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DAVEY'S PRIMER

== ON ==

TREES AND BIRDS

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My faithful friend—the Camera.

J. Dancy.

DAVEY'S PRIMER ON TREES AND BIRDS

BY
JOHN DAVEY,
Author of "The Tree Doctor," etc., etc.

ILLUSTRATED

With numerous photographs by the Author, also with cuts and

DESCRIPTIONS OF BIRDS
furnished by the Agricultural Department of the United
States Government.

PUBLISHED BY
THE AUTHOR.

1905

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PREFACE.

THE four years in which the "Tree Doctor" has been before the public, and my stereopticon lecture on diseased trees, during that period, have developed the grave fact that not more than *one per cent* of the people manifest any concern about this matter *which is of such vital importance*.

How to reach and arouse the public, has been one of the deepest considerations. The Granges, and most highly educated—as well as the wealthy—people of the cities have all expressed themselves, where the matter has been laid before them, to "*teach the child*."

With the curriculum of the schools already overcrowded, the question at once presents itself, *how* is such a work to be introduced into the school room? There was but one possible way, as pointed out by teachers, namely: "make it strictly a *Recreative Reader*." The point is, in *some* way to reach, interest and instruct the child. With this in view, all attempts at anything like a literary production has been laid aside, and a style adopted which will not fail to create a reverence for tree life both with the child and the adult.

In order that there may not be any grave departures from our common law of language, Prof. John R. Smith, a prominent educator of Akron, O., has twice reviewed this work, and for the wise suggestions made by that gentleman the author expresses the most sincere thanks.

Whether School Boards will be sufficiently interested to invest in this work and thus bring about a remedy of our "tree troubles," by *educating the child*, remains to be seen.

There are thousands who, with the author, will breathe a silent prayer that health may be restored and maintained among the occupants of the orchard, lawn, park and forest, so that there may "*Ring from all the trees sweet freedom's song*."

THE AUTHOR.

(v)

THE BIBLE

*opens with TREES — of the gar-
den of Eden, and closes with
THE TREES
of the New Jerusalem.*

Davey's Primer on Trees and Birds.

DEDICATED

TO THE CHILDREN OF THE UNITED STATES OF AMERICA,
OF CANADA, AND OF THE WHOLE WORLD.

THE INDUSTRY OF THE GREAT FUTURE MUST BE
REFORESTRATION.

CHILDREN :

Allow me to give you an introduction to Miss Helen Christensen; but be careful not to disturb her, for she is listening to a sermon from a blade of grass.

“Does the grass preach?”

Oh, yes! Susie; a blade of grass is more eloquent than the greatest orator that ever lived. You have seen cities with their handsome buildings, and most of you have seen street cars and ocean steamers and railroad locomotives and hundreds of fine and beautiful things, made by the hand of man; but all the men and women in the world cannot make one blade of grass! Men dispute over their various “beliefs” about religion, and some affirm “There is no God”; but the little blade of grass is a silent witness to the fact that *there is creative power*. When you see a house you *know* there was a builder; when you see a watch you *know* there was a watchmaker; so, when you see a blade of grass growing, you *see* this creative power in operation!

The blade of grass also prays; it calls upon you to help the Creator to make better grass, better flowers, better shrubs and trees. Trees and plants are LIVING CREATURES, just as much as we are, only of a different order, and must have food and drink. On account of neglect they often die in youth instead of living to a good old age. There are things that we can do that will make the trees and plants more healthful

and more beautiful and more fruitful. In this book you will learn what these duties are.

(Photograph by Christensen.)

Hello! look at little Ruth. See how she is delighted with that pile of nice ripe apples!

Well, well, what child is there that is not animated by such a sight! Of course every boy and girl likes the apple and almost every other kind of fruit. I knew a family, a few years ago, who put forty-five bushels of apples in the cellar in the fall of the year and, by March, they had all "marched" somewhere (down "Red Lane," I presume), and there was not the least sickness in that family for those four months. If we ate more fruit and vegetables there would not be half of the doctor's bills; and, with good health, how joyous life would be! It is our custom to eat the flesh of other animals (I confess I do it myself), but I am fully satisfied that the fruit and vegetable diet is more productive of good health; besides, it gives a better disposition. The animals that feed on vegetation are gentler than those that live on flesh. Think of the difference between the sheep and the dog, the deer and the panther, or the hawk and the dove! While I am not suggesting that we should abstain entirely from using the flesh of animals, yet I think that we all will agree that we should use more fruit. Decaying fruits, such as we so often see on the market, are not wholesome, and it is one of the purposes of this book to help our boys and girls to raise their own supply. Hundreds of thousands of American children who now have to use bad fruit, or, perhaps, go without will, in a few years, have the unspeakable pleasure of seeing their tables laden with their own products.

This book will tell you how to grow good, healthy

trees, and you must remember that, if your tree is unhealthy, the fruit will be imperfect and, perhaps, unwholesome. When you go to the store or market house and see scabby and gnarly fruit, you may make up your mind that there is some trouble with the trees from which it came. The story of creation tells us that the Lord put man in the garden of Eden "to dress it and to keep it." Men have destroyed nearly all of the beautiful forests of America, and you children must learn how to get new and healthy trees.

CHILDREN :

I now have the pleasure of introducing to you two pairs of twins, Frank, Francis, Carl, and Carletta. They are the children of a wise woman; she makes but few cakes and pies, but invests in wholesome fruits, and as a reward, there is but little sickness in the family.

You may not have yet learned it, children, but it is true that nice, ripe apples, pears, or other ripe fruit, lessen the appetite for strong drink, even where the habit has been formed for it. You must not forget that in these days, much of the water in cities is quite impure. Father might have spent a day at hard mental work in the office, and the water was not good; he feels sick at his stomach, and, as he is going home, he steps into a saloon and buys a glass of beer. The alcohol revives him, and he honestly thinks it has given him strength! this opens the gate, and he takes a little more each day until, finally, the "habit" is formed and father loses his job, and is known as a "drunkard!" The same sad downfall happens to men who work in the shops, and in the sewers and, indeed, almost everywhere. Now, children, suppose your fathers had some fine, large apples, such as the little folks in the photograph have, or other ripe fruits, these would have allayed the thirst, and father would not drink the bad water, but would come home full of health and joy, and help you take care of the flower beds, train the vines, and care for the trees. Then the place where you reside would be "Home, sweet home." Study carefully

all the pages that follow and you will learn how to co-operate with the Creator and grow your own fruits and not have to go to the store and purchase decaying, unwholesome articles, or do without.

What is more charming than the red-cheeked apples on the tree in the morning sunlight? or the pear tree, laden with the rich golden fruit? How delicious the plums when plucked fresh from the tree! and oh! what a charm to look at the purple clusters of grapes! Now, children, carry these thoughts with you, namely: *the tree and the vine are alive as much as you are, and if they have poor health they give defective fruit.*

Come boss! Come boss!

Gracious! children, don't you think this is a fine herd of cows? After having filled themselves with nice, fresh grass, these "bossies" take great pleasure under the shade of these beautiful maple trees. This is a grove of what is known as the "Rock" or "Sugar Maple." Farmers bore holes into this kind of maple trees, along in February or March, and the sap runs out, is caught in pails, and then boiled down into syrup and sugar. Ohio, and several other states, used to have large numbers of these majestic beauties; and they also had walnut, oak, ash, wild cherry, and many other valuable kinds of trees. People needed farms, and some of the forests had to be cut down, but they used very poor judgment.

What do you think they did? Why, they cut down some of the finest trees and called their neighbors to help them roll those splendid logs together, and set fire to them and burned them up! Millions of dollars worth of the best kinds of lumber were in this way destroyed, and that is not the worst that has happened; on account of destroying the forests the surface of the earth is laid bare, and dries up and when it does rain, the water rushes into the rivers and creates great and destructive floods.

At Marietta, Ohio, I was shown a place where, last fall, a traction engine went through the river without putting out the fire. Shortly after, the water was forty-six feet deep at the same place! As you children grow into manhood and womanhood you must study how to plant new forests on land that is now going to

waste, and in this way preserve the water in the ground and keep our climate more even. But before you can expect success in planting and growing forests you must learn something about the real life of trees. When you have read this book carefully and studied all the photographs you will be surprised to see how the trees are suffering all around you. But, oh! what a delightful study you will have, and the trees will sing for joy as you come forth by the millions to their relief!

Well, children, I now present to you another of God's creatures, a veritable LIVING CREATURE; people say, "Yes, we know the tree is alive," but they treat it as if it were a "stick of timber." The oak in this photograph is really "alive," just as much as you are. It has a body, arms and legs. Boys, you smile at this statement. You have legs, and you make them carry your body into the house when it storms. This oak has legs, and they faithfully hold the body and upper portions of the tree to the ground, standing there day and night, through the heat of the summer, to give you cooling shade, and, more faithful than any watch-dog, during the bleak, cold winters, they break the fury of the storms, awaiting spring and welcoming the birds with their inspiring songs. Did you ever think how few birds we would have if we had no trees? The large side roots of the tree are its legs, and the main branches its arms. Look at it! what a picture of health. You have arms with elbows, wrists, joints and fingers. Did you ever hear of what the wonderful arms of the tree do for you? Does any of you know? You have not thought of this; let me tell you. Many of these huge arms weigh hundreds of pounds, some of them thousands; they hold up a great number of smaller branches, and twigs (the fingers) on which are borne leaves, those wonderful organs without which we could not live!

If you study your arm you will learn that it has in it large tubes called veins, and that your very *life, the blood*, is constantly passing and repassing through these

little tubes. Your arm is strong and through it you move your hand and fingers. Now, the tree is a little differently formed; it has little cells, and the sap comes from the roots through these, and finally reaches the leaf, where a change takes place, and forms what you may call *tree blood*, if you please. These great arms, the main branches, hold up all this great weight while the leaves are making this new life element, and they hold up the fruit to the fresh air and sunlight to be ripened for your use. Do you not think, then, that it is wicked to destroy the powerful arms of these beautiful creatures?

Oh, my! children, what do you think of that for an "arm?" You can get some idea of the size of this main arm from the height of the man (who is nearly six feet tall), standing under the tree. It is all of four feet through this branch, close to the trunk of the tree. I am told that the good Horace Greeley, when on one of his trips west, was so charmed with this beautiful maple, that he alighted from the stage coach, measured the tree and "wrote it up," and published it in the *New York Tribune*. This tree is situated on the "Ridge Road," near Unionville, some fifteen miles east of Painsville, O.

Now, children, close attention! please; for you must not miss a single word of what I have to say. In the other photograph you see the lady's finger pointing to the base of a small branch. The one on the big maple was once no larger than that to which the finger points, and before that it was nothing but a little, tender bud. One thing more you must fix in your minds, namely: **THAT BUD** sprang from the pith or heart of the parent stock, and always remains connected with it. Keeping this fact in mind will help you to understand what has caused the death of millions of beautiful trees!

You do not find "*sick trees*" in the native forests, unless something happens to injure them, like the falling of another tree, or a stroke of lightning or similar causes. We would naturally expect that they would improve when they come under care of man, but it is not so.

Now for the work of the "tree butcher." Pupils you have legs, feet, toes, arms, hands, fingers, nose, and ears. None of us are so presuming as to say that the Creator made a mistake and supplied too many members; possibly if we had two more pairs of hands and arms we could use them, at times. The same power that created us made the trees, and do we think for a moment that we could improve on the plan? Then why do we mar the beauty of the trees?

This lovely oak was ruined by telephone men. They have cut through and spoiled hundreds of thousands of trees in this country. I saw where the "feed wires" of an electric car company had been notched out, so that they could "see-saw" into a main branch of a large maple tree, and (when I saw it), they had nearly burnt it off.

There are members of those companies who have trees, and would not purposely have such destructive work done, but there are all kinds of men employed to do the work, and many of these know or care but little or nothing how the work is performed. We want, therefore, every child in this country to learn the proper way to take off branches, and then to be on the lookout for tree vandals and report them at once to the proper authorities. They are now putting telephone wires under ground, in the cities, and the proper thing to do, in the country, would be to build the lines out in the open fields, away from the trees. If the companies

had to pay more for the "right of way," lower poles could be used, and there would be no contact with trees to "ground the current." The expense to the companies would be less in the end. We need the service of the telephone and telegraph lines, and the "people" and the "companies" should study to get the best results with the least damage. When people have learned the real value of trees they will see that they are protected.

