Shade trees indigenous shrubs and vines.

by

John Truesdale Stewart
UNIVERSITY OF CALIFORNIA
AT LOS ANGELES

EX LIBRIS

GIFT OF
William McPherson
SHADE TREES,

INDIGENOUS

Shrubs and Vines,

by

J. T. STEWART, M. D.,

and

INSECTS THAT INFEST THEM,

by

MISS EMMA A. SMITH.

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TO MY READERS.

The following pages are the result of many years observation and much careful study. Every statement has been maturely considered. There may be and doubtless are errors, but I am sure a critical examination and the test of experience, will prove them to be few. I have endeavored to put in a small compass as much practical information as possible, on a subject on which much is needed. It was written expressly for this city, though parts of it apply equally to other places.

J. T. STEWART.
A little time devoted by every family to the culture of shade trees and ornamental shrubbery, would add much to the healthfulness and beauty of our city, and would have a refining and elevating influence upon its people.

Every tastefully arranged and nicely kept yard invites every passer-by to a higher and better life, and is a joy to the family forever. The growing children drink in its beauty, and make it a part of themselves as surely and naturally as they breathe their native air. Coarse, unlovely children, brought up in the midst of lovely surroundings, are impossible things.

I wish to call attention to this subject, to urge its importance and give some little information upon it.

Before planting a tree in any given locality, the first thing to determine is what tree will flourish there. A healthy tree is usually handsome, but a sickly tree never is.

As a rule, indigenous* trees are the most reliable. Unfortunately our soil is such that but few of them will grow. Experience and observation will add, year by year, to our present knowledge, but if we had known twenty-five years ago what we now know, or have the means of knowing, it would have saved us many thousand dollars that have been wasted on trees that never will grow in this place.

During the last thirty years several thousand dollars have been expended on trees in the court house square alone; and with a few exceptions it is now filled with the silver-leaf poplar. Although they are better than no

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*Natives of the place or vicinity.
shade trees, still when placed in such a soil, and in a place so exposed as that square, the silver-leaf poplar is an inferior and short-lived tree.

We have our own peculiar soil and location, and many trees that will flourish in a prairie loam having a clay sub-soil, will not grow here.

Most of that portion of the city that lies between the bluff on the one side, and the lake and river on the other, has a thin, sandy soil, with a sand and gravel subsoil. It slopes towards the river in a southwesterly direction, and except a strip near the bluff which is a little depressed, is thoroughly drained.

Having such a declivity, soil and subsoil, it becomes excessively dry in summer. In exposed places it is not uncommon for the ground to dry five feet below the surface. And what is worse, when thoroughly dried, in places the subsoil becomes almost as hard as rock. It is that peculiar formation which is commonly and appropriately termed hard pan. Hence the extreme difficulty of making many trees grow that do well in other places.

That portion of the city which lies on the bluff has quite a different soil and subsoil, and a different exposure. That part northeast of the Knoxville road, has a clay loam, with a clay subsoil, and is somewhat rolling. That part which lies southwest of the Knoxville road, has chiefly a rich prairie loam, with a clay subsoil, and is rather level. Here almost any of the forest trees will grow. There is much less difficulty in raising trees anywhere on the bluff than in raising them below, and as it is a little cooler there in summer, there is in reality not quite so much necessity for them.

**TREES THAT WILL GROW BETWEEN THE BLUFF AND THE RIVER.**

In the plateau between the bluff and the river, we would recommend for outside planting, the following trees:

The Hackberry—*Celtis Occidentalis*; the White Elm—
Ulmus Americana; the Soft, or Silver Leaf Maple—Acer dasycarpum; the American and European Linn—Tilia Americana and Tilia Europaea; the Box Elder—Negundo Aceroides.

Of these six species, the Hackberry is beyond comparison, the best. It is difficult to say which of the others should have the preference. Taking all things into account, perhaps they have about equal merits. All, except the European Linn, are natives of our forests, prefer moist, rich land, but will flourish in almost any soil.

The Hackberry is a medium sized tree, resembling the elm; has a medium growth, is clean and symmetrical. When not crowded its top rounds up well and becomes quite dense. Its spray is the most graceful of our forest trees, and it holds its leaves till late in autumn. It is exceedingly tough. Its limbs never break. It will bear any amount of trampling around, and any amount of drouth, heat, cold, dust and smoke. It bears a dark purple globuler stone fruit, about the size of a pea, with a thin, sweet pulp, ripening late in the fall. It is rarely infested with insects; in fact, I never knew this tree to be injured by them. The only insect that seems to fancy it is the Psylla Celtides Mam-ma. Riley, which sometimes forms little gulls on the leaves. It grows slowly when small, but when it becomes large enough for transplanting, its growth is fully equal to that of the elm. A row of these trees may be seen in front of Mr. David Proctor's place, on Perry street. Another, and the largest one in the city, grows in Dr. I. W. Johnson's front yard, on Perry street. There is one in Mr. W. H. Cruger's front yard, and there are two in the court house square. A few others may be seen in the city, most of which were set out last year. A good sized tree of this species grows in Chambers street, on the bluff. For some distance 'round the tree, the earth has been washed from the roots, which have been battered and trampled enough to kill many trees; yet, under this treatment, it seems not only to have suffered no injury, but to thrive.
A large sized typical tree of this kind may be seen across the river, about a mile beyond the bridge, at the crossing of the Groveland and Pekin roads. It was very symmetrical and beautiful, but recently a telegraph wire has been passed through the top of it, and some of the limbs, on one side, have been cut off, which, of course, mars its beauty, still by seeing it now one may form an idea of what it was before it was mutilated.

The White Elm is, perhaps, the most famous of our American shade trees; but, in this dry soil, it will not develope its full proportions, therefore it must take a second place. Its top is apt to become open and unsymmetrical, and it is sometimes seriously injured by bark lice. For a few years after it is set out, it grows slowly but finally improves and grows quite rapidly. It is so well known that it needs no especial description.

The Soft Maple is a rapid grower, a clean, elegant tree, but is very brittle. The limbs are liable to split from the body and break off. In their native forests they grow close together, tall and slender, and protect each other from the wind; the tops are smaller and the limbs less liable to break. The bark is tender when young, and requires careful protection. It is somewhat subject to the inroads of borers. Recently a few trees have been attacked by an enemy that is new to this part of the country, which may prove serious here as it has proved in parts of Missouri.

For a full description of this insect, and the best method of destroying it, I refer you to Miss Smith’s paper.

The Box Elder is a medium sized tree, having a medium growth, and while young a tender bark, but if protected does well and is quite hardy. Like its relative, the Soft Maple, it is sometimes injured by borers. It bears cultivation well and is a handsome tree anywhere, but in the river bottoms where it luxuriates, it is very beautiful, and makes a rapid growth. On moist, rich prairie land but few trees grow more rapidly or present a finer appearance.
The European and American Linn are elegant trees and do well. The former is the more handsome of the two, and merits more attention than it has received. Dr. G. L. Lucas has a fine row of them on his grounds, on the bluff. Mr. J. B. Smith has one in his yard, and there are a few others in the city. A good specimen of the American Linn, and by far the largest one in the city, grows in the front yard, of the place on south Jefferson street, formerly occupied by Mr. J. McClay Smith. A smaller but a typical one grows in Mrs. Purple's yard, on Fulton street.

These are the only trees, that with our present knowledge, we would recommend for outside planting, as all others, heretofore, have either done badly or totally failed. For inside planting quite a variety may be added, among them many of those recommended for the bluff; but judgment must be exercised in their selection and location.

The Hard Maple.

We are not now discussing the relative merits or demerits of trees as trees, but their fitness for our purpose. For beauty and durability, the Hard or Sugar Maple—Acer Saccharinum, stands among the very first forest trees of America or the world, but unfortunately, except in a few places, it will not live between the bluff and the river, either outside or inside. From the early days of Peoria to the present time, it has been tried again and again, and has almost invariably failed.

During the last forty years several thousand have been set out, and with many of them, great care was taken, and what have we to show for it? Just two survive that are of any size; one of these is in the lot on Jefferson street, adjoining the Library, and has been there forty years. It is now about twenty-five feet high, and four feet above the ground, measures twelve inches in diameter. The other one is on Mr. Robert Grier's lot, corner of Perry and Ham-
ilton streets. It has been there thirty-five years, and is about the same size. It is, by no means, as healthy and vigorous as it was five years ago. And these, remember, are not on the sidewalk, but inside. Not one that was set on the street twenty-five years ago is alive.

The further planting of this tree under the bluff, except in a few spots where there is clay in the sub-soil, is sheer folly. On the bluff it does well either outside or inside, except in exposed places. Some years ago Mr. Grove set out a row of twenty-two in front of his place, which is one of the most exposed on the bluff. Eight of them have been re-set or their places left vacant, and one-half the rest should be placed on the invalid list. If in this place, instead of the Hard Maple, he had set the Hackberry, it would now be a splendid row of trees.

