsi. The most important Families are Spring or snapping beetles (ELATERIDÆ), the saw-horned borers (BUPRESTIDÆ), and the fire-fly and soldier beetles (LAMPYRADÆ). The spring beetles have the entirely peculiar habit, if laid upon their backs, of throwing themselves into the air with a jerk, in most cases coming down in proper position. If held loosely in the hand, also, they will bend themselves backward and strike again and again in the effort to obtain their freedom. The power to effect these motions lies in an ingenious sort of spring in the shape of a strong pointed projection on the prosternum (the under side of the prothorax), which by curving the body backward is caught suddenly in a socket on the mezo sternum, causing an elastic rebound of the whole body. These beetles are of long, oval, somewhat flattened form, and usually of dull brown color, though a few species display brighter tints, and the surface is covered with a fine pubescence. The outer angles of the very wide prothorax are prolonged into points which curve around the edge of the wing covers.

The larvæ are known as "Wire-worms," in reference to their long, hard, slender bodies. Some species rank with injurious insects from their habit of cutting off the roots of young corn and other vegetation. On the other hand, several are beneficial, and are known to find their way into the tunnels of wood-boring larvæ and destroy them. The majority, however, so far as known, breed in decaying wood or the pith of weeds. A few large species are luminous, and are, at night, objects of great splendor.

Our largest and most striking American species, the Eye-spotted Elater or Snapping-beetle (*Alaus oculatus,* Linn.), varies in length from one to one and one-half inches. It is of a black color, with the wing covers longitudinally ridged, and marked with fine lines and flecks of white, which, being of the nature of scale-like hairs, are liable to rub off. On the top of the broad pro-thorax are two large velvety black spots encircled with white, which from their resemblance to eyes are often mistaken for them.

The Saw-horned borers (BUPRESTIDÆ), compose a large group of handsome hard-shelled, compactly formed beetles, all of which have the antennæ, which are rather short, serrate on the inner edge. They are usually of a pale brown or gray color, with brassy or coppery reflections:

indeed the entire surface, minutely roughened and indented as it is, appears like beaten metal. The head is deeply sunken into the thorax, and the latter widens slightly behind and fits tightly over the base of the wing covers.

The Buprestians are diurnal insects, flying in the sunshine or basking in it while slowly crawling up and down the trunks of trees, in the bark of which they deposit their eggs. The larvæ are wood-borers, gall-makers or leaf-miners, and are all more or less destructive to forest and fruit trees and shrubbery. They are characterized by a relatively enormous expansion of the pro-thoracic joint, from which the remaining two joints of the thorax taper abruptly to the slender, cylindrical abdominal division. There are no legs, and the enlarged joint has a smooth horny plate on both upper and under sides, and is much flattened.

The well-known Flat-headed borer (*Chrysobothras femorata,* Fabr.), so destructive to many kinds of fruit and shade trees, is the best representative of the boring species. The species of *Agrilus* cause swellings in the stems of blackberries and raspberries. These beetles are slender and cylindrical, with dark-blue or black wing covers and copper-colored thorax, and are about one-fourth of an inch long. The larvæ of the species, included in the genus *Brachys*, mine the leaves of apple and oak.

The Fire-flies and Soldier beetles are very different in many respects from the preceding group. Their bodies are very soft and the wing covers thin and flexible. In the "Fire-flies" or "Lightning-bugs" (genera *Photinus* and *Photurus*), the head is almost concealed under the expanded margin of the pro-thorax. The light which they emit is supposed to be from a phosphorescent substance in the abdomen, and is given off in flashes at irregular intervals, both during flight and repose. In *Photinus pyralis* both sexes are winged and luminous. In *Photurus*, the somewhat smaller and less brilliant species often have wingless females.

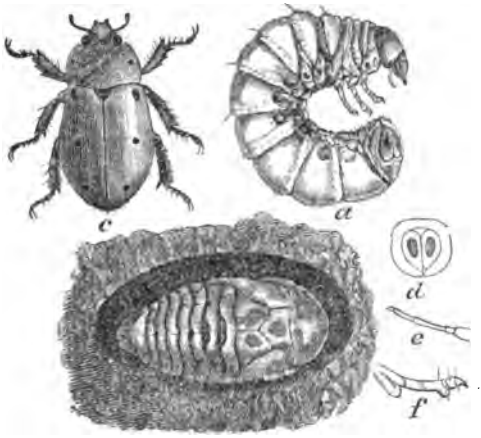
The larvæ, which are "glow-worms," burrow in th eearth, often coming to the surface, and have a faint luminosity. They feed on the soft larvæ of other insects and on earth-worms.

The most common species of Soldier-beetle is a slender, clay-yellow insect, with a large black spot on the top of the pro-thorax and an oblong one near the tip of each wing cover. This beetle bears the rather formidable name of *Chauliognathus pennsylvanicus*, De G. The larvæ somewhat resemble those of the lady-birds and like them are of service to us by feeding on other insects that are injurious to vegetation. The beetles may almost always be found in the autumn upon the flowers of the Golden-rod and Eupatorium.

CHAPTER XVII.

Order COLEOPTERA. Tribe LAMELLICORNIA.

[Fig. 25.]



Spotted Pelidnota, *(Pelidnota punctata)* with larvæ and pupæ (after Riley).

The Tribe LAMELLICORNIA is of great extent, and in it we find mostly large or medium-sized beetles which feed on vegetation, either fresh or in a state of decay, or on the excrement of the larger animals. These beetles resemble each other chiefly in the form of the antennæ, which terminate in a knob or expansion, composed of three—sometimes more—leaf-like blades, attached by one end and capable of being opened or closed like the pages of a book, at the will of the insect.

Before taking up the true Lamellicorns we find a small group, sometimes distinguished as PECTICORNIA (tooth-horned), in which the antennæ are furnished at the tips with several stiff projections on one side, like the teeth to a comb, and are further characterized by being bent or elbowed in the middle.

In this division the principal Family (LUCANIDÆ) contains the Stag beetles or Pinching beetles. In these the head is very broad, the eyes comparatively small, the shanks (tibiæ) notched or spined on the outer edge, and the feet are all five-jointed. The great peculiarity, however, is found in the unusual development of the jaws, which protrude from the front of the head, and are from one-fourth to one-half the length of the body, armed with spines and tooth-like projections on their inner edges. The larvæ are large, horny textured grubs, with four or six sprangling thoracic legs, and are mostly found in rotten stumps or roots.

Our largest species, *Lucanus elaphus*, Fab., occurs most abundantly in the southern States, but is often taken as far north as St. Louis. This is indeed a formidable looking insect. It is very hard and smooth, of a mahogany-brown color, the body one and one-half inch in length, and the immense mandibles extending forward three-fourths of an inch more. It is from the resemblance of these to the antlers of a deer that it receives the most appropriate name of "Stag beetle." *Lucanus dama*, Hum., is the most common "Pinch beetle," and often enters our rooms on summer evenings to the terror of nervous people, whom it could not injure, but to whom it might give a severe pinch with its sharply toothed jaws, which curve inward and are about one-fourth inch long. The beetle is of the same form and texture, but a little lighter in color and considerably smaller than the southern Stag beetle.

Another large beetle belonging in this group is the Horned Passalus (*Passalus cornutus*, Fab.). This is a shining black species of an oblong form, having the squarish pro-thorax separated on top from the abdomen by a decided "waist" or constriction. The wing covers are longitudinally grooved. In this species the jaws are not abnormally enlarged, but on each side of the head is a little pointed horn, and between them a longer one curving downward over the mouth. This beetle is usually one and one-fourth inch in length.

The typical LAMELLICORNIA are, for convenience, separated into two divisions, in consideration of their different feeding habit chiefly, viz.: the *Excrementivora*, the larvæ of which mostly breed in manure, and *Herbivora*, in which the larvæ feed on vegetation, either growing or dead. In the first division the principal families are the *Copridæ*, *Aphodiidæ* and *Trogidæ*.

They are all scavengers and rank either as beneficial or innoxious. The largest species, *Copris Carolina*, Lim., is a great, squarish, clumsy creature, nearly an inch long and three-fourths inch wide, that frequently flies into our lighted rooms at night, and after bumping about against the walls and ceiling falls to the floor with a thud, generally landing upon its back, and lying helpless, kicking its legs about wildly in the effort to turn over. It is of a black color, somewhat hairy on the under surface and legs, and the latter have the shanks of the fore legs expanded and notched for use in digging, as is characteristic of all the Lamellicorns. The female beetle tunnels perpendicularly under the droppings of cows and horses, and at the bottom of the hole places a large round ball of manure on which she deposits an egg. The larva, an unsightly, much-wrinkled grub, very thick in the middle and tapering toward each end, works its way into this compact ball, and beginning somewhere near the middle, eats toward the surface until it is reduced

to a mere shell, which serves as a sort of cocoon for the protection of the pupa.

Here also we find the common "Tumble-bug" or "Tumble-dung" (*Canthon lævis,* Drury), a much smaller, dark-brown species, usually seen in pairs rolling a ball of manure about the size of a large marble. This species affords one of the rare instances in which the male assists the female in making provision for the young. When a suitable spot is found, a shaft is sunk four or five inches into the earth, the ball rolled in, and the female, after pausing long enough to deposit an egg upon it, begins filling up the hole, in which labor her partner assists. But little pains, however, is taken with this part of the work, and often the hole is left partly unfilled. A beautiful species, somewhat larger than the above, has similar habits. This is (*Phanæus carnifex,* Linn.) It is of a metallic green color with copper-colored thorax, which in the male is adorned with a backward curving horn.

The APHODIDÆ are all small shining black or black and red beetles, which sometimes astonish gardeners by the numbers in which they appear in green-houses and on hot-bed sashes, having bred from the manure used as a fertilizer.

The family TROGIDÆ includes but one genus, *Trox.* The most common species are small, dingy, black, roundish beetles, often attracted to the light at night. They are distinguished by the widely dilated thighs of the front legs and by the deeply ridged and pitted surface of the thorax and wing covers.

The Leaf-chafers, Herbivorous Lamellicorns, are distinguished from the manure-beetles by their more slender legs, long sharp claws, and by the tip of the abdomen projecting slightly beyond the wing covers. They feed entirely on vegetable matter, and unlike most other insects in their perfect state, the beetles themselves often do great damage to flowers and foliage. Many of the larvæ live underground, subsisting on the roots of grasses and other valuable plants; others are found in rotten wood or other decaying vegetation. They are fat, white, wrinkled grubs, with horny heads, long, sprawling legs, and the hinder part of the body in many species thicker than the remainder, and filled with dark waste matter.

This group has been separated into four families: the Monarch beetles (*Dynastidæ*), the Dor beetles or May beetles (*Melonthidæ*), the Brilliant chafers (*Rutelidæ*), and the Flower chafers (*Cetonædæ*). Among the Monarch beetles we find the largest insects in the Order. One species, sometimes called the Rhinocerus beetle (*Dynastes tityus,* Linn.), is often seen in the Southern and Middle States. It is fully two

inches in length, by an inch in diameter, and thick in proportion. The color is pale gray, the wing covers being marked with numerous irregular blotches and spots of black. From the front of the head of the male a long, pointed, polished horn curves upward, which is almost met by a similar downward curving one on the thorax, on each side of which are two small, straight ones. The female has no thoracic horn, and only a small protuberance on the head. The larvæ are, as a rule, found in rotten wood, but are also said to injure ash trees by feeding on the roots.

Under the name of Dor-beetles or May or June beetles (MELONTHIDÆ), are grouped a great variety of medium-sized, leaf-feeding species, most of which have thick, oblong bodies and are of a plain brown color. In some the surface is smooth and shining, in others more or less thickly covered with hairs or scales. One of their most peculiar characters is that each of the claws of the feet is minutely bifid or forked at the tip, which accounts for the persistence with which they cling to any but the hardest and most polished surfaces. This fine division of the claws can be distinctly seen only with a lens.

In this family the agriculturist finds a large number of the prominent pests of his farm and orchard, to only a few of which have we here space for reference.

One of these destructive species is the common May or June beetle (*Lachnosterna fusca*, Froh.), a smooth, shining, chestnut-brown insect, which issues from the ground in swarms during the latter part of May or early in June, filling the air at twilight, and finding its way in numbers into lamp-lighted rooms, unless excluded with the utmost care. These beetles settle on trees at night and feed voraciously on the foliage. They are cleanly, inodorous and inofensive creatures to handle, and therefore make excellent and interesting subjects for examination and experiment.

They remain hidden and dormant during the day, but awake to renewed activity for several successive evenings. After pairing the male dies and the female burrows into the earth to lay her eggs.

From the latter are hatched the "white grubs," so well known as among the chief pests of corn fields, meadows, lawns and strawberry beds. The observations of earlier entomologists pointed to the conclusion that these grubs required at least two years for development, but Prof. Forbes, of Illinois, has demonstrated that under certain conditions the insect attains its growth and passes through all its transformations in a single year.

In the same genus (*Lachnosterna*—which means "hairy-breasted") are a large number of other chafers, having essentially the same habits

as *L. fusca*, but many of these have not only the under side of the thorax hairy, but the pro-thorax and wing-covers also covered with a soft pubescence, sometimes evenly distributed and again arranged on the wing-covers in longitudinal ridges. Some of the species are much smaller and lighter colored. The Rose chafer or Rose-bug (*Macrodactylus subspinosus*, Fabr.) belongs also in this family (MELOLONTHIDÆ). This is an ochreous-yellow beetle, rather slender in form, about one-third inch in length, with very long, spiny legs. Its color is really almost black, but when fresh it is densely and evenly clothed in pale ochreous scales, which give to it its light color. It is altogether too common in the Eastern and Northwestern States, where it is exceedingly destructive to the blossoms of the grape, rose, and some other plants. Its larvæ feed on the roots of shrubbery, and in their turn do much damage.

Among the Brilliant chafers (RUTELIDÆ), which are separated from the Melolonthians by the unequal claws, which are not bifid at the tip, is a large species, the Spotted Pelidnota (*Pelidnota punctata*, Linn.), which is illustrated as a type of the Family. (Fig. 25.) This is one of the grape-vine pests, gnawing the foliage. It is a stout species, about three-fourths of an inch long, of a clay-yellow color, with three large, black dots on each wing-cover. Dr. Riley bred the larva in decaying stumps and roots. The Goldsmith beetle (*Catalpa lanigera*, Linn.), a beautiful species, is very like the above in form and size, but is entirely of a cream yellow color, with golden and prismatic reflections.

Among the Flower beetles (CETONIIDÆ) are a few of great size, but, while none are very small, most of the North American species are of medium or under medium size. The form is slightly flattened, the scutellum unusually large, and the wing covers are peculiarly notched or hollowed out on the sides near the base, so that it is not necessary to raise them to allow the wings to be unfolded for flight. The mouth is provided with a brush for collecting pollen, of which these insects are very greedy, as they also are of nectar, and to procure it they cut into tubular flowers. They may be found in spring drinking the sap that sometimes oozes from the trunks of maples and other trees, and are also quite injurious to ripe fruit. They differ from other members of their family in being diurnal in habit. *Allorhina nitida*, Linn., is a beautiful, large, velvety green species, with light-brown margins to the wing covers. *Euryomia inda* and *E. melancholica*, smaller, red-brown mottled species, are the most destructive to flowers and fruit.

CHAPTER XVIII.

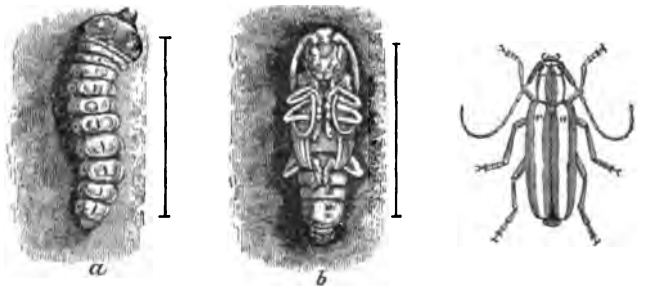
Order COLEOPTERA. Tribe PHYTOPHAGA.

BORERS AND LEAF BEETLES.

Also Section HETEROMERA.

BLISTER BEETLES, ETC.

[Fig. 26.]



Round-headed Apple Tree Borer *(Saperda Candida.)*

This division of similar footed beetles comprises a great variety of forms, all of which feed on vegetation, and many of which are extremely destructive to trees, herbaceous plants and seeds. Three of the most important families are the Long-horned borers (CERAMBYCIDÆ), the Leaf beetles (CHRYSOMELIDÆ), and the Seed beetles (BRUCHIDÆ).

The first of these families, often termed the "Longicorns" or "Capricorns," is a large and interesting one, including many species of great size, others of rare beauty and all very injurious. They may be recognized at a glance by their long and usually slender antennæ, which in a few species are more than twice the length of the body, and which curve backward like the horns of a goat. The form of the body is elongate sub-cylindrical, in some species tapering toward the hinder end. The head is broad, vertical, and furnished with strong jaws. The eyes are quite peculiar, being *lunate* (hollowed out) on the inner side, with the antennæ implanted in the hollows. The basal joint of the latter is almost invariably longer than any of the succeeding joints, which gradually taper to a point. The thorax is seldom as broad as the hind body, and is square or barrel-shaped, often with one or two spines or teeth on each side. The legs are long, but scarcely so well fitted for running as for affording a secure support to the insect when at rest. The joints of the feet are four in number, spongy or

cushioned beneath, and the third one bilobed. These beetles have the power of producing a squeaking sound by rubbing the pro-thorax up and down over the bases of the wing covers. This is done not only as an expression of fear when captured, but for amusement or as a call to their mates, and is termed *Stridulation*. The females have an ovipositor that can be telescopically extended to a considerable length, in order to place the eggs deep into holes or into the crevices of bark of the trees in which the larvæ feed. The colors of many species are very bright, disposed in stripes or bands or in dotted patterns on a plain ground. They are for the most part nocturnal, and conceal themselves carefully during the day. A few, however, are exceptional, and may, at certain seasons, be found on flowers or enjoying the sunshine on the trunks of trees.

The larvæ are all wood-borers, and many of them do great damage to fruit and forest trees, and in vineyards. They are fleshy, white cylindrical grubs, terminating bluntly behind, with all the joints separated by deep incisions, and the first thoracic one much enlarged and covered with a horny plate. The head is small and usually dark brown, the greater part of it comprised in a pair of powerful jaws, capable of cutting into the hardest wood. A few of these larvæ have the usual number of very small thoracic legs, but the majority have no legs at all, and move up and down in their burrows by alternate contractions and extensions of the body, and by means of the hunched segments. It is a habit with some species to keep one end of the burrow open, through which to push out the chips and castings, and their presence is often betrayed by the little heaps of sawdust on the bark. The great majority, however, leave their castings in a compact mass behind them as they proceed. Many of these larvæ grow for two or three years, and a few even longer. When ready for transformation they tunnel their way to the surface, leaving a slight shell of the bark entire over the place of exit. They then retreat to a safe distance and form a cell or nest of wood fibers and castings, and here assume the pupæ form. In this stage they are soft and white, sometimes almost transparent, but with each member of the future beetle clearly defined, and they have a peculiar mummified appearance. At the end of two or three weeks the membranous casings are slipped off and the perfect beetle, but in a very soft and imperfectly colored condition, is disclosed. The insect remains quiet in its cell for some time until all the parts are hardened, after which it breaks through the slight door and enters upon the enjoyments and business of its mature life.

In the genus *Prionus* we find several very large, dark-brown species, whose larvæ, measuring two and one-half or three inches in length, are quite frequently found boring roots of grape-vines, apple trees and similar plants.

Saperda candida, Fab., a beautiful species of a cinnamon-brown color above, with two broad milk-white stripes extending the whole length of the body, is the parent of the much execrated "Round-headed Apple tree borer" (see Fig. 26), which does so much damage in orchards by boring the trees near the ground.