Here we are again, in the company of the "tree butcher."

"Who are the 'tree butchers?'"

That's right, George, ask questions; for that often brings out the information which, otherwise, might be missed.

The professional "tree butchers" are a class of men in the towns and cities who make a business of going around "trimming trees," just as if you had a lot of doctors tramping around, cutting off people's arms, noses and ears. Suppose we had such a class of doctors, and that they never dressed the wounds after hacking off the members; wouldn't you call the police and have them arrested? "Yes!" Why certainly you would. Well that's what the American people are going to do with the "tree butchers." The reason they do not arrest and imprison them now, is because they are not aware that the "Butchers" are committing such terrible slaughter; but we want every boy and girl to tell father and mother all about the wicked work that is being done in killing millions of beautiful trees. Just think of the number that are thus destroyed! MILLIONS of them! It is not only the professional "tree butchers" who have done the mischief, but your fathers, many of them, honestly thinking that the "tree man" understood his business, have done the work in the same way and brought about the same trouble—the death of the tree! Look at the "stub" on this maple, and those on the oak in the former lesson.

As you ride through the rural districts keep your eyes open and see what the farmers are doing. Orchards are hacked to pieces by the owners. This is sad, indeed, as it results in decayed trees and unsound fruit. The intelligent portion of the farmers, however, are joining the Granges and other societies, and it is hoped that the average farmer will soon understand tree life, and treat them in a way to preserve their health; then they will be a source of wealth.

To what was the lady's finger pointing on page No. 19, Mary?

"To a little branch growing out of a large branch."
Correct.

What did the little branch come from, Henry?

"From a bud."

Right, my boy. Now, tell us what was said about the bud, Marguerite.

"Why, it came from the center or pith of the parent stalk or branch, and always remains connected with it."

Good memory! little girl. Now, let none of you "forget to remember," as the boy said.

We are now ready to see what takes place when the branches are cut off and the wounds not cared for. Look at these two photographs; and, children, bear in mind that the camera never lies.

What horrible sights! Suppose some one had chopped off your arm and left it undressed and exposed, and that gangrene had set in, how painful the wound and how loathsome to look upon! Who could describe the sufferings? Have trees no sufferings? Oh! yes, yes, children; everything that has life has some kind of feeling; and, consequently, suffering—when they are injured. The trees are among our best friends, and I am confident that the children will help to remove the causes of their diseases, and see, hereafter, that they are not subjected to such shameful abuse and consequent sufferings.

Because we cannot understand *how* a tree suffers, it is no proof that it does not suffer. We suffer in *mind* and also in *body*.

Do you know how the inside of a tree is constructed, children?

Perhaps not, I will therefore tell you.

It is built of little cells, attached one to the other. Through these the sap, gathered by the faithful roots, of which we shall say more, passes from one to the other, even out to the farthestmost twig. These cells are wonderfully arranged. In some respects they resemble the "mains" of a water works system. The sap flows onward, upward in a certain system of cells, and turns off on this main street (branch), while that in the other goes out into another street (branch), etc. Now, suppose you cut off a branch and leave a "stub," as you see on page 23; death sets in on the remaining "stub," and though nature tries to heal, she is unable to do it while this obstacle—the stub—is in the way. After some years the stub rots off, but the decay has followed down, down, down! and a damage has been done that may shorten the life of the tree two-thirds, or more.

Did you ever try to count a million? Well, what will you think when I tell you that in Ohio alone there are millions of these wounds, opening inroads of decay and destruction on our friends, the trees! and the same is true in other states. If the branch is properly removed, and a nice, clean cut made, close to the trunk or branch from which it comes, it will heal, as you see in this photograph.

A branch of any size may be taken off, but it is

always best to cut large ones off in sections, and the last part may be fastened with a rope so as not to allow it to split down the bark as it drops. It is *so easy* to make mistakes and do mischief that it will take nature years to heal. It will pay you to take time and do your work with care; for always, "prevention is better than cure."

Nature is very patient and powerful. See how nicely she plodded away and healed the large wound presented in the previous lesson. Who, not acquainted with trees, would suspect anything amiss? Here, however, is a revelation! Look at the same specimen reversed. In this case there was no "stub" in the way to prevent the granulation from closing over the wounded spot, but the fungii (rot) takes hold of those exposed cells, and the deadly work goes on! on! on! into the heart, following down in the cells, as before pointed out. In this same case, it closed over this foul mass of decay, and the sap in its upward flow, takes up this virus, and if it were in an animal instead of a tree you would have a case of "blood poisoning."

The expert tree surgeon will glance at the top of one of these trees and pass upon it as having "sap poisoning." It is a misfortune that cannot be expressed in words that so many trees that are supposed to have been rightly treated are thus undergoing a slow process of destruction, all because people have not, in reality, recognized that the tree is a LIVING CREATURE, and, therefore, subject to all the general laws that govern the animal kingdom.

There are but few people who have any idea of the evil effects of allowing disease to enter the system of the tree in this way. The twigs drop off, and the whole top will look sickly; but this, however, may arise from other causes. Be wise, therefore, and avoid

all trouble by assisting Nature in her noble efforts of preserving her humble creatures, the trees and plants. I say "trees and plants," because the smaller plants are governed by the same general laws. There is no sickness that "happens" to them. There is a *cause* for every condition in which you find them. Strive, then, to *prevent* all causes of disease.

In trees, as well as among animals, Nature has a power in healing that looks like intelligence. Something happens to your arm and it must be amputated. The veins and arteries begin to flow, but the surgeon binds them up and carefully shuts out all foreign matter. Slowly, but surely and effectually, Nature does her part, and rebuilds and reunites all the venous and arterial system, and you go on and live out the balance of your days, though you are deprived of a hand, or foot. It is the same with a tree; you can take off any branch, or number of branches, if the work is skillfully done, and it will make perfect work of healing. If the branch be large, cut it off a foot or so from the trunk and let it drop to prevent "splitting down," then make a clean cut back to the "shoulder," and the healing will commence at once, as you see in this photograph. Any kind of paint will do for dressing the wound, but it is well to make it near the color of the bark. Large wounds should be painted every season, for a few years; but be very careful not to get the paint on the new bark. If the tops of shade trees were properly formed, they would not need and should not have a lot of "pruning" on them; Nature does not give these beautiful branches to be ruthlessly thrown away. With fruit trees it is different; we prune them to produce "fruit spurs."

This photograph shows how the cuts were made at the proper place, and the wounds have been carefully painted. See how finely they are healing!

What we call the "shoulder" is a prominent ridge or ring around the base of the branch. This is the place where the final cut must be made. All that the paint is for is to preserve the wood from decay. Of late years there is a class of people who have come forward, and making great claims of "liquids," which applied on trees "give them health." Keep your trees clean, but keep all *dopes* away from them.

Do you see anything wrong with the tree in this photograph?

“It looks ‘forked.’”

Well said, Claude; you must have been studying on our tree troubles. There is, however, another grave objection to this tree. It is situated on Clifton Boulevard, Cleveland, O., which is a lovely street, with a spacious drive in the center, and a street car track on either side, and a row of young trees. If these trees were of such a character that they could be properly trained, some time in the future this would have been the grandest of street scenes. Imagine miles of the most excellent drive overarched with lovely trees, hanging gracefully away beyond the trolley cars on the opposite sides! But here is a gnarly, scrawny little elm with four main branches, and the “Leader” destroyed! There are hundreds of trees in the two rows on this beautiful street no better than this one. Do you wonder that the thinking, educated and business-people of our “Go-a-head” Cleveland are waking up and feeling indignant at this unwise tree planting? All over the country similar blunders have been made. But don’t become discouraged, children; for, from Maine to California, a great movement is arising, and as soon as you children learn what to do, AND DO IT, we will have the remedy.

Street planting in almost every town or city has been done without any particular system. Usually, the planting is “let” by contract, and the planters

seem to put out anything. This is a great wrong, for if the street trees prove to be defective it is a great loss to the value of the property. The planting on the streets should be done with the greatest care, and the very best of trees should be used. There are but few objects more attractive than a fine street beautifully arched with healthy oaks, elms, or other suitable trees.

How do you like the looks of this young tree for street planting? On pages 21 and 23 you see what the telephone companies and other people have done. All that trouble might have been avoided. The photograph before you presents a tree whose top is formed about twelve feet from the ground. If the right kind of trees were selected for street planting, and tops were all formed at this height, or even higher, then all telephone and "feed wires" for the trolley cars could pass *under the branches* and the trees would not be cut to pieces nor have the wires come in contact with the tree and "ground the current." Tree planting has been done by "Tom, Dick and Harry," and they have produced the most evil results. The tree in this photograph is at Gates Mills, sixteen miles east of Cleveland, one of God's most beautiful spots, where the good people of Cleveland have bought a large tract of land and are preserving the natural scenery. They have laid out beautiful boulevards and they ordered three thousand trees, many of which were used to line the new streets. The trees, I am told, came in good order, and they hired a man and paid him \$3.00 a day to set them, and what do you think he did? Took the hatchet and chopped off their tops! compelling them to force out branches low down, some of them not over six feet from the ground! The one presented here was, I suppose, accidentally missed! In a few years, these low-formed branches will push out and interfere with the carriages on the drive, and pedestrians on the sidewalk.

There is but one thing to do in such a case, that is, to remove the branches. This error in forming the top too low is what has led to "butchering" so many hundreds of thousands of what otherwise would have been beautiful street trees.

A great many nurseries "head back" their young trees. This should not be done. The "Leader" should be left on until it is sold. Then, if it is wanted for street planting, it is all right for that purpose. If used for lawn cut it as low as you desire to suit your taste.

Now, children, you have been receiving lessons on the necessity of forming the tops of some trees high up. Tell us on what trees this should be performed, James.

"On the trees that are planted along the streets and by the side of driveways."

Right, my boy, you are in advance of the "tree man" already.

You may tell why these trees should have the heads formed high, Sadie.

"So that carriages, loads of hay and other moving objects can pass under them."

Correct; any other reason?

"The telephone wires and the 'feed wires' of the trolley cars should pass UNDER the branches of the trees."

Well said, Joseph. If you retain in that way all you hear, by the time you are twenty you will have a position to plant trees on the streets of some large city. By the way, boys, there is going to be a demand for thousands of bright young men in the cities for this kind of work. America will yet have the grandest tree system in the world! All trees, however, should not have their heads formed high up.

How do you like the form of the one in this photograph?

We sometimes see private grounds where the trees have been planted too thick. As the trees became large people saw they had too much shade and could

procure no good sod on the lawns. They then went to work and cut off all the lower branches, so that as one looks among the trees they appear like a lot of telephone poles with a little foliage at the tops. This is a grave error. You are looking at a tree here nearly one hundred feet through its branches. From a landscape point of view this tree is worth a hundred crowded together with all the lower branches destroyed.

In the last lesson we had the photograph of a beautiful maple tree, growing in the midst of an open field, and you can form some idea of its size by the horse and buggy by its side. Here is another specimen of the American elm. I am not going to give you any scientific names.

Is not this a majestic, graceful beauty? It stands at Twin Lakes, two miles north of Kent, O. It is nearly a hundred feet through the branches. This perfect health and size, however, are not the result of "luck" or chance; it has been well fed.

"How do you feed trees?"

Good question, Don. Perhaps but very few boys and girls ever thought that trees must have a supply of food, just as much as horses, cattle, swine, or any other animals; but this is one of the most important things to fix in your minds. It is because people have not really THOUGHT on the subject that the trees in the cities and out in old pasture lots dry up and die. If a person has an animal and does not take care of it, the authorities take the creature and care for it and charge the cost up to the owner, or take it from him. It is right to thus protect our dumb friends. Children, the time will come in America when, if one does not properly care for his trees, it will be done for him, and the costs charged in with his taxes. They do it now for the trees on streets in some cities. It is a good plan, is it not?