Trees on the Bluff.

On the bluff we are not restricted as we are under it. All the trees recommended for below will do well here, and many more. It is not necessary to be so careful what trees are put on the sidewalks, but as a general rule the larger and more hardy ones should be selected for this purpose, and the smaller and more tender trees for the inside.

There are five species of Ash in our forest, all of which do well and are handsome trees.

The Sycamore is a stately tree, and should, by no means, be neglected.

The Catalpa is a native of the southern states; is an elegant tree and may be planted in protected places. It is a clean tree, a rapid grower, has large, rich, green foliage, and covers itself in spring with panicles of white flowers. It is unfit for planting on the streets, but in places both below and on the bluff, it has done well inside. In the latitude of southern Illinois it is reliable, but here it sometimes winter kills.
The Honey Locust, especially that variety which is thornless, or nearly so, is a beautiful tree and does well, fine specimens may be seen in front of Mr. Hogue's and Mr. Lazell's places, on the bluff; there is also one in the court house square. It is a large hardy forest tree, with large pinnate and twice pinnate leaves, and a profusion of little leaflets, of a deep rich green color.

The Kentucky Coffee Tree, or as it is commonly called, the coffee nut tree—Gymnocladus Canadensis, we would especially recommend for the beauty of its foliage. In this respect, it has no equal in our forest, and but few superiors in the world. It has very large decompound leaves, with a multitude of graceful leaflets. It is usually a small tree, but sometimes attains to considerable size. There is one in Mr. Darst's (formerly Frink's) grove, that measures two feet in diameter.

The Black Walnut is a large forest tree, and where it is not trampled about, and there is not too much smoke and dust, does well. It is one of the finest trees in the world for timber, but in a city, is not so well adapted for a shade tree.

The Wild Black Cherry is a nice little tree, but tender.

The Persimmon cultivates well, and is a fine little shade tree.

The Horse Chestnut will do well inside, especially on the bluff, so will its brother, our Buckeye, but it grows slowly. These trees are the first to put out in the spring, and while in leaf, are very handsome. I hope more of them will be planted. They shed their leaves early in the fall, sometimes in August. They have one peculiarity which not many deciduous trees have; in from four to five weeks they make their entire growth for the year, during the summer and fall they are preparing the next year's growth. Every leaf and every flower is formed and packed in the buds ready to unfold and expand the following spring.
The Norway Maple has been introduced by Mr. A. P. Bartlett, in his grounds on the bluff, and has done well. It is a splendid tree, clean, with a well rounded dense top, and a profusion of foliage. We strongly recommend this tree for the bluff. Mr. Bartlett has also the English Elm, which is superior even to our White Elm. It is probably as hardy, grows a little faster, and its top is more dense.

The Cucumber Tree—Magnolia Acuminata, is a large and elegant tree. It is perfectly, hardy, and in rich land grows rapidly. I think there is not one in the city. Why it has not been introduced is more than I can understand. As an ornamental shade tree, it has few equals; it may be obtained at any of the nurseries. The rest of the magnolias, winter-kill, and are worthless for planting here.

The Pecan has been highly recommended, both for a shade and fruit tree. How this may be I cannot say from observation. I hope it may prove to be an exception to the hickory family, of which it is a member, as it is a useful and ornamental tree.

The Mulberry is a handsome little tree, but tender.

The Sassafras is a handsome little tree, hardy and well adapted for inside planting, either on or under the bluff. It is the only representative of the Laurel family in this vicinity. Every part of the tree is aromatic, especially the bark and leaves.

The Butternut or White Walnut is rather a handsome little tree, and does well inside where there is not much smoke and dust.

The Mountain Ash is worthless under the bluff, but in some protected places on the bluff, has done reasonably well. It is too handsome to discard altogether.

The Shepherdia argentea, the Buffalo Berry of the upper Missouri and the Rocky Mountains, is a small tree that ought to be further introduced. There is now but one in the city, and it is in Mr. Mathew Griswold’s yard, on
Madison Street. It is hardy and has a profusion of slender leaves, silver gray on both sides, giving the whole top a bright, rich, silvery appearance.

The White Willow—Salix Alba, is a good tree, a native of Europe, a rapid grower, and flourishes here.

The common Silver Leaf Poplar grows rapidly almost anywhere, but on exposed places is short lived. It is subject to borers and sprouts dreadfully.

The Populus Dilatata—Lombardy Poplar, is a unique tree, a rapid grower, rather handsome, but is very short lived.

The Cottonwood is a rapid grower and flourishes in any moist soil, but cannot be regarded as a choice tree.

The Red, or Slippery Elm, is of little value for a shade tree.

Our Oaks and Hickories do not do well for shade trees. They do not bear trampling 'round, and the heat, dust and smoke of the city destroy them.

The Yellow Poplar, or Tulip tree, winter-kills and is unreliable. In some protected places a few have grown to considerable size and are still healthy and vigorous, but nearly all that have been put out in the city are now dead.

The Ailanthus winter-kills and is unreliable.

The Black Locust has, fortunately, been killed by borers. It is a rapid grower but not a choice tree.

Fruit trees are not desirable for shade trees in a city. The Apple, Peach and Cherry, especially the two latter, are short lived. The Pear tree lives longer, but the heat, smoke and dust of cities injure them all, and prevent them from fruiting well.

The Chestnut tree has done badly and cannot be recommended.
Coniferæ.

1. DECIDUOUS.*

The Birches are fine ornamental trees and hardy, though they do not make much shade. The European White Birch—\textit{Betula Alba}, is the most ornamental of the family, and will thrive in the most barren soil. It is well suited for inside planting, anywhere in the city.

In the extreme north it is a mere shrub. In the north of Europe it is a lofty tree. In the south of Europe it is smaller and the timber inferior. The climate here is suited to its full development.

A smaller and inferior variety of this species, called the American White Birch—\textit{Betula Populifolia}, is found in the eastern states.

The \textit{Betula Papyracea}—Canoe Birch, the bark of which the Indians use for making canoes, is a handsome tree, grows rapidly on rich prairie soil, and would do well on the bluff.

The Black, Yellow and Red Birches are all natives of the northern part of the United States and Canada, are all handsome trees; prefer moist, rich land, and will doubtless thrive on the bluff.

The Larix, or Larch, is a cone-bearing tree, with needle shaped leaves, but not an evergreen.

The Larix Americana, Black Larch, Hackmetack, Tamarrack, grows in swamps in the north and northeastern portions of the United States, and further north it is found also on uplands. It flourishes on our prairies, will do well on the bluff, and is a handsome tree.

The \textit{Larix Europæa}—European Larch is a native of the mountainous parts of Europe, and the south of Russia. It

*Trees that shed their leaves annually.
is extensively cultivated in England and on the continent of Europe for timber and ornament. Its timber is among the most durable and valuable in the world. It is a rapid grower and very ornamental. It is one of the most reliable and desirable trees for planting on the bluff.

2. EVERGREENS.

Under the bluff, except in a few spots where clay is mixed with the subsoil, all evergreens have failed, and will continue to fail. They live and thrive a few years and then die for want of nutriment. They literally starve to death. We do not know how to supply the deficient nourishment, and if we knew, it would probably cost too much to be practicable. But on the bluff a few species will succeed.

The Scotch, Austrian and White Pine may be recommended.

The Scotch Pine—*Pinus sylvestris*, is the least ornamental of the three; but it is so hardy, grows so well, and is so easy to cultivate, that in a place like this, where so few evergreens will flourish, it is worthy of notice and should be planted. It constitutes a large part of the forests of northern Europe, and makes the best of timber.

The Austrian Pine—*Pinus Austriaca*, is a native of the mountainous regions of Austria, where it grows to the height of one hundred to one hundred and twenty feet. It is more ornamental than the last, and is equally hardy, but requires more care in transplanting. As it becomes a large tree, and is a rapid grower, it should not be crowded but have an abundance of room. The same may be said of the White Pine and the Norway Spruce.

The White Pine—*Pinus Strobus*, is so well known it needs no description here. In Pennsylvania, New York, New England, Michigan, Wisconsin and Minnesota it has been very abundant, and in parts of Michigan, Wisconsin and Minnesota it still is. It is the tree from which our
common pine lumber is made. It is one of the most graceful trees of the pine family. If it were a rare foreign tree, its beauty would be appreciated. It grows well on the bluff, and should be more extensively cultivated for ornament.

Perhaps it may be proper to add the Yellow Pine—*Pinus mitis*. It is rather a pretty evergreen and will grow on the bluff.

The Norway Spruce—*Abies Excelsa*, is one of the finest of evergreens. It is a lofty forest tree, indigenous to northern Europe and Asia, and further south among the mountains where it is very abundant. It lives to a great age. It is said by Michaux to require one hundred and fifty years to develop its full proportions. Bryant in his work on forest trees, says: "No other evergreen is more easily raised from seed; no other is more cheaply obtained from nurseries; no other is more successfully transplanted. It is perfectly hardy; its growth is vigorous and rapid; its branches and foliage dense and compact, and it readily adapts itself to a variety of soils and climate. Its lower branches are persistent; its growth is perfectly upright, and where room is allowed, it pushes its limbs out in all directions in defiance of the force of the wind."