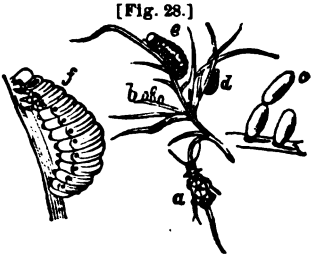
The Twig-girdler (*Oncideres cingulatus*, Say.) has the bad habit of girdling the twigs in which the female lays her eggs. It attacks both fruit and forest trees. Maples, Locust and Hickory are bored by the larvæ of a group of beautiful beetles of the genus *Clytus*. They are rather large, of dark colors, ornamented with curved and V-shaped transverse bands of bright yellow, pale green or white.

[Fig. 27.]

Twig-girdler. Colors, dull-brown and dingy-white.

The Leaf-beetles (CHRYSOMELIDÆ) constitute an immense group of small to medium-sized species, many of which display brilliant and beautiful colors. The scientific name given to the family, from words signifying a *golden apple*, refers to this quality as well as to the round or oval form so common among them. The head is very short and much narrower than the pro-thorax; the antennæ somewhat enlarged toward the tips and set wide apart; the eyes are round and prominent; the legs are short and stout; the joints of the feet are four in number, each broad and cushioned beneath. The larvæ are of a variety of forms, but mostly broad and thick, with well-developed thoracic legs. They feed exposed upon the surface of leaves, or, in the case of a few of the smaller species, they mine between the upper and under cuticles.

[Fig. 28.]



Asparagus beetle-- *a*, beetle; *b*, eggs; *e*, *d*, larvæ; *f*, same enlarged; *c*, eggs enlarged—after Riley.

Among these beetles we find such notorious pests as the Colorado Potato beetle (*Doryphora 10-lineata*, Say), the Asparagus beetle (*Crioceiisa asparagi*, Linn.), the Striped Cucumber beetle (*Diabrotica vittata*, Fab.), the Streaked Cottonwood beetle (*Plagioperma scripta*, Fab.), and great numbers of others.

The Tortoise beetles, which are the especial enemies of the Sweet potato plant and of other *Convolvulaceæ* are round or oval species from one-fifth to one-fourth inch in length, of a flattened oval form, with a

membranous margin around the thorax and wing covers which almost conceals the legs. The coloring is extremely beautiful—in one species, *Cassida aurichalcea,* being at times of the most brilliantly burnished gold, and again with opalescent reflections. Other species are mottled or striped in gold and brown.

The flat, oval larvæ have a spiny surface and lateral margin, and the body terminates in a pair of strong bristles, upon which during growth the cast-off skins and excrement are accumulated and held up over the body to shield it from the sun and from its enemies.

The larvæ of species belonging to the genera *Chlamys* and *Cosinoptera* make cases, which, when feeding, they carry over or drag behind them, and to which they retire for repose.

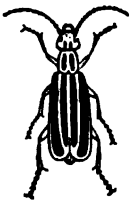
Another group with whose destructive work the farmer and gardener is only too well acquainted, contains the Flea-beetles. These are mostly small species, characterized by their greatly expanded and thickened thighs, which give them their remarkable jumping power. *Haltica chalybea*, Illig., is a dark steel-blue species, often very troublesome on grape-vines. The Cucumber-flea beetle *Crepidodera cucumeris*, Har., is one of the pests of the Gourd family of plants. The Striped Flea beetles (*Phyllotreta sinuata*, Steph., and *P. vittata*, Fabr.), riddle the leaves of turnips, radishes and cabbage with small, round holes. The larvæ feed under ground on the roots or mine the leaves of plants belonging in the same family with the vegetables mentioned. *Haltica (Graptodera) foliacea*, Lec., is very destructive in the far western States to the foliage of young apple trees.

The Seed weevils (BRUCHIDÆ) are a small family of beetles that breed in seeds and grain. They are of broad oval, flattened form, from one-tenth to one-fifth inch long. The antennæ are rather short and serrate, and the tip of the abdomen protrudes beyond the wing-covers. The Pea weevil (*Bruchus pisi,* Linn.), the Bean weevil (*B. obsoletus*, Say.), and the Grain weevil (*B. granarius*, Linn.,) are the most destructive species, whose habits are well known to every farmer and gardener.

Section HETEROMERA.

In this somewhat isolated group of beetles, we find the chief peculiarity in the feet, the front and middle pair of which are five-jointed and the hind pair four-jointed. These are not cushioned beneath, as are those of the Leaf beetles. Many of the species are exceedingly interesting to the biologist on account of their peculiar development, which has one or two seemingly retrograde stages in those of parasitic habits.

[Fig 29.]



Blister beetle—after Riley.

The Heteromerous beetles are separated into quite a number of families, of which two only are of especial interest to the economic entomologist, viz.: The Oil or Blister beetles (MELOIDÆ) and the Meal beetles (TENEBRIONIDÆ). The Blister beetles are rather elegantly formed insects and differ from all others in having the somewhat triangular head set on vertically with a distinct neck. The wing covers and entire body wall are rather thin and leathery. The colors are satin black or plain ash-gray, or black, margined with pale gray, or striped longitudinally with yellow. They are diurnal insects, and, in their perfect state, feed voraciously on the foliage of the potato and also on certain kinds of flowers, and in the early autumn may be found on golden rod. The larvæ, which undergo what is termed *hypermetamorphosis*, exist in two forms, and are parasitic in the nests of bees and on the eggs of locusts (grasshoppers). They belong to the genera *Cantharis* and *Epicauta*.

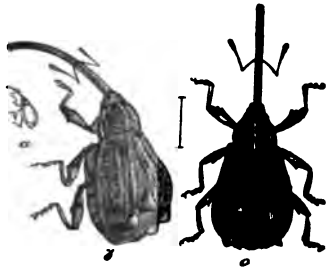
Among the Meal beetles, the most abundant and pernicious species is *Tenebrio molitor*, Linn, a plain black or very dark brown species, about three-fifths inch long, rather slender and elongate, and without any striking characteristics. The larvæ are horny skinned, slender, cylindrical worms, with well-developed feet, and are great pests in warehouses and storerooms where ground grain is kept.

CHAPTER XIX.

Order COLEOPTERA. Sub-Order RHYNCOPHORA.

SNOUT-BEETLES AND BARK-BORERS.

[Fig. 30.]

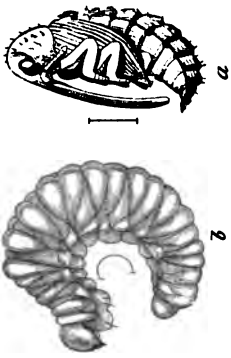


Apple curculio—(*a*) natural size; (*b*) side view; (*c*) back view, enlarged—after Riley.

The snout-beetles are all included, by the most recent writers on the subject, in seven or eight very distinct families, but the species are very numerous. None of the North American species are of more than medium size, while the majority are small—under one-fourth inch in length. The great peculiarity of these insects is found in the prolongation of the front part of the head into a *beak* or *snout*, termed the *rostrum*, which is either broad and short, or long and thin, in some species straight, in others curved. The small but sharp jaws are situated at the end of the beak, and the labrum and palpi are but very slightly developed or wanting. The antennæ arise from the sides of the beak; they are slender, elbowed or bent in the middle, and end in a knob or club. The rostrum is often grooved at the sides for the reception of these organs. The eyes are small and round. The body is compact and often wedge-shaped, and in many species the surface is ridged, pitted and raised into tubercles. The feet are four-jointed, each joint strongly bilobed and cushioned beneath.

When disturbed or frightened, most of the species "play 'possum," feigning death most skillfully and persistently. The antennæ sink into the grooves in the beak, the latter, where its structure permits, is bent under, close to the body, as are also the legs, and the insect drops to the ground motionless, where its color and shape so closely simulate a dried bud, bit of twig or seed, that only the most practiced eye can detect it.

The great majority of these beetles are fruit and nut-eaters. The beak is used to drill the holes in which the eggs are placed. The larvæ are fat, white, thin-skinned and wrinkled grubs, without feet or prolegs —except in one small and peculiar group, the Brenthians, which are wood borers. They are usually in a more or less curved position from which some species, like the Apple-curculio, can never straighten themselves. Some, when full fed, work their way out of the fruit or nuts and drop to the ground, into which the burrow to transform; others change where they have fed.



Larva and papa of Apple curculio.--After Riley.

Among the more important families are the Fruit and Nut weevils (CURCULIONIDÆ), the Rice weevils and "Bill bugs" (CALANDRIDÆ), and the Leaf-rollers (ATTALABIDÆ).

In the amount and value of the products destroyed by it, the Peach or Plum curculio (*Conotrachelus nenuphar*, *Herbst*) may well head the list of the pernicious species. Its characters and habits are so well known that it is not necessary to recapitulate them here.

In some parts of the country this species is rivaled in the injury done to stone fruits by a slightly larger, smoother species called the Plum Gouger (*Cocoturus scutellaris* Lec.) The Apple curculio (*Anthonomus quadrigibbus*, Say), represented in Fig. 30, breeds in the fruit and passes its transformations without leaving it. The Nut weevils are nearly all included in the genus *Balininus*. They are smooth, oval beetles of an ochreous-drab color, with a very long, slender, dark brown beak, with which they drill holes in the green nuts for the reception of their eggs.

The principal genus of the CALANDRIDÆ is *Sphenophorus*, in which are found the Corn Bill-bugs which often do so much injury to Indian corn by boring the roots and lower part of the stalk. The Rice weevil (*Calandra oryzal*, Linn.) is injurious to stored rice and other grain in the Southern States. The small beetles composing the family *Attalabidæ* breed on the leaves of Oak, *Rhus* and other trees. After placing an egg a portion of the leaf is rolled into a knapsack-like case, in which the larva develops, feeding on the partially withered portions of the enclosed leaf.

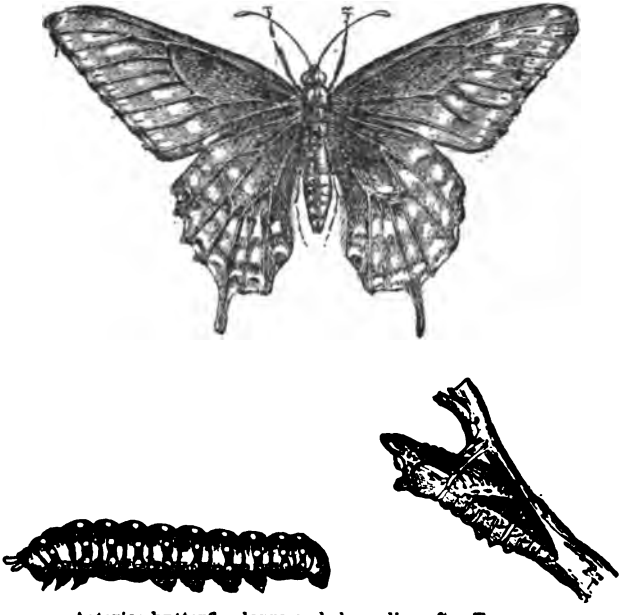
The Bark-beetles (SCOLYTIDÆ) are small, hard, cylindrical insects of a shining black or brown color, the abdomen appearing as though cut off obliquely behind, encircled by a ring of little points or teeth. The antennæ are very short and knobbed at the tip. The larvæ are much like those of curculios, but have stronger jaws to adapt them for

wood-boring. They bore between the bark and solid wood, several of them working from a common center—their burrows, which gradually widen to the place of exit, radiating in all directions, making fanciful carvings on the inner side of the bark and the surface of the wood. They often prove very destructive in forests, to both pine and hard-wood trees. A species introduced from Europe (*Scolytus rugulosus*, Ratz.) has recently excited alarm among the fruit-growers of Illinois, by working under the bark of twigs and young branches, principally of stone fruits, producing an effect like blight, and in some cases causing the death of the tree. Prof. Forbes, who has published the first account of its injuries in this country, finds it very generally distributed and promising to become a very serious enemy to all varieties of fruit trees.

CHAPTER XX.

Order III. LEPIDOPTERA.

[Fig. 32.]



Asterias butterfly, larva and chrysalis—after Tenney.

Among the butterflies and moths we find the most attractive, and with a few exceptions, the most conspicuous members of the class of insects. They are recognized without difficulty by their broad and often

gaily colored wings, their soft, hairy bodies, small heads, prominent eyes and antennæ, and in most species, the long, coiled tongue.

In the Lepidoptera the three principal divisions of the body are distinct, but the neck is very short and there is no slender pedicel connecting the thorax and abdomen. The head is small, but broad in proportion to its length, and moves freely on the neck; the eyes are hemispherical and of various colors, sometimes sparsely hairy.

Two ocelli are present in some of the moths, but are concealed under the hairy scales that clothe the top and front of the head, and probably are not of much use as organs of vision.

The antennæ are always conspicuous. They are either filiform, feathered or club-shaped. The upper jaws are not developed in the perfect insects, and the lower jaws *(maxillæ)* are united and lengthened out to form a horny tube called the tongue or *lingua*, which is coiled up like a watch spring when not in use. The palpi—at least one pair of them—are large and plumy and curve up in front of the face on each side of the tongue.

The usual form of the body is long and slender, tapering somewhat in both directions. The pro-thorax is a very narrow ring, scarcely visible on top except for the two little knobs which it bears, from which arise small tufts of hairs. The mezo-thorax is the most developed segment of the body, bearing the fore-wings and the middle legs, and the two little lappets *(patagia)* that cover the bases of the wings. The meta-thorax is also quite large, and has attached to it the hind legs and hind wings. The legs are weak and slender, and are used chiefly as supports for the body when the insect is at rest, and only rarely for walking or crawling. They are clothed with hair-like scales, and have one or two pairs of spurs at or near the outer end of the shank *(tibia)*. The feet have five slender cylindrical joints, and terminate in a pair of minute claws.

The wings, in this order of insects, are the most striking features of the organism, and of first importance in every respect. They are formed of membrane supported by numerous strong veins (see Fig. 5), and covered with a powdery substance which, when magnified, is found to consist of minute scales narrowly or broadly oblong, attached by a little stem; they are notched on the outer edge and overlap each other in irregular rows, like the shingles on a roof. It is in the brilliant colors and elegant patterns formed by the arrangement of these scales, that the beauty of the butterflies and moths chiefly resides.

The *patagia* are covered with long hairs, and fit over the bases of the upper wings like epaulettes. In their perfect state lepidopterous insects are rather short-lived, if we except the comparatively few species

that hibernate. The only nourishment they require is an occasional sip of nectar from flowers or water from a dew-drop or from the moist earth. Their business in life is to seek their mates and place their eggs upon the plants or other substances upon which their larvæ subsist. The eggs of butterflies are usually conical and ridged or fretted on the surface, and as a rule are deposited singly, while those of moths are mostly spherical or circular, and deposited in clusters.

The transformations in this order are complete, and more easily observed than in most other insects. The larvæ are all properly termed *caterpillars*, but the smooth species are often popularly designated "worms," as for example, "cut-worms," "canker-worms," "bud-worms," etc. Like the parent insects, they vary greatly in form, size and color. The body is usually cylindrical, composed of twelve or thirteen segments, besides the head. The latter is covered by a horny plate, often divided in the middle by a triangular "face," which has its base at the labrum. The jaws are broad and strong, serrated or toothed on the edges, the under lip (labium) is well developed, but the maxillæ and palpi are in most species quite rudimentary. The antennæ are represented by a pair of three or four jointed tubercles, and the eyes by three or four little dots or simple eyes, which probably enable them to distinguish daylight from darkness. As Dr. Packard says, "this is useful information from a caterpillar's stand-point, as most of them hide by day and feed by night." The *spineret* is a small colnical tube on the lower lip, through which a gummy substance, secreted by most caterpillars, is drawn out and becomes a fine silken thread, of which these insects make great use in forming their nests or cocoons, in attaching themselves when molting, or suspending themselves in the air as a means of escape from their enemies.

Caterpillars, with very few exceptions, have from *ten* to *sixteen* legs—six of which, on the thoracic joints, are termed the *true* or *thoracic* legs, and are pointed and horny; the others, which support the hinder part of the body, are broad fleshy props, and are termed the *false* legs or *pro-legs;* they terminate in a circle of minute hooks, by which their possessor is enabled to cling to any surface upon which it wishes to crawl. Some caterpillars have the surface of the body smooth, while in others it is covered with hair or protected by clusters of sharp branching spines, or roughened by warts and tubercles. On the top of the first joint, just back of the head, there is in many species a clearly defined horny plate called the *cervical collar* or *shield*, and a similar plate at the hinder end forms the *anal* or *supra-anal* plate.

In the process of growth, lepidopterous larvæ *molt* or change their skins from three to five times. The operation is as follows: The hindmost or anal pro-legs are made fast to some rough surface, or to a mat of silk prepared for the purpose. The larva then rests and fasts for a certain length of time. Presently the head plates begin to separate from the neck, and a longitudinal slit appears on the top of the thoracic segments, which gradually widens until the fore part of the body can be forced through, after which, by alternate expansions and contractions, the outgrown skin is made to slip backward until, by a final effort, the anal legs are withdrawn and the crumpled mass of cast-off skin, termed the *exuvium* (plural, *exuviæ),* is left attached to the leaf or bark, while the caterpillar, in its new dress—which is, in some cases, quite differently colored and ornamented from the out-grown one—crawls off in search of food with which to renew its exhausted strength.

The great majority of caterpillars subsist on the leaves, flowers and fruit of trees, shrubs and herbaceous plants. Of these they consume vast quantities every year, often partially or entirely destroying the most valuable crops in satisfying their voracious appetites. A few species infest drugs and grocers' wares and some gnaw furs and woolen goods.

When full grown, caterpillars cease to feed, and seek some place in which they will be concealed from their enemies while unable either to escape or defend themselves. In this they succeed so well that it is but rarely that the pupæ are discovered by any but practiced eyes.

Lepidopterous pupæ are called *chrysalides.* They are of various shapes, some being angular and irregular in outline, and have the surface roughened with humps and protuberances, while others are smooth, oval or oblong and highly polished. The integument is horny or shelly in its nature, composed of *chitine,* a substance which enters largely into the composition of the body-wall of insects in all stages of development. Each member is not encased in a separate sheath, as with the Hymenoptera and Coleoptera, but the outlines of the parts can, in most species, be distinguished through the case in which they are enclosed. The chrysalides of many species have no covering or outer envelope, but are simply attached by bands of silk to some surface. Others are enclosed in thick cocoons, or hidden within rolled-up leaves, or formed in earthen cells several inches under ground. The pupa state varies in duration from eight or ten days to several months, according to the habit of the species or the season of the year.

The Lepidoptera cannot be so readily classified by the beginner as the bees and beetles, although the primary groups are not difficult to distinguish. The first division is into two sections or sub-orders:

I. BUTTERFLIES (*Rhopalocera*—club-horns).

II. MOTHS (*Heterocera*—variable horns).

A glance at the antennæ serves to show us to which of these groups an insect belongs. In the butterflies these organs are stiff, thread-like, and either abruptly or gradually enlarged at the tip, so that they always terminate in a *knob* or *club*. The antennæ of moths, on the other hand, no matter what their general form may be, whether feathered or filiform, or spindle-shaped, invariably end in a *point*. Besides the antennæ there are many other characters which separate the insects composing these two divisions. In the butterflies the body is usually small and slender in proportion to the size of the wings, while in many moths it is stout and clumsy; the fore and hind wings of butterflies are not attached during flight, while those of moths are held together near the base by a bristle termed a *frenulum* on the secondaries, which fits into a loop or socket on the inner margin of the primaries. The butterflies are *diurnal* insects, while most of the moths fly at *night* or during the morning and evening twilight. When at rest butterflies hold the wings, at least one pair of them, erect, with the under surfaces exposed; the moths on the contrary close the wings either flat or roof-like over the body, with the upper pair entirely concealing the under pair, except in one family, where both are spread out.