The trees, you must remember, do not feed on

“solids.” Everything has to be dissolved. You see people applying bone meal and other fertilizers, but none of these are used by trees or plants until they have been dissolved in water. You can make these *stimulants* so strong that they may injure the plant. One of the best ways of keeping a tree growing well is to spread coarse gravel all over the ground, out as far as the drip of the branches, and then give it all the water it will take through July and August.

The question raised in the last talk as to "How are trees fed?" was not answered. Here is an imposing, lofty specimen of the sugar maple, of the "Bird's eye" type. If you look at the man by the tree you can form some idea of the size of the latter. This tree, also, is in good health because it receives a supply of food. Trees in the woods take care of themselves. For thousands of years some of the forests have been producing leaves, and every fall these leaves are thrown off, and if you scrape away the top layer you would find innumerable, healthy, fine, thread-like roots feeding on these decaying leaves. (Children, it is very unwise to burn up the leaves in the fall of the year; see what is said about it on page 104). But there is something else you must remember, which is this: as the trees are thick in the forests there is no grass growing there, and **THROUGH** the dead leaves which lie on the ground both the rain and the air pass, and no tree can thrive without both air and water.

Now, children, in the future, watch the old pasture lots, and you will see that nearly all the trees are sickly, and many of them dying. But in the open, cultivated fields, the trees are nearly all healthy (like this one). The reason is this: the farmer plows at a depth of about eight inches and, in doing this, turns under stubble, weeds and other vegetable matter, and on these the roots feed; and, besides this, in working the soil, the air and the water are admitted to the roots, keeping them healthy, and supplying food. If you will watch,

as you are riding on cars, you will observe that all the *cultivated* fields have healthy trees.

In the foregoing statement that the roots feed on "stubble, weeds and other vegetable matter," you must not forget that these must have a supply of moisture to hasten decay, in which condition they can be dissolved in water and be taken up as plant food. Now, children, don't forget this same lesson in gardening and in the care of your flower beds. *Always* keep the surface of the soil loose, then the water can enter and the air penetrate.

“What kind of trees should we plant?”

A good question, Lillie, and shows that girls are as much interested in the matter as boys.

For shade trees, generally, it is well to take what we commonly call native trees; those that grow well naturally in your own climate; these, if properly cared for, will do well when transplanted. For example, in Cleveland, O., the sycamore, tulip tree, linden, elms, maples, oaks, all—when they have the proper care—do well.

On very high altitudes, such as the hills of New England, the white pine, birch, hemlock and spruce do well. Observation is the best guide in this matter.

There are many trees brought from nurseries that are not desirable. The one in this photograph, however, should have a thousand planted in lawns where but one is sold. It is a Camperdown Elm. I never saw one over twenty-five feet high, but it is quite hardy, and its gracefulness is unexcelled.

One common mistake is to plant too many trees. In one city I saw seventeen cut-leaved birches planted in a space less than that which I have seen one good specimen completely cover! As a rule it is not wise to purchase of “tree agents.” You may find an honest man among them, but I have seen others who seem to have an unlimited capacity for lying. Get a catalog and send direct to the nurseries, and they will send you trees true to name, and give you information that you may rely on.

The "tree agent," generally speaking, has but two objects: First; to sell a person all the "stock" he can get him to purchase. Second; to get the money for this dishonest work. It is *dishonest* to force the sale of unnecessary trees, because it is a damage to the property to have them where they are not needed. The nurseries all print catalogs; (we prefer printing this word as it is pronounced) order your stock direct; in this way you will not be apt to find your "Northern Spy" to be a wild seedling.

Children: As you grow up and procure homes you certainly will endeavor to secure trees. To get the best results you must not only avoid too thick planting, but also stiffness. This photograph shows you a glimpse of the grounds at the Agricultural College, Amherst, Mass., where many young men are being trained for forestry work, landscaping, and such healthful and desirable occupations. One thing, particularly, I wish you to notice. Suggest one thing that strikes you.

"The branches of the evergreen are down on the ground."

That's good, Martha; the very thing we desire all to observe.

Now, who will suggest some good to the tree that comes from this?

"Like the trees in the forest,—keep the grass down."

Good for Norma! That's just the lesson.

The branches if let alone take care of the roots. These low-hanging branches not only smother the grass and other vegetation, but shade the roots and keep them cool, and when it does rain the water enters the ground and the tree gets the full benefit. If you were to plant an oak or an elm or, in fact, almost any tree, and keep the horses and cattle and "tree butchers" from it, the lower branches would lie almost flat on the ground. Boys, how would that be for climbing! The reason that the trees in the forests have such clean, long trunks

is because they are so close together and the small, side branches die for the want of light and air.

The care of the roots is the great lesson that the American people must learn. This is the one lesson that we reiterate, namely; the beautiful part that we admire, *i. e.*, the *top*, is only secondary. You cannot get a good top on a tree unless the root is healthy, and no root can be healthful if it is covered with a heavy sod or weeds, which shut off both air and water.

What variety Nature bestows upon us! Look at the beautiful *weeping willow*, only five years old! What a cosy place for a man to select on a hot day, where he can recline and read or repose. The gentleman that you see, there is not a *lazy man*, but his delight is to get up in the morning to hear the songs of birds, slips on a colored shirt, overalls and old shoes and works like a beaver, and sweats like a hay-pitcher, and his flower beds and trees seem to sing for joy. This is Mr. S. W. Black, Shields, Pa. If you ever go that way call and see his little paradise.

One of the most valuable lessons is taught by Mr. Black's *morning cultivation*. It is better to cultivate crops any time of the day rather than let the ground become *crusted*, or the weeds grow, but in *deep stirring* of the soil, in midday, the *hot* particles of soil drop down, and may have a tendency to dry the roots; but when the cultivator, hoe or rake is put to work in the *early* part of the day you *preserve* the moisture—an important thing to be aimed at.

There is not a greater lesson needed to be taught than this, namely; *there is no "luck" in plant or tree growing*. Every plant struggles to do its utmost. The docks, dandelions, ragweeds and all are struggling for their own preservation. It is for *you*, children, to say which shall occupy the soil, the thistle or rose, the sorrel or aster, "stick-tights" or balsams, poison ivy

or hop vines. Think of your high calling! and be ye *co-workers with God* to make this world what it *could* be and *should* be.

"Pshaw!"

What's the matter, Mike? Don't you like the looks of these trees?

"No, I don't; Dad says that everything is pretty over in his country, the Emerald Isle, even the girls; and the trees are always green; nothing pretty about them trees!"

Well, Mike, we'll not disagree with you; for we all admire a handsome tree top. This picture was taken on the 4th day of July (nothing to "celebrate" over, was it?), and thousands of trees could have been found in the same city no better than these, some worse; let us see if we can discover the trouble.

How many of you have seen a steam engine? All hands up! Well, how many of you were ever inside of a steam boiler? None; there are times when we would not want to be there, for there is a terrific power inside that iron cylinder! It is not necessary to go into the boiler to know that the force is there, for we have what we call a steam gauge, and this instrument tells us how matters are within. It is much so with a tree; for the top that we so much admire is the tell-tale, informing us whether the other parts are all right. The foliage always indicates the good or the bad condition of the roots. These tree tops are telling you there is trouble within or below; they have out "danger signals"; it is very unfortunate that most people do not know what these signals stand for. We desire that all children shall see and understand them.

Further on in this book we shall teach you something about *tree surgery*. We cannot *restore life* to any part of a tree that is dead, but we can amputate the dead portions and rebuild a new top. It was possible at the time this picture was taken to have saved the life of the main portion of these trees. The tops of these fine elms have actually *died of thirst*. How cruel to permit such a thing! The owners had no means of knowing what was the trouble, and the "lawn men" were entirely ignorant of the cause.

Here is a sick oak. To understand a tree you must bear in mind that its life is real, as real as yours; and you must know this fact also, namely: IT IS NATURAL TO BE WELL. When you children are in good health, it is what we call a "normal condition"; your cheeks will be ruddy, the eye animated and the step elastic. When your cheeks become pale and sunken, your shoulders "round," and you lack cheerfulness, your parents are alarmed. If your horse becomes sick, droops his head and refuses to eat, you become uneasy and send for the veterinary surgeon; but millions of trees are sick, and but very few people seem to suspect that there is anything wrong. In this photograph the leaves are not only dead, but the twigs and small branches also. There are several causes leading to this trouble, but here, also, it was want of water.

Children: there is no one cause in our whole country that has produced the death of so many trees as the lack of sufficient water. It is one of the greatest problems that America has to deal with. Without sufficient water we cannot have healthy trees. What would you think if your horse, or cow, or dog were allowed to die of thirst? On page 52 you will learn how much water a tree can use.

In loose, sandy soil, like they have in the central part of Cleveland, O., there is no way that a tree can get sufficient water when a thick sod is formed. In planting trees in such soil it would be wise to take less trees and use the money in preparing for the few. Dig

a hole, say eight feet in diameter and three feet deep, and put in about two wagon loads of good soil from the field or garden, plant a small tree, and put about four inches of coarse gravel on top, to keep out weeds and prevent sod from growing, and in a few years there would be a thrifty tree. It is a comparatively small elm, maple, oak, linden or sycamore that does not spread more than 50 feet; but in any city and on almost any small lot such a tree might be grown and be kept in a state of good health.

"That's a dandy!"

I should say so! Frank. Now, turn back to the last page and the one preceding. Great contrast, is there not? The former are dying of thirst; this has all the water it needs. How much water do you think there is in the leaves of this beautiful maple? Of course you have not yet had the chance of figuring this out, so I will tell you: There is almost forty gallons, or nearly a barrel and a quarter!

"How do we know this?"

That's a good question, Bertha. Our botanical professors have wonderful instruments for finding this out. At the Experiment Station at the University of Vermont (Burlington, Vt.), some very valuable experiments have been made. According to the basis of measurements for leaf area the tree in this photograph has leaves enough, if they were spread out and laid side by side, to cover more than half an acre of ground. The leaves will stand on the tree, fresh, all through a hot day. But cut off a twig, and see how soon the leaves droop! The speed with which it wilts shows you how fast the water escapes. Taking the figures that botanists give us I find that this maple takes up and throws off, through the leaves, some five hundred barrels of water, from the first of May to the first of December.

From such figures you may get some idea what effect there has been brought about by destroying the native forests. Think of a million large trees throwing 500,000,000 barrels of water into the atmosphere in one

season, and then think of how their roots plunge away down into the ground and let the water into the soil when it rains, and think how the tops shade the ground and keep it cool in summer, and how the vapors rising in the fall keep away the early autumn frost, and how the cool, sluggish condition of the soil — under the shade of the forest trees — keeps things backward in spring, so that they do not get nipped by frost, and then think of all the conditions having been changed! Do you wonder, then, that we have changed our climate, and that we are getting winter weather in summer, and *vice versa*?

Attention! children. Now, all of you raise your hands over your heads and feel around. Do you feel anything? "No!" Well, there is something there, and we could not live without it; it is called "oxygen."

The untold billions of leaves are engaged making this. Before vegetation existed animals could not live. Look at those marvelous veins! See how they branch, much like the veins in your hand. The largest are the midveins, from them branch off the veinlets and veinulets. The leaves on the trees stand through hot days and chilly nights, taking the water that the faithful little roots send up, spread it out to the rays of the glorious sun, and there in that mysterious laboratory—the leaf—the oxygen is manufactured, and sent forth on the wings of the wind. Have you not noticed what large-bodied men and women some of your grandparents are? Well, they lived in or near the woods, in early days, and their lungs were filled with this life-giving substance. Some of our city people are very small and weakly compared with these old frontiersmen and women.

The leaf does many other things; it manufactures starch and sugar, and stores them up in the wood of the tree. But one of the most valuable things it does is to gather up the carbonic acid gas that you breathe out—a deadly poison to you. The leaf greedily consumes this and makes it into wood. Surely then we are very foolish to destroy that which takes from us the poisons, and gives to us that substance without which we could not live—the oxygen.

Children, you should have reverence for the leaf.