The Hemlock—*Abies Canadensis*, is a graceful tree, with dense, dark green foliage, a native of the colder parts of the United States and Canada. It will doubtless thrive best where it is somewhat protected from the sun.

Bryant says of it: "Although despised as 'common' by many in the countries where it is native, the Hemlock has few, if any, equals among evergreens as an ornamental tree."

The Balsam Fir—*Abies Balsamea*, is handsome while young, but is short lived and of little value.

The Red Cedar—*Juniperus Virginiana*, does reasonably well on the declivities of the bluff. Its growth, however,
is very slow, and in the winter its foliage becomes dark and dingy.

The Dwarf or Ground Juniper—*Juniperus Communis*, and the Sweedish and Irish Junipers, which are varieties of this species, is an evergreen which we must not overlook or neglect. It might have been placed among the other shrubs, but I prefer noticing it here. It is a prostrate or ascending shrub, with a profusion of branches spreading in all directions, and is very ornamental. It will flourish on the most exposed gravelly and barren knolls, of the bluff where few other things will grow. If extensively planted in these places, it would relieve them of their barren aspect, and add much to the beauty of our city. They may be obtained at most of the nurseries.

The Arbor Vita—*Thuja Occidentalis*, is the best evergreen for ornamental screens and hedges. It prefers rocky places, the borders of streams or swamps, but grows well on the bluff, as it does on prairie soil generally.

Doubtless other evergreens will grow here, and I hope more may be introduced on trial, but the success of those we have named is already an assured fact.

Transplanting Deciduous Trees.

In this climate, all transplanting of trees should be done in spring. They should be neither too large nor too small, but about medium size. If they are too large they will not do so well, and if they are too small it involves an unnecessary loss of time. They should be dug up carefully, and plenty of roots taken with them. The roots should be exposed neither to the sun nor cold air, nor be allowed to dry. Many trees are ruined in this way before they are set. Never buy or receive trees that are brought into the city with the roots exposed, unless it is a cloudy, damp day, and you know they have been recently dug. As the roots are necessarily more or less broken and cut off, the top should be cut back
in proportion, so as to maintain an equilibrium between them. They should be set the same depth or a little deeper than they originally grew. Each root that is broken should be cut smoothly with a sharp knife, sloping from the tree outwards, with the cut surface downward. The hole should be large, and when the tree is set in it, filled with fine earth to near the surface, taking care that the rootlets are well spread out and put in their natural position, then fill up with water and while it is settling, work the tree up and down so that every crevice will be filled with earth, in a semi-liquid state; in this way, every root will come in immediate contact with the soil. This is one of the most important things to be observed in setting a tree. Then fill the hole to a level with the surrounding earth and mulch with old straw, rotted leaves, or (what is equally good) four or five inches of sand, this will retain the moisture till the roots grow and acquire strength to support themselves. One or two quarts of oats, or one-half peck of potatoes put in the bottom of the hole before the tree is set, will assist in retaining moisture about the roots.

It is a good plan, especially the first summer, to protect the bodies of young trees from the sun, as many of them are killed by it. The bodies of trees need no sunlight. They are better without it. In their native state they are usually protected from the sun by other trees when young, and as they grow older, their own tops shade them.

For the first few years it is better to spade around them every spring, and mulch them. In the fall when the leaves drop, leave them under and around the trees, they give protection to the roots and nutriment to the soil. Leaves should never be removed from our lawns or grass plats, as they protect the grass in winter and enrich the ground more than anything else that can be applied.

When trees are set in rows, each row should be of the same kind. Planting different species in the same row,
especially alternating them, destroys the effect and shows bad taste. In a large ground or park, where they are planted promiscuously, in imitation of nature, a judicious mingling and grouping of different species is in good taste, and gives the whole a natural and pleasing appearance.

Transplanting Evergreens.

The same principles that apply to the transplanting of deciduous trees, apply also to evergreens, but greater care is necessary to insure success. There is one difference, however, the tops should not be cut back. The roots must not be exposed to the sun, to drying winds, or to cold. As soon as the tree is taken from the ground, its roots should be dipped in liquid earth and then covered with wet canvas, moss or straw, so as to retain the moisture until it is reset. A failure to observe this will be likely to injure, if not ruin it. Cloudy weather is the better time to transplant all trees, especially evergreens.

It is better to transplant evergreens while small, as they will then make better trees and are less liable to die. All authorities agree that they should not be transplanted during the growing season, and most of them agree that here in the west, the best time is in early spring.

Pruning Deciduous Trees.

As a general rule, the less shade trees are pruned the better. Nature will form a better top and a more harmonious tree in all its parts than art. Severe pruning is no longer practiced even in fruit orchards by our best horticulturists. The custom that formerly prevailed, of pruning evergreens and other trees, so as to make top-shaped, ovate, and other fantastic tops is no longer regarded as good taste. If you want a tree with a low spreading top, plant one that grows that way. If you want an ovate or pyramidal top,
plant a tree that will make such a top, but do not attempt to force trees to assume different forms from those which nature gives them. Each tree treated in this way is a *standing lie*, and proclaims to every passer-by the folly of its owner.

The true idea is to make each species assume as nearly as possible the typical form of that species. To do this, some pruning is sometimes necessary. If trees are not crowded—if each one has room enough for the air and sunlight to have free access to it on all sides, it will round out and develop its full proportions, and if it does not actually attain it, will approximate its typical form. Where the lower limbs are in the way, of course they must be sacrificed, but where they are not, leave them and you will have a finer and more thrifty tree. If a limb, as is often the case with the elm in our dry soil, extends beyond the rest, absorbing the strength and destroying the symmetry of the tree, it should be cut back while yet small.

The Soft Maple often throws out limbs that have no firm attachment to the body, and will sooner or later split off; these should be removed while small. The idea of cutting back the top of a soft maple, or any other tree, to prevent it from becoming top-heavy, is fallacious; it relieves for the time but makes it worse afterward. If a Soft Maple, as some of them will do, breaks bodily, and continues to do so, it is better to remove it and plant another in its place. Severe pruning lowers the vitality of any ordinary tree, making it less able to bear the drouth and heat of summer, and the cold of winter, and leaving it an easy prey to borers and other noxious insects.

As a strong man is able to resist disease, so a vigorous tree is able to resist the attacks of its enemies, while a feeble one succumbs.

So far as possible all limbs should be removed while small. It is rarely necessary to cut a large limb from a tree that has been properly cared for.
The Time for Pruning Deciduous Trees.

On this question there is much difference of opinion among tree-growers. Some contend that late autumn is the best time; others, that it should be done while the tree is in its most vigorous growth, say in May or June; others again, in the early part of the growing season, when the young leaf stems first show themselves. I think the last is the most favorable time, for then we have almost the entire summer's growth to heal over the wound. All agree that the worst possible time is in early spring, just when people usually prune. If pruning is done at this time, as soon as the sap begins to flow, it exudes from the wounds, weakens the tree, and is apt to cause the wood to decay. Trees recently transplanted are an exception, they do not suffer in this way, and for special reasons, usually require more or less pruning when set out. The wound left after removing a large limb is best treated by a mud plaster, bound on with a cloth. Wax which is often recommended becomes heated by the sun, and is liable to irritate and blister the parts around the wound. The wounds that are made in cutting off small limbs need no application.

There is usually a ridge, called the collar, around the base of each limb. It has been a subject of dispute whether this collar should be removed with the limb or left on and the limb cut outside of it. I prefer removing it. If it is not removed it is apt to die down to the body of the tree. There are often latent buds in this collar which develop when the limb is taken off. Though in removing it the cut surface is a little larger, yet it heals over quicker and smoother, and there is no sprouting around it.

Pruning Evergreens.

Deciduous shade trees require little pruning, and evergreens, still less. The beauty of an evergreen is spoiled when the lower limbs are removed. If any of the side
branches become irregular or grow out of proportion, they should be shortened. If the tree throws up two or more leaders, all but one should be removed. "If the leader is lost, it may be restored by lashing a rod to the stem of the tree, and tying one of the side shoots to it, in a position as nearly upright as possible." If you fail in this, dig up the tree, and put another in its place.

**Indigenous Shrubs.**

There are in this vicinity a number of ornamental shrubs to which I wish to call attention. They are not appreciated for two reasons: first, though growing around us, they are scarcely known, and second, they do not come from Europe, China, Japan or some other foreign country.