While an entomologist rarely mistakes a butterfly larva for that of a moth, or *vice versa*, it is somewhat difficult to give a list of the characters by which they can be distinguished. The chrysalides of butterflies are usually unprotected by any sort of cover or cocoon, and are very angular and irregular in outline, or are brightly colored, while those of moths are protected in cocoons of silk, or in rolled leaves, or hidden in the earth, and are mostly smooth and oval or oblong in outline, and in no instance display brilliant or metallic colors.

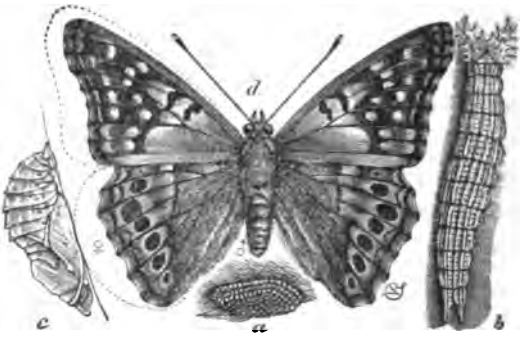
It must be borne in mind that in entomology the term "moth" is not restricted to the few small insects that breed in furs, woolens and similar substances, but is used to designate the greater proportion of the scale-winged insects, without regard to size or habit. The gigantic Cecropia, whose wings expand about six inches, and whose body is as thick as one's finger, is as much a "moth" as is the tiny creature that sometimes flutters out of closets or up from the borders of carpets, to the disturbance of the thrifty housekeeper.

CHAPTER XXI.

Order LEPIDOPTERA. Sub-Order RHOPALOCERA.

BUTTERFLIES.

[Fig. 33.]



Hackberry butterfly, *Apatura-clyton*, with larva and chrysalis. After Riley.

Of all the insect tribes the butterflies are the popular favorites. None of the prejudice with which insects are generally regarded seems to attach to them. Used by the classic writers to symbolize the soul, they have ever continued to be favorites of the poets, and are associated with whatever is most airily graceful and beautiful in nature.

The larvæ of butterflies feed exclusively on vegetation, each species being restricted to one, or at most to two or three kinds of plants. In their general form they do not vary so much as the larvæ of moths, being all more or less cylindrical and always possessing the full complement of six legs and ten prolegs. The head, though not always large, is quite distinct, usually with a somewhat fretted or stippled surface, and in a few species, adorned with branching horns (see Fig. 33*b*), or spiny tubercles. The surface of the body is in some species smooth and velvety, in others bearing fleshy horns and protuberances or covered with spines.

The pupæ are naked, except in the species constituting one family, where they are slightly enclosed in threads of silk. They are, as a rule, very angular, especially toward the anterior end, and are either pendent by the tail, or are supported in an upright position by a band of silk which the larva, before changing, contrives to weave across its back.

Some of the characters by which butterflies are grouped into families and genera are found in the outline and venation of the wings, the shape of the club of the antennæ and of the palpi, the presence or

seeming absence of the front pair of legs, and, to a certain extent, in the coloring.

Butterflies have been classified and re-classified in various ways, by different naturalists, each system based on some excellent ideas, but all more or less defective. The simplest arrangement is that by which they are all grouped into four comprehensive families, all of which are numerously represented in all parts of the United States. These families are: the Swallow-tails and their allies (PAPILIONIDÆ), the Browns and Silver-spots (NYMPHALIDÆ), the Little Blues and Coppers (LYCÆNIDÆ,) and the Skippers (HESPERIDÆ).

The Swallow-tails (genus *Papilio)* are so called from the narrow lobes or tabs into which the outer edges of the lower wings are prolonged. Among these we find the largest and some of the most beautiful of our native species. They are mostly of dark colors—black or rich brown, ornamented on the wings and body with spots and streaks of bright yellow and orange, with shadings or lustrous reflections of blue or green. The club of the antennæ is rather small; the tibiæ of the hind legs have a single pair of spurs, and those of the fore legs at the base a sort of flap covered with long hairs. All the species in the family have six equally developed legs. (See Fig. 32.)

The larvæ are, with one or two exceptions, smooth, cylindrical caterpillars, often gaily striped or ornamented with eye-like spots (see Fig. —), and possess a distinguishing character in a V-shaped scent organ *(osmaterium)* of an orange color, which can be protruded at will and emits a disagreeable odor. It is used to frighten away parasitic enemies. This appendage is peculiar to the larvæ of the true Papilios, and when the insect is quiet, is completely retracted under the edge of the segment next the head. The larva of *Papilio asterias* feeds on the foliage of carrots, parsley, caraway and other umbeliferous plants. The chrysalis is marked in wood brown and white, and has the form represented in Fig. 32. The butterfly is black, with bluish shadings, and is ornamented with several rows of bright yellow dots near the outer edges of the wings. The Turnus butterfly *(Papilio turnus*, Linn.) is one of the largest and commonest species, expanding over four inches. It differs from all its congeners in having the ground color of the wings bright yellow, but crossed by broad dashes and streaks of black, and with a black border in which are set lunate yellow spots. The larva is deep green, and about one and one-half inches in length deep when full grown. The front edge of the second joint and a part of the fifth joint are yellow, and on each side of the fourth joint are a couple of small purple spots. The chrysalis is in various shades of

brown, in shape much like that of *P. asterias,* but is larger and has a more prominent horn projecting forward over the head. The larvæ feed on a variety of fruit and shade trees, and are sometimes quite destructive. There are eight or nine North American species of Swallow-tailed butterflies, besides several quite distinct varieties, all of which are very handsome.

The Garden Whites or Cabbage butterflies (genus *Pieris)* include about a half dozen species, among which are found several very serious pests of the vegetable garden. They are of rather small size, expanding not more than two inches, and are all of a dingy white with blackish margins and dustings, or are more or less thickly spotted with grayish black. The larvæ are slender, cylindrical caterpillars with a rugose or velvety surface, and either plain green or with a striped and checkered pattern in dull green, black, lilac and white.

The European cabbage butterfly *(Pieris rapæ,* Linn.) was accidentally introduced into this country about twenty years ago, and has now become naturalized in almost every section, proving very destructive to cabbages, turnips and other cruciferous plants.

The Sulphur yellows (genus *Colias)* include the medium-sized, gay yellow and black or orange and black butterflies that are so numerous late in spring and early in autumn. Their larvæ are of a green color, with a velvety surface, and many of them have a lateral band, composed of a line of bright crimson, and one of white, extending from the second to the eleventh segments. They feed upon clover, lucern and other leguminous plants.

The Browns and Silver Spots composing the family NYMPHALIDÆ are called the "four-footed" butterflies, from the apparent absence of the front pair of legs. If carefully examined these members are seen to be folded and closely appressed to the breast, and often have the tarsi undeveloped. The majority of these butterflies are of large size and of dark, rich colors, many species being elegantly ornamented on the under side of the wings with silvery spots. The larvæ of most species have the surface covered with spines or raised into humps and prominences. The pupæ are always suspended by the tail and hang head downward. A few of the chrysalides are smooth and casket-shaped, but the majority are characterized by many angles and projections. Nearly all are studded with golden or gem-like spots, which disappear or lose their luster shortly before the butterfly emerges.

The manner in which these pupæ contrive to attach themselves to the point of support is a process so interesting that the observer is well repaid for the time expended in watching it. It may be briefly described as follows: The caterpillar, when ready to change, spins a

little mat or tuft of silk upon some convenient surface. Into this it entangles the hooks of the hind legs, and loosening its hold in front and curling up the head, it suffers itself to drop and hang by these anal pro-legs. In this position it remains from twelve to thirty-six hours. The skin then bursts open just back of the head, and the anterior end of the chrysalis is protruded. By violent exertion, in alternate lengthenings and contractions, the larval skin is shoved backward until it forms a shriveled mass near the point of attachment. The crowning effort is now to be made in withdrawing the tail of the chrysalis and fixing it into the little mat of silk prepared for it. The chrysalis, it must be remembered, is not yet hard and stiff, but is capable of considerable motion; accordingly, by a sharp contraction, a portion of the larval skin is firmly grasped between two of the abdominal joints, and with only this slight hold the hinder end of the chrysalis is withdrawn from the old skin, and, with a vigorous thrust, the little spike, termed the *cremaster,* with which it is provided, is struck sharply into the tuft of silk. Sometimes the first stroke suffices to fix it; in other cases two or three efforts are required, and, occasionally, there is utter failure and the chrysalis drops to the ground. When the chrysalis is made fast it whirls itself rapidly round and round to detach the larval skin and to more firmly entangle the barbs of the cremaster. After this the chrysalis contracts and hardens, and the beautiful colors which characterize the particular species are displayed.

Among the most beautiful and most easily recognized genera of the four-footed butterflies may be mentioned *Danais*, *Argynnis*, *Apatura*, *Vanessa*, *Grapta* and *Hipparchia*. The Archippus butterfly (*Danais archippus*, Fabr.) is one of the most common and abundant species. The wing expanse is between four and five inches, the color a bright red-brown with black veins and black border in which are set two rows of white dots. The larva feeds on the milkweed or silkweed (*Asclepias*), and is elegantly colored in transverse stripes of black, white and yellow, with a pair of black velvety horns on the third and eleventh joints. The chrysalis is shaped like a lady's ear-drop, and is of a clear green color, ornamented with black and gold.

The Argynnis butterflies have broad velvety wings of a tawny orange color, shaded and spotted with dark-brown on the upper surface, while the under sides are resplendent with numerous silvery spots. In these species the antennæ terminate in a large, roundish knob. The larvæ are covered with spines and feed upon violets.

The Hackberry butterflies (genus *Apatura*) are of a dull brown, mottled with white and black spots. The eggs of *A. clyton* (see Fig. 33)

are laid in a mass, and the head of the larva bears a pair of branching horns.

In *Vanessa* the edges of the wings are scalloped and angular in outline. The palpi are large, and project in front of the head like a beak. The beautiful Antiopa butterfly (*Vanessa antiopa*, Linn), which has deep purple, buff-bordered wings, and whose larva are very destructive to the Lombardy poplar and elm, and the red Admiral (*V. atalanta,* Linn), distinguished by broad, orange-red stripes, passing obliquely across the upper wings and bordering the outer edges of the lower ones, and whose larvæ feed on the nettle, belong to this genus.

The genus *Grapta* may be recognized by the very jagged outline of the wings. The upper pair, besides being notched, are deeply hollowed out on the outer edge, and the lower pair are furnished with two short "tails." The upper surface is pale reddish-brown, mottled with large, irregular spots of dark brown. Some species have a narrow border of pale blue. The under side is of duller colors, with a single silvery or golden mark. These butterflies may be popularly termed the "Punctuation" butterflies, since, from the punctuation-like marks on the under side of the wings, the various species have been named *Grapta comma*, *Grapta interrogationis*, etc.

The genus *Hipparchia* contains the "Wood butterflies," so named from the fact of their being usually found in groves and thickets, and also from their wood-brown colors, relieved by eye-like spots.

The family LYCÆNIDÆ contains the small coppery red and the blue butterflies often seen fluttering about pools of water and muddy places by road-sides.

The larvæ feed on grass, are smooth, short and thick, and secure themselves with a loop in an upright position, when about to transform. The genus *Theckla* may be recognized by the two thread-like tails which ornament each of the hind wings.

The HESPERIDÆ comprise a large number of black and brown, dull-colored butterflies, mostly of small size, and which differ in so many respects from the other RHOPALOCERA that they seem to furnish the connecting link between the true butterflies and the moths. The body is generally short and thick, and in repose only the fore wings are held erect, and these not pressed together, while the hind wings are laid flat upon the back. The antennæ end in a little hook. They fly with rapid, jerky motions, often alighting. Hence they are popularly denominated "Skippers." The larvæ are spindle-shaped, with a rough surface, a small, distinct neck and a large head, which is usually somewhat heart-shaped and marked with two or more conspicuous spots. They live in cases which they form by folding leaves and fast-

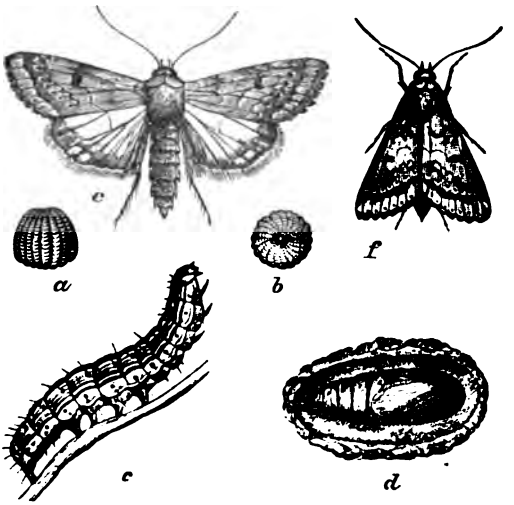
ening them in place with what look like long stitches of coarse, white silk. They leave their cases at night to feed, and when one case is outgrown they construct a new one. They change to pupæ within their leafy homes and further enclosed in a lace-like silken cocoon. The chrysalis is smooth and oval, often covered with a fine powder or "bloom," and is suspended by the tail. The Tityrus skipper *(Eudamus tityrus,* Fabr.), the larva of which feeds on the locust and acacia, is the largest and best known species.

CHAPTER XXII.

Order LEPIDOPTERA. Sub-Order HETEROCERA.

MOTHS.

Fig. 34.



Corn-worm *(Heliothis armigera)*—after Riley; *a*, *b*, egg magnified; *c*, larva; *d*, pupa; *e*, *f*, imago or moth.

The moths greatly exceed the butterflies in number of species and individuals and in diversity of size, structure and habit. Among them may be found some (tropical) species whose expanded wings measure a foot from tip to tip, and others whose wing expanse is scarcely one-eighth inch. Some forms are slender and graceful, and can scarcely be distinguished from butterflies; others, when on the wing, might easily be mistaken for bees or wasps; still others simulate beetles, while a few, destitute of wings, and in some cases of legs also, present the appearance of over-grown maggots or grubs. In the peculiarities of their development, also, the entomologist finds a field of inexhaust-

ible interest, and in which he learns much that can be turned to practical account in his endeavors to discover the best methods of keeping pernicious species in check. A *general* description of the insects composing this sub-order is almost impossible. Almost the only characters common to all are the pointed antennæ, the horizontal position of the wings in repose, the rounded or oval and inclosed pupæ, and, with some exceptions, the nocturnal habit. The moths are very conveniently separated into *ten* families: Sphinx moths (SPHINGIDÆ), Clear-wings (ÆGERIIDÆ), Butterfly Mimics (ZYGÆNIDÆ), Spinners (BOMBYCIDÆ), Owlet moths or Cut-worm moths (NOCTUIDÆ), Span-worm or Measuring-worm moths (GEOMETRIDÆ), Snout moths (PYRALIDÆ), Leaf-rollers (TORTRICIDÆ), Fringe-wings or Tineids (TINEIDÆ) and Plume moths or Feather-wings (PTEROPHORIDÆ). Of these families the first six are sometimes collectively termed the Macro-lepidoptera, and the remaining four the Micro-lepidoptera.

The Ægerians and Zygænids are *diurnal*; the Sphinx moths are *crepuscular—i. e.,* flying in the twilight—while all the others are nocturnal.

The Sphinx moths are so named from a habit of many of the larvæ when at rest, of raising the front part of the body and drawing in the head, giving them a fanciful resemblance to the figures of the Sphinx in Egyptian carvings and pictures. They are also called "hawk-moths" from the strength of their narrow and pointed wings, and "humming-bird moths" from their manner of hovering over flowers while extracting the nectar. These moths have stout, smooth, spindle-shaped bodies, and the fore wings are nearly twice the length and breadth of the hinder pair, and close roof fashion over the body in repose. The antennæ are somewhat thickened in the middle, and in most species end in a hook. The "tongue" is remarkably long, often five or six inches, enabling the insects, while on the wing, to reach the deepest nectaries of the flowers for which they have a preference, among which may be mentioned the Daturas, Petunias, and other long-tubed blossoms. The larvæ are cylindrical caterpillars with a roughened or granulated surface, generally of some shade of green, and often with oblique stripes along each side, and almost always have a pointed horn or an eye-like spot on the top of the twelfth joint. With a few exceptions they enter the ground to transform, and some species have an external tongue case which is bent over like a jug-handle in front.

The common tomato or tobacco worm (*Sphinx quinquemaculata*, Haw.) and the Sphinx caterpillars of the grape vine are good examples of this family. All the species are very voracious and destructive to valuable trees and plants.

The Clear-winged moths (ÆGERIIDÆ) are mostly of small size and might easily be mistaken for bees or small wasps when on the wing. They have slender bodies, sometimes ending in a tuft of long hairs. In some species only the underwings are transparent, in others there is merely a border of scales around each pair. Among the larvæ we find some of the worst borers, such as the Peach-tree borer (*Ægeria exitiosa*, Say.), the Raspberry borer (*Ærubi*, Riley), and the Pickle worm (*Phakellura nitidalis*, Cram).

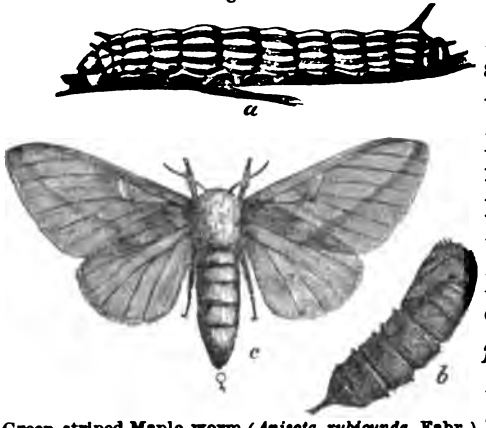
[Fig. 35.]

Peach-borer (*Ægeria exitiosa*), Say.—after Riley. *a*, female; *b*, male.

The beautiful insects that I have termed "Butterfly Mimics" (ZYGÆNIDÆ) can scarcely be distinguished from the genuine butterflies, except by the pointed antennæ, and even these organs sometimes have a little silken tuft near the tip which helps the deception. They delight in the hottest sunshine, and display very gay colors on their broad wings. The larvæ are usually transversely striped in black and white with an orange-colored hump on the top of the eleventh segment. Some very injurious species are known as the "Blue caterpillars of the vine." When ready to change they enter the ground or bore into the wood of the grape posts.

Among the spinners (BOMBYCIDÆ) are most of our largest and most elegant moths, as well as the few species which are in the highest degree valuable, viz., the silk producers. Some of these species expand from six to nine inches. The wings are broad, and sometimes *falcate:* *i. e.,* hollowed out at the outer edges. They are densely covered with hairs and scales of rich colors. The head is small, and the antennæ beautifully feathered, and are in some species so broad as to be mistaken for an additional pair of wings. The mouth parts are undeveloped, and, large as they are, these moths are incapable of taking even a sip of nectar. The body is stout and heavy, and the plumy legs rather weak. The magnificent Cecropia moth (*Samia cecropia*, Linn) or the Polyphemus (*Telea polyphemus*, Cram.)—named for the fabled one-eyed monster of classic poetry, because of the great eye-like spot that orna-

Fig. 36.



Green-striped Maple worm (*Anisota rubicunda*, Fabr.) after Riley. *a*, larva; *b*, pupa; *c*, moth—all natural size.

ments each hind wing—occasionally enter lighted rooms on summer nights; but, as a rule, the moths of this family are not much attracted by light. The most delicately beautiful of our native species is the Luna moth (*Actias luna,* Linn.), which is of a pale green color with an eye spot at the end of the discal cell in each wing, and the hind wings extended at the outer edges into lobes or tails sometimes one and one-half inches long. The full grown larvæ of these species are immense caterpillars, usually of a green color, sparsely hairy and studded with wart-like tubercles of brilliant colors, or bear, near the head, from one to six long, spiny horns that give them a most formidable aspect.