This group is from the Epworth League, of Sewickley, Pa. The rear row represents the senior class. The girl to the left exhibits a beautiful magnolia leaf; the second, a pinnate leaf of the *Alianthus*—"Tree of Heaven." The middle girl holds the charming bipinnate leaf of the *Aralia*; the fourth, a lovely pinnate leaf of the sumach, and the one to the right a robust leaf of *Catalpa Speciosa*.

The front row represents the junior leaguers, and the trees speak through them in poetry from "The Tree Mission," by the author. Five trees speak, going from left to right, skipped the little boy—Stanley Diehl—who comes last, and calls for vengeance on the tree vandals:

"Thus spake the oak, as solemn sage,
 'A *thousand years* would be my age,
 If comprehended I could be
 And right conditions granted me.'
 The *weeping elm* dried up his tears,
 And banished all his crushing fears,
 And said: 'Three hundred years *I'll live*
 And constant praise to *Him* I'll give,
 If thou canst only stay the hand
 Of wicked men throughout the land.'
 The maple, clad in gorgeous tints,
 Began to drop some potent hints;
His bleeding sores and ghastly wounds
 Are seen wherever man abounds.
 The apple tree then loud did call,
 And showed *his* 'case' far worse than all;
 Ten billion wounds he represents,
 Caused by those men (?) who have no sense.
 Two hundred years *his life* would be,
 But's hack'd to death at fifty-three.
 The pear was *grave* and scarcely spoke,
 But finally the silence broke;
 Said he, '*I'd live three hundred years*,
 And all that time produce you pears,
 But how can I, or any chum,
 The apple, cherry, peach or plum,
 Whose roots are bruised and branches hacked,
 With bodies scarred and marred and cracked,
 Bring forth to you our wholesome fruits,
 When *thus* abused by heartless brutes?
 We call on those who love us trees
 T' sound the 'larm upon the breeze,
 And pray you hang 'tree butchers' all
 And forest vandals great and small.'"

Photographed by A. H. Diehl.

“What’s them men doing?”

You are violating the rules of grammar, Thomas.

Put that sentence on the board and analyze it at your leisure.

These men are digging a ditch, and the soil is all full of roots, even down to the rock, where the men are blasting. There are some very nice elm trees situated around this spot and they have pumped and pumped until they have drawn all the water out of the earth, and the leaves were all dropping. This is in Sandusky, O., and the property is owned by a great lover of trees, and he has had water supplied for the thirsty trees. Remember a former lesson, how that the leaves manufacture the oxygen for us. You see, it is a great misfortune for us to let these factories go to ruin.

We all admire the beautiful top of a tree, but how very few think anything about the roots! and yet these roots should have our deepest thoughts. How much water did we say was in the leaves of the Maple on page 53?

“About forty gallons.”

Good memory, Martin. And how is the water procured?

“Pumped up by the roots.”

Right, Sarah, this shows close observation of what is said.

But suppose the “pumps” at the water-works were out of order, what’s the consequence?

“No water in the stand-pipe.”

Correct, Clarence. Now, if a fire breaks out, everything is likely to burn up. That is what has happened to the trees on pages 49 and 51.

At the very ends of the little roots is where the valves, or pumps are. They are very easily injured.

There is no "luck" nor "chance" when machinery gets out of order. If there is anything wrong some one has been guilty of ignorance or neglect. It is just so with trees, and we want you to learn all about them, then you will know how to give them perfect health.

The roots and the leaves always work together; they co-operate. The roots are the first to move, sending up the water which has in it very small potions of plant food. It travels on, on, up, until it comes to the bud which, kissed by the sun, expands, and out here that wonderful something, by the scientists called "protoplasm," in a marvelous way constructs that beautiful network of veins in the leaf; at the same time, filling in the space with a pulpy substance, called "parenchyma"; thus the leaf is formed, and is never ungrateful for favors received. The leaf is a busy fellow, catching up the infinitely small particles of carbon, and forming what we call "cambium," that is, the new building material. This flows down, down, building as it goes until it reaches away out into the farthest points of the smallest rootlets; and here, in return, for faithful pumping, feeds those untiring little workers. Marvelous! is it not?

Ought it not to be made criminal to allow our friends, the trees, to die of thirst? Dead tops are not always produced on trees for the WANT of water; there are a few cases where the roots have too much, and the little rootlets drown; in deep fillings, they smother for the want of air. In dry, sandy, gravelly soil it is almost always *the want of water*. People do not understand this, and they sow grass seed all around the trees. The thick sod shuts out both air and water. You should cut a ring around the tree, say three feet from the tree, and then take out the soil about six

inches deep. Fill in this space with coarse gravel or siftings from sand, such as masons throw out. In this the weeds will not grow; it looks pretty, and through this you can give the tree all the water it needs.

The "feeders," *i. e.*, the little "hair roots," as they are called, are away out about under the drip of the branches, and I contend that any tree is entitled to all the soil that it occupies, but if one does not like to destroy that much sod, it will help greatly by giving the space suggested. See this photograph.

But very few people have any idea of what they are missing in not giving trees and plants all the water they need, *at the time* they require it. In our eastern, middle and northern states the lack of water is usually in July and August. In the south or in other climates it may be at other seasons. But it operates in this way, viz: there is but little water needed when the foliage is off the tree. Usually, when spring opens, there is enough moisture in the ground to start the tree. As the temperature rises daily, *more* water is needed, but, as a matter of fact, it receives *less*.

When lecturing at Burlington, Vt., last December, Prof. Jones of the University, said: "I agree with you, that the world has not yet demonstrated the *possibility* of tree life." While people are not aware of it, one-half or more of our trees are either killed or badly injured from *thirst*. This is *cruel*.

In June (or about seven weeks ago) the young Cyprus, in the photograph, showed but little sign of life; but its owner, Mr. Henry Irwin—whose sympathies beam on his face—as you see, had the arrangements made for supplying water, by putting in gravel (as described in former lesson). The result you can see even in the picture. The little tree is now singing, "Praise God from whom all blessings flow," and the good citizens of Shields, Pa., are astonished to see the apparent resurrection of what seemed to be a dead tree.

“How does the carbon get into the leaves?”

Good question, Jacob. As you advance in your studies and take up botany, you will, I think, become wonderfully interested. On the under part of the leaf are little openings, called stomata (stoma, singular). They are so small and close together that there are at times millions of them on a single leaf! Hard to believe, is it not? It is through these little holes that the water escapes, and in through them the air, carrying carbonic acid gas, assists in making material which, as was said, is called “cambium.”

“What course does this cambium take to build up the different parts of the tree?”

You would make a good botanist Clara; your inquiring mind would lead you to find out causes. Now, listen: the sap is gathered, or pumped up by the roots and sent up through the cells, *in the wood, proper*; and the nearer it is to the outside the more open the cells and the more freely it flows. After it has been to the leaf and undergone a change, then it returns down *outside* the last year's wood, between that and the bark and, as it travels, the protoplasm works, building cell upon cell and layer upon layer. This interesting work continues down and out into the roots, clear out to the tinniest little worker. As the tree grows the cells are built, as was before stated, much like the “mains” of a water-works system. Suppose some one should make the mistake of cutting off one of those large main

roots, as they often do in cities, in laying sidewalks, as you see has been done, in this picture.

The next photograph will show you what takes place. Of all the millions of little rootlets that are at work on a tree there is not one too many; Nature makes no mistake, root and top are evenly balanced. Often there is a splendid tree encroaching on a sidewalk, and instead of swinging the walk to one side and saving a valuable tree the officials of a town will cut off its main roots to get a straight line. What's the result?

"You have cut off the supply from the top."

Good conclusion, drawn from a self-evident fact, Bessie. Here is the photograph of the top of the same tree that you have in the last lesson. The dead branch that you see stood directly over the large root that was destroyed. About two weeks after these photos were taken a gale blew the tree over, and it was then seen that decay had followed death in all the parts where the sap was cut off. A similar occurrence is seen in the large trees that are transplanted where the main roots have been destroyed; a "dead center" often follows.

"Lots of trees have their roots cut off in laying sidewalks in the cities, do they not?"

Yes they do, Olive; and that is the reason why it is best, in narrow streets, to plant the shade trees inside the sidewalk on the lawn, and they should not be less than four feet from the sidewalk, nearer than that makes it possible for the large root to lift the walks. If the street is very wide, and there is a spacious lawn between the walk and the street, then the trees can be put midway between the two points.

In every city or town that is incorporated, trees that line the streets should be under city government just as much as the sidewalk. Then the trees would be all somewhat uniform, and would be well cared for, the streets would be more beautiful and property more valuable.

As it now is, every property owner plants where he pleases, or not at all. Some plant too thick, others

set out kinds entirely unfit for street shading, and, worst of all, the trees are generally set by "contract," the main roots cut off and a little hole dug about the size of a bushel basket, and a little earth thrown or kicked in and tramped down, and the plant left to live or die. Let all children begin to study the *place* for trees and *how* to plant them.

“Is that a ‘tree butcher?’”

No, Nettie; that is a noble young man with no bad habits. He is posing here to bring out a little more clearly what happens to a “crotched” tree.

“What is a ‘crotched’ tree?”

Well, Jessie, this is a term we use to indicate a weak point formed between the branches. It is a seam or crack which, as the branches become large, is made to open by the wind playing upon them, causing it to split. Nearly all the soft maples have this weakness. It can be prevented, to some extent, by cutting off these dangerous limbs and forcing out the “laterals.”

On one occasion a tree — some thirty feet high — was in such a weak and dangerous condition that we took off everything but the small twigs, carefully painting all the wounds; it then forced these twigs into a rapid growth and formed strong arms, making a handsome tree. But, boys, if you can get your parent's consent to do the work, be sure you make the cuts right. Remember, if the branch is large, cut it off, say two or three feet from the trunk; then you can manage the “stub” so that it will not split the bark down when you make the second cut — back to the “shoulder.” I expect to make thousands of young “tree doctors,” or practical foresters, by reading this book. Every time you have a chance examine the trees; see whether they have strong shoulders, or whether there is a seam and it is “forked.” If it is, cut it out while the tree is small.

This is one of the most fascinating things about the care of trees; they respond to your wishes. You can form the head high or low, cut off one side and have a "split cone," and, with some of the evergreens, make animals or birds out of them. But the point we want you to study, here, is the *types* of trees and their strength or weakness. There is no need, in the future, of being afflicted with the "crotched tree."

Here is one of the undesirable "soft maples." Look at it! It seems as if it were liable to go into a dozen pieces.

"What trees are the freest from 'crotchiness?'"

An excellent question, Sam. The "forked" or "crotched" tree troubles are traced more to variety than to kind, though some kinds are reasonably free from these faults. The white oak has nearly always strong, lateral arms, while the red oaks and scarlet oaks have a strong tendency to have these crotchty joints. The sycamore, or button ball, is usually strongly built. The liriodendron, or tulip tree, is generally well constructed, also the liquid amber. There is but little trouble with the Norway maples and the rock, or sugar maple. The beech, American white elm, hickories and black walnut, can be usually relied upon. The European lindens give but little trouble; but, even from all these mentioned, care should be taken to select the seed from the best types. The poplars and soft maples should be discarded entirely from street planting. The noble cut-leaved birch is a strong tree, but not suitable for the street.

There should be consistency in naming streets. If it is called "Elm Street" it should have elms; if "Maple," that's the kind that should be there. It seems ridiculous to call a street "Walnut," when, perhaps, there may not be a walnut tree within a mile.

Trees, like animals, breed after their own type. The grayhound has long legs and a long, slim, body;

the bulldog is the opposite in form. If you gather seed from a crotchky maple, like the one in this photograph, you might procure healthy young trees, but they would all have these same "forked" branches. See the difference in the structure of the tree on page 83. The study of the forms and the character of the different trees will keep your minds pure. The study of Nature is purifying to the mind.

“What’s he doing with the trowel?”

He is not a mason nor a plasterer, Polly; he is a “tree doctor.” He is pointing out what the “tree men” generally are ignorant of; that is to say, inside that tree, between the two points indicated, there is a large quantity of water which is rotting the tree.

“How did the water get there?”