*The Amelanchier Canadensis*—June Berry, Service Berry, Shad Bush, is intermediate between a tree and a shrub, attaining to the height of from fifteen to twenty feet, belongs to the Rosaceae family, has a graceful form, clean bark, and beautiful foliage. It covers itself in early spring before the leaves are out, with a profusion of racemes of white flowers which are very beautiful. It bears an edible berry about the size of a huckleberry. It grows on the river hills above Prospect Hill, across the river among the bluffs, and also on Kickapoo Creek. It is hardy, and few shrubs are more ornamental. There is one in the grounds of the late Charles Ballance, on South-Adams street, and one in the yard of Mr. James, corner Monroe and Jackson streets. A few others have been introduced and have given satisfaction.

The Red Bud—*Cercis Canadensis*, is a large shrub or small tree of the Leguminosae order, with large heart-shaped, smooth, entire, pointed leaves, and in early spring before the leaves appear, bears a profusion of red-purple flowers. It is clean, free from insects, holding its leaves till late autumn. It prefers rich soil and is easily cultivated. It
is common in this vicinity and deserves more attention than it has received.

There are three species and a number of varieties of the Red Haw in this vicinity, *Crataagus coccinea*, *tomentosa* and *Crus-galli*, all of which are worthy of cultivation. They are large and very hardy shrubs, some of them attaining to the size of small trees. They all bear white flowers in the spring, and red berries in the fall. They belong to the Rosaceæ family and are no mean representatives of it.

The Black Haw—*Viburnum Lantago* belongs to the Honeysuckle family, and is a large handsome shrub. It bears some resemblance to the Snowball, but is a finer shrub. It blooms in May and June, flowers white in large flat compound cymes. It will grow in any soil, but prefers rich loam.

The *Staphylea trifolia*—Staff-tree, American Bludder Nut, is one of my little favorites. It grows in thickets usually on moist hill sides, eight or ten feet high, slender, with greenish striped branches, trifoliate leaves, pendent racemes, of greenish white flowers, pods membranous, inflated three lobed, about an inch long and three-fourths of an inch in diameter. A specimen may be seen in my side yard.

The Red-osier—*Cornus stolonifera*, is found in boggy places, but will grow in any moist soil. The branches and long, slender annual shoots, are bright red-purple, very handsome. It multiplies freely by subterranean suckers, and forms broad clumps six to ten feet high. It bears white flowers in June, and white to lead colored fruit in the fall.

The *Cornus alternifolia*—Alternate Leaved cornel, is a little taller shrub, found on hill sides in copses, with slender, greenish branches, broad cymes of handsome white flowers, and pretty foliage, the whole presenting a graceful appearance.
The *Amorpha fruticosa*—False Indigo, grows in moist places on the banks of streams, is common around here, and should be introduced in our grounds. It belongs to the Leguminosae family, has pinnate leaves, and clustered, terminal spikes of violet purple flowers. As found in this vicinity, it is usually six to eight feet high, but it is sometimes much taller.

The *Euonymus atropurpureus*—Waahoo, Burning Bush, is common in our woods and thickets, will grow in sunshine or shade, but prefers partially shaded places. When fully developed it is from ten to fifteen feet high. It is a pretty shrub, with green, four-sided branches, and bears panicles of little purple flowers. In autumn when covered with its deeply lobed crimson fruit, drooping on long peduncles, it is very ornamental. It requires little room, and will do well in places that are so shaded nothing else will grow. It should be sheltered from the north wind.

The *Euonymus Europceus*, is cultivated and highly esteemed a little further south, but is not quite hardy here. Our *Euonymus* is almost as handsome and is hardy, though it flourishes best in protected places.

The *Euonymus Japanica* is a common greenhouse shrub.

The common Sumac—*Rhus glabra*, is so common we do not realize that it is pretty, yet it is, and should be in every one’s grounds. It always grows and looks fresh, never becomes large, and lives to a great age.

The Aromatic Sumac—*Rhus aromaticus*, grows from four to six feet high, is ascending, inclined to spread around loosely, has pretty aromatic foliage, and spikes of little yellow flowers appearing before the leaves in early spring. These flowers, like the flowers of the soft maple, and many other plants, are formed during the fall, and have only to expand when the warm weather comes in the spring. It loves dry, gravelly places, and will flourish where nothing else will. These two species of Rhus belong to a poisonous family, but are innocent members of it.
Indigenous Vines.

Vines are my favorites. No grounds are complete without them. Nature never plants a park without interspersing it with vines. There is a peculiar grace and beauty—a charm about vines, that pertains to nothing else. They are the poetry of the forest, the emblem of affection, the companion of love. In her distribution of them, nature has not forgotten us. Let us not forget them.

The *Ampleopsis quinquifolia*—Virginia Creeper, is a woody vine of vigorous growth, climbing to the tops of our highest trees. It will cover the side of a brick or stone house, clinging to the walls by its tendrils, which do not penetrate them but adhere to the surface by little discs, on atmospheric principles, just as a tree frog holds to a tree. They become so firmly fastened they will break before they loosen their hold. It has five leaflets and may thus be distinguished from the poison Ivy, which has but three. The northwest side of Mr. Lightner’s house is covered with this vine. It is well suited for covering large arbors.

The common wild grape vine, though worthless for fruit, makes a good covering for arbors. It is better for this purpose than the tame grape, because it is more hardy and grows more rapidly. This and the Ampleopsis belong to the same family.

The *Tecoma radicans*—Trumpet Creeper, Trumpet Flower, is a beautiful woody vine, very hardy, a rapid grower, with pinnate leaves, leaflets five to eleven, flowers two to three inches long, orange and scarlet, very showy. This vine may be trained into any shape that is desired. It will grow almost anywhere. It merits more attention than it has received. Hundreds of them may be obtained in the river bottom on this side of the lake below the Narrows.

The *Celastrus scandens*—Wax Work, Climbing Bittersweet, False Bittersweet is a hardy woody vine, common in
our woods and should be cultivated more in the city. The leaves are medium sized, ovate oblong, finely serrate pointed. "The opening orange-colored pods displaying the scarlet covering of the seeds are very ornamental in autumn," and remain so till the middle of winter. The only one I know of in the city is in my yard.

The *Menispermum Canadense*—Moonseed, Yellow Ferrilla, is a handsome little twiner with smooth bark and large pretty leaves, loves rich soil and shady places. It is one of the modest little things that no one can observe without admiring. A specimen may be seen twining round a little Box Elder tree in my front yard. It is common in thickets in rich bottom land. The stem is smooth and slender. It bears panicles of delicate little yellowish white flowers in summer, and little round clusters of purple fruit in autumn, but its chief beauty is its foliage.

The *Clematis Virginiana*—common Virgin’s Bower, is not uncommon in thickets around Peoria. This vine is a little woody, but chiefly herbaceous; therefore dying back in winter, but each year throwing out a vigorous growth. It is a profuse bloomer, flowers white, and the fruit plumous with conspicuous feathery tails that are curious and ornamental.

The *Dioscorea villosa*—Wild Yam, is the most elegant of our indigenous vines. It is the rare beauty of our woods. No one can see it without admiring it. It is a delicate herbaceous vine. It loves the thickets, is modest and retiring. If it came from Japan it would be esteemed and cultivated. It grows around us and we scarcely know it. "Verily, a prophet is not without honor save in his own country." It is the only representative we have of the *Dioscorea* or Yam family. It is an endogen with net-veined leaves, which is an exception to the rule. The flowers are not conspicuous, greenish yellow, the sterile in drooping panicles, the fertile in drooping simple racemes, the fruit three angled or winged, pods nearly an inch long, stems slender from large knotty and matted rootstocks.
The _Adlumia cirrhosa_—Climbing Fumitory, is not indigenous to this vicinity, but is found in the eastern part of the state, Indiana and Ohio. It is a handsome climbing biennial vine with delicate foliage, thrice pinnate leaves, cut lobed little leaflets, and ample panicles of drooping pale, flesh-colored flowers. It climbs over high bushes, and in cultivation makes elegant festoons and bowers in shady places. It may be obtained at Mr. Frederick's greenhouse.

**General Remarks.**

If our streets were lined with shade trees, and our yards properly set with them, and with shrubbery and vines, they would absorb much of the carbonic acid gas that generates in excess in all cities and places where great numbers of men or animals congregate. They would perceptibly modify the intensity of the heat and dryness of the atmosphere in summer, and add much to the healthfulness, comfort and beauty of the city.

It is well known, that in summer much of our sickness, especially among children, is caused chiefly by intense heat. Reduce the temperature ten degrees, and you will lessen the percentage of mortality from cholera infantum and allied diseases of children twenty-five to fifty per cent. Our broad, naked, sandy streets; our unnecessarily broad, brick sidewalks, the walls and roofs of our houses, reflect the heat from the burning rays of the sun until the whole atmosphere at times becomes like a heated oven. No wonder many persons become suddenly sick and die. No wonder multitudes of little children, the light and hope of the family succumb, and our cemeteries are dotted all over with little graves.