The invaluable and interesting Chinese silk-worm (*Bombyx mori,* Linn.) is a near relative of the species named above. It is of a bluish or creamy white, with a few more or less distinct brown markings. The surface is smooth, except for a few ridges and wrinkles on the thoracic joints and a small pointed horn on the top of the eleventh joint. All these species are very voracious, and feed for from four to six weeks.

The native spinners are often quite destructive to various kinds of fruit and shade trees, while the Chinese silk-worm thrives best on the White mulberry, but may be grown successfully on the Osage orange, and, in the Southern States, it is said to feed on Alfalfa. The silk gland, lying along the under side of the body, is very large in all the typical Bombycids, and secretes a quantity of viscid fluid, which upon being drawn out through the spineret on the labium, forms fine threads of the exquisite substance known as *silk.* Of this the larvæ form thick oval, or slender, oblong cocoons, weaving layer over layer until about half the substance of the caterpillar is transformed into the covering for the pupa. In the latter stage our native species hibernate, but the imported species cuts its way out in about two weeks, appearing as a rather small, white moth, whose weak wings are incapable of supporting it in flight. The female lays a quantity of eggs, and by means of these the species is carried over winter.

Among the most interesting species of Bombycids are the singular forms termed "slug caterpillars."

In these the feet are but slightly developed, and the insect moves with a snail-like glide, over a leaf or other surface, by means of ridges on the under side, leaving a slimy track behind it. Some have a rectangular shape with several fleshy prominences on the back, others are almost circular, or of the shape of a beech nut. Some are adorned on top with a double row of plumy spines.

Nearly all are brightly colored, or have the colors displayed in peculiar and beautiful patterns. Great care must be exercised in

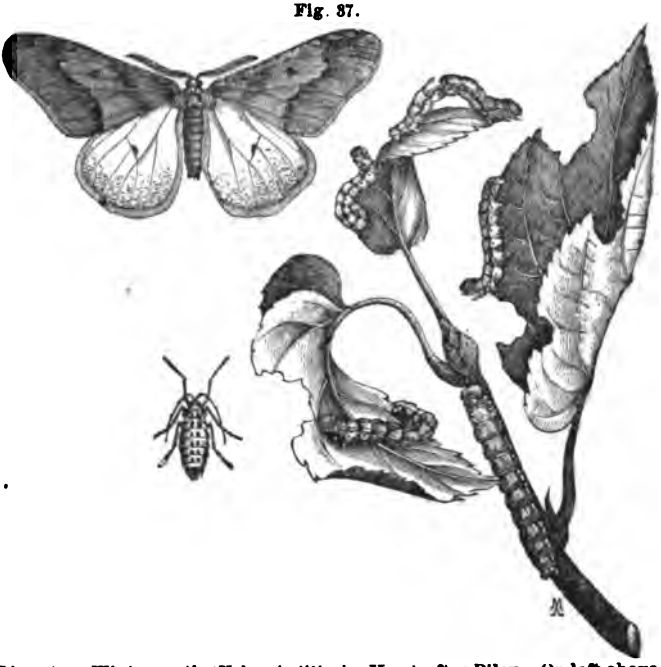
handling them, as the hairs and spines inflict a nettle-like sting. Quite a number of species included among the spinners do not secrete silk, and change to pupæ under ground in a frail earthen cell. Among these is the Green-striped Maple worm (*Dryocampa rubicunda*, Fab.), (see Fig. 36), which is occasionally very destructive to the shade trees from which it derives its name.

The Cut-worm moths or Owlet moths (NOCTUIDÆ) are a very extensive group of medium sized insects, mostly of plain clors, but containing a few very gaily decked species. The body is rather thick and heavy, the fore wings narrow, and in repose entirely cover the hind wings, which are folded beneath them. The head is small, the antennæ simple (thread-like), the tongue long, and the eyes in many cases hairy or encircled by hairs.

The thorax is often crested or tufted, with long, erect scales. The upper wings, whatever their color and markings, display two more or less distinct spots, the one round, the other kidney-shaped (*orbicular* and *reniform*). The true cut-worms are smooth, dingy-colored caterpillars, many of which commonly rest in a coiled position. They conceal themselves by day and crawl out by night to their work of destruction, cutting off not only tender herbaceous vegetation, but ascending trees and vines to nip off the young leaves. When ready to transform, these "worms" burrow into the earth or conceal themselves under rubbish on its surface, but never spin any regular cocoon.

The well-known Army worm (*Leucania unipuncta*, Haw.), which sometimes devastates numerous grain fields in a single march, is one of the representatives of this group. So, also, is the wide-spread Corn worm or Boll worm (*Heliothis armigera*, Hub.) See Fig. 34. The large moths of the genus *Catocala*, easily recognized by their gaily banded under-wings, in which scarlet, crimson, orange or white alternates with black, are also included in the family NOCTUIDÆ.

Fig. 37.



Lime-tree Winter moth (*Hybernia tiliaria*, Har.) after Riley. On left above is the broad-winged male, while the spider-like creature below is the female, which never acquires wings; on right, caterpillars.

The Span-worm moths (GEOMETRIDÆ) are mostly of pale, delicate colors, with slender bodies, broad thin wings, which in repose are spread out at right angles from the body, and by the usually slightly or broadly feathered antennæ. In this family the females are sometimes wingless. The larvæ are called "Measuring worms" or "Span worms" from their looping mode of crawling. This is necessitated by the lack of two or three pairs of the abdominal pro-legs, so that in crawling the hinder end of the body is brought up close to the head at every onward motion. These worms are generally long, slender and cylindrical. Some have bud-like or scale-like humps on the body, so that when the latter is at rest and held out from a branch in an oblique direction, it simulates a twig so closely as to escape recognition. In preparing for transformation, these larvæ either enter the ground or enclose themselves in thin cocoons in some concealed spot. Among the pernicious species we find the Apple and Elm tree Canker worms (*Anisopteryx vernata*, Har., and *A. autumnalis*, Pack.), and the Lime tree Winter moth (*Hybernia tiliari*, Har.) See Fig. 37.

The Snout moths (*Pyralidæ*) are much like many of the Geometers in general appearance, but may usually be distinguished from them by their smaller size and the long, slender palpi, which are held close together and project in front of the head like a beak. Some of the larvæ are leaf-rollers; others feed on meal or in clover hay, while others are true "grass worms" and do much damage to meadows and pastures.

The true leaf-rollers (*Tortricidæ*) are a family of small moths, many of which are richly and beautifully colored. They are characterized by the oblong form of the upper wings, which, in repose, are folded

roof-like over the body. The eyes are large, the antennæ filiform, the palpi broad, tufted and somewhat triangular. The larvæ are usually rather soft, plainly colored worms with a heart-shaped head, a distinct horny collar, and horny plate on top of the last joint. The great majority conceal themselves within leaves variously twisted and rolled, from which habit the group derives its name. A few species feed on fruit, among which the universal apple enemy, the Codling moth (*Carpocapsa pomonella,* Linn.), is the most notorious.

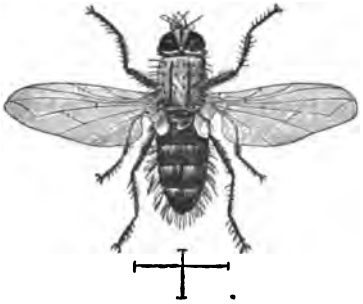
The Fringe-wings (TINEIDÆ) include the smallest insects in the Order. They have slender, lance-shaped wings, bordered by long fringes, and many of them are exquisitely colored in various metallic and prismatic tints. The antennæ are simple, and usually nearly as long as the body. The palpi vary in form, but are, as a rule, long and conspicuous, in many species curving upward in front of the head. The larvæ are often leaf-miners or case-bearers. Others are destructive to fruit or grain, or feed upon feathers, furs and wool, being the "clothes moths," against whose ravages it is necessary to protect some of our costliest apparel.

The Feather-wings or Plume moths (PTEROPHORIDÆ) have the wings cleft so that each appears composed of several feathers. They are small insects, only one or two of which are seriously destructive, as for example the Grape-vine Plume.

CHAPTER XXIII.

Order IV. DIPTERA.

[Fig. 38.]



Tachina fly (*Lydella doryphoræ*) Riley.

In this Order are grouped the insects that have but a single pair of wings, and a few others that have no wings at all. They are popu-

larly distinguished as flies. Although many flies, in the larva state, are undoubtedly useful as scavengers, yet the perfect insects are, most of them, so annoying, and often so positively injurious, that the entire Order is regarded with much disfavor. Mosquitos, gnats, house-flies, gad-flies and other species frequently occur in such immense swarms in certain localities as to render life almost intolerable. A few species are brilliantly colored, or of striking size or form, but, as a rule, the members of this division are the most individually inconspicuous of insects.

The bodies of most flies are soft and fragile. The head is usually large, round or hemispherical, often quite concave behind, and is attached to the thorax by a peg-like neck, on which it can be twirled almost completely around without being separated from the body. The eyes are, except in a few very lowly organized species, very large, covering the greater part of the head, and their faceted structure can be seen even without the aid of a lens. The mouth-parts are very differently developed in the different families, but are all peculiarly fitted for sipping fluids. In the house-fly the jaws and true maxillæ are wanting, but the secondary maxillæ and the lower lip form a proboscis which ends in a pair of broad flaps, whose ridged surface enables the insect to lap up sweet fluids or the perspiration from the hand, or the juices of meat or other liquids to which it is attracted. When not in use, the proboscis being jointed, is folded up and fits into a groove in the face. The so-called "stinging flies" have the jaws modified into very sharp lancets, which are so strong that they are capable of piercing even the thick skin of a horse and drawing the blood. The antennæ are either short and stout, having but three joints and a bristle, or are many-jointed, long and feathered, as in the mosquito. The thorax is large and round, the first and third segments—pro-thorax and meta-thorax—being very small and closely consolidated above with the meso-thorax, which is large and muscular. The wings are composed of thin, transparent or smoky membrane supported by strong veins. They can be vibrated with exceeding swiftness, and the insects are capable of longer and more continuous flights than any of the four-winged species. At the base of each wing is a little roundish scale called the *winglet* or *alulet*, the use of which has not yet been discovered. The hind wings are represented by two thread-like organs ending in little knobs, which are the *halteres*, *poisers* or *balancers*, whose function is likewise unknown. The legs are generally rather weak and slender, and in some species are very long. The feet are five-jointed, and besides the claws, are provided with a bilobed cushion clothed with microscopic hairs

from which exudes a sticky fluid, by means of which the insect is enabled to walk up and down the panes of a window or along the ceiling of a room. The old, ingenious theory of "the exhaustion of air under its feet," by which the crawling of a fly on such surfaces used to be explained, is now known to be erroneous. In the abdomen of the stouter-bodied flies it is difficult to distinguish more than four segments, the terminal ones being abruptly narrowed and drawn within the body to form the ovipositor.

Such flies as the house-fly and the gad-fly are on the wing and troublesome only during the day. Others, like the mosquito, are most active at night, while some are equally tormenting during the entire twenty-four hours.

The transformations of dipterous insects are complete. The eggs are deposited singly or in masses upon the solids or fluids upon which the larvæ feed. Those of many species are smooth and white and of a linear oblong shape.

The larvae of terrestrial flies are called *maggots*. They are soft, thin-skinned, cylindrical, and taper most toward the head, or rather the mouth, for but few of them have any distinct head. They have no legs or other organs of locomotion, and wriggle from place to place by a peculiar twisting of the body, or, as in the case of the "cheese skippers," they coil themselves up and seize the tail between the jaws, and then by suddenly letting go, jerk themselves to great distances by the rebound.

Aquatic larvæ are furnished with fin-like swimming organs, and some species breathe through long tubes situated on the posterior end of the body, which can be elevated above the surface of the water. Many dipterous larvæ are parasitic; others feed upon decaying animal or vegetable matter; those which are aquatic subsist on organic impurities of water, and a considerable proportion feed on the tissues of growing plants. Except in the case of some aquatic species, the pupæ are *inactive*. They are of two forms: *coarctate*, that is, inclosed in the dry and hardened larva skin, or *obtected*, with the larva skin thrown off, and the rudimentary members of the mature insect separately encased, as in the pupæ of Hymenoptera and Coleoptera. The pupa state is generally of short duration. The Diptera may be considered under two sub-orders:

I. ORTHORAPHA, in which the obtected pupa escapes from the larval skin through a cross slit or T-shaped opening between the seventh and eighth joints; and

II. CYCLORAPHA, including mostly coarctate pupæ, from which the perfect fly escapes through a circular hole on top of the puparium.

Each of these divisions contains many families which differ in many points of structure and habit. It will be possible here to refer only to those which include the species most commonly met with, and of most importance from an economic standpoint. In the first we find the Gall-gnats and grain-flies (CECIDOMYIDÆ). These are all small species, which are injurious to vegetation. They have slender bodies and long antennæ, which are often plumy. The wings have three or four veins, extending from base to outer margin, and are usually fringed around the edge. The halteres are long and round-knobbed, and the legs long and slender. The gall-making species place their eggs upon leaves or tender stems, into the tissues of which the larvæ work their way, causing by irritation, peculiar fleshy or woody swellings. On this abnormal vegetable tissue the larvæ feed. The latter are minute maggots, often of a pale red color, with a peculiar, clove-shaped dark mark on the under side near the head, which can be clearly distinguished only by the aid of a lens.

The Hessian fly (*Cecidomyia destructor*, Say.) and the Wheat-midge (*Diplosis tritici*, Kirby) are the most notoriously destructive of these gnats. The larvæ of the former are flesh-colored maggots, which are found beneath the sheaths of the lower joints of the wheat stalk in autumn and early spring, and which dwarf and sometimes entirely kill the plant by extracting the sap from the tender stems. In the change to pupa, the larval skin hardens and turns brown, forming a "flax-seed"-like *puparium*, within which the transformations take place.

The Wheat-midge is a tiny, orange-colored fly which places its eggs on the young heads of wheat, from which the red maggots extract the juices and cause the kernels to shrivel.

The Buffalo-gnats (SIMULIDÆ) are short, thick species with a very rounded thorax, short antennæ and strong mouth parts, capable of drawing blood from cattle and mules as well as from man. At certain seasons of the year they are an almost insupportable pest on the shores of the northern lakes and in the south, along the principal water-courses. The larvæ breed in water and have a singular feathery gill at the hinder end.

Mosquitos (CULICIDÆ) are characterized chiefly by the complex mouth parts, which are projected straight forward in front of the head. The beak or sting of the female mosquito—for the males are inoffensive creatures, that neither sing nor *sting*—when closely examined, is seen to consist of a bundle of fine bristles, seven in number, which together form a sharp-pointed tube by which the skin of man and the larger animals is pierced, and through which a minute portion of poison from a gland in the pro-thorax is forced into the wound, before or after

the blood has been drawn. The mouth parts of the male mosquito are not so long, and are adapted to sipping the nectar of flowers instead of the sanguinary nourishment preferred by his partner. The eyes are very large and somewhat oblong. The antennæ are plumy in both sexes, but those of the male are much more ornamental than those of the female. The thorax is considerably humped and the hind body long and slender. The legs are also very long and thin. The wings are fringed on the edge and the principal veins are outlined by fine scales. The eggs are laid in a boat-shaped mass on the surface of still water, and the larvæ are the well-known "wrigglers" so often seen in standing water. They swim by the aid of unsymmetrically arranged tufts of bristles, and breathe through a tube at the hinder end of the body, which they frequently project above the surface of the water. The pupæ do not take any nourishment, but are active, club-headed affairs which swim by means of the two paddles in which the abdomen terminates. There are a great many species of these venomous gnats, some of which are strictly nocturnal while others are equally active day and night. *Culex ciliatus*, Fab. is perhaps the most generally distributed species.

The Crane-flies (TIPULIDÆ) resemble mosquitoes in general appearance, but many species are from five to ten times the size of the latter. They have no sting and are not injurious in any way. The larvæ breed in soil that is rich in decaying organic matter, and therefore often emerge from flower-pots and hot-beds. They also occur in mould and other fungi, and in water.

Gad-flies or Breeze-flies (TABANIDÆ).—In this and the two following families of the Orthorapha, the antennæ are short and three-jointed. The Gad-flies or Horse-flies are shaped much like the house-fly, but are very much larger. The mouth parts are very strong and awl-shaped, and the bite is very painful. There are several species, of which the "Green-head fly" (*Tabanus lineola*, Fabr.) and the large black Horse-fly (*T. atratus* Fabr.) are exceedingly annoying to horses during the summer months, their sharp stabs and their menacing buzz driving the animals into a frenzy, and not infrequently causing them to run away.

The Mottled Breeze-fly, a somewhat smaller species, mottled in a dirty white and brown, is more especially injurious to horn cattle. The larvæ are aquatic or semi-aquatic, and those that have been described are glossy, greenish or yellowish "worms," with a row of rounded tubercles on each side, and taper to a very small head. The pupæ are ridged or roughened on the abdominal joints, and formed in the ground.

The Robber-flies (ASILIDÆ) have long, slender bodies and wings, and spiny, long, stout legs. The beak is short but strong, and the under lip well developed. The eyes are almost globular, and the antennæ short, often tipped with a bristle. The body is usually hairy, varying in length from one to two inches, and tapers toward the tip. The colors are mostly black and white, though some species have the thorax clothed with yellow hairs. In their perfect state, the Robber-flies are fierce and greedy cannibals, especially destructive to the honey-bee, of which one species has been known to kill and suck the vital juices of more than one hundred and forty in a day, according to Dr. Packard. They sometimes make amends, however, by preying on the Cabbage butterfly, though I fear this has not yet become a very general habit. The larvæ live in the ground, and those that have been studied have fed upon roots.

The Bee-flies (BOMBYLIDÆ) resemble small Humble bees in their thick, hairy bodies. They are very swift on the wing, and are often found on flowers, from which they extract nectar with the long proboscis. The larvæ are parasitic on bees and on the eggs of locusts (grasshoppers).

In the Sub-Order CYCLORAPHA we find a large number of families of flies whose larvæ are parasites or scavengers and a few that feed on vegetation, among which are some common gall-makers, also some that live in water. The transformations take place either underground or on the surfaces upon which the larvæ fed—the larval skin thickening and hardening into an oblong case, within which the soft, white pupa is formed. The flies always come out through a round hole on the top. They usually have rather short, thick bodies, broad heads and short antennæ, ending in a bristle. The following families contain the species that are most directly beneficial or injurious to man: Syrphus flies (SYRPHIDÆ). See Plate of Orders.) This is a group of handsome flies, ranging in size from small to medium (having a body length of from one-fifth to one-half inch). The colors are often arranged in bright bands, giving the insects quite a wasp-like appearance. The front of the face has no groove for the reception of the antennæ, which have the last joint much thickened just back of the bristle. The larvæ are legless and headless, leech-like creatures, which do us great service in destroying all kinds of plant-lice (*Aphididæ*), and may almost always be found in the colonies of the latter, which they very rapidly exterminate. The great majority of the beneficial species are found in the genus *Syrphus*. Their transformations are very easily observed, as they are hardy and develop rapidly.