Glad you asked that, Fanny. Every one should be on the lookout and avoid the cause of such a calamity. This is one of the “crotched” trees; it stands at the entrance of Wade Park on Euclid Ave., Cleveland, O. In this case you see the “fork” is where the “head” was originally formed, forcing out two branches, instead of having one—the “Leader.” One-half of the whole top is on each branch and, as the wind blows, a great force is brought to bear on either side, thus straining and splitting it open. But Nature is very persistent, and keeps on healing and repairing the damage. If you look at it closely you will see a ridge formed and a rent down the middle. So faithful is Nature that she keeps on healing, but this brings about another trouble, and catches and holds the water, which hastens decay. In one large maple, when holes were drilled, from ten to fifteen gallons of putrid water ran out! Tens of thousands of trees are thus rotting to pieces while they live, and their owners are not aware of it. Dreadful! is it not? Well, of course, you will now study the trees along the streets, in your lawn and everywhere, and tell your fathers and mothers all about these troubles.

Children, we must not scold and find fault because things are not what they ought to be. The busy people who have been building homes and making America what it is had not the time to study out all the beautiful lessons which we are trying to teach you, and it is that wonderful little instrument, the CAMERA, that makes it possible for you to learn these lessons. A book on this subject, without photographs, would be dry reading for you, *so dry* you probably would not read it.

“What’s the matter with that tree?”

Glad to see you interested, Chester. In the preceding photograph you had a view of a tree of which there are hundreds of thousands in a similar condition—that had gradually been rent open by the force of wind playing upon its branches. You saw, also, how kind Nature was in trying to repair the damages, and how she worked away, building up new cells and new tissues, building or arching out to make the parts stronger; but, in doing this it formed a “cup” at the base of the crotch, which holds water and conveys it down into the crevice, from whence, very often, it is unable to escape. This water then becomes putrid and produces decay. Such trees are doomed: it is only a question of time until the tree will be rent asunder. In spite of all our abuse and neglect of the faithful trees that God has given to bless us with health and bring us joy, see how patiently they work away, doing the best they can, granulating and building and repairing (see where the boy’s hand is), trying to heal over these huge and ghastly wounds! In mute silence, this faithful, patient creature is standing there alone, but its fearful wound is crying, “Help!” “Help!” “Help!”

Children, will you not respond to the cry of the helpless trees?

This tree could be put under a surgical operation and be restored to health, but it is very unwise for any one to attempt that kind of work if not an expert at it. There are already presuming, unskilled

men taking up this work, and killing trees through not knowing how to perform the work. What we desire you children to do is to *prevent* such future troubles by selecting seed from the right types of trees, and starting the *right kind* of trees.

“What a funny looking top!”

No, Annie; it is curious, but not “funny.”

(Don't forget that words have different shades of meaning). If you had been the owner of this lovely “Weeping elm,” you would have seen no “fun” when one-half was broken off in a wind storm: that is just what happened. This is the remainder of the beautiful tree, the lower part of which was shown in the last photograph. Does it not seem to you that the portion that is yet standing is truly “weeping?”

“Why do people neglect their trees and allow them to be ruined in this way?”

Well, Edith, people certainly do not purposely allow such things to happen. It came about in this way.

After the discovery of America, people came from all parts of the world (you know something of the history) and found about all of America, except the prairies, covered with forests. But they needed farms, and so they commenced to cut, slash, burn, any way to clear the land and raise crops. Then as towns and cities were built up, trees were planted, making lawns, parks, orchards, and the like. People were so busy in building homes and getting rich—or trying to—that they forgot to think of one thing—the one thing that we are now trying to get you to understand, namely: that the tree is a **LIVING CREATURE**, just as much as you are. While, as before stated, all people will say, “Yes, we know that the tree is alive,” yet they seem

to think that it can take care of itself just as easily as the hitching post or telegraph pole. Indeed, some people would paint a hitching post, but would not spend a nickel on a tree in a life time.

Even after the trouble had started on this tree it might have been saved if a bolt or a lag hook and chain had been used to prevent the other half splitting off. Here, again, is where it requires skill to do the work, and those who wish to learn about the surgical operations should read the book called "The Tree Doctor," by the author of this work.

“Could we not get trees that are not ‘forked?’”

Splendid question, Albert. Yes, certainly; and we want, at least, eight million of the children of the United States (that is only one out of ten of our population; great country, is it not!) to commence raising trees.

Along with the growth of other industries, great “nurseries” have been established, where they start the seeds, and “bud” and “graft”—things that we want you to do as you grow older—and then, of course, the next thing was to sell their “stock,” so they would have catalogs printed, and in this way have done great good in giving us new and valuable fruits, flowers, shrubs and trees; but now we have a great many “nurseries,” and they raise more “stock” than the people need, so that it has come about that there are a class of men (?) running over the country called “Agents.” While it is true that now and then there is an honest man among them; yet, to their regret, some of your fathers and mothers know that all of them are not honest. I was in a nursery one day and a foreman told me that one of these “Agents” had been there and bought thirteen cheap roses of ONE kind, then labelled them as thirteen different kinds *of the very best!* Another agent, he said, filled an order for high-classed peonies (“pinies,” some call them) with rhubarb roots! Well I’ll not tell you all their “tricks” that I know, but ask you to start to raising many of your own trees. You can get acorns;

why not grow a beautiful oak, like the one in this photograph?

If you desire an oak, a sweet chestnut, hickory-nut, walnut, or butternut, procure the seed—the nut—and plant it where you want the tree to grow. These—and some other trees—have strong “tap roots,” and they are hard to transplant. It is well, however, to dig out a hole and put in good soil, so that the tree will do well after it has started to grow.

“Under the spreading chestnut tree
The village smithy stands.”

You have read that beautiful poem ; but the reading might have suggested a question. The word “spreading” might have led you to think of the tall clean trunks of the chestnut trees that you have seen in the forests — much to your annoyance when you could not climb them to thresh off the nuts. Perhaps you have wondered how a tree of this kind could become “spreading.” But you will learn by observation that these differences are common to nearly all trees. The oaks, pines, spruces, etc., have long, clean bodies when grown in the forests ; but in the open field, if left alone, their lower branches will lie almost flat on the ground.

The American sweet chestnut is prized highly for its fruit, being far superior to the larger nuts from foreign varieties, but the wood also is of great service. The young tree grows rapidly and in about ten years from planting the seed, they make good fence posts ; in twenty years, first rate telegraph poles.

Now, boys, I want to start you making money. Invest in a nickel's worth of chestnuts. Pick out one hundred of the best nuts. Put them in a cigar box of sand and leave them out of doors all winter. As soon as the frost is out of the ground plant them, eight inches apart, don't let a weed grow among them. At the end of two years they will be worth five cents a

piece — a good suit of clothes, see? Almost any newspaper will tell that you have these for sale, and there are a great number of gentlemen of wealth that are planting and trying to reforest our waste land, and will readily purchase your healthy young chestnut trees.

“That’s a beauty!”

We will not disagree with you, Elizabeth. This tree, like the oak and the chestnut on the preceding pages, is standing out in the open cultivated field, and has had the full nourishment that comes from plowing and cultivating, which keeps the roots in a healthy, active condition.

The winter season is the time to see the outlines of the form of the tree. Glancing at this tree you will observe it is not “crotched,” but has large and powerful “lateral” arms. We want you to form the habit of looking at trees in the winter season, and talk about them among yourselves, and don’t forget to tell your father and mother what you learn concerning them, for they had no books to guide them when they were young.

After you have decided what is the best type of tree to breed from, then be on the lookout for the seed. You will become wonderfully interested to see the elms, oaks, maples, indeed, all trees forming their modest but beautiful flowers in the spring or early summer, and ripening their fruit in due season. (Elms and soft maples drop their seed just after the leaves expand, the hard maples in fall.)

Perhaps there is nothing more pleasing than the seed of the maple. This seed is called “samara.” It has a wing. It seems that the Creator considered the maple one of his most beautiful trees, and gave it the “wing” so that it could be carried by the wind and, in this way, be spread around to give us more maple sugar

and syrup! Watch for your strongest forms of the "Rock Maple," gather the seed and send it to the children in the cities. If you are living in the city write to your "country cousins," and they will send you seed by mail.

America leads the world in *push* and *enterprise*, and she must also *lead the way* in the reforestation of the waste lands of the world; and you, dear children, are the ones on whom this duty will fall. So get ready to play your part, so that future history will record the facts that your labors were "*well done.*"

Here we have a most interesting lesson. We have been telling you that children must study the *form* of trees in winter, and then see if they are *healthy* in summer, and from the most favorable types to gather seed.

Here is Mrs. R. F. Shannon, of Edgeworth, Pa., with a group of children of the neighborhood, gathering seed from a majestic "sugar maple," one of those genuine "Rock Maples." The good mothers and school-teachers, in all parts of the land, should take hold of this work, and little plots selected in some corner of the garden, where all kinds of *native* trees should be started. *Early* every spring these young trees should be taken up and transplanted, and given a little more room, and this, also, will give a *bushy, strong* root. We can then cut out and burn all trees infested with "scale," and have *new* and *healthy* ones to take their place.

Pennsylvania, at present, is ahead in the "forestry movement"; but, if the children take hold of this work, in five years things will be all astir, and hundreds of millions of young trees should be ready, not only for street and lawn planting, but also for new forests. For hundreds of years, nearly all the old countries have depended on America for lumber and we have been so foolish as to waste—in the most shameful manner—the beautiful and valuable trees that should have been preserved. It is conceded that

within fifty years the United States will have to purchase nearly all our lumber from Canada. Let us prepare at once for NEW FORESTS.

"That's a grand building!"

You will make an architect, Daniel; your eye catches the buildings. That is the State House at Hartford, Connecticut. Is there any other object that looks attractive?

"There is a fine tree to the right."

Correct, Sophie, it is an unusually lovely elm.

To give you a better idea of its size I allowed the camera to "wink" at it a second time, shooting sideways from the right. It was a very cold day when these were taken, and snowing lightly.

What beautiful outlines this majestic monarch presents, with the cold winter sky as a background! The city of Hartford is very much alive to the problem of preserving its trees.

Some three hundred years ago, the destruction of the native forests commenced in the east and swept westward. One of America's greatest revenues has been from the exports of timber. The slaughter of the forests, however, went beyond all reason and sound judgment. The citizens of New England were among the first to see the dangers that were threatening us, and were the first to raise the cry of alarm.

Among the earnest workers for the preservation of the trees and the judicious planting of new ones, none excel the zeal of many of the citizens of Hartford, Conn.

“Gee-wiz! What a big ’un.”

Sambo, that’s a little bit slangy, but we will excuse you, seeing that you have a nature that can be inspired by such a grand, monarch-like spectacle!

I am not aware that I ever saw an elm that had more top than this. It is situated in the midst of the city of Springfield, Mass. Back of it is the City Hall, which looks like a small building when compared with this mammoth tree. But they told me this was not near as large as one they called “The Queen Elm,” in this city, but stupid fellows in digging a sewer cut off its roots, and killed it! Such a tree as “The Queen Elm” was worth ten thousand dollars to so lovely a city as Springfield. The people, however, are getting very much in earnest. You see, children, I am not following the stiff rules of book-writing, but in a homely and familiar way am telling you what is taking place in America—glorious America! where people with a base-ball rush are apt to make mistakes, but where they are just as ready and as anxious to make wrongs right again, and improve by the mistakes of the past.

Say, children, allow me to make a suggestion. Suppose the girls undertake to gather seeds and plant them and take care of the little baby trees, and the boys begin to clean, prune and dress the old ones. How many favor this? All hands up! That’s good! One generation, and American trees will be rejuvenated.

But, children, bear in mind that you must *prepare* the soil to get the little baby plants to do well. Don't expect that the little infant trees are going to thrive in dry sand or gravel beds; true, they might possibly grow, but you should aim to get the *best*, particularly if you expect to sell them. Don't let a weed grow among them, and give them plenty of water in July and August. It is not necessary to cover them in winter.

“What’s the matter with that tree?”