Except in the business part of the city, one-half of all our wide streets should be converted into grass plats and set in trees. Every property owner should be required to care for and protect these grass plats and trees the same as and even more than his sidewalks.
Most of our streets are eighty feet wide. Make a drive-way in the center thirty-five or forty feet wide, which for this purpose is now and always will be enough; make the sidewalks eight feet wide, which will give ample room, and leave the intervening space on either side for grass plats and trees, and we will have streets that are convenient and present a tasteful and elegant appearance.

When this is done, and the trees have had a few years to grow, the increased heat our improvements have made, will be materially modified and our death rate lessened in proportion.

I am happy to say, that a move in this direction was made last year on Madison and some other streets, and I hope it will be extended throughout the city generally. When these improvements are completed, it will be comparatively little expense to gravel or pave our streets. Then with our location and surroundings, which for variety and beauty are unequalled, surely not surpassed, and with the general cultivation of good taste, to which these would lead, we would have one of the most cheerful and pleasant cities in the world.
TO OBSERVERS.

The reader having carefully perused the excellent remarks of Dr. STEWART on the several varieties of shade trees best adapted for the climate in and about the City of Peoria, will observe that, however much care and labor is expended in procuring the kinds recommended, the insect foes are ready to commence their ravages, and unless careful attention is given them, will mar if not destroy the fruits of the expended labor.

The following treatise is intended to point out and describe the most destructive insects found in our city, and the simplest as well as most effectual remedies known for their destruction. I would call particular attention to the maple tree bark-louse—*Lecanium Acericola*, found at the present time in such numbers upon the aforesaid tree. This insect appeared in Davenport, Iowa, during the years 1870 and 1872, in such numbers as to excite much attention, but the natural enemies came to the rescue and destroyed many of them. Whether they will appear here or not remains to be seen.

EMMA A. SMITH.
The *Psylla celtides-mamma* is the only insect found upon the leaves of Hackberry tree. Prof. C. V. Riley has described the insect in Johnson's Encyclopaedia as follows:

"The *Psylla* form galls of various shapes and sizes on the stems and leaves of Hackberry (*Celtis*). In life-habits they differ from all the other gall-insects, and agree with their nearest relatives, the plant-lice, only in being the architect of their own galls. The egg—glued in spring to tender leaf or twig—soon hatches, and under the irritation caused by the young *Psylla*, the gall soon imbeds it. Within this gall the insect dwells till it has acquired the pupa state, which is generally by the time the leaves begin to turn and drop. Then, by means of certain horny spines or thorns at the end of its
body, this pupa works its way out of its prison, and once out soon gives forth the perfect fly. The galls made by these flea-lice are usually quite hard and woody, and generally one-celled.”

The Elm.

The Coxcomb—elm gall. *Pemphigus ulmicola.* Fitch. (Hemiptera. Aphidæ.)

The leaves of the young Elms were very much infested with the galls of this insect, during the past season, in the valley of Springdale Cemetery.

*Its natural history.*

The egg deposited in the fall, hatches in early spring, and the young larva stations itself upon the leaf, causing that part to bulge out into a comb-like appearance, finally closing entirely, making a kind of prison. This is the wingless mother-louse. The gall increases as the inhabitants of the gall increase in number and size. One louse will give birth to hundreds of very minute and wingless young larvae, and by the end of June or beginning of July the gall becomes full of lice fully grown and winged. The leaf is then forced open—under the gall—and they make their escape into the open air. Parasites are often found inhabiting the same gall with them, and many are thus destroyed. These resemble the authors of the gall so closely that it often requires considerable knowledge of Entomology to distinguish one from the other.
The young Elms only are thus infested. When the trees are about twenty-five feet high the insect ceases to trouble them, and generally the younger the trees the greater number of galls found upon them.

_Eriosoma ulmi._ RILEY, OR DOWNY LICE.  
_(HEMIPTERA. APHIDÆ.)_

The bark of the Elm is subject to the attacks of a woolly plant louse, often proving their destruction. The young lice cluster together and cause a knotty, unnatural growth of the wood. They are found in between the crevices formed by these knots, subsisting on the sap which exudes from the holes made by the punctures of their beaks. A downy or woolly matter is secreted from all parts of the body, but mostly from the posterior end. The lice are often imbedded in the substance and hidden from view.

The matured insect is found on the tree with the larvac and pupæ, about the first of July. Prof. Riley has found washing the trunk of the tree with a weak solution of cresylic acid soap will kill them instantly. They are preyed upon by the larvac of a Lacewing fly.  
_(Chrysopa eriosoma.)_

_The Vanessa Antiopa._ LINNÆUS.  
_(LEPIDOPTERA. VANESSA.)_

During the summer of 1875, the leaves of the Elm were very much riddled by the caterpillars of this butterfly.

The natural history of the insect is as follows: The eggs are deposited in clusters, during the latter part of May or first of June, on the twigs of the Elm, Poplar and Willow. The caterpillars live together, feeding on the under side of the leaves. In about one month they become fully grown; are black, minutely dotted with white, with a row of eight dark brick-red spots on the top of the back. The head is black, and rough with projecting points; the spines, of which there are six or seven on each segment except the first, are black, stiff and branched; the intermediate legs reddish. The insect measures an inch and three-quarters in length.
They are very voracious, and when occurring in great numbers, will strip whole limbs, marring the beauty of the tree, and often seriously injuring it. Having attained full growth, they suspend themselves from some object, and change into a chrysalis of a dark brown color, with large, tawny spots around the tubercles on the back. After remaining in this position from eleven to twelve days, the butterfly appears,—the whole time consumed, from the egg to the butterfly, being a little over one month. There are two broods each year, the butterfly of the second brood hybernating, and may be found, during the winter months, under the eaves of houses, and in secluded places, apparently lifeless, but reviving when brought into a warm room.

As soon as the first warm days of spring appear, this butterfly may be seen flying, often presenting a dilapidated appearance. It expands from three to three and a half inches. The upper side of the wings is purplish brown, with a broad buff-yellow margin, near the inner edge of which there is a row of pale-blue spots; the under side is a mottled wood-color. In the sunlight this butterfly presents a beautiful appearance. Gathering the caterpillars, and destroying them, is the only artificial remedy I know of. This is comparatively easy, from their habit of clustering together on the leaves.

*Tremex Columba*, of *Linnaeus*.

(Hymenoptera. Tremex.)

This insect can be seen on the trunks of the Elm, Pear and Buttonwood, during the months of July and August. The body of the female is cylindrical, about as thick as a small lead pencil, and more than an inch long, exclusive of the borer, which itself is about an inch in length, and projects three-eighths of an inch beyond the end of the body. It is concealed, when not in use, between two narrow rust-colored side pieces. The head and thorax are rust-colored varied with black. Across the back are seven ochre-yellow transverse bands. The antennae are rather short and rust-
The wings, four in number, are smoky-brown and semi-transparent. The legs are ochre-yellow with blackish thighs.

When about to lay her eggs she draws her borer out of its sheath till it stands perpendicularly under the middle of the body; then she plunges it through the bark into the wood. When the hole is made deep enough she then drops an egg therein, conducting it by means of the two furrowed pieces of the sheath. The borer often pierces the wood to the depth of half an inch or more, and not unfrequently becomes a victim to her own zeal and labor, driving in her borer so tightly that she is unable to extract it and perishes from starvation.

The eggs are oblong and less than one-twentieth of an inch in length. The larva is a yellowish white, of a cylindrical shape, with a horny point on the upper part of the hinder extremity. They feed exclusively on wood, making long passages through it and destroying much valuable timber. As they grow very slowly, and remain several years in the larva state, they often become injurious to whole forests of trees.

The Tremex is considered one of the most destructive insects in the eastern states. In the year 1873, I received from Oregon, Illinois, a piece of Hickory bark with the female attached, who, being unable to extract her borer, had perished. They had destroyed many of the trees in that part of the state.

The larva is often destroyed by the maggots of two kinds of Ichneumon flies, (Pimpla atrata and lunator,) Fabricius. These flies thrust their slender borers, measuring from three to four inches in length, into the trunks of trees inhabited by the grubs of the Tremex, and their life is often lost by being in like manner fastened to the trunks of the trees.

The male of the Tremex Columba is very unlike the female in color, form and size, and is not furnished with the remarkable borer of the other sex. He is rust-colored, variegated with black. His antennae are rust-colored or
blackish. His hind body is flattened rather widest behind, and ends with a conical horn. His hind legs are of a blackish color and shaded with black. He is longer than the female, and his wings expand from one inch and a quarter to two inches or more in length.

**American Linn.**

*Datana Ministra. Drury. Yellow-necked Caterpillars.*

(*Lepidoptera. Notodontidae.*)

The larvae of this moth is found on both fruit and ornamental trees, among which are the Apple, Quince, Pear, the American Linn, Walnut and Sumac.