The singular "rat-tailed" larvæ, often found in stagnant pools or other foul water, produce hairy flies of the genus *Eristalis.*

Bot-flies (ŒSTRIDÆ) are stout, hairy insects, much resembling small Humble bees. The mouth parts are but slightly developed, and the small antennæ, hidden in little cavities in the very narrow face, seem, at first glance, to be wanting. They are chiefly interesting from the habits of the larvæ, which live in the stomachs of horses, in the heads of sheep, and on the backs and other parts of the bodies of cattle and other animals, causing great suffering and sometimes even death to the poor creatures infested. The Bot-flies of the horse (*Gastrophilus equi,* Fabr.) lay their eggs on the horse's front legs or on the flanks or hips, glueing them most firmly to the hairs. The larvæ, which are hatched very shortly, produce an irritation which induces the horse to bite at those parts, and by this means they enter the mouth and make their way into the stomach. There they attach themselves, by means of mouth hooks, to the lining membrane, feeding on the mucus and digestive fluids, occasionally penetrating to the muscular tissue, causing much irritation and pain, and, when very numerous, producing dangerous fever and weakness. When full grown, the "bots" pass out with the excrement and burrow into the earth, from which the flies issue in six or seven weeks. The Sheep bot-fly (*Œstrus ovis,* Linn.) deposits its larvæ, already hatched, in the nostrils of the sheep, which immediately work their way into the nasal cavities and frontal sinus of the head and attach themselves to the walls, producing the disease known as "grub in the head," from which sheep so commonly suffer and not infrequently die. When these maggots are full grown they drop from the nostrils to the ground, beneath the surface of which they transform.

The Ox bot-fly (*Hipoderma bovis,* De Geer) is a similar, but larger species, which causes tumors on the backs of cattle, usually laying its eggs on parts which the creature cannot conveniently reach with its tongue. The larvæ, termed "warbles," burrow beneath the skin and cause very disfiguring and painful swellings.

The Tachina flies (TACHINIDÆ) are stout, dark-colored, bristly flies, which deserve to be held in the highest estimation on account of the parasitic habits of all the larvæ, which feed in the bodies of numerous destructive caterpillars and grubs, and greatly reduce the numbers of these pests. The small, oval, ivory-white eggs are laid, sometimes singly, sometimes two or three in a cluster, on the back of the caterpillar or other insect, often just behind the head, in order to be safe from the jaws of the victim. These eggs adhere so firmly that

it is impossible to remove them entire. The larvæ, immediately upon hatching, penetrate the skin of the insect and feed upon the non-vital parts, so that, as a rule, the infested specimen is able to enter the ground or to spin its cocoon before it is killed by the parasite. The transformations of the latter then take place, and the flies appear very shortly, or, in other cases, hibernate with the remains of their host and emerge in the spring, at the season when fresh victims are most numerous. Army worms and all cut-worms, various spinners and sphinxes, grasshoppers, the larvæ of the Colorado potato-beetles and many other pests are destroyed by them. See Fig. 38.

House-flies, blow-flies, etc. *(Muscidæ).* No family of insects are more familiar to us than the principal members of this group. At almost any season of the year the student can obtain a fresh specimen for examination, since many individuals of the common house-fly, and also of the meat-fly, contrive to secure winter quarters in our warm sitting-rooms and pantries. In these insects the greater portion of the head is occupied by the eyes, which are, in some species, quite brightly colored. The short antennæ are plumy or sparingly bristled; the labrum is elongated into a jointed proboscis, terminating in a pair of broad, sucker-like flaps, which have their ridged inner surfaces closely pressed together when not in use, but are spread out when lapping up liquids, as may be easily observed in the House-fly. Other species have the proboscis terminate in minute lancets. The body is sparingly clothed with stiff hairs, and is either of a dull black and white or gray color, or, as in the "Blue-bottles" or green meat-flies, it is of a dark metallic blue or green. The wings are transparent, the legs rather stouter than in other flies and more or less hairy. The eggs are soft, pearl-white and slender-oblong, deposited singly or in little bundles or masses. The larvæ are soft, white or whitish maggots, some of them elongate-conical, thick and blunt at the hinder end and tapering to a point in front; others are slender and cylindrical; most of them have a smooth or somewhat ridged surface, but a few are hairy. Those of the House-fly *(Musca domestica*, Linn.) breed mainly in horse manure. Another species which also breeds in stables and barn-yards is the Lancet-fly *(Stomoxys calcitraus*, Linn.) It is scarcely to be distinguished from the common House-fly, except that when crawling or at rest the wings are held more apart and the proboscis is more slender and terminates in a point instead of a pair of fleshy lips. It bites severely and is very troublesome to horses and cattle, nor does it hesitate, upon occasion, to draw human blood. It is most abundant late in summer and in early autumn.

Still another plague of the herds has recently appeared in this country as an immigrant from Europe. This is the Horn-fly (*Hæmatobia serrata*, Rob.—Des). From the accounts of Dr. Riley of Washington, and other eastern entomologists, we learn that it is a dark species, much smaller than the house-fly, but otherwise much like it, which has the habit of settling in swarms on the necks, shoulders, and around the bases of the horns of cattle. It punctures the skin with its horny beak and draws the blood, so worrying the poor animals that they become reduced in flesh, and cows fail to give the usual quantity of milk. The flies lay their eggs on the fresh droppings of the cattle, in which the larvæ breed.

The large hairy "Blue-bottle" fly (*Musca cæsar, Linn.*), and the smaller Green "Meat-fly" (*Calliphora erythro cephala*, Meig.), are well. known species which give much trouble to meat dealers and housekeepers.

The Screw-worm fly (*Lucilia macellaria*, Fabr.) has occasionally proved fatal to human life by laying its eggs in wounds or in the nostrils of persons who were sleeping in the open air. It occurs in the Southwestern States, where it is a great plague on cattle.

The family TRYPETIDÆ includes a number of very pretty flies, which have the wings variegated with smoky-brown spots and bands. Many of these flies are gall-makers on various weeds, and are not especially injurious. One, however (*Trypeta pomonella*, Walsh.), is the parent of the Apple maggot, which has, in some of the Eastern States, proved very destructive to apples, rivaling, and in some instances exceeding, the damage done by the Codling moth.

The Onion fly (*Tritoxa flexa*, Wied.) is sometimes quite injurious to growing onions. It has dark, oblong wings, crossed by three curving white bands. It is now placed in the family ORTALIDÆ.

In the PIOPHILIDÆ we find the Cheese fly (*Piophila casei*, Linn). The family DROSPHILIDÆ includes several small species that attack ripe and preserved fruits. In OSCINIDÆ are a few species injurious to growing grain. *Meromyza americana*, Fitch., burrows in the tender stalks.

A third Sub-Order (PUPIPARA) has been grouped with the more lowly organized Diptera, although the usually minute insects composing it are not much like the typical flies. These are the Sheep-tick (*Melophagus ovinus*, Linn.) and the Horse tick (*Hippobosca equina* Linn.), which is the only winged species. Others, very minute, are the Bat-ticks and Bee-lice.

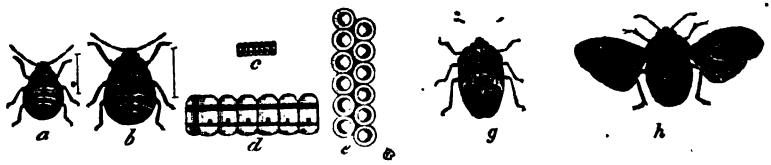
The Fleas also have many affinities with flies, and may here be considered in connection with them; yet most authors now class them in a

small separate Order—SIPHONAPTERA. They are hard, thick, wingless creatures, having the body compressed at the sides and sparsely hairy. In place of the usual compound eyes they have two ocelli. The pointed head is armed with backward pointing teeth. The legs are stout, with the thighs greatly thickened, giving them their wonderful leaping power. The eggs are scattered about in untidy human dwellings, dog kennels and the like, and the slender maggot-like larvæ feed in the dust and organic particles that accumulate in the cracks of floors, under rugs and similar hiding places. When ready to transform the larvæ enclose themselves in silken cocoons. The human flea is *Pulex irritans*, Linn., while *P. canis*, Dug., affects the dog and cat. The tropical "jigger," "chigoe" or "chique" *(Sarcopsylla penetrans)* is the pest of hot, sandy regions, but must not be confounded with a small tick—a species of mite—that occurs further north, and also burrows into the skin and causes sores, and which is likewise often called a "jigger."

CHAPTER XXIV.

Order V. HEMIPTERA.

[Fig. 40.]



Harlequin Cabbage-bug *(Murgantia histrionica*, Hahn.—after Riley. *a*, *b*, larva and pupa (nymphæ); *c*, eggs natural size; *d*, *e*, same magnified; *g*, *h*, perfect bug.

This Order derives its name from a compound Greek word signifying *half-wing*, and refers to the half membranous, half-leathery (coriaceous) structure of the wings of many of the representatives. It contains the only insects that may, with perfect accuracy, be called *bugs*. The term "bug," so generally but incorrectly applied to many kinds of insects, is supposed to have had its origin in the word "bug-bear," as something frightful or dangerous, and it is most fitting that, correctly used, it should refer to the division which includes such insects as the bed-bug, louse and similar objects of dread and disgust.

The insects of this Order display great differences of form and habit, but as all subsist solely on liquid nourishment, extracted from living plants or animals, all the principal representatives agree perfectly in the structure of the mouth. This consists of a strong, three or four-jointed beak, which is a modification of the under lip into a channeled brace in which rest two pairs of very fine bristles, corresponding to the two pairs of jaws, the combination being an admirable arrangement for piercing and sucking. (In some of the more lowly organized members of this Order, there is no horny-jointed beak, but the front of the head is merely elongated, forming a sucker-like cup provided with minute biting organs.) The upper lip (labrum) is consolidated with the lower part of the face to form a strong support to the developed mouth parts. The eyes are large and round, in some cases brightly colored, and two ocelli may be distinguished in many species. The antennæ are usually thread-like or bristle-like, in some cases quite long, with the terminal joints slightly enlarged.

In their general form the Hemiptera are among the most variable of insects. Some have the body almost hemispherical, others are thick and square or oblong, while others still are very long and slender. There is no general plan on which the joints of the thorax are developed, some having the pro-thorax crowded down out of sight from the upper side, while in others it is very large and conspicuous. The meso-thorax is usually the least variable division, except as to the scutellum, which is sometimes so large as to extend backward almost to the tip of the abdomen. The six legs are always present and the feet are three-jointed; some terminate in a very distinct claw or pair of claws with cushions (*pulvilli*) between them, while in others these appendages cannot be distinguished. The upper wings, sometimes termed *hemelytra*, in the typical bugs lie flat upon the back, the transparent or translucent tips overlapping, appearing as though crossed in the middle. In other forms they are altogether membranous or coriaceous, and fold roof like over the body.

In this and the remaining Orders the transformations are usually *incomplete*, the pupa being as active and as voracious as the larva or the perfect insect. These Orders are termed *inferior*, not only on account of the less distinct metamorphosis, but also because of the many lowly organized forms which they include.

Hemipterists are not agreed as to the primary subdivisions of the Order, some finding it more convenient to consider the various forms under *three* Sub-Orders, while others find it necessary to define *five*.

As two of these include but few species of general interest, we shall here consider but three:

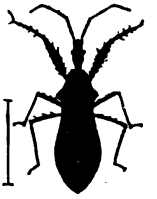
I. True Bugs (Sub-Order HETEROPTERA).
II. Harvest-flies, Leaf-hoppers, etc. (Sub-Order HOMOPTERA).
III. Lice (Sub-Order PARASITA).

CHAPTER XXV.

Order HEMIPTERA. Sub-Order HETEROPTERA.

PRINCIPAL FAMILIES OF TRUE BUGS.

[Fig. 41.]



Rapacious Soldier-bug (*Reduvius raptatorius*, Say.)—after Riley.

The insects in this Sub-Order always have the head horizontal—namely, on a plane with the body, with the beak arising from the front. The form of the head is somewhat flattened and triangular, attached to the thorax by a broad base or by a very short neck. The thorax from above does not present any striking peculiarities, except in the varying size of the scutellum; on the under side, however, of a large majority of the species are two small openings, connected with an internal scent gland that emit a vile and persistent odor—one of the chief characteristics of these insects, familiar to the farmer in the smell of the chinch-bug and squashbug, and to the housekeeper in that of the bedbug. The wing-covers show considerable variety in coloring and in the relative size of the opaque and transparent portions. The hind wings are veined somewhat like those of beetles, and afford no characters used in classification. The eggs of many bugs are conspicuous for their beauty, making amends, in some measure, for the deficiencies of most of the perfect insects in this respect. Some of them can only be compared to strings or clusters of tiny beads of the purest gold; others are bronzed or reflect prismatic colors; others, again, are remarkable for their graceful shapes or for their elaborate ornamentation in what appears like filigree work. Instead of larvæ, the immature

bugs are termed *nymphæ,* and after the third molt the rudiments of the wings begin to show, there being two stages corresponding to the pupæ of the higher Orders. These nymphæ are often quite differently colored from the mature insects.

A convenient division of the Heteroptera is into three sections: Terrestrial bugs, Amphibious bugs and Aquatic bugs.

The Terrestrial bugs may be again divided into Plant-eaters and Cannibals.

Plant-eating bugs have a more slender beak than those that prey on other insects, or draw the blood of larger animals, but are otherwise not very different from them. The most important Families are: COREIDÆ, LYGÆIDÆ, CAPSIDÆ and CORIMÆLIDÆ. Inclusive popular names are difficult to suggest for these groups.

The first of these families is best represented by the well-known Squash-bug (*Anasa tristis*, DeGeer). (See bug on plate.) This is a medium-sized, oblong, dingy-brown insect, paler beneath, with the head marked on top with two dull black stripes. The antennæ are about half the length of the body and rather stout; the feet are three-jointed. The young are dull green or yellowish, much broader in proportion than the perfect insect. This is one of the most universal and serious pests of melon, cucumber and squash vines. Some very large and striking species belonging in this family occur in the Southern states.

The LYGÆIDÆ is a large group of rather small bugs which are gaily or contrastingly colored, among which we find the pernicious Chinch-bug (*Blissus leucopterus,* Say). Few farmers, especially in the Western States, have escaped a costly acquaintance with this insect, which is one of the chief enemies of cereal crops, particularly of wheat and Indian corn. The perfect bug is of oblong form, about one-eighth inch in length and of clear black and white color. The yellow eggs are laid in the spring upon the roots or base of the stalk of wheat or other grain, and from these hatch myriads of pale-red young, which by their punctures soon dwarf and deaden the plant. Although the perfect insects have ample wings, they seldom rise into the air, and mostly perform their emigrations from field to field on foot. The false Chinch-bug (*Nysius destructor*, Riley) is rather smaller than its namesake, and less strikingly marked, being of a shaded grayish brown color. It is very injurious in certain sections of the country to grape-vines, potatoes, radishes and a number of other plants.

As the most familiar example of the family CAPSIDÆ, the Tarnished Plant-bug (*Lygus lineolaris*, Beaur.) may be instanced. This species is one-fourth inch in length, of flat, oblong form, with four-jointed antennæ, the joints being long. It varies in color from yellowish gray to

ochreous brown, has a yellow V-shaped mark on the scutel, and two or three parallel dark veins on each wing cover. The larvæ of these bugs are green, and broad oval in form. They may be found during summer in great abundance in all stages of development upon flowers. They injure fruit trees in the spring by puncturing the leaf and flower buds and the tender twigs and sucking the sap. They also feed on berries, to which they impart a flavor as nauseous as their odor.

Another abundant member of this family is the Four-lined Leaf-bug *(Pœcilocapsus lineatus)*. This is somewhat larger than the preceding species, is of a deep yellow color, ornamented with four black lines, extending the whole length of the body. It feeds on various shrubs and herbaceous plants, and is at times seriously destructive to currant bushes, clover and other valuable plants.

The CORIMELÆNIDÆ contains but a single genus, the "Negro-bugs" *(Corimelæna)*, small, shining, almost round, beetle-like insects of a black color, sometimes with bluish or greenish reflections. The great peculiarity is the depth of the scutellum, which extends backward so far as to entirely cover the wings. These little bugs are sometimes very destructive on strawberry beds and on the foliage of various flowering plants. They also have a great predilection for ripe raspberries, to which they give their own disagreeable, bed-buggy odor and flavor.

Among the cannibal bugs the most important families are the PENTATOMIDÆ, REDUVIADÆ and ACANTHIINÆ.

In the first of these groups we find many species of flattened, short, oblong bugs, somewhat under medium size, having the large scutellum extended backward in a rather slender point. The head and pro thorax together form an obtuse angle, there being no constriction to form a neck; the antennæ are five-jointed and the thighs are but slightly broadened and not spiny; the beak is stout. Although the great majority of the species are predaceous, and rank among useful insects, we find among them one serious pest. This is the Harlequin Cabbage-bug *(Murgantia histrionica,* Hahn.), a notorious exception to the rule, being very destructive, in the Middle and Southern States, to the vegetable from which it gets its popular name. It is a handsome insect, as bugs go (See Fig. 40), of a polished black color, with the scutel margined and the wing covers crossed by stripes of bright red or orange, and with two distinct white spots on the head; beneath, it is marked by lines of yellow dots. Dr. Riley says the eggs "may be likened to little barrels, for though the sides are straight, the edges are rounded off, and the black bands recalling the hoops, and a black spot near the middle recalling the bung-hole, add to the resemblance."

The larvæ, or young nymphæ, are pale green, marked with black, while those more mature show some of the colors of the perfect insect and have large wing-pads. The development is very rapid, often requiring not more than two weeks from the egg to the mature insect. It attacks not only cabbage and other cruciferous plants, but sometimes injures peas and other vegetables.

The other members of this family make amends for the injuries done by this one. Among them we find the Spined Soldier-bug (*Podisus spinosus* Dallas), long celebrated as a most persistent enemy of the Colorado Potato-beetle. This insect is of a dull green, and is chiefly characterized by having the sides of the pro-thorax produced into sharp spines. The beak is so strong that the habit of the bug, even when very young and small, is to impale the beetle larva or young caterpillar upon the end of it, and hold it up in the air while sucking out the fluid contents of the body.

The REDUVIADÆ are fiercely predaceous and destroy great numbers of other insects, and are thus directly of the greatest benefit to the agriculturist. They are more slender and elongate in form and of harder texture than the members of the preceding family, and some are rather elegantly colored. The strong, horny beak is folded under against the breast when not in use. The legs are stout in some species, somewhat bristly, but seldom toothed or spined. Some of the species are more than an inch in length, but the majority only about half that length.

The Wheel-bug (*Prionidas cristatus*), which is quite common in the more southern States, is one of the largest and most formidable species. It is of a shaded gray color, and has a curious notched crest on the pro-thorax, which resembles a section of a cog-wheel—whence its popular name.

The young bugs are bright red, with black markings. They are most ferocious, and Mr. Glover says: "They kill their prey by inserting into it the proboscis, which ejects a most powerful poisonous liquid into the wound. The victim, thus pierced, dies in a very short time. They then leisurely suck out the juices and drop the empty skin."

They attack all kinds of caterpillars and grubs, and even destroy one another at times in true cannibal fashion.

The Blood-sucking Cone-nose or Big Bed-bug (*Conorhinus sanguisugus* Lec.) is sometimes found hiding in beds and stuffed furniture, and does not hesitate to attack the rightful occupants, upon whom it inflicts very painful wounds. People have been known to die from the effects of its venomed stabs. It is about an inch in length, black margined all around with short red dashes.

A similar but more plainly colored species has been named by Prof. Comstock the Masked Bed-bug hunter (*Opsicœtas personatus*), from its habit of preying on the genuine bed-bug. It is an European species, but a variety is also native to the Eastern States. The young secrete all over the surface a viscid fluid to which dust and particles of wool and feathers adhere, giving them a most singular and disguised appearance. The Rapacious Soldier-bug (*Reduvius raptatorius*, Say.) is a slender, rather graceful bug with a long narrow head, and stout raptatorial front legs. The sides of the thorax are sharply angled. (See Fig. 41.) It preys on all soft-bodied insects. Of similar form and habits is the Many-banded robber (*Milyas cinctus*, Fabr.), which appears in yellow, black and white colors.