Well, Maude, there was nothing particularly wrong with it until the “tree butcher” assailed it. It was one of those crotchky “soft maples,” that I have been telling you about. People desire something that will “grow fast”—a very natural wish when one is building a new home, and there is no shade near—therefore the “nurseries” grew a large quantity of this kind, and the “agents” preached loud and long concerning their special merits of rapid growth.

They certainly are a pretty tree when young, and their rapid-growing habits made them special favorites; but, alas! when they become large their branches split down with the most ordinary wind storm; then the tree butcher volunteers to cut their heads off!—if you will pay him for the job. Think of it, children, pay a man for killing your friends! Thousands of trees have been ruined in Akron and in Cleveland, O., and thousands also in Sharon and Harrisburg, Pa. (I am speaking of what I have witnessed.) The bull dog has short ears, and the beagle hound long ears; shall we cut off the long ears of the beagle because the wind acts upon them? The “Soft Maples” have long, slim branches, and they are handsome when planted in clumps, or among other trees where they get protection, but they should not be used for shade trees on the streets.

The practice of “trimming” shade trees should be abandoned. There would be no need of it if the

trees were planted in the locations for which each kind is by Nature adapted. A very light cutting to form the head as desired, when the plant is young, is about all that is needed. When the top is properly formed, and at the right height, *keep hands off*.

“What’s the lady holding?”

That is a specimen of the wicked work of the “tree butcher,” Belle. Turn back to the last photograph and you can see that it has been “butchered” twice. Some years ago they cut the top off, and the tree nobly made another effort and was gradually recovering from the shock and forming a new head when the “butcher” — possibly running out off “beer money” — made the owner believe that “a tree hadn’tter have a big head;” so it was decapitated the second time. Cruel! But, if the mischief stopped with the work of the butcher’s saw and hatchet, the results would not be so bad; however, this is only the beginning of the real trouble, which is being shown you by the lady in this photograph. This is what happens to every tree whose top is cut off by unskilled workmen and left unprotected. The very small branches may heal over their wounds the first season; but branches more than half an inch in diameter, if the wounds are not dressed, will commence to decay; then Nature, as if in the frantic efforts to save the tree from death, builds up around the wounded member; but this forms a “cup” and holds the water and the process of rotting goes on, down! down! as you see it in the photograph.

It is sad, *sad, indeed*, to find thousands of otherwise fine trees in a city hacked to pieces in this shameful way by ignorant men. There are cases where tops may be removed to an advantage to the tree, but the work should always be performed by a skilled work-

man. When a top is diseased, it might be subjected to surgical operations, and often a new and healthy set of branches may be grown.

“That’s a queer looking exhibit.”

It certainly is, Harmon. Perhaps you have no idea what it is, so I will tell you.

You probably know that when a person breaks a bone, the surgeons use what are called “splints” to brace or hold the parts together. That is what we often have to do with a tree that is so weakened that it cannot stand without support. Here is an apple tree in the pretty city of Sandusky, O. It was situated at a point where they did not want to lose it. Years ago, it was gnawed by horses and a large branch had split down and, as usual, no care had been taken of it. Gradually decay worked its way into the center of the trunk, and so destructive was it that not over one-third of the body of the tree was sound.

After all the diseased portions were removed, strong steel braces were made and bolted through the sound wood to give it strength. This is “tree surgery,” and, as this apple tree is not more than sixty years of age, the treatment will probably add one hundred years more to its life.

“Why, I never heard of an apple tree living to be a hundred years old!” Perhaps not, Wolcie; but, with proper care from time of planting, an apple tree would be in good state of bearing at two hundred years of age; pear trees have lived for three hundred years; oaks run as high as a thousand. The great “Charter Oak,” of New England, was estimated to be two

thousand years old. These estimates seem rather startling to people who have given the subject no attention, but it should be more startling to think that most of our trees do not live a third of their natural life on account of misuse and neglect.

“What’s that man doing?”

He is testing the work of the “tree doctors,” Teddie. This is the same tree that you saw in the last photograph. It has been filled with portland cement, which has been painted the color of the bark and, anyone passing, would not know but this was a tree with the bark skinned off and the wood painted. It will now grow new wood and produce good fruit.

“Wonderful!” did you say? Yes, it is wonderful to those who are not acquainted with the science of tree surgery; but, in ten years from now I expect to see most of you children possess a knowledge that will enable you to care for these faithful friends, the trees, and not allow such troubles to occur.

“What kinds of apple trees are best to plant?”

Thoughtful question, Mollie; it’s a wonder the boys had not thought of that. Red Astrachan and Early Harvest for July, are about the best. Queen Ann, Rambo, Maiden Blush, Bellflower, Rhode Island Greening, Northern Spy and Baldwin are all good, standard varieties. Write the nursery men and tell them where you live, and they will tell you what is best for your locality. Nearly all the owners of nurseries are honorable men. Don’t trust the “Tree Agents,” they may sell you a tree true to name or they may not. You would have no means of knowing what it is for eight or ten years.

Never let grass or weeds grow around an apple tree, nor any other fruit; no, not even around a shade tree. If you do not put on a coating of gravel, as suggested, keep the ground constantly hoed, then your trees will thrive. Do not make the mistake of planting too thickly. Apple trees should be from thirty to forty feet apart.

How is that for a good job of healing!

“What do you put on a tree to make it heal?”

Nothing, Lena. It is those wonderful life forces that do the “healing.” All we can do is to fix matters up so that Nature can go on with her marvelous process of building new cells and tissues. A person cuts his hand and he will put on all kinds of applications to “heal” the wound, but your physician will tell you that the idea is false and misleading. You may put on things to counteract the poisons, and salves and various compositions to keep off the air and shut out foreign matter, but none of these “heal”: they simply keep things from being further injured till Mother Nature can repair the damages. This is just as true with a tree or a plant, and you must always bear in mind when you cut off a branch to put paint on it at once and, as before stated, if the wound is large, paint it every year, but don't get the paint on the delicate young bark that is being formed. In tree surgery, proper, it is difficult to teach a person without actually showing him. I knew a young man who finished killing a good apple tree by thinking honestly that he was saving it. Go slow on such undertakings, but if there are any “tree doctors” working around watch them, and see how they do the work. This young maple was treated rightly, and you see the two lines of new bark, one on each side. What you see in the middle is solid cement.

One of the leading professors of the country, I am told, has condemned the use of cement for “filling”

wounds in trees. A few months ago I was in Boston, and went to the parks to see the cement work that had received condemnation. Well it might be denounced, for any school boy could have done it just as well, and, with a few minutes' drill, much better. This photograph shows you that cement work is a perfect success, if the work is properly done. This will heal over in about three more years.

Now, children, are you getting tired of the talks about trees? You are not. Well, that's good. What you have been reading in these lessons are just the "A, B, C." Be sure you get your alphabet right; if you fail in that part you never will read plant life right nor practice culture correctly.

Here is a very charming object. It is a cut-leaved birch, covered with hoar frost. What a lovely sight! How weird and unspeakably grand the trees are, especially the evergreens—when covered with snow! How delightful when in bloom, and how charming when hung with luscious fruits or the gay-colored foliage of fall! The book of Nature is wide open; boys and girls, learn to read it. "The heavens declare the glory of God and the firmament sheweth forth his handiwork"; the stratified rocks tell of his might and wisdom; the blade of grass his creative power; the simplest flower whispers his love, while the trees show forth his fatherly care in blessing us with pure air, shade in the heat of summer and the breaking up of the fierce winds of winter, and, above all, the abundance of fruit to give us health of body and contentment of mind. Surely you cannot afford to spend any part of your lives in those things that are low and base! May you all live in touch with Nature's throbbing heart.

There is not only no *need* of sin in this beautiful world, but, as near as I can guess at it, there is no *excuse* for its existence. Sin is the violation of

law ; sin and sorrow always go together. How foolish to do wrong and then suffer. The child that studies Nature will be filled with *pure thoughts* and a *loving heart* ; hence the great Teacher said, "Blessed are the pure in heart, for they shall see God."

Here is Paul with apples, parsnips, carrots, turnips, pumpkin, squash and potatoes. He looks a little "pig-gish" by the way he is "hanging on" to those good things, but he is only showing you what any boy of ten years old might grow if his father has a few rods of land. This boy has been trained to grow plants, as all boys should be—rich or poor—but you can have no success with the vegetable garden unless you learn from the start what we have been trying to teach you concerning the trees, namely: that they are LIVING CREATURES, and, therefore, subjects to all the general laws that govern animal life. If you want to fatten a hog or an ox, you *feed it*. If you plant corn or cabbage under the shade of a large tree, the tree will steal the greater part of the food—and you cannot blame it, you would do so if you were the tree; but quick-growing crops, like spring onions, lettuce, or early string beans, will be a partial success under the tree, especially if you give a plenty of water in hot weather. However, to grow good vegetables, you must have the open sun-light and be away off from the roots of trees. If the soil is wet and soggy, you must make ditches or put in under drains to carry off the surplus water; for, except in the case of a few water plants, you can get too much water and drown the little feeding rootlets.

Don't cultivate the ground to *kill weeds*; keep the soil stirred to *make the plants grow*, and the *weeds* will never appear. Plow or spade the ground deep and

work in lots of barn-yard manure. If *you* feed the soil the ground will feed your plants. In the cultivation of trees and plants of all kinds you should bear in mind all the time what has been previously said, namely: *there is no luck or "chance."* Everything is cause and effect. Be faithful to Mother Nature and she will give you a rich reward.

Here are Lucile, Mirabelle and Harold. They are gathering plant food.

“What do you feed plants with?”

Glad to hear from you, Gotlieb; it is plain that you will try to keep up the reputation of your parents' nationality.

It is said, “You can't beat the Dutch in raising cabbage.” This is true: they are among our best gardeners and florists. They know that any plant, to do well, must be fed and cared for.

Perhaps you are not aware that children burn up the best plant food that we have! You look astonished; but that is what they do. In the fall of the year, children gather the leaves and make bonfires of them. Why, children! children! the leaves, when decayed, make the very best of plant food for the flowers or for the garden crops. Ask your father for a good sized dry-goods box and, if you have a “big brother,” get him to help you to sink this box into the ground, in the rear of the garden. Put in a layer of leaves and then a layer of soil and a layer of street sweeping, and in this way fill the box. After a while it can be turned over and mixed together. This will not give any offensive odor; so that any child in the city can make soil and keep it on hand for the flower beds, and also for the flower pots; he can do this even if he has no room for a vegetable garden. Don't try to grow good plants without food; if you do, you will fail.

It is sinful to destroy the good that Nature bestows

upon us. The way that she makes the soil is through the forming of leaves and grasses, and then turning these into decay and in this way separating the rocks into small particles, and thus replacing the earth that is washed into the rivers. But the waste of soil is more rapid than the formation. We cannot afford to destroy the earth's surface. We should live to make the world better.

To a competent florist, an educated gardener, or a practical farmer, there are but few things that excite more pity than to see people striving to grow plants and meeting nothing but failure, and nothing will stir his wrath much quicker than to see a person set plants or sow a crop and then let them die of starvation or neglect.

The photograph shows you a gentleman, Mr. S. C. Walker, of Shields, Pa., who always has what some people call "good luck" with his plants. He is a man of means, but has the good habit of spending his evenings *at home*—taking care of his plants. His "good luck" comes in this way:

When he makes a flower-bed he has it dug out two feet deep, and fills in with rich soil and one-fifth of good manure, and every season this is well enriched again, and just as soon as a flower has matured the blooms are cut off; in this way the strength of the plant is kept to work *making new blossoms*.

Children, this is a sample of what I have been telling you, that you *must feed your plants*. It would set you nearly wild with delight to see the health of the geraniums and petunias, and other plants in the "porch-boxes" that you are looking at in this picture. The vines that you see are the German ivy, one of the very best vines to be used for this purpose. However, there is *one* plant that you must not feed too highly when planted out in a flower-bed, that is the *geranium*. If you were to put this in rich soil—such as is needed for the coleus, canna, or caladium, you would get but

little bloom. It would run all to *leaf*. You would get leaves as big as good sized tea-saucers. This plant does not grow so rankly when put in flower pots, vases, or porch-boxes.