The moth varies in color according to the food previously fed upon. When the wings are expanded they measure from one and a half to two and a half inches. The under wings are much lighter in color than the upper, being usually of a pale-yellowish, or whitish color; the posterior margin of a deeper color. The upper wings vary from bright yellow to smoky brown, crossed by four or five narrow bands. The body itself is of a yellowish color, sometimes inclining to red. The larvae, when matured, differ in appearance to some extent according to the food. Those found upon the American Linn have four narrow, pale-yellow stripes upon the sides of the body, while those upon the Black Walnut are black without stripes. They are about two inches in length.

The eggs are deposited on the under side of the leaves,
in a dense patch, from seventy to one hundred in number; these are white and round. As soon as hatched, the larvae commence eating the underside of the leaves; but, as they increase in size, they eat the entire leaf, except the midrib. They do not spin a common web, as the tent-caterpillars do; yet are strictly gregarious, eating from one branch or twig until the leaves are all consumed, and then migrating to another.

The most interesting feature of these larvae is during the moulting season, when they all come down upon the trunk of the tree and cling in one body to the bark, assisted in this position by a silken thread passed among them. They remain in this position, without food, usually two days and two nights, when they cast off their old skins and commence crawling up the trunk of the tree to their food, leaving the old empty skins attached to the tree.

I have observed them on the Hickory, clinging to one of the upper branches, when moulting, instead of coming down; but this is the case only when the tree is old enough for the branches to become as large as that of a common-sized tree. When suddenly alarmed, they assume a peculiar position, by throwing the head and tail at right angles with the rest of the body, as seen in figure at $a$, and this is also observed when resting. When they become fully grown, their social habits change, and for the first time they separate and wander off alone, before entering the pupa state. They do not appear until mid-summer, and remain until the frost has destroyed the leaves in the fall. They remain in the pupa state, under ground, during the winter, changing to the moth late in summer. Owing to the fact that they eat the entire leaves upon a branch before migrating to another, the tree assumes an unsightly appearance when cultivated for shade or ornament, but upon fruit trees it decreases the vigor, and thereby lessens the value of the fruit.

They can be easily destroyed during any of the moulting-
ing seasons, by detaching the caterpillars from the trunk or limb, and burning or scalding them; or, by breaking off the leaves upon which they are feeding, and killing them. Two Ichneumon flies have been bred from them which serves to keep them largely in check. The American Cuckoo has been seen in the act of devouring them, always seizing the insect by one extremity and crushing to destroy vitality before swallowing.

Oak Tree.

*Stenocorus putator.* Peck. The Oak Pruner.

(Coleoptera, Cerambycidae.)

During the latter part of summer, and through the autumn, branches from one to four feet in length may be seen under the Oak trees. The branch has the appearance of being sawed from the tree, but upon close examination the center will be found to be filled with saw-dust like fillings. Upon splitting the cut end of the branch, the larva will be found, thus showing the cause of the branch having fallen. Harris states that the branches may be found cut from the tree in the fall, the larva remaining in the wood during the winter, transforming to a pupa in the spring, and in June or July changed to a beetle and comes out of the branch. Packard states it undergoes its transformation in mid-summer and lays its egg near the axilla of a leaf, stalk, or small stem.

Those bred by myself, were found as early as the 25th of July, and changed to the perfect insect the following May 10th.

The egg is deposited on a small branch,—four or five inches from the main branch—which it eventually severs from the tree. The young larva hatches and obtains its nourishment from the pith, boring a cylindrical hole as it
proceeds. Obtaining its full growth, it cuts the wood away, leaving only the outside bark; then, retreating, it fills the entrance of the hole with fibres of the wood, when the action of the wind severs the whole from the tree and the branch falls to the ground, often while the leaves are yet green.

Why the insect should cut the branch away, I am unable to state, since it undergoes its transformation in the branch. The beetle is slender, long horned, of a dull, brown color, sprinkled with gray spots, composed of very short, close hairs, and ranging in length from four and a half to six-tenths of an inch. By collecting the branches in the autumn and destroying them, the development of the beetle can be prevented.

The Sycamore.

The Sycamore suffers to some extent from the boring of the *Tremex Columba*—for description see Elm—beyond this, no other has, as yet, come under my observation.

The cleanliness of the Catalpa from insect depredation in our city, has often caused particular attention. The leaves remain perfect, and the indications on the trunk and limbs are free from borers.

Soft Maple.

*Lecanium Acericola*. RILEY. BARK-LOUSE.

(*Hemiptera, Coccidæ.*)

Especial attention should be called to the ravages of the bark-louse, *Lecanium acericola*, which are destroying the Soft Maple trees in our city. They were first observed in the summer of 1874, on the trees in front of the ruins of St. Paul's Church on Main Street. Since then they have
increased in number with wonderful rapidity, and have spread down Franklin to Second Street.

When first observed, a small amount of labor would have exterminated them, but owing to negligence, the trees which form the principal shade in said locality, present during the summer a disgusting and unclean appearance. The general habits of the insect are as follows:

In the early spring the female is found on the bark apparently torpid. As warm weather advances the body is more swelled, and carefully raising it with a knife, numerous oblong eggs will be found, the dead body forming a cover. Under this shield the young are hatched, and make their escape from the lower end, where it is either slightly elevated or notched. They then wander with considerable activity over leaf and branch, inserting their beaks into the bark or leaves, drawing up the sap, which nourishes them. The leaves of the peach tree often present a black appearance, and is sticky to the touch, caused by the dripping of the sap from the numerous punctures made by insects belonging to the Coccidae.

While the Lecanium acericola continue their exhausting suction of sap, they increase in size, and during this time are in what is called the larva state. When this is com-
pleted they will be found to be of different sizes, and they then prepare for a change that is about to take place, by emitting from the under side of their body numerous little white downy threads, which fastened to the bark, serve to secure them. The larger ones are females, who manage to throw off this covering in a few days, and become fastened to the bark as a scale, where they become immovable and apparently inanimate; while the smaller ones continue under their outer skins which serve instead of cocoons, from which they seem to shrink and detach themselves and transform into the perfect insect, having two wings which lie on the top of the body. 'After the larger lice have become fixed, and have thrown off their outer coats, they enter upon the pupa, or chrysalis state. But when they have become mature, they do not leave the skins, or shells, covering their bodies, which continue flexible for a time. These larger insects are females, and are destined to remain immovable, and never change their place after they have once become stationary.' After the insects have paired, the female increases in size for a time, and then remains without alteration. Under this skin the eggs are deposited, but not being large enough to cover all her eggs, a white, downy substance issues from the under or hinder part of her body, and imbeds them. This is the time the insects spread from tree to tree. The cottony substance is light and is easily borne from one tree to another by the wind, and one female deposits as many as two hundred eggs.

The most effective time for destroying the insect is while the young are crawling over leaf and branch; they are then tender, and almost any solution of soap will kill them. The time depends upon the advance of the season, but about the last of the month of May or first of June.

A wash made of two pounds of potash in seven quarts of water, or a pickle, consisting of a quart of common salt to two gallons of water, would prove a cheap and effectual preventive. Perhaps the best application is a wash made
of two parts of soft soap and eight of water, with which is to be mixed lime enough to bring it to the consistence of thick whitewash. The larger trees already infested might be saved by using Babcock's extinguisher. They are preyed upon to some extent by parasites.

A letter received March 19th, from J. Duncan Putnam, Corresponding Secretary of the Davenport Academy of Natural Sciences, states that the *Lecanium acericola*, still continues to be very injurious to the Maple trees in that city, though it spreads very slowly, and he thinks if proper means were used, its injuries could be checked. The best part of the shade trees of Davenport have been almost entirely destroyed. He thinks the best preventive would be to syringe the trees with water in which tobacco and soap, or some other poison had been dissolved, applied at the time the young lice are hatching.

**Maple Leaf Cutter.** *Ornix Acerifoliella.* Fitch.

*(Lepidoptera. Tineidæ.)*

During the summer of 1875 my attention was often called to the appearance of the Maples growing in the forests. They seemed as though nipped with frost. When first observed it was about the first of August, and continued increasing until the fall of the leaves late in autumn. Upon careful examination the depredator was found to be a small white worm situated under a covering or scale made from several pieces of the leaf, and feeding on the pulpy substance. The worms fall with the leaves to the ground in the autumn, and change to pupæ in their cases, where they may be found in the spring. When warm weather advances, a small moth appears, of a dark, brilliant, blue color, with a bright orange-yellow head. These insects are not found on Maple trees used for shade along the street, or where standing alone in a field, but only in forests, and for the reason that the leaves in the streets are either gathered and destroyed in the autumn, or blown about by the wind, and trampled under foot, thereby
destroying the worms, while those in the forests remain undisturbed. This difficulty can be obviated by allowing cattle or sheep to range the ground.

In the year 1850 the forests of New York suffered much from this insect, but afterwards escaped, owing probably to the presence of a parasite in the pupæ, which proved to be a small Ichneumon fly.

*Aegeria acerni.* (Clemens.) The Legged-Maple Borer. (Lepidoptera Aegeriidae.)