The family ACANTHIINÆ, is represented by a single species of the worst repute—the mal-odorous and cosmopolitan bed-bug (*Acanthia lectularia*, Linn). Few people are so happy as not to have made the acquaintance of this annoying insect, if not in their own well-kept chambers, at least in those of hotels and boarding houses, from which it can only by the greatest care be excluded. It is of flat, broad-oval form and red-brown color, about one-fifth of an inch long. It never acquires wings, and the perfect bugs can only be known from the young by their larger size, darker color and very minute rudiments of wing covers. It is strictly nocturnal, and hides by day in the smallest cracks and crevices. It is capable of enduring long fasts, and it is said will recover its vitality after being imprisoned for many months without food.

A solution of corrosive sublimate in alcohol is the most certain remedy in infested rooms and on bed-steads. Benzine and kerosene are also much used, and by dusting the sheets with pyrethrum powder, travelers may obtain a night's rest even in infested rooms. This bug is said to occur in myriads under the dead bark of certain trees in the far west, although, if animal fluids be necessary to its development, it is difficult to imagine on what it can feed under such circumstances.

There are several families of amphibious bugs which are chiefly interesting from their adaptation to walking lightly on the surface of the water, or in marshy spots, without having the feet broadened or any sail-like or oar-like processes to aid locomotion.

The Water-striders (HYDROBATIDÆ) have the middle and hinder legs very long, the bodies slender and flattened, and no distinct scutellum. They are predaceous in habit, and leap into the air after the small flies and gnats on which they subsist.

Among the Aquatic bugs are the Water scorpions and Giant water bugs (NEPIDÆ), where we find some species that exceed in size all

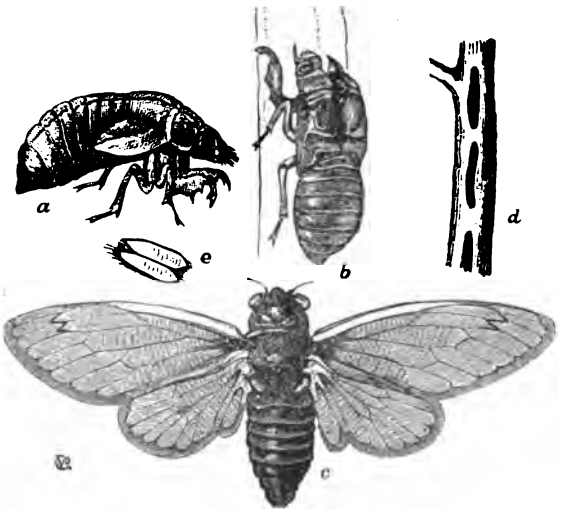
other species of the Order. They possess oar-like legs and flat bodies. The species are all carnivorous and are provided with strong, sharp beaks, upon which the bodies, not only of other insects, but of tadpoles and young fish, are impaled until they can be drained of the vital fluids. The Water scorpions are of slender form, and the abdomen is terminated by a pair of long, slender, grooved styles, which, when shut together, form a breathing tube that can be elevated above the water, while the insect is making its predatory excursions beneath the surface. The Giant water bug (*Belostoma grisea*, Say.) is more than two inches in length, by one in width, with a flat, boat-shaped body and powerful swimming legs. It also flies long distances, and is often attracted in great numbers to electric lights. The Back-swimmers (NOTONECTIDÆ) swim in a reversed position, and have very long, feathery hind legs.

CHAPTER XXVI.

Order HEMIPTERA. Sub-Order HOMOPTERA.

CICADAS, LEAF-HOPPERS, PLANT-LICE AND BARK-LICE.

[Fig. 42.]



17-year Cicada (*C. septemdecim*, Linn.), after Riley. *a*, pupa or nymph; *b*, shell of same; *c*, perfect Cicada; *d*, punctures in twig made for the eggs; *e*, eggs, much magnified.

In this division of beaked insects we find the wings—where these organs are present—of the same texture throughout, and closing roof-

like over the body. In several large groups they are transparent, and supported by many or few strong veins; in others they are tough and opaque, and show many different colors. The head is broad, but usually very short, without any neck, and has the beak arising so far under that it seems to be attached to the breast, against which it may be closely folded. The eyes are round and prominent. The antennæ in the larger species are very inconspicuous, but in the more minute forms are long, and often beautifully feathered. Some species are provided with a strong, horny ovipositor by which the eggs are inserted into woody stems or branches of trees; others place their eggs on exposed surfaces, or under loosened bark.

The most important families of homopterous insects are the CICADIDÆ, MEMBRACIDÆ, JASSIDÆ, APHIDIDÆ and COCCIDÆ.

In the first of these families we find the large and noisy Harvest-flies or Dog-day flies (genus *Cicada).* They have an oval form, with the body enclosed in a firm, shelly crust, head as broad as the thorax, protruding eyes, with three distinct ocelli between them, and the antennæ are short and awl-shaped or end in a sharp-pointed bristle. The feet are three-jointed; wings large and glassy; abdomen of the females bearing an ovipositor which rests in a fissure on the under side of the abdomen, and is adapted for sawing and boring into hard wood. The males have a most ingenious musical apparatus for producing the deafening buzzing or "drumming" with which our shade trees and groves resound from early summer until autumn. These instruments are little membranous sacs, which are gathered into fine plaits and fit over cavities at the base of the abdomen. The sound is produced by rapid expansion and contraction, by means of strong muscles within that part of the body.

The most interesting of these insects is the Periodical or Seventeen-year Cicada, or "Locust"—incorrectly so-called—*(Cicada septemdecim,* Linn.) see Fig. 42, which enjoys the distinction of being the longest-lived insect known to entomologists. The perfect cicadas are of a dark brown or black color, with red eyes and glassy, orange-veined wings, beneath which are situated the "drums," whose sound is thought by some to be the word "Pharaoh," very much prolonged.

These singular insects appear in the same locality only once in seventeen or thirteen years—the development in the Southern States being somewhat more rapid than in the Northern States. Their life, as perfect insects, is comparatively brief, lasting not more than five or six weeks. The females saw numerous consecutive, longitudinal slits in the branches of fruit and forest trees, often severely injuring the trees in the process. The young hatch in the course of a few weeks

and drop to the ground, into which they burrow and where they remain, descending deeper and deeper year by year, feeding on the rootlets of trees and growing very slowly, until ready to change to pupæ, when they begin to ascend. The pupa is active, and after emerging from the ground crawls to the trunk of some tree or shrub, to which it clings with its spiny claws, while the perfect cicada emerges. As these pupa shells retain their form, except for the slit on the top, through which the imago escaped, they are often mistaken for dead "locusts," and it used to be a popular superstition that they "sang until they burst." They appear in May or June.

The annual Dog-day or Harvest-flies, of which there are but two or three, not very distinct species, in this country, develop about midsummer, and sing late in the afternoon and in the twilight, until frost. The most common species is somewhat larger than the seventeen-year species, of a green and black color, having the body thickly covered by a whitish powder or "bloom," from which circumstance it received its name, *Cicada pruinosa*, Say.

The Tree-hoppers (MEMBRACIDÆ) are rather small insects, but among them are some of the most singular and grotesque forms of animate life. The pro-thorax is the part most subject to variation. This often extends backward almost to the tip of the abdomen, or the front edge is prolonged into a horn that curves far over the head.

The Buffalo Tree-hopper (*Ceresa bubalus*, Fabr.) exhibits in its form a variety of triangles; in front, on top, and on each side, one or more of these geometric figures can be traced. It is of a dull green color, nearly one-half inch in length, and the female often does considerable damage to the tender twigs of fruit trees by the numerous slits which she saws in them for the reception of her eggs.

Among the Leaf-hoppers (JASSIDÆ) are a number of small, but very destructive species. These insects have oblong forms, long wings, often beautifully colored, a rounded pro-thorax and a triangular head. A few are about one-half inch in length, but the greater number are very small. The Grape-vine Leaf-hopper (*Erythroneura vitis*, Har.), commonly but erroneously called "Thrips," frets the leaves of the vine with innumerable punctures until they turn brown and wither. These insects are often so numerous late in summer that they leap off in clouds when the vines are shaken. Other species are injurious to roses, growing grain and grass.

The Plant-lice (APHIDIDÆ) are a very comprehensive and interesting class of insects. They range from small to exceedingly minute, but make up in numbers what they lack in size, and include some of the most destructive pests known to the agriculturist. They are soft-

bodied and gregarious, and most numerous in the wingless forms. The eyes are usually quite large and of a dark color, and the antennæ of many species long and thread-like; the beak is two-jointed, and in some cases as long or longer than the body; legs, in the leaf-feeding species, rather long and slender, but in the root-feeding and gall-inhabiting forms short and stout; wings thin and transparent, with dark veins on the anterior margin. Near the tip of the abdomen, on the back, many species have a pair of little tubes through which exudes a sweet fluid, sometimes in such quantities as to thickly besprinkle the plants infested. This is then termed "honey dew," although the genuine "honey dew" is an excretion from the leaves of certain plants during dry, hot weather. Ants, as is well known, are extremely fond of "aphis nectar," and induce the insects to yield it in large quantities by caressing them with their antennæ, for which reason they are called the "ants' cows." Other species of aphides excrete from a part or the whole of the surface of the body a whitish powder or "bloom," or numerous filaments of fine, cottony matter, in which they become completely enveloped. The reproductive processes of aphides are very complicated and remarkable, and have been the subject of much careful study and experiment. Our knowledge in regard to them may be briefly summarized as follows: At certain seasons of the year—usually late in summer or early autumn—individuals of both sexes are produced, and the females lay eggs, which in some species hatch immediately, in others remain dormant over winter. The sexed aphides were formerly supposed to be the winged form, but later discovery shows that there is not necessarily any connection between the possession of wings and of true sexual organs, the wings being simply an adaptation for migration from one locality or plant to another. The form hatching from the egg is denominated the "stem mother," and in the course of a few days begins a peculiar process of reproduction, called *parthenogenesis* or *agamic* reproduction, bringing forth her young alive and in very rapid succession. This process has been likened to the multiplication of certain kinds of plants by slipping and budding. The offspring of the "stem mother" begin, in their turn, to produce viviparously in the course of a few days, and in this way the multiplication of individuals proceeds at a most extraordinary rate. Fortunately for the safety of vegetation, plant lice have a variety of natural enemies. They may also be destroyed by alkaline applications, tobacco smoke or infusion, or kerosene emulsions. Poisons such as Paris green or London purple do not have much effect upon them, as they do not *eat* leaves, but puncture them and extract the sap from beneath the cuticle.

Among the excessively injurious species of Aphides may be mentioned the Grape *Phylloxera (P. vastatrix,* Plan.) which has caused such wholesale destruction of the vineyards in France and other European countries, and prevents the cultivation of many choice varieties of grapes in this country. This species occurs in two forms, one inhabiting warty galls on the foliage, but the most destructive form occurring on the roots, which it causes to decay. This species and its allies do not produce the young alive, but always by means of eggs. Another root-louse, belonging in another family, is the Woolly louse of the apple *(Schizoneura lanigera,* Hausm.) This also sometimes appears above ground on the trunk of the tree, and is one of the species that clothes itself in a cottony or woolly excretion.

The Hop Aphis *(Phorodon humuli)* often occasions great loss in hop-yards, and Dr. Riley has made the interesting discovery that in autumn the winged migrant form resorts to plum trees and there produces the sexed individuals whose eggs hibernate on the plum, on the leaves of which the first spring generations feed, becoming winged early in summer and again returning to the hop-yards. The largest species are found on the hickory and sycamore trees. These belong to the genus *Lachnus,* and when thickly congregated on the trunks and branches are a most repulsive sight. Some species, especially those of the genus *Pemphigus,* cause very singular galls on trees of the poplar and willow family. As nearly all aphids are more or less injurious, it is out of the question to attempt here to give a list, even of those that are serious pests.

In the family COCCIDIDÆ are grouped the Scale-insects or Bark-lice, the Mealy-bugs and a few similar forms, which rival the members of the preceding family in rapidity of increase, in injurious effect upon the plants attacked and in the difficulty with which they are eradicated or even kept in check. In these insects only the males undergo transformation, protected by a small larval scale. They acquire wings, two in number, very transparent and with only one or two veins. The antennæ are long, and, under the microscope, are seen to be many-jointed and hairy or plumy. The mouth parts are undeveloped, and in their place we find a second pair of eyes. The females never acquire wings, and most of the species become fixed in one spot very shortly after hatching, the long but extremely fine beak penetrating to the sap-wood of the tree or shrub infested and slowly imbibing the sap required to perfect the growth and development of the insect. Immediately upon becoming fixed the surface of the body exudes a waxy substance that very soon forms, together with the motled skins, a complete shell or scale over the body. After being visited by the winged male, the

eggs begin to form and soon fill the body of the mother insect. Upon hatching, the very minute lice creep from under the scale and disperse with great activity all over the tree or branch, from whence some are carried by birds and insects, or are wafted by the wind to other trees, and in this way they are disseminated from one orchard or vineyard or grove to another. Besides the waxy scale, some species excrete a great quantity of white, cottony matter, as a protection to the eggs. This substance is arranged in various forms characteristic of the species.

Among the coccids that form simple scales is the widely-distributed Oyster-shell Bark-louse of the apple (*Mytilaspis pomonum*, Bouche.) This species covers the branches and trunks of trees with its pale brown, somewhat oyster-shaped scales, beneath which are the females, each with its almost invisible beak penetrating to the growing wood and extracting sap in such quantities as to retard the growth of the tree, and reduce the quantity and impair the quality of the fruit. The young are hatched late in spring, and are active for a few days only. Alkaline washes or kerosene emulsion applied at this time are most effectual in preventing their increase. They have a few natural enemies in the shape of Coccinelid beetles, Lace-wing fly larvæ and one or two minute parasitic flies. Two similar scales of other species are found in the South on orange trees. Several species of white scales (*Chionaspis*) are also found on apple, pear, pine and willow. A smaller, white, scurfy scale (*Diaspis*) is sometimes very abundant on the stems of roses, blackberries and raspberries. The scale insects most troublesome in green-houses and on house-plants, and occurring also on the orange, belong to the genus *Aspidiotus*. Among the scale insects that produce cottony masses is *Pulvinaria innumerabalis* (Rath.), which appears in great numbers on grape vines, and especially on maple and elm trees, covering the bark with its masses of flocculent matter and honey-dew like excretions, greatly disfiguring and injuring vines and trees. The orange tree is especially subject to the attacks of scale insects; and one of these, the Fluted scale (*Icerya purchasi*), seriously threatened the existence of the groves of California, until Dr. Riley happily discovered its chief natural enemy in Australia, from which country the scale had been introduced, and secured the importation of the useful Lady-bird beetle, which in about two years has almost exterminated the particular species of pest on which it naturally preys.

The Mealy bugs (*Dactylopius*)—especially troublesome on house-plants and in green-houses—while agreeing with the scale insects in many particulars, do not secrete scales and the females do not become fixed in one place. The bodies are covered with a white powdery

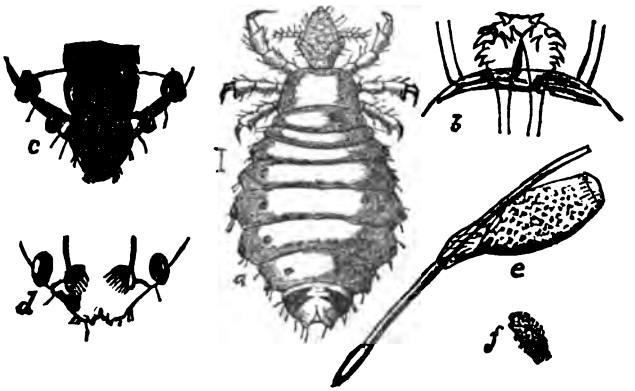
matter, with short filaments around the anterior end and sides and several long ones at the tail. One of the Coccidæ *(Coccus cacti)* is the insect so well known as "cochineal," which, until the invention of the aniline dyes, was the source of the beautiful red and crimson colors so much used in the manufacture of textile fabrics.

CHAPTER XXVII.

Order HEMIPTERA. Sub-Order PARASITICA.

HUMAN AND CATTLE PARASITES.

[Fig. 44.]



The Short-nosed Ox-louse *(Hæmatopinus eurysternus)* after Osborne. *a.* female; *b.* rostrum (beak); *c.* under surface of last joint of male; *e.* egg; *f.* surface of egg, all greatly magnified.

In this Sub-order we find the most repulsive and annoying of all insects—the true parasites of mammals, not excepting man. The general structural characters are depicted with great exactness in the illustration, Fig. 44.

The true lice are all very small insects, which never acquire wings. They remain close to the skin and suck the blood of the animals infested, causing great discomfort and irritation by their presence and their innumerable punctures. They are the result of neglect and squalor, and on cattle and horses indicate a very unthrifty physical condition. The proboscis is merely a fleshy prolongation of the front of the head, at the end of which are a pair of extremely sharp lancets, which are retracted within the head when not in use. At the base of these, as shown at *b*, in the figure, is a rosette of sharp, recurved hooks, which,

when the insect is feeding, are thrust into the skin to support the lancets. The eyes are simple and very small, and the antennæ very short and minutely bristly. The legs have thick, short, notched joints and end in a strong curved claw, that when closed down, meets a little tooth on the shank—a provision for clinging to and climbing hairs. There are no transformations. The eggs are called "nits," and are firmly glued at one end to the hairs.

Three species attack man under certain external conditions of poverty and uncleanliness, namely: The Head-louse (*Pediculus capitis*), which is confined to the hair and skin of the head, and is most frequently found on neglected children; the Body-louse (*Pediculus vestmenta*), which hides in the seams and folds of the clothing, and draws the blood from any part of the body; and the Crab-louse (*Pthirius pubis*), which attacks the arm pits and pubic region. These pests commonly aggravate the miseries of military prisons and camps and other situations where human beings are congregated without provision for cleanliness and lack nourishing food. Mercurial ointment is the best remedy, with entire change of clothing, where possible.

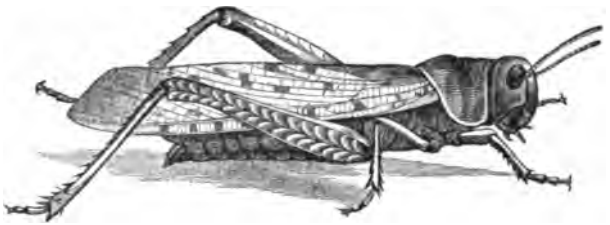
The true lice that are sometimes found on thin and neglected horses, cattle, swine and other animals, differ very slightly from those found on man. They are placed in the genus *Hematopinus*. Strong infusions of tobacco or of larkspur seeds are among the remedial washes, also an ointment of kerosene and lard, thoroughly mixed; but the experiments of Prof. C. P. Gillette, of Colorado, have demonstrated the superiority of that valuable insecticide, the ordinary kerosene emulsion, over every other preparation, in ridding animals of these pests. Dr. Riley, whose invention it was, says of it: "It has long since become recognized as an insecticide of unrivaled merit, against most of the insect enemies of plants, and also in the case of animals, as a means against the Buffalo-gnat, Horse-fly, etc. * * * The only precaution necessary with this substance is to see that the emulsion is properly made, and that in winter time the animal be protected from severe cold."

There are certain other kinds of lice occasionally found on cattle, belonging to the same group with chicken-lice, bird-lice and so forth, which, although they bear considerable resemblance to the true lice, are structurally very different and form a low sub-order of the Neuroptera. The remedies for these are the same as for the more common species.

CHAPTER XXVIII.

Order VI. ORTHOPTERA.

[Fig 45.]



Old World Migratory Locust (*Pachytylus migratorius.*)

In this Order of so-called *straight-winged* insects we find many unusually interesting species. Geologically and historically they are the oldest of insects. In the stratified rocks their remains are found among the very earliest forms of animal life; while the "locusts," so frequently mentioned in the Old Testament, and in equally ancient secular history, as suddenly swooping down upon a country and "devouring every green thing," are among the typical representatives. Excepting the Cicadas, described in a preceding chapter, we find among the Orthoptera the only insects provided with a special musical apparatus, each species having its own peculiar instrument and contributing its characteristic notes, called *stridulations*, to the insect concerts that enliven the summer days and nights. Many of the most singular imitative forms that occur in nature are also found here in the "walking sticks" and "walking leaves" that compose one of the groups; and by many other peculiarities of structure and habit the Orthoptera challenge attention from the student of pure science, the lover of nature, and the economist.