Here are some of Mr. Walker's hollyhocks. Oh, my! what beauties! One plant was 12 feet 7 inches high! ("good luck!" you see) and the colors! Why, you should have seen them! They were jet black, pure white, red, pink, yellow, buff, lilac, and shades hard to name. They were double and single, and, oh! such leaves! big as great cabbage leaves.

In this picture Mrs. Pontifract, her daughter and two nieces are regaling themselves among these gorgeous flowers.

The hollyhock has many enemies, and is subject to what is called "rust," but those who love this majestic flower may get some "pointers" from Mr. Walker. He understands the habits of the enemies of this plant pretty well, and is a day ahead with hellebore, slug-shot, or some "preventive"; but the great secret of all is the *deep, rich soil* in which they are planted, and the *constant* cultivation and abundance of water in hot weather. I am of the opinion that a great deal of what is called "rust" comes from allowing the leaves to shrivel for the want of water.

In *all* plants, whether it be trees, flowers, garden or field crops, it must be borne in mind that you cannot get a *good top* unless you have a *healthy root*.

Lest people should get a wrong idea, I will remark, that you can easily give *too much water*. If the beds be made *deep* and *rich*, like Mr. Walker makes them, there is need of but little water until the plants are in

a good, vigorous, growing condition. Keep the hoe and rake at work; *don't allow the weeds to get a start.* Useful as weeds are—for making soil—they are robbers when allowed to occupy the ground that you have designed for your plants. *Keep the soil stirred.* It would be well for the city children to learn and sing that thrilling, Grange song, “Three cheers for the plow, spade and hoe.”

I need not tell you what plant this is, for you will all exclaim, "The pansy!" Who is there that does not admire and love this beautiful flower? If people would listen to it they would hear some wonderful lessons about the trees.

"What are the lessons it teaches concerning the trees?"

Why, this, Freddie: If one plant by good treatment can be improved, then another can, whether it be a pansy or an oak tree.

"*Viola Tricolor*" (the pansy) has an interesting history. In its native state it grows in the open field—I have seen thousands of them in the wheat fields in England—and its flower is not larger than one's little finger nail, and the plant small in proportion. Once upon a time a little girl—whose name was Bennett, I think—took a great liking to this innocent flower, and planted some in the garden. Her father, who was a gardener, saw that by the care the plant had received, it improved both in foliage and flower, whereupon he took a hand in it, and the work has gone on until today we have these mammoth beauties of all colors—except pure red—ranging from jet black to snowy white, and blooms, sometimes measuring four inches in diameter! Children, see what a good work a little girl can set in motion! The lesson of the pansy is, that you can *co-operate with the Creator* and get larger and better plants and trees. You will all try what you can do, will you not?

Everyone loves this charming flower, but very few succeed in growing it. You will see people go to the market about the 30th of May and buy plants *in bloom*. This is not wise; the plants should be set out early and when small. They do the best in cool weather.

The photograph on the opposite page is our little Ira at the age of four, in his 4th of July pose. At the age of nine he was called into spirit life, his last request being: "Papa, won't you raise pansies for the mission of India?"

The seeds from his little white pansies were gathered, the plants raised, and a row planted three hundred feet long, as you see them in this picture, which was taken the middle of July, showing that the pansy does not need "partial shade," as you read in some seed catalogs.

All who think this would be a good way of raising money to relieve the distress of children in India can send two one-cent stamps, one of which will be used for the return mail, and the other kept to pay for envelope and paper, giving information concerning the work.

Address letters to John Davey, Kent, O.

Ira Davey's last request: "Papa, won't you raise pausies for the mission of India?"

Here is a pansy bed that is teaching the people of Cleveland, O., an important lesson. This city has been one of the most unfortunate in losing so many valuable trees. All kinds of opinions have been expressed. Some said it was "gas" that killed them, others laid it to "smoke," while many declared it was the "electric currents," "acids," etc. There is a portion of the city they call "The Gas Belt." Mr. R. A. Harman, living at 930 Prospect St., a gentleman connected with business and banking interests of the city, and a great lover of trees, consented to have a trial made to see if it were true that "No plants would grow in the gas belt." Early in the spring of 1904, as soon as the frost was out of the ground, a hole was dug in the lawn—as you see—8 feet wide and $2\frac{1}{2}$ feet deep, and was filled and rounded up with rich soil, and the plants set at once (they had been out of doors all winter). They grew very slowly at first, but when the weather warmed up they went to work "for dear life," and they kept it up for all summer—"resting" slightly in July and August—and bloomed until it froze up. This photograph was taken July 3rd, and the plants and the flowers at the time were equally as fine as on our own farm, where we grow the "best." The bed was taken care of by Miss Mary Helen Harman, who is seen in the picture, and, without knowing it, she has shown the people of that city that what their plants and trees need is food, water, and good care.

This is the *one* lesson of all that people seem slow

or unwilling to learn—that the plant must be *fed and cared* for. They are willing to purchase plants and trees, but, somehow, they seem to think they should care for themselves, forgetting that all our cultivated plants are brought up to their high condition *under the best of care*. To get good trees and plants means that you must *think and work*.

“Isn't that a sweet little pet?”

Yes, Jennie, it is, and it teaches a great lesson, showing how all wild creatures would become tame, if we were kind to them. Mr. Pendleton takes great pleasure in cracking nuts and feeding those happy, frisky, innocent little squirrels, as does also Mrs. Pendleton, who, you see, is taking much enjoyment out of the performance of the little fellow on the head of the post.

To me, there is something sacred about the spot on which you now gaze. This is a residence of the late Harmon Austin who, with his amiable wife, were among the first to extend a welcome hand to me, in 1873, when I first came to this country. Think, children, of your going nearly four thousand miles from your home of childhood and some one welcomes you and makes you feel happy; don't you think you would always have an attachment for the place? On this very porch on which you now look is where I had the delight of meeting President Garfield, B. A. Hinsdale, president of Hiram College, and many other scholarly men and women who, from time to time, offered words of council and encouragement. No nation was ever so thoughtful and helpful to foreigners as America. Do you not think that we ought to do all we can to make the country better? Well, you see, that's what I am trying to do. My early education, in England, with trees, is now of great value to me; so I give you the

benefit of my experience. England, and other "old countries," may be "*slow*," but they are *thorough*. Every boy there must qualify and learn his profession before he is entrusted with the care of trees or plants, but we want to beat Mother England a little, and have *every boy and girl* know how to grow and care for them in our beloved America.

Solomon said, "There is nothing new under the sun."

In one respect this may be true, but another thing is also true, namely: All things are "new" to us when we first learn of them. Just how "new" these pests are, here presented, I cannot say; neither could I answer the question that a small boy asked one day, as to when they were "first invented." The photograph to the left is a piece of a small branch of an ash tree that has been killed by the "scale" that you see on it—the Oyster-shell bark-louse. There were millions on the one tree, and they were so thick that they actually covered the bark in places, and the result was they sucked the life from the tree and killed it! The picture to the right presents the scurfy bark-louse and the San José (pronounced San Hosa) scale.

As you get older you will learn more concerning the enemies of our trees, but, for the present, the purpose is to lead you to form habits of observing, so that with a practised eye you will know how to take "a stitch in time." There is a peculiar arrangement in this life, for example: the leaves decay and the grass feeds on them; the ox eats the grass, and we eat the ox; everything seems parasitic, that is, living on some other creature.

Of all the animals man has the largest brain. Through our eyes the beauty of the trees and other objects are impressed on the brain; through our ears come the thrilling songs of birds, but the birds must

have food supply, or they would have to live entirely on our fruits and grains; and we have killed or driven away our best friends—the birds—shame! shame on us!

Hon. Chas. M. Loring, president of the Minnesota State Forestry Association, has just written me that there are scarcely any robins in Minneapolis this season. He says that in the South there are bands of idle fellows who spend their time in the winter months shooting robins and other useful birds, and putting them on the market as “reed birds.” The government should stop this at once.

As a result of unkindness to the birds they are afraid of us. We are not only unkind but murderous. The woodpeckers, as they once existed, were worth millions of dollars annually; but now, sad to say it, they have been nearly all killed! Oh, how cruel! Alas! how foolish we have been. Boys! instead of shooting or stoning the birds begin to study them; see how beautiful they are! Listen to their inspiring songs! Oh, how dreary this life would be without our beautiful flowers and lovely songsters! Then think how foolish we are to kill or drive away our protectors—the birds. I know that boys do not shoot at birds for the fun of killing them, but more as a test of their skill in marksmanship. For goodness sake, boys! select something else, “clay pigeons,” or any “mark,” but don’t shoot your friends. If we keep up this destruction of the feathered tribe we shall surely find that “The way of the transgressor is hard.” Already our valuable forest timber is being destroyed by grubs and insects—all because there are not enough birds to keep down the billions of these pests.

At a recent carriage-makers’ convention a report was read that nearly all the remaining hickory timber is being bored and eaten by worms. It would be well for these gentlemen to learn the threefold cause of this. First: The native woods have been thinned out and the grass and underbrush is taking up the moisture, and the trees are dying of thirst; and, second, *because*

the trees are diseased, *therefore* they are attacked by *boring insects*, and, *because* there are not birds enough, *therefore* the insects are *killing the trees*.

This photograph shows you a loathsome "scale" insect that is doing a great damage to the trees in the cities. The name is a jaw-breaker, "*Pulvarina Innumerabilis*."

Here is another enemy of our trees, which, in the cities, is spreading like wild-fire. It is commonly called "cushion scale." From June till fall they can be seen on the under surface of leaves, and small branches are, at times, almost white with them. A great number of these can be destroyed by turning a sharp, strong spray of water on them and knocking them off. In the battle with the scale, the birds do not accomplish as much as they do in destroying larvæ, pupæ and the moths of the leaf-eating insects; spraying is necessary to conquer these "armored scale."

"What do we spray with?"

Good question for a small boy, Bennie. If your tree is very badly infested, cut it down and burn it; if the scale has not made much headway, dissolve two pounds of whale oil soap in one gallon of water. Spray this on after the leaves have fallen, again in mid-winter, and just before the buds expand in spring. This, experiment stations have found to be one of the best remedies; it is also a great help to rose bushes, to destroy the "slug," and other foes of the beautiful flower. It is a very hard matter, however, to conquer the "scale," and, if any are left, they will continue to spread. I saw a beautiful Japan Quince hedge, last summer, that had millions of "scale" on it, and it had to be dug out and burned. I don't know but we will have to do the same with trees! Therefore, children, begin at once to gather seed and start new trees that will be free from disease.

However, keep the whale oil soap on hand. Where you see these and other scale on the trunks of trees, as you will in July and August, clean the trunk of the tree by scrubbing it thoroughly with a good, stiff scrub brush and your whale oil solution. You can make no mistake, any time of the year, by keeping the tree *clean*.

Now, children, take a look at Leon, cleaning the tree.

“Should trees be kept clean?”

Why, *certainly*, Mollie. John Wesley said, “Cleanliness is next to godliness.” The venerable gentleman might have made it a little stronger and declared that *cleanliness is a part of godliness*. Horses and cattle that are not properly fed and cared for often become afflicted with annoying insect pests, and even the human body, when left in a filthy condition, will become infested with disgusting crawling insects—the penalty for the sin of uncleanness. The tree does *all it can* to throw off old bark with all the dirt and dust that accumulates thereon, and the storms help in blowing away these tattered rags.

Besides this there is about one-fifth as many breathing pores on the *new* bark as there is on the leaf. It is not wise to take draw-knives and hatchets and *smooth down* the bark on large oaks, elms and native shade trees, destroying all the ridges, but a strong spray of water should be frequently turned upon the trunks of such valuable trees and thus keep them clean. Apple trees, however, do become quite filthy, and should be cleaned with a curry comb or some other implement. Pears and other fruit trees, also, should have watchful attention. This dislodges the insects and destroys their hiding places, and when the tree is “sprayed” it

takes good effect. You must be careful, however, and not cut through the inner bark, for that would injure the tree.