The Maple trees used for shade are injured by this borer to some extent in Peoria. The eggs are deposited during the latter part of May, or even later, in the crevices of the bark. As soon as the eggs hatch the worms burrow under the bark, feeding on the inner bark and sapwood, filling the burrows with the excrement, and causing the bark to crack open and loosen. When occurring in great numbers they girdle the tree and kill it, while when a few only attack a small tree it is weakened, and liable to be broken by the wind. The worm when fully matured changes into the chrysalis, loosely covered with white silk and the brown pellet excrement of the worm. When ready to come forth as a moth, it works its way through a hole in the bark, made by the worm.

The borers are only found in the trees which have already been injured by the Flat-headed Borer, *Chrysobothris femorata.* Fabricius, or where the bark has been rubbed and is cracked or roughened. A smooth bark is seldom
chosen for the consignment of the eggs. Anything which will keep the bark smooth will undoubtedly prove beneficial. Mr. Gennadius recommends whitewashing the trunks, and filling up all holes and fissures with mortar, so as to render the bark as smooth as possible.

Wild Black Cherry.

*Clisiocampa Americana.* Harris. Tent Caterpillar.

(*Lepidoptera. Bombycidæ.*)

This insect which infests the apple orchards, is found upon the Black Cherry, and seems to give the preference to this tree when in the vicinity. As many as ten webs have been found on one tree—for this reason orchardists are advised to grow the tree. The same genial warmth of the sun which brings forth the leaves of the Black Cherry, also hatches from the eggs laid upon the branches of the tree, from two to three hundred small caterpillars confined within a white silken enclosure. All the caterpillars hatched from one batch of eggs, live harmoniously together in one common tent; spun by themselves, enlarged with their growth until sometimes the nesting places acquire a diameter of eight or ten inches.

The caterpillars feed in pleasant weather about twice a
day, upon the leaves of the tree, going and returning in a single procession. As they crawl over twig and leaf, they spin from their mouths a silken thread, which in time forms a pathway of silk, serving to render their footing more secure and assist them in again finding their way back to their common habitation. They are hardy little creatures, and can fast many days without apparent suffering. During stormy weather they do not leave their tents, and sometimes as many as three or four days elapse without their partaking of food. The first warm weather often hatches the young and causes them to appear before the leaves are unfolded, and they then subsist on the glutinous substance on the outside of the egg; which substance has also served to prevent the winter storms from destroying the eggs. After five or six weeks have elapsed, they having changed their skins four times, the caterpillars become fully grown, and for the first time scatter independently of each other, and seek to find a shelter in which to spin their cocoons. These cocoons are of a long, oval form, composed of silk, woven loosely, the crevices being filled with a paste, which, on drying, becomes yellow, and resembles sulphur.

After remaining in the chrysalis state from fourteen to seventeen days, the insect bursts its chrysalis skin and forces its way out of the softened end of the cocoon and issues forth as a moth. Many die either from weakness or injury, during the chrysalis state, by small maggots, which subsist upon the inside of the chrysalis and come forth in time as a small four-winged Ichneumon fly. They are kept in partial subjection by these parasites. It is also said that some of our birds peck at the nests of the caterpillars, and destroy many in that way, but do not subsist entirely upon them.

The moth expands from one inch and a quarter to one inch and a half. It is of a rusty, reddish-brown color, the front wings being divided into nearly three equal parts, by two white lines, between which the color is paler in the
male, but nearer the ground color or even darker in the female. These moths appear in great numbers during the month of July. Being nocturnal in their habits, they fly by night, and often enter our houses, attracted by the light. They do not eat during the moth state, the only aim of their short existence seeming to be the perpetuation of their species; for as soon as they pair and lay their eggs, their object being completed, they die.

There are few insects so easily managed as the three last described. The eggs being deposited in clusters, they can be secured in that form, but should any escape the eye and hatch, they can be secured when in their tent, and destroyed by burning or scalding. The larva of Papilio Turnus Linn, lives upon the leaves of the Black Cherry, but not to any extent in Illinois.

The Birch and Buckeye trees appear unusually free from insects. Upon the latter tree has been found the larva of one of the Lepidopterous insects, but not in sufficient numbers to attract attention.

A bark-louse is found upon the Mountain Ash. I have not had sufficient opportunity as yet for observing its habits or ascertaining the scientific name.

The Cotton-wood tree does not suffer much from borers in our vicinity. A tree which was felled one year ago on the bluff, and more than twenty-five years old, was almost free from insect depredation. There are, however, two insects found on the leaves worthy of consideration.

_Pemphigus vagabundus._ WALSH.

(HEMIPTERA. APHIDÆ.)

Commonly known as the vagabond Pemphigus, "so called from its habit of wandering to very great distances in its native forests, raises large galls on the tops of the Cotton-wood and Balsam Poplars; the old blackened galls hang on to the twigs for several seasons, giving the tree a singular appearance when the leaves are off in the winter
time. A single female begins the gall, whose young soon multiply, leaving the gall in September."

*Acronycta populi.* **RILEY.** *THE COTTON-WOOD DAGGER.*

(*Lepidoptera. Acronycta.*

The caterpillars of this moth are found on the leaves of the Cotton-wood. The caterpillar is easily recognized by "its body being covered with long, soft, bright-yellow hairs which grow immediately from the body, part on the back, and curl round on each side." The head is black, and on the top of five joints, is a straight black brush. When at rest they have a habit of curling round upon a leaf. There are two broods each year, the first brood appearing during the month of June, the second the last of August.

The chrysalis is surrounded by a pale, yellow, silk cocoon, and is generally found in some sheltered place, such as a chink in the bark of a tree, or under the cap of some fence. Mr. Riley has bred three distinct parasites from the larva of this moth, which undoubtedly serve to keep them in subjection. Although not strictly gregarious in habit, they are found in clusters when young, and can, at that time be easily destroyed by gathering.

**Locust.**

The Locust suffers from the borers to an alarming extent throughout Illinois. It is discouraging to find the main trunk of a whole row of trees riddled through and through with these depredators, and yet it is frequently seen, and unless the natural enemies come to the rescue, a healthy Locust tree will be the effect of the imagination. Only two or three trees remain to represent the long row which once afforded shade on the northern extremity of Elizabeth street. The most numerous of which are the *Clytus Robiniae* and *Xyleutes Robiniae.*
Clytus Robiniae. Forster. Locust Tree Borer.
(Coleoptera, Cerambycidae.)

This beetle is often confounded with the hickory borer, Clytus pictus Drury, being similar in general appearance and color.

The eggs of the Clytus Robiniae are deposited in clusters in the trunk of the tree, and in a short time are hatched and the grubs commence boring into the bark, subsisting on the soft inner substance until winter approaches, when it bores into the centre, or heart of the tree, remaining torpid until spring. The following June, the beetle emerges, requiring one year for the full development of the insect.

When, as often happens, many borers are in one tree, it becomes full of holes and very much weakened. Any kind of wash that is offensive to the beetle and will serve to keep the eggs from being deposited, applied to the trunk of the tree will prove effective.

Dr. Harris proposes whitewashing the trunk of the tree, and watching for the insect and destroying them. This is easily accomplished, since they are frequently seen basking in the sunshine on the bark.

Xyleutes Robiniae. Peck. Locust Tree Carpenter Moth.
(Lepidoptera, Bombycidae.)

The larvae of this moth bores into our Locust trees, and although it is not found in the same number as the Clytus, it is much larger and longer lived in the tree, and much damage is done by them. They are nearly three inches long, when fully grown, and about as thick around as the end of the little finger. In color, it is reddish above, and white beneath, sparsely covered with short hairs arising from minute warts. "These caterpillars bore the tree in various directions, but for the most part obliquely upwards and downwards through the solid
wood, enlarging the holes as they increase in size, and continuing them through the bark to the outside of the trunk. Before transforming, they line these passages with a web of silk, and retiring to some distance from the orifice, they spin around their bodies a closer web, or cocoon, within which they assume the chrysalis form.” —Harris.

The moth is large; the wings narrow, both pairs being equal in size, and somewhat resemble the nit-veined style of the Neuroptera.

Black Walnut Tree.

Hyphantria Textor. Harris. The Fall Web-Worm. (Lepidoptera Bombycidae.)

Near the end of the branches of the Walnut tree, large webs can often be seen in the fall of the year, and if carefully examined will be found to be filled with small worms, or caterpillars. They are very injurious to the tree, often occurring in large numbers. The eggs are laid by the parent moth in clusters upon a leaf near the extremity of a branch, and are hatched from the last of June till the middle of August, some broods being later than others. The young caterpillars immediately begin to provide a shelter for themselves by covering the upper portion of the leaf with a web, feeding on the pulpy portion of the leaf, the skeleton of the leaf and the lower skin remaining. As they increase in size, they enlarge their web until carried over a large portion of the branch. When fully grown, they measure something over one inch in length. In early autumn they leave their web and for the first time
separate, and hiding under stones and boards change into the pupae, remaining inactive during the winter, and appearing as a moth the following June or July.