The straight-winged insects are nearly all of a size to be examined without the aid of a microscope, and some forms have been considered superior to all others as subjects for dissection in the study of internal as well as external structure. While they exhibit much variation in form, all the more conspicuous species agree in the vertical position of the head, the biting mouth, the large pro-thorax, and the parchment-like wing-covers—when these organs are present.

The head is usually large, and though somewhat sunken under the pro-thorax in many species, is freely movable on the flexible neck. The eyes are round or oblong, and prominent in most species. The antennæ

are either short, stout and few-jointed, or very long and slender with an indefinite number of indistinct joints.

In these insects we find the mouth parts particularly well developed, and adapted for biting and masticating solid food. The mandibles are short, but broad and strong, with a toothed cutting edge; the maxillæ are adapted to the office of holding the food in place, in which the two pairs of mouth-feelers (palpi) assist; the lower lip (labium) forms the floor to the mouth, and the unusually long and broad labrum closes over the other mouth parts like a true lip, when the insect is not feeding. The pro-thorax only appears on the upper side of the body, and in a great majority of the species it is more or less saddle-shaped, often with a longitudinal ridge on top. There is much variation in the length, thickness and character of the surface of the legs, which are adapted for running, jumping, burrowing, grasping and other uses. The wing-covers are composed of strong membrane more or less thickened and opaque, in which the venation is peculiar to the species. They usually over-lap at the bases or for their entire length, and either lie flat upon the back or are concave, and enclose the sides also like a pod. The under wings are very broad, in many species composed of transparent, but closely net-veined membrane. A few kinds display in life various beautiful colors, which shortly disappear in cabinet specimens. When not in use these wings are folded in fan-like plaits and hidden under the upper pair. In the hind body we can count eight or nine distinct segments, attached to the last of which are the variously shaped claspers of the males, and the equally varied ovipositing organs of the females. On the under side of this part of the body the protecting crust seems thinner and more flexible than elsewhere, and expands and contracts with the inhalation and exhalation of air.

The Orthoptera are very voracious in all stages of their development, and while the majority feed on growing vegetation, others are predaceous, and a considerable number are serious household pests, on account of their preference for the contents of pantries and the offal of kitchens.

The transformations are incomplete, and the young differ from the mature insects even less than young bugs differ from those that have acquired the perfect form.

There is considerable confusion in the terms applied to some of the groups in this Order. Thus the true locusts are very generally called "grasshoppers," while the term "locust" is in this country applied to the Periodical Cicada. Again, all the more conspicuous forms included by entomologists among "grasshoppers" are not found on grass at all, but inhabit the tops of the tallest trees. Nor does this

inapt nomenclature occur only in popular language, for we find the LOCUSTIDÆ include only the green grasshoppers and other solitary species, while the genuine, often gregarious, and infinitely more destructive locusts are placed in the Family ACRIDIDÆ.

All the more important American species of ORTHOPTERA are found in six Families, namely: Crickets (GRYLLIDÆ); Green Grasshoppers and Katydids (LOCUSTIDÆ); True Locusts (ACRIDIDÆ); Walking sticks or Specters (PHASMIDÆ); Soothsayers, Devil's horses (MANTIDÆ) and Cockroaches (BLATTIDÆ). The first three Families form a section of the Order distinguished from their mode of progression as the Jumpers (SALTATORIA); the fourth Family includes the Walkers (AMBULATORIA); the fifth the Graspers (RAPTATORIA); the sixth the Runners (CURSORIA).

CHAPTER XXIX.

Order, ORTHOPTERA. Section, SALTATORIA.

CRICKETS, GRASSHOPPERS, KATYDIDS, AND LOCUSTS.

The jumping Orthoptera include all the musical and nearly all the injurious species, namely, the Crickets, Green Grasshoppers and Locusts. The Crickets (GRYLLIDÆ) are easily separated into three groups, Mole crickets, House and Field crickets and Tree crickets, each containing comparatively few species. They all agree in having somewhat cylindrical bodies, either short and stout or slender and elongate, and always terminate in more or less conspicuous stylets or a long, exserted ovipositor. The head is large, roundish, or obtusely triangular; eyes hemispherical, widely separated; antennæ long, slender and tapering; upper lip nearly circular, and the palpi, of which both pairs are well developed, are somewhat club-shaped. The pro-thorax is broad and of a firm, horny or shelly texture. The wings and wing covers, except in the Tree crickets, cover only one-half or two-thirds of the abdomen. The wing covers are of thick, leathery or mica-like membrane, with a peculiar ridged venation, by means of which their calls and chirps are produced. The legs vary in the development of certain parts to correspond with the habits of the species, but the hinder pair always have large thighs and more or less spiny shanks.

The Mole crickets do not jump, but are peculiar for their burrowing habits, and seldom emerge from their subterranean abodes until after nightfall. They are large, stout insects, of dull brown colors, and

have the surface thickly clothed with a soft pubescence—in this, as in many other particulars, imitating the genuine mole. In the fore legs all the joints are flattened and broadened, the tibiæ spreading out like the palm of the hand, and having on the lower edge four long, horny, finger-like processes, so that they are almost exact miniatures of the shovel-like fore feet of the animal from which they are named. These insects are usually found in damp soils, where their horizontal galleries are betrayed by the little ridges which appear on the surface of the ground. They feed upon roots and under-ground stems of plants, varying their diet by devouring any burrowing larvæ or exposed pupæ with which they come in contact in their tunneling operations. The most common Northern species is *Gryllotalpa borealis*, Burm, while in the Southern States *G. longipennis* is more frequently met with.

The House and Field crickets live in chimneys, stone walls and similar situations, or in holes in the ground. Modern methods in building have banished the "cricket on the hearth," whose cheerful chirp formerly blended with the cosy "song" of the tea-kettle, inspiring in poets and novelists some of their most beautiful thoughts on the comforts of home.

The House Cricket *(Gryllus domesticus)* is of a brown or grayish color, and is an immigrant from Europe and the far East. It is quite abundant in our eastern cities, but is not yet very generally disseminated over the country. The larger Field Crickets are black with brown wings, and the males of some species survive the winter and may be heard chirping during warm evenings early in the spring. They all belong in the same genus with the Mole and House Crickets, and show much variation in coloring and in the development of the wings. The eggs are deposited in masses of two or three hundred, but are not enclosed in a sac as are those of the Mole Cricket. The young hatch about midsummer and disperse in all directions, feeding on all varieties of vegetation, often proving quite injurious. The species of *Nemobius* appear later in the summer, are of a dull, pale brown color, sometimes obscurely striped, and in one or two species the wings are wanting, and the shelly elytra (wing covers) somewhat loosely enclose the body. The Tree Crickets are of more slender and delicate form, with broader and more glassy wing covers and long slender legs and antennæ. The males of *Œcanthus niveus* Har. and *Œ. latipennis* Riley are white or greenish white, the wing covers transparent, flat, and when closed, completely over-lapping and crossed by W-shaped ridges. When stridulating, these wings are elevated almost at right angles to the body and the surfaces rubbed together with a motion too swift to be followed by the eye, producing a metallic "whirr" that is incredibly loud and pierc-

ing in comparison with the size and delicate texture of the insect. The females are quite different in appearance, being slender and almost cylindrical, with the wing covers curving down at the sides so as to partly enclose the body. The ovipositor is slender but very strong and horny, nearly as long as the abdomen, and terminates in a blunt tip beset with minute points. With this instrument the female of *Œ. niveus* pierces the young canes of grape or of raspberry, depositing in a row a considerable number of eggs. *Œ. latipennis* forces hers into the pith of stems or into bark through a series of pinhole-like punctures from one-half an inch to one inch apart. The punctured twigs are invariably killed, and the insects occasionally do considerable damage; but as these crickets feed almost entirely upon aphides and other minute pests, they make ample compensation for all the injury that they do, and may be accounted beneficial rather than injurious.

The most æsthetically interesting insects among the *Locustidæ* are the "Katydids." The peculiar, interrupted stridulations of these little tree-top musicians have inspired many a poetic gem and dainty bit of imaginative prose. Nor are they merely favorites with the poets, who, for the most part, know them only by their notes; but the naturalist, who keeps them as pets, finds in their habits and histories most instructive and suggestive revelations of insect life. They are mostly of large size, and of a bright green color, in this assimilating closely to the foliage amid which they dwell. The large, free head is curiously like that of a horse; the eyes are round and bright, and of a yellowish-brown color; the antennæ are very long, slender and tapering; the various mouth parts are easily distinguished without the aid of a lens, and the processes of cutting and mastication may be closely observed, as the insects will often sit upon one's finger and nibble a leaf or bit of fruit in fearless enjoyment. The upper side of the pro-thorax is covered by a wide collar, which projects slightly over the head in front, and, posteriorly, overlaps the bases of the wings. In repose the wings meet on the back in an acute angle, and are more or less convex at the sides, to enclose the body. At the base they over-lap in a wide, flat triangle, the upper surface of one and the under surface of the other being peculiarly ridged and roughened to form the "taborets," which grate together as the insect raises and lowers its wings. These wing-covers display a venation imitative of that of leaves. The under wings are broad, composed of very delicate, finely-netted membrane, with green tips where they project slightly beyond the upper pair. The legs are slender, with the tibiæ slightly spiny and the tarsi ending in long, sharp claws. The hind legs are very nearly twice the length of the others. At the base of the tibiæ of the fore legs are peculiar oval cavities covered with

transparent membrane, which are supposed to be the seat of the sense of hearing. The bodies of the males terminate in conspicuous stylets or claspers, while those of the females bear a large sickle-shaped or sword-like ovipositor, composed of two thin blades, by means of which the eggs are inserted into bark or leaves, or are laid in over-lapping rows on thin stems or on the edges of leaves.

The true Katydid *(Cyrtophyllus concavus)* is the most robust-looking species, the wing-covers being oblong and very convex on the sides, almost meeting below as well as on the back. The taborets consist of mica-like plates, with very strong, peculiarly curving ridges. The Angular-winged Katydid *(Microcentrum retinervis)* has longer, narrower and less convex wings. The taborets are opaque, and the sounds produced resemble a metallic clicking sound, which has not been reduced by any imaginative listener to syllables. The Narrow-winged Katydid *(Phaneroptera curvicauda)* is a smaller, duller-green species, with a less noticeable note. It must be remembered that the males are the musicians of the family, although the females are capable of emitting a faint response by a sudden upward jerk of the wings.

Among the Grasshoppers are some long, slender, bright-green species which have the front of the head produced into a point. These are called the Cone-heads. *Xiphidium ensifer* is the largest species. The males produce the most deafening, continuous "whirr" of any of the tribe. The females have a long, straight, sword-shaped ovipositor, and in both sexes the wings are nearly twice the length of the body. The smaller and very graceful *Orchilimums*, which enliven the autumn days with their soft purring notes, belong also in this group.

The true Locusts (ACRIDIDÆ) are the species which live on grass, grains and other low-growing vegetation, and are in this country very generally called "grasshoppers." In this group belong not only the various dull-green and brown species that are so numerous every year in fields and pastures, and which in dry seasons become very injurious, but certain migratory species, which, having exhausted the food supply of the regions to which they are indigenous, by a common impulse rise into the air in clouds and sweep like a besom of destruction over the country. They fly by day and descend at night to feed, often traversing thousands of miles before reaching their limit. These are the only insects which have been used to any great extent as food, and this mainly in trans-Atlantic countries, where the famishing inhabitants of the desolated regions were forced to feed upon them or perish. The Rocky Mountain Locust *(Caloptenus spretus,* Thom.) is the most important American species of migratory locust; but one or two Eastern species manifest a like tendency, and during some years prove very destructive over limited areas.

The Locusts are robust insects, stouter in body and legs than the Grasshopper and Katydids, and are well protected by a firm leathery integument. The head is even larger in proportion to the body than in the preceding family. It is set vertically, in some species receding toward the mouth. The eyes are large and broadly elliptical in form; antennæ short and rather thick; the face is marked in many species by three distinct ridges; upper lip broad, with the lower edge somewhat hollowed out just above the jaws. The saddle-like collar over the back of the pro-thorax, or pro-notum, is marked by transverse indented lines, and rounds out over the insertion of the wings. Many locusts have on the pro-sternum, just under the chin, a cone-like projection sparsely covered with short spines or prickles. The wing covers are of stout, closely netted membrane, with a projecting ridge or heavy vein near the middle on the outside, or a series of prominent veins on the under side. They are of a narrowly oblong form and slightly overlap in a straight line on the back. The broad under wings are so folded as to be entirely covered by them. The legs are all stout, but the hinder pair, always much thicker, and generally much longer also, than the others, provide the leaping power which is so wonderful in these insects. The outer margins of the tibiæ are beset with a varying number of pairs of spines, and just at the base of the three-jointed tarsi are two pairs of jointed spurs. At the base of the abdomen on each side is an oval orifice covered with thin membrane, like those on the fore legs of the Katydids, and, like them, termed the *ears* or aural sacs. In the abdomen of the males nine segments can be perceived from the under side. The anal appendages are a pair of side claspers and an upward curving ventral plate. In the abdomen of the female but eight segments can be distinguished, and the tip has four horny, pointed blades, which can be brought together in a point to penetrate the soil, and afterward spread out to pry the earth apart and prepare a cavity for the reception of the eggs, which are extruded in a compact mass, inclosed in a sort of glutinous pod or case.

The stridulations of Locusts are effected in two ways by differing species. Most of the larger species "fiddle," by rubbing the ridged inner surface of the hind thighs over the prominent mid-vein of the outside of the wing covers. Prof. Comstock, quoting Mr. Scudder, who has made most exact and interesting studies of the so-called musical insects, says: "When about to stridulate they place themselves in a horizontal position, with the head a little elevated; then they raise both hind legs at once, and grating the femora against the outer surface of the tegmina, produce notes which in the different species vary in rapid-

ity, number and duration." Another method of "fiddling" characteristic of other species takes place during flight, when the under surface of the upper wings is grated back and forth over the front edge of the under wings.

These insects are probably all single-brooded, the young hatching in the spring from the eggs laid the previous summer and autumn. The very young locusts have much larger heads in proportion to their bodies than the more mature forms. There are five molts before the insect arrives at its perfect form. At the third molt the embryo wings begin to appear. These are in a reversed position with the under wings on top. By this peculiarity pupæ can always be distinguished from the few species of locusts that never acquire wings, but have these organs represented merely by short pads on each side of the abdomen. Examples of these wingless species are found in the Lubber Grasshoppers of the South and West, which are large, dark, clumsy species, incapable of flight or stridulation.

Our largest and handsomest species is the American Locust (*Acridium americanum*), which is often more than two inches in length, with a golden brown stripe down the back and beautifully mottled wings; the hind shanks are bright red, beset with spines, which are ivory-white tipped with black. There are red markings also on the head, thorax and edges of the wings, and the fore and middle legs are also a paler shade of the same color. The most common and generally distributed species is the Red-legged Locust (*Caloptenus femur-rubrum* DeG.). This is scarcely more than one-third the size of the first-named species, is of a pale, greenish-brown with dull-red hind legs. It often multiplies to such an extent as to do great injury to growing grain.

The Rocky Mountain Locust, or Western Migratory Locust (*Caloptenus spretus*, Thomas), is only to be distinguished from the familiar red-legged species by the greater length of its wing-covers and wings. Concerning the destructiveness of this species at irregular periods in the States and territories west of the Mississippi river, Dr. Riley, who has devoted much time and labor to the study of this insect, and to devising methods for keeping it in check, writes: "It was so very destructive in the Northwestern States and Territories from 1873 to 1877 that it may truly be said to have been one of the chief causes of the business crises which characterized that period. So wide-spread and disastrous were the results of its work that Congress provided for a commission to investigate it. * * * No one who has not witnessed the ravaging power of locusts can fully conceive of or appreciate it. The organization and habit of the typical locust admirably fit it for ravenous work. Muscular, gregarious, with powerful jaws, and ample diges-

tive and reproductive systems; strong of wing and assisted in flight by numerous buoyant air sacs—all these traits conspire to make it the terrible engine of destruction which history shows it to have been. Insignificant individually, but mighty collectively, locusts fall upon a country like a plague or blight."

The winged locusts do not generally appear in swarms until late in summer, when, after devouring all sorts of vegetation, the females fill the ground with their eggs and then die.

The young locusts, which hatch in the spring, are at hand to take the next crop, and unless vigorous and combined effort is made to subdue them, by repeated plowings, they take all the early vegetation of the second year. Those that survive to attain their wings return in small swarms to their native breeding places.

The species of *Œdipoda* often have the hind wings brightly colored and prettily banded or bordered. The small species, termed Grouse Locusts, genus *Tettix*, are characterized by the prolongation of the collar backward so as to almost entirely cover the top of the abdomen and taking the place of the upper wings, which, being useless, are reduced to very small pads. In these insects the hind legs, though not long, are very stout. They are of dull black or dark colors, and are usually found along water-courses or in other damp places. None of the species are especially injurious.

CHAPTER XXX.

Order ORTHOPTERA. Sections AMBULATORIA, RAPTORIA, and CURSORIA.

WALKING STICKS, MANTES AND COCKROACHES.

The "Walking sticks," "Walking leaves," and so forth, included in the family PHASMIDÆ, are mainly tropical species, exhibiting in their forms the most exact and remarkable resemblances to twigs and leaves that have been observed in nature. These imitations of inanimate objects are the sole reliance of these insects for safety, as they have no means of defense agianst their enemies, and their movements are too sluggish to permit them to escape. The Walking sticks, of which a few species occur in the United States, are long, slender and cylindrical in form, with long legs, the middle pair having the thighs somewhat thickened. When at rest the front legs are pressed close together and

stuck straight out in front of the head, with the long thread-like antennæ between them, and when in this position the eye may rest for some time upon them without recognizing their difference from the twigs and leaf-stalks by which they are surrounded. They also have a chameleon-like power of changing their colors to assimilate with those of the plant or tree which they inhabit. They never acquire even the rudiments of wings, and the principal difference between the sexes is that the females are somewhat larger and stouter than the males. The former lay their eggs in the autumn, dropping them carelessly to the ground. They are about the size, shape and color of spinach seed, and remain unhatched until late the following spring, or for two years. The young, which are about one-fourth of an inch long when hatched, are precise miniatures of the mature insects, except that they are more uniformly green in color. They feed at first on grass and other low-growing vegetation, but soon ascend the nearest trees, in which they find a home adapted to all their needs. *Diapheromera femorata* is the only common northern species. This is, when full grown, from three to four inches long, exclusive of the front legs, with a diameter varying from one-eighth to one-fifth inch. It seldom appears in any locality in sufficient numbers to be accounted injurious, but there are exceptions to this rule, as, for example, in certain parts of the middle Atlantic states, where during one or two seasons some years ago it almost defoliated the forest trees.