As soon as the webs are seen they should be stripped off, with the few leaves which they cover, and the caterpillars destroyed.

*Clisiocampa Sylvatica* Harris. Tent Caterpillar of the Forest.

(*Lepidoptera. Bombycidae.*)

Upon the Walnut and Oak fastened to the trunk or larger branches, large tents or webs are frequently seen, resembling in habits the *Clisiocampa Americana*. The tent contains as many as three or four hundred individuals, and often prove very injurious to the trees infested, defoliating at times a greater portion of the tree. When fully grown, the caterpillars leave the tree and seek some dry, sheltered spot, where they change into the pupae inside a cocoon, resembling in form and color the *Americana*. The moths appear from sixteen to twenty days after, depositing the eggs on the tree in clusters, during the autumn. Destroying the caterpillars while in the tents, or gathering the eggs during the winter, is the most effectual way of preventing their ravages.

*Sassafras Tree.*

*Attacus [Callosamia] Promethea* Drury. The Promethea Silk Worm.

(*Lepidoptera Bombycidae.*)

Upon the Sassafras tree, in the winter time, leaves apparently dried and curled are seen hanging from the limbs; close observation shows this is used as an outside covering for a cocoon. The caterpillar had gathered this around itself, the stem of the leaf made secure to the
branch by silken threads being wound around and fastened so securely that the winds fail to detach it, and there it hangs until warm weather unfolds the leaves and the moth makes its escape through one end. They are nocturnal in habit, and are seldom seen.

The male and female differ very much in appearance. "The same design is manifest in both sexes, but the general color of the male is a deep, rich, smoky or amber-brown; while that of the female is of a lighter rust or reddish brown. Both have a pale wavy line across the middle, and a clay-colored border along the hind edges of the wings. Both also have an eye-like black spot, with a pale-blush crescent inside, near the tip of front wings, but the female has a pale angular spot, shaded outside with black, near the middle of each wing, which is only occasionally faintly indicated on the underside in the male. The Antennae of the male are about twice as broad as those of the female."

The eggs are laid on the limbs of the tree, about the first of July, in clusters of five or six. The larvae subsist upon the leaves of the Sassafras, changing to the chrysalis in the autumn. They can be gathered from the tree any time during the winter or early spring.

The Promethea cocoon often contain other small silken cocoons from which issue small parasites, they having subsisted on the substance found on the inside of the chrysalis.

The Sassafras is not the only food which they live upon. The cocoons are found suspended from the branches of the Wild Cherry, Ash, Poplar, and a few others, but not as frequently as from the Sassafras limbs.

The Pines.

The pine and fir tree are seldom disturbed to any extent by leaf-eating caterpillars—the resinous odor of the tree proving offensive to many of them—does not prevent
many kinds of borers from burrowing into and destroying their trunks. The larvae of several Capricorn beetles, live entirely in the pine and fir trees, or in timber of these kinds of wood. They undermine the bark in various directions, and even enter the more solid portions of the trunk, having little regularity in its course. Their burrows are wide, and as they advance they fill up the hole with a saw-dust like filling. In the eastern states they do immense damage.

Harris says the Callidium bajulus Linnaeus, one of the most common kinds of Callidium found in Massachusetts, is a flatish, rusty-black beetle, with some downy whitish spots across the middle of the wing-covers. It measures from four-tenths to three-quarters of an inch in length.

The Callidium violaceum, Harris, are found just under the bark. When they are about to transform, they bore into the solid wood to the depth of several inches.

*Hylurgus terebrans.* Olivier.

*(Coleoptera. Scolytidæ.)*

The outside appearance of the bark of a pine tree shows no indication of workers on the inside to the casual observer. If, however, during the month of May, we watch closely, small beetles will be seen emerging from the trunk, through small round holes. Upon raising a part of the bark—which is loosened—we shall find the underside pierced by these insects. The grubs, or larvae, hatched from the eggs deposited in spring, come to maturity in the autumn, and boring into the bark remain until spring, when they emerge as the perfect insect. They are very small, but when occurring in great numbers, they interrupt the descent of the sap, and prevent the formation of new wood. The tree, after a time, languishes and dies. With this insect has been found another more slender, of a dark-brown color, and clothed with a few short, yellow hairs. "The larvae eat zigzag and wavy passages parallel
to each other, between the bark and the wood." The name given it is the *Tomicus exesus*. Say.

*Curculio Pales. Herbst.*

*(Coleoptera Curculionidae.)*

The larva of this beetle is found under the bark of the pine, sometimes doing much damage. Even the mature insects prove destructive by puncturing the buds and tender bark of the small branches, feeding upon the juice; the young shoots break off or die at the wounded part, so great is the injury. It is only when the larva is found in great numbers under the bark that the tree receives a permanent injury. Woodpeckers prove of great assistance in destroying them. Wilson, the ornithologist, describes this insect when speaking of the ivory-billed woodpecker, and urges the protection of the bird.

The *Buprestes Virginica*, Drury, is the largest beetle we have treated of infesting the pine trees. It measures from eight-tenths of an inch to one inch or more in length. The larva bores into the trunk of the trees, oftentimes proving very injurious.

According to Packard, the larva of the Pine saw-fly, *Lophyrus abietis*, Harris, are found upon the fir and pitch pine. They are social in habit, and may be found in considerable numbers on a single needle of the pitch-pine. The larva spin tough cocoons among the leaves, and the flies appear in the spring. The larva can be easily destroyed by showering them with a solution of carbolic acid or whale oil soap. The eggs are laid singly in the side of a needle of the pine; though sometimes an egg is inserted on each side of the leaf.

Mr. Riley has described the habits of the white pine saw-fly, *Lophyrus abbotii* Leach. The flies appear in June, and there is but a single brood of larva, which remain on the tree, in Illinois, until November, and hibernate before changing to pupae.
By reviewing the preceding pages, we shall find that a preventive used for one kind of insect, will serve to keep others in subjection.

A little time and attention given to the insects infesting the shade trees will increase the vigor and healthfulness, and more than repay the owner by the beauty and symmetry of the tree. It is not a pleasant sight to find scattered under the oak trees, branches cut off by the Oak-pruner, or whole limbs of trees defoliated by caterpillars. The bark-lice found on the Maple trees in the center of our city, prove the effect of neglect, and if this insect is allowed to increase undisturbed, the trees will be seriously injured unless nature comes to the rescue in the form of parasites. The most efficient workers we have, are the birds. There is a law existing against discharging fire-arms within the city limits, and if this law was enforced, the effect upon the insects would soon be apparent.

Mr. John Griswold, on Moss street, has, without doubt, the best collection of trees in the city. The scarcity of insects on his grounds has often caused surprise. The reason is, however, he makes every effort to protect the birds, by prohibiting guns from being fired anywhere about the premises. Many kinds build their nests in the trees, feeding their young the caterpillars from the tree. While riding over the arsenal at Rock Island, last fall, the webs made by the three kinds of insects previously described, were rarely found, although many were seen from the cars before reaching Rock Island. Upon inquiry, I found that the birds were protected, and for several years have not been disturbed or frightened away.

Woodpeckers, with their long bills, penetrate the trunks of trees and search out the retreats of the many borers. The number of worms necessary daily for the maintainance of a young brood of birds and their parents, is greater than the casual observer would imagine, and if the birds were protected they would add much to the beauty of our city by their presence and labor.
A gentleman of this city said, that the thieving habits of the birds had lessened his admiration of them. I suspect that much of our want of appreciation of the birds making their homes among our garden fruit trees and shrubbery, comes from our inveterate selfishness. They guard our choicest fruits from spring till autumn, destroying millions of insects that otherwise would puncture and deposit eggs in the grape, cherry, and other kinds. It looks to me very much like ingratitude to begrudge them a grape or cherry in their season, and especially so, since they prefer those that have worms in them, and even if they take those which are sound, who could blame them for desiring a small share of the delicious nectar.

There are but few birds, if any, that feed upon the curculio, the pest of the plum, and hence, the scarcity of the fruit in our markets.

If the birds should entirely leave us it is a question if any fruits could ripen in all the land. It is impious to talk against the birds, and sacrilege to wantonly destroy their innocent lives.

Children, instead of robbing their nests and throwing stones at them, should be taught to regard them as special messengers from heaven to protect our garden fruits and enliven our homes with their vocal music. It is certainly kind in Mr. G. to prohibit guns from being fired in his beautiful park, and especially so in supplying pools of clear fresh water for their drink and morning ablutions, which they enjoy without fear of annoyance. His groves are full of their warblings, and much tamer than in other localities. He is abundantly rewarded for his kindness. There is no other grove of trees and shrubbery in this vicinity that is kept so fresh and delightful, and Mr. G. fully appreciates the services of the birds.