The second section—Graspers (RAPTORIA)—contains the family MANTIDÆ. The singular forms and attitudes of these insects have suggested for them various expressive popular names, such as "Devil's riding-horses," "Rear-horses," "Intelligence bugs," "Sooth-sayers," "Praying nuns" and the like. The English names "Camel-cricket" or "Praying mantis" are more appropriate, and worthy of general adoption. These insects have always been the objects of superstitious regard, not only by the ignorant and uncivilized natives of tropical regions, where their species are most numerous, but even by cultured, but too imaginative Europeans. It was formerly believed that they could foretell good and evil fortunes, and that the person on whom one alighted was especially favored of the gods, and they still receive divine honors from many savage tribes. They have indeed a wickedly-wise and weird look, to which their rapacious and cruel habits fully correspond. They are among the fiercest of cannibals, greedily devouring all kinds of soft-bodied insects, which they seize and hold between their spiny front legs until slowly masticated. They do not hesitate to attack each other, and when two chance to meet a battle is the almost invariable result. The females are stronger and more savage than the males, and after

pairing the former generally dines upon her partner. These insects are of large size—two inches or more in length. The head is triangular, free, very wide at the top, with large, round, singularly expressive eyes; antennæ thread-like and not very long; mouth at the apex of the inverted triangle; jaws strong, though small. The thoracic joints are cylindrical and elongated, and move freely upon each other; the fore legs (graspers) are not used for walking, but are folded and held up in a position suggesting the attitude of prayer, though it is really one of menace. The hind body is oval or oblong, somewhat flattened, and in the male completely covered by the folded ample wings, and the overlapping wing covers. The female has much shorter wings and wing covers, and is incapable of flight. The sexes differ also in color, the male being dull-brown while the female is usually some shade of green. This description applies to the only species commonly met with in the United States below the thirty-ninth parallel, namely, *Phasmomentis carolina*. The eggs are laid in a compact oblong mass, which closely resembles a fossil called a "trilobite." It is attached by its flat surface to fence-posts, the wood of trellises and the stems of shrubbery. These egg masses should never be destroyed, as the Mantes are very useful in clearing gardens and vineyards of plant-feeding pests.

The section CURSORIA, family BLATIDÆ, is represented by the disgusting and omnivorous household pests, the Cockroaches. These insects have no attractions of form or color, and have a disagreeable odor which they communicate to the closets and rooms infested, while their swift motions and the deftness with which they disappear into almost invisible cracks and crevices is most exasperating to their pursuer. There is nothing to be said in their favor, except that they prey upon the bed-bug, an instance in which the "cure is as bad as the disease." They have received various common names, such as "black beetles" and "croton bugs," but are quite generally recognized as "roaches" or "cockroaches." They are all nocturnal in their habits and very partial to warmth and moisture, which accounts for their abundance about kitchen sinks and in the holds and pantries of ships, steamboats and similar situations. They are of very flat, oblong form, with the head horizontal and almost concealed by the projecting margin of the collar. The antennæ are long and slender; the legs spiny and nearly equally developed; the wing-covers are usually present, but sometimes short, and the under wings often entirely wanting. The females lay all their eggs in one mass, enclosed in a bean-shaped sack, which is often carried about for some time before being dropped. Dr. Riley has observed that the females of some species remain with and protect their young. The latter are at first pure white, and at every molt the

insects revert more or less to this color, though soon becoming of the shade of brown which characterizes them.

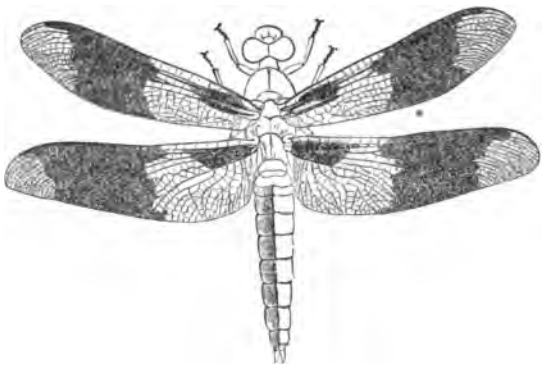
Our native species seldom give us much annoyance. The males occasionally fly into lighted rooms at night, but the females are usually found around rotten stumps and under bark of dead trees. The Light brown cockroach *(Platamodes Pennsylvanica)* is the largest species. It measures about an inch in length, has very delicate wings, and is of a light brown color. A smaller species of a very dark brown or black color, but with lighter margins, is also quite common. This is *Ectobia flavocincta.* The most destructive and annoying cockroaches are found among the introduced species. These are especially, the large, very dark brown or black Oriental cockroach *(Periplaneta orientalis,* Linn.), a species which is supposed to be native in eastern Asia, but which now occurs in all parts of the civilized world. It is about one inch long and one-third of an inch wide, very flat, so that it is able to creep into the smallest crack. The wing covers in the male extend over little more than one-half of the abdomen, and in the female are still more rudimentary These insects are very long-lived, and it is said require several years to complete their transformations. The smaller, German cockroach, also called the "Croton bug" *(Ectobia germanica)*, has become very troublesome in the eastern cities, and from its fondness for wheat bread and dough, is the especial pest of bakeries and bread boxes. This species has fully developed wings, and is of a light brown color, with two dark stripes on the pro-thorax.

The free use of pyrethrum powder will preserve cloth-bound books and similar property from the attacks of these insects, and if used freely in kitchens and other places which they frequent, will render them helpless, so that they may be easily swept up and burned. Powdered borax mixed with sugar will also kill them.

CHAPTER XXXI.

Order VII. NEUROPTERA.

Fig. 47.



Dragon-fly (*Plathemis tri-maculata*).

The insects here considered under the old Order NEUROPTERA are now separated into from two to five minor Orders, according to the importance attached by authors to the peculiar development of certain organs, and, more especially, with regard to the different methods of transformation which obtain among them. As very few of these insects are of economic importance, however, and as all the more conspicuous forms agree in general wing structure, and in the possession of biting mouth parts (except in one group, where these organs are entirely undeveloped), it will be more convenient to discuss them as members of a single primary group.

In these insects the body wall is soft and flexible, and there is but little consolidation of segments in any part. The head is usually rather large and free; antennæ always filiform or bristle-like, but sometimes very short; eyes, except in a few of the lowliest forms, conspicuous, and in many species occupying the entire sides of the head; mouth parts, especially the outer jaws and lips, peculiarly large and strong; thoracic joints more equally developed than in most species of preceding orders. The two pairs of wings are composed of delicate, transparent membrane, closely netted with fine veins, with strong supporting ribs on the anterior margin; legs, as a rule, rather small and weak; abdomen slender, oblong or lanceolate, in some cases terminated by a pair of curved forceps or two or three long, bristle-like tails.

In a portion of these insects the metamorphosis is complete, the pupal stage of life being one of quiescence and rest; while in the remainder of the Neuroptera the pupæ are active and voracious and

molt a number of times, although they differ considerably in form from the larvæ. Even the winged insects of a few species molt once or twice, a habit that has no parallel in the life history of the more highly organized forms. The great majority of the species are aquatic, and feed upon insects and other small water animals. In their relation to man they are, with the exception of a few small groups, either neutral or beneficial. The aquatic species form a large part of the food of fishes, and the few terrestrial species mostly prey on small pests of the orchard and garden.

Following the idea of Prof. Comstock, it will be convenient to separate the Nerve-winged insects into two sections, NEUROPTERA, proper, and PSEUDONEUROPTERA. The insects included in the first section undergo complete metamorphosis, and are therefore ranked by many authors higher than Hemiptera or Orthoptera, although their structural peculiarities would not place them in advance of the latter. The principal families of Neuroptera, proper, are the Caddice flies (PHRYGANIDÆ), Ant lions and Lace wings (HEMEROBIADÆ) and the Hellgrammite flies and others (SCIALIDÆ). In the Pseudoneuroptera are grouped a large number of more or less diverse families, including some wingless and degraded parasitic forms. The most interesting and conspicuous species are found in the families of the Dragon-flies (LIBELLULIDÆ), the May-flies (EPHEMERIDÆ), the Stone-flies (PERLIDÆ), and the White ants (TERMITIDÆ). Here also belong the little creatures often seen in old or long unopened books, called book-lice (PSOCIDÆ), and the peculiar parasites referred to in a previous chapter, the true Bird-lice (MALOPHAGIDÆ).

The Caddice flies closely resemble moths in their general outline, but the wings are of more delicate texture and rather sparsely covered with hairs instead of scales. The antennæ also are like those of moths, being long and thread-like, but there is no coiled tongue, and the other mouth parts are differently developed. The female flies lay their eggs upon water plants, and the aquatic larvæ attract much attention on account of the sigular and ingenious little cases which they construct for the protection of their soft bodies. These are made of silk, and to the outside are attached small pebbles, coarse sand, or bits of sticks or leaves, giving them very peculiar and often beautiful forms. Some species make their cases entirely of silk, and of a very elongated cone shape. The thoracic legs are long and strong, and when moving from place to place, the case is dragged along over the hinder end of the body, but when resting or molting the larva retires within it and closes the opening by a little door or grating, which admits the water necessary to respiration, but excludes enemies. These case-bearing larvæ may be found along the shores of lakes and in the beds of shallow

streams. They feed upon small water insects and vegetation. Prof. Comstock describes a species that makes a very simple case under stones in rapid streams, but excites much admiration by its ingenuity in fishing, catching its prey by means of a seine-like web stretched between two stones.

The Ant-lions (genus *Myrmeleon*) are very delicate and beautiful flies, with slender bodies and oblong, lace-like wings, sometimes plain, sometimes ornamented with black dots (see lower figure in plate). They have a graceful flight, and are occasionally attracted into our lamp-lighted rooms at night. The larvæ are ugly and ferocious looking. The body is rough and broad-oval in shape, and the flattened head is provided with a proportionately enormous pair of pincer-like mandibles, adapted for seizing and holding its victims while they are pierced and comminuted by the maxillæ. These larvæ dig funnel-shaped or saucer-shaped pits in sandy soil, with a straight shaft in the center in which they hide, supporting themselves with the tips of the gaping jaws just above the edge, ready to close with lightning-like rapidity on any unlucky ant or other insect that carelessly strays over the edge of the pit-falls and slides into the trap at the bottom. If the insect obtains its footing and attempts to crawl up the steep sides it is brought down with showers of sand thrown upon it by the enraged and disappointed ant-lion, and it is but very rarely that it escapes. These larvæ are called "doodle bugs" in some parts of the country, and are most commonly found on the margins of streams and in sheltered ravines. [Fig. 48.]

Lace-wing fly (*Chrysopa*) and eggs on stalks, after Riley.

The Lace-wing flies are another small group of terrestrial Neuroptera. They are pretty but fragile and ill-odored flies, of a pale green or rosy hue, the wings reflecting prismatic colors. The antennæ are thread-like and nearly as long as the body, and the round eyes gleam like jewels. The oval pale green eggs are laid in clusters, each attached to the top of a slender silken stalk. This is supposed to be a precautionary instinct of the parent fly to preserve them from the rapacity of the larva that hatches first. The larvæ are called "Aphis-lions" from the small insects which are their more especial prey. They are of depressed oval form with pincer-like jaws and long, rather sprawling legs. They render valuable aid to the farmer and horticulturist in clearing his trees and other plants of plant lice, bark lice and similar small pests. When full grown they enclose themselves in round white cocoons, which are closed on top by a lid that is easily pushed up when the fly is ready to emerge.

The Hellgrammite fly and the other, much smaller, species of the family SCIALIDÆ have carnivorous larvæ that live under stones in running water. The large fly above named *(Corydalis cornutus)* is the only conspicuous member of the group. This is one of the largest, if not the very largest, insect in the Order—the length being between two and three inches, with a wing expanse of about five inches. It is quite common in most sections of the United States. The body is soft, with the pro-thoracic joint rather narrow, forming a sort of neck to which the much broader and rather square head is closely joined. The eyes are rather small and wide apart, and the stout, many-jointed antennæ taper to a point. In the female the jaws are broad, curved and notched at the extremity, but in the male these are modified into a pair of long, cylindrical tapering tusks, with which he can clasp the neck of the female. The wings are quite broad, of rather thick membrane, with a fine net-work of veins, and stippled all over with whitish dots. The general color of the insect is a dull, ash gray. The female lays her eggs on sticks or leaves or stones that overhang the water, protecting and surrounding them by a white substance that gives the entire mass the appearance of a splash of whitewash. The larvæ, upon hatching, drop into the water. They are formidable-looking creatures when full grown. The head is broad and almost square, with strong jaws and other mouth parts. The thoracic joints, of which the first is longest, are quite elegantly sculptured. The feet terminate in a pair of claws. The sides of the hind body are furnished on each joint with spiny, oar-like processes and feathery tufts for gills, and there are also spiracles through which air can be breathed. They are from two to two and a half inches long by nearly one-half inch in diameter. They are highly esteemed for bait by fishermen, by whom they are termed "crawlers," "dobson," etc. It is said that they are nearly three years in completing their growth, and that the transformations are rapid and take place in cells under stones or drift-wood on or near the banks of the stream.

The other insects of this group (genera *Chauliodes* and *Sialis)* bear a close general resemblance to *Corydalis* in structure and habit, but are very much smaller and do not attract much popular attention.

Among the PSEUDONEUROPTERA the most conspicuous and beautiful insects are the Dragon flies or Mosquito-hawks (LIBELLULIDÆ). These are also called "Darning needles," and have been made objects of terror to children by the tradition that they are constantly watching for an opportunity to "sew up their ears," or do them some other bodily harm. In other parts of the country they are termed "Snake doctors," and are said to hover over the bodies of dead reptiles

and "bring them to life." The probable foundation for the latter superstition is that they are in pursuit of the flies that have been attracted by the odor of the carrion. It is needless to say that they are absolutely incapable of injuring any human being, and never show even the disposition to do so. Their motions are very graceful, and their habits are in the highest degree interesting. They are most numerous in the neighborhood of standing water, and dart back and forth through the clouds of mosquites and small gnats, seizing and devouring them in great numbers.

Their appearance is familiar to every one. The body is long and slender, tapering backward, and often of brilliant metallic colors, terminating in more or less conspicuous claspers or other appendages. The sides of the head are nearly covered by the large eyes; the antennæ are very short and bristle-tipped; the jaws are small but strong, and the parts corresponding to the lips of larger animals are both very large and close completely over the other mouth parts.

The wings are long, narrow and stiff, the hinder pair a little larger than the others. They are composed of transparent, closely-netted membrane, in many species crossed by broad dark bands or ornamented with spots and cloudings of crimson or orange. The legs are rather soft and weak, and are useful chiefly as supports to the body when the insect alights. The females drop their eggs in masses, embedded in a jelly-like substance, into the water, or attach them to the submerged stems of aquatic plants. The larvæ are carnivorous, and somewhat resemble the perfect insect in form, but breathe through leaf-like gills at the tip or along the sides of the body. In this age the labium (lower lip) shows a still more remarkable form than in the mature insect; it is very broad and hinged in the middle, and when the insect is at rest folds up over the face like a mask. The anterior edge is furnished with a pair of sharp hooks, and the apparatus can be extended to a great length in reaching after the prey, which is seized by the hooks and carried back to the jaws for mastication. The pupæ, when full grown, crawl up the stems of water plants, to which they cling by their legs, while the fly emerges through a slit on the back.

The May flies or Lake flies *(Ephemera)*, of which there are many species, often arise in clouds at night from the shores of lakes or rivers, and in the morning the ground, especially around lamp-posts and under lighted windows, will be covered with their dead bodies. These insects are very soft-bodied and frail, and, in the perfect state, live but a few hours—just long enough to pair and lay their eggs. The head is small, the greater part of its surface being occupied by the eyes; the antennæ are very short and fine. The fore wings are broad,

somewhat triangular in shape, while the hind wings are scarcely one-fourth their size, and nearly circular. The legs are slender, the front pair longer than the others. The abdomen tapers backward, and ends in two or three bristle-like appendages that are twice or three times the length of the body. The eggs are simply dropped into the water in a mass. The young feed upon minute aquatic vegetation or prey upon microscopic animals. Some species, whose habits have been studied in aquaria, have been observed to molt more than twenty times, and to require from one to three years in which to complete their growth. Among other anomalous characters found in these larvæ are a pair of large tracheal gills attached to the under side of the head. Another singular phenomenon occurs in these insects—namely, the molting of the perfect insect. The first winged form is called the sub-imago. This rises into the air, but after a short flight settles upon some object and rapidly sheds its skin, wings, legs, caudal bristles and all, leaving behind it the filmy integument of the sub-imago.

The Stone flies *(Perlidæ)*, so called because the young are commonly found under stones in running water, are much larger than the May flies, and resemble, in general form and structure of the body and wings, the Hellgrammite fly, although none of the species are so large as the latter. The hind wings are also proportionately much broader, and have few cross-veins. Some very minute species appear very early in the spring, and are called Snow flies, being often coincident with late snows.

The Termites or white ants abound chiefly in tropical regions, where they are excessively destructive and difficult to contend with. A few species also occur in temperate climates, and one, *Termes flavipes*, is found in all parts of the United States, and often does much damage to the sills of buildings and wooden sidewalks, to fence posts and similar property. In the Southern States it also occasionally attacks the roots and trunks of orange trees, and the roots of Pampas grass. It feeds, however, by preference upon dead wood, and works so insidiously that its presence is not even suspected until the walls of a building give way, or an article of furniture drops in pieces upon being moved. Like the true ants, the Termites are social insects, and live in exceedingly populous colonies. In the tropics many species are mound-builders, erecting conical structures of earth or wood fiber, held in place with cement, that are from eight to ten feet high. All the more northern species are more secluded in their habits, avoiding the light and excavating chambers deep in the earth or in the centers of the largest stumps. From these, under-ground passages and tunnels extend for hundreds of feet in every direction. They are all small insects

probably seldom exceeding one-half inch in length, even in the equatorial regions, while our own species are only about one-fifth of an inch long. In this matter of size, however, one individual in each colony is an exception. This is the "queen" or fertile female, whose abdomen becomes so enormously distended with eggs, that it is from two to six or eight inches in length and of a proportionate thickness. The average size of the queen of *Termes flavipes* is from one to one and one-half inches. These insects are of a dingy white color. The head, with which the excavating is done, is large and horny and very nearly square in shape, except in the "soldiers," in which it is oblong, and provided with long, sharp-pointed mandibles. The thoracic segments are constricted anteriorly, but broaden gradually toward the oval abdomen, which has the surface microscopically hairy. The wings are possessed only by the perfect males and females, and by these for a few hours only; they are long and narrow, with forked but not netted venation. The legs are quite long and stout.

As in the colonies of the true ants, the Termites are divided into *castes*, each nest containg not only males, females and neuters, but the latter are divided into "workers" and "soldiers," the sole duty of the latter being the defense of the colony, while the workers perform all the labors of sapping and mining, building and provisioning the different cells, taking care of the helpless queen and feeding the young. Moreover, the sexed individuals are of two sorts, "kings" and "queens" of the first rank, which, upon reaching maturity, acquire wings and make an excursion into the upper world of light and air before settling down to their one duty of providing for the continuance of the colony; and in addition to these, what are termed "supplemental" kings and queens, which never become winged, and whose function is to preserve the colony from extermination in case, after swarming, the workers fail to secure a genuinely royal pair.

The internal economy of Termes' nests has been found very difficult to investigate, but so far as it has been observed, corresponds closely to that of the ants. The eggs, as fast as they are laid, are carried out by the workers and placed in other apartments, and the young, which are active but incapable of taking care of themselves, are fed upon comminuted wood or fungi. In due time the males and females acquire wings and make their way out of the nest, but after flying or being wafted by the wind to greater or less distances, fall to the ground and shed their wings. Each male then seizes a female by his mandibles, and such of the couples as escape the greediness of birds and carnivorous insects are, it is said, taken in charge by workers which are on the watch for them, and either taken to old colonies in

need of new queens and kings, or a new colony is founded for them to people. They are placed in the strongest and most healthful chambers and receive every attention, but are not even permitted to wander about the nest, which the queen would indeed be incapable of doing in a very short time. She is supposed to live for several years, and during this period lays innumerable eggs. The swarming of the young males and females in such vast numbers is understood to be a provision for cross-fertilization, as the swarming from a number of colonies takes place at once, and the chances are largely in favor of males and females from different colonies coming together. In the event of the death of the old queen, and the failure to secure a young one after her aerial excursion, a wingless "supplemental" pair are brought into the royal apartments and the colony is preserved by means of their progeny, although the latter are not nearly so numerous as those of the true queen.

THE END.

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