The scale is not the only enemy of the trees. Insects of every description are on the increase. Recently, in the neighborhood of Pittsburg, Pa., the canker worms appeared and stripped *miles* of forest trees. There were untold *billions* of them. Fruit trees, as well, were defoliated. All trees looked as if a fire had run through them. The row of fine young apple trees, shown in the upper photo on the next page, is a sample of how the trees looked. In the lower photo you have a view of a twig that had escaped and one that had been eaten.

In the neighborhood where the scourge was the worst, a gentleman had his property fenced in with wire netting, to keep his chickens and turkeys from bothering his neighbors. Here the worms made no havoc, as the birds caught the female canker worm (which is wingless) before they crawled up the trees. This shows the value of even common poultry to help us save our trees. With the restoration of native birds we would have but little trouble from such attacks. Even many of the "scale" are eaten by the oriole and house wren (see pages 151 and 159).

The English sparrow should be annihilated, for they break the eggs and kill the young of native birds and destroy no insects, of any account.

In the latter part of July and all through the month of August you can see what is called the "tent caterpillar." At first it is noticed like a little patch of dew on a few leaves. Then it commences enlarging, and, in some cases, covers the whole tree with the "webs." The worms crawl out and feed on the leaves and then return and huddle together in a bunch. In the accompanying photograph, the boys are burning about a *pound* of them in one nest. This pest is increasing so rapidly that there are hundreds of tons of them in the country. They are particularly fond of the wild cherry, walnut, elm and fruit trees. Every boy should be on the alert for them. Have a fish pole ready; on the top of this fasten a wire which run out a foot or so and double back like a hairpin. In this place a piece of cloth or an old stocking which soak with coal oil and place under the nest and thus burn them out. Remember, every caterpillar that escapes means a new "nest" for next year.

In a few years, *when we have restored our birds*, they will look after these worms for us, and undoubtedly, will be delighted to get a "square meal" when they find the gormandizers. On page 139 you will learn how the cuckoos destroy this pest.

Not only the children, but all parents are requested to make a close study of the habits of the birds which our "Uncle Sam" has kindly permitted to be used. By reinstating the birds, and working

with them in co-operation, the trees and plants will tell of the wisdom and power of God and the birds will day by day untiringly sing His praises.

There are not many questions before the American people to-day of greater importance than that of protecting our trees from the ravages of insects. What was said in reference to the canker work can convey no idea of the heart-sickening sight. Just imagine the sight of great oaks and elms and maples, and wild cherries, in fact, nearly all kinds of trees, being stripped of their leaves, right in the hot days of May! Think of *miles* of woodlands thus *scourged*; and then think of whole orchards of fruit trees, and think of the impossibility of "spraying" such areas. Is it not time that all boys and girls were joining the Audubon Society, and that from Maine to California a great movement should arise to *restore the native birds* in sufficient numbers to help us keep down the destructive insect pests with which we are entirely unable to cope?

Mr. Alex. Laughlin, of Sewickley, Pa., has acted upon a suggestion, and had a "moat" put around an apple tree as an experiment. The female canker worm is wingless, and has to crawl up the trunk of the tree before she can lay her eggs. This arrangement is built of cement, and a little moat is made to be kept full of water. But care should be used not to have grass or sticks spanning the moat, or they will use them for bridges, and if there should be a leaf sailing around they will use it as a canoe.

After the moat was finished some wag posted up the notice which you see, which reads :

"Now, ye sneaking, crawling, noctivorous, four-legged, six-legged, thousand-legged, tough-jawed baists from bug-land, climb this tree if you can!"

You have heard of the elm leaf beetle that has worked such destruction on the fine old elm trees of New England. Here is a "cut," furnished by the United States government, showing how the pest appears.

You observe the eggs as they are carefully glued into the leaf by the moth that lays them, and you can see the larvæ (or caterpillars) at work, eating away the soft portions of the leaf. So numerous did these become in New Haven, that they were tramped into a slush as they dropped on the sidewalk—so they told me—and they threatened the life of the gigantic trees! They found, however, that in the fall of the year the caterpillars crawled into the belfries, and the garrets of the houses and they swept up bushels of them and burned them.

This you see, proved a "preventative"; for every pupa that had been allowed to hatch out and become a moth would have laid thousands of eggs, again to become caterpillars to destroy the leaves.

Children: don't scold because you have such things to contend with; for even these caterpillars are beautiful, but we must not allow that which is pretty to exist if they prey upon and destroy that which is more useful and beautiful—the trees. Presently, when you read about the birds, you will see how the pupæ, larvæ and moths are useful, in their place,—as food for birds—and it is the privilege of man to be a real "Lord of Creation," and turn all forces to his own benefit and to the glory of the Creator.

RESTORE THE BIRDS.

ACKNOWLEDGMENT.

BY PERMISSION of the U. S. Department of Agriculture I have selected from "Farmers' Bulletin, 54," thirteen of our best insectivorous birds, as prepared by F. E. L. Beal, B. S., for use in this work, the government charging only the actual cost of making the "cuts." This is one of the numberless examples where our government shows its pleasure in co-operating with the citizen in efforts for general betterment. By the same courtesy the cut of the elm-leaf beetle is permitted to be used. It gives me great pleasure to make this acknowledgment, as I feel confident that the general public do not realize fully what grand work the various departments of our government are doing. Instead of talking about what "the government ought to do," let us *help* it to accomplish what it is already trying to perform.

With thanks to Agricultural Department,

JOHN DAVEY.

THE CATBIRD.

The catbird, like the thrasher, is a lover of swamps, and delights to make its home in a tangle of wild grape-vines, greenbriers, and shrubs, where it is safe from attack and can find its favorite food in abundance. It is found throughout the United States west to the Rocky Mountains, and occurs also in Washington, Idaho, and Utah, and extends northward into the British provinces. It winters in the Southern States, Cuba, Mexico, and Central America.

Reports from the Mississippi Valley indicate that the catbird is sometimes a serious annoyance to fruit growers. The reason for such reports may possibly be found in the fact that on the prairies fruit-bearing shrubs, which afford so large a part of this bird's food, are conspicuously absent. With the settlement of this region comes an extensive planting of orchards, vineyards, and small fruit-gardens, which furnish shelter and nesting sites for the catbird, as well as for other species. There is in consequence a large increase in the numbers of the birds, but no corresponding gain in the supply of native fruits upon which they were accustomed to feed.

The stomachs of 213 catbirds were examined and found to contain 44 per cent of animal (insect) and 56 per cent of vegetable food. Ants, beetles, caterpillars, and grasshoppers constitute three-fourths of the animal food, the remainder being made up of bugs, miscellaneous insects and spiders. One-third of the vegetable

food consists of cultivated fruits, or those which may be cultivated, such as strawberries, raspberries, and blackberries; but while we debit the bird with the whole of this, it is probable—and in the eastern and well-wooded part of the country almost certain—that a large part is obtained from wild vines. The rest of the vegetable matter is mostly wild fruit, such as cherries, dogwood, sour gum, elderberries, greenbrier, spiceberries, black alder, sumac, and poison ivy.

CATBIRD.

THE CUCKOOS.

Two species of cuckoos, the yellow-billed (see photograph) and the black-billed, are common in the United States east of the Plains, and a subspecies of the yellow-billed extends westward to the Pacific. While the two species are quite distinct, they do not differ greatly in food habits, and their economic status is practically the same.

An examination of 155 stomachs has shown that these cuckoos are much given to eating caterpillars, and, unlike most birds, do not reject those covered with hair. In fact, cuckoos eat so many hairy caterpillars that the hairs pierce the inner lining of the stomach and remain there, so that when the stomach is opened and turned inside out, it appears to be lined with a thin coating of fur.

An examination of the stomachs of 46 black-billed cuckoos, taken during the summer months, showed the remains of 906 caterpillars, 44 beetles, 96 grasshoppers, 100 sawflies, 30 stink bugs, and 15 spiders. In all probability more individuals than these were represented, but their remains were too badly broken for recognition. Most of the caterpillars were hairy, and many of them belonged to a genus that lives in colonies and feeds on the leaves of trees, including the apple.

Of the yellow-billed cuckoo, 109 stomachs collected from May to October, inclusive, were examined. The contents consisted of 1,865 caterpillars, 93 beetles, 242 grasshoppers, 37 sawflies, 69 bugs, 6 flies, and 86

spiders. Most of the caterpillars belonged to hairy species and many of them were of large size. One stomach contained 250 American tent caterpillars; another 217 fall webworms. In places where tent caterpillars are abundant, they seem to constitute a large portion of the food of these two birds. The beetles were distributed among several families, but all were more or less harmful to agriculture. In the same stomach which contained the tent caterpillars were two Colorado potato beetles; in another were three goldsmith beetles and remains of several other large beetles. Besides grasshoppers there were several katydids and tree crickets. The sawflies were in the larval stage, in which they resemble caterpillars.

YELLOW-BILLED CUCKOO.

THE WOODPECKER.

Farmers are prone to look upon woodpeckers with suspicion. When the birds are seen scrambling over fruit trees and pecking holes in the bark, it is concluded that they are doing harm. Careful observers, however, have noticed that, excepting a single species, these birds rarely leave any conspicuous mark on a healthy tree, except when it is affected by wood-boring larvæ, which are accurately located, dislodged, and devoured by the woodpecker.

The male birds are distinguished by a scarlet patch on the head. An examination of many stomachs of these two birds shows that from two-thirds to three-fourths of the food consists of insects, chiefly noxious. Wood-boring beetles, both adults and larvæ, are conspicuous, and with them are associated many caterpillars, mostly species that burrow into trees. Next in importance are the ants that live in decaying wood, all of which are sought by woodpeckers and eaten in great quantities. Many ants are particularly harmful to timber, for if they find a small spot of decay in the vacant burrow of some woodborer, they enlarge the hole, and as their colony is always on the increase, continue to eat away the wood until the whole trunk is honeycombed. Moreover, these insects are not accessible to other birds, and could pursue their career of destruction unmolested were it not for the woodpeckers, whose beaks and tongues are especially fitted for digging out and devouring them. It is thus evident that woodpeckers are great conservators of forests. To them, more than

to any other agency, we owe the preservation of timber from destructive insects.

HAIKY WOODPECKER.

Of the flickers' stomachs examined, three were completely filled with ants. Two of these each contained more than 3,000 individuals, while the third contained fully 5,000. These ants belong to species which live in the ground. It is these insects for which the flicker is searching when it runs about in the grass, although some grasshoppers also are then taken. The habit of the flicker of pecking holes in buildings sometimes greatly annoys his human friends. This habit is particularly noticeable in the California species. Observation has shown that the object of the work is to obtain shelter for the winter. In the East most of the flickers are migratory, and only a few remain at the North where a shelter is necessary. These generally find a safe retreat in the hollow tree in which they nested. In California, however, where the birds do not migrate, trees are not as abundant as in the East, and so buildings are brought into requisition and holes are drilled, usually under the eaves, where a snug retreat for the night is found. Often a dozen holes may be seen in one building. Barns or other outbuildings are usually selected, though a church is sometimes used.

The red-headed woodpecker is well known east of the Rocky Mountains, but is rather rare in New England. Unlike some of the other species, it prefers fence posts and telegraph poles to trees as a foraging ground. Its food therefore naturally differs from that of the preceding species, and consists largely of adult beetles and wasps, which it frequently captures on the wing, after the fashion of flycatchers. Grasshoppers also form an

important part of the food. The redhead has a peculiar habit of selecting very large beetles, as shown by the presence of fragments of several of the largest species in the stomachs examined. Among the beetles were quite a number of predaceous ground species and some tiger beetles, which are useful insects. The redhead has been accused of robbing the nests of other birds, but there is no proof of this.

RED-HEADED WOODPECKER.

THE KINGBIRD.

The kingbird is essentially a lover of the orchard. It breeds in the States east of the Rocky Mountains, and less commonly in the Great Basin and on the Pacific coast. Its antipathy for hawks and crows is well known, and for this reason a family of kingbirds is a desirable adjunct to a poultry yard. On one occasion within the knowledge of the writer a hawk which attacked a brood of young turkeys was pounced upon and so severely buffeted by a pair of kingbirds, whose nest was near by, that the would-be robber was glad to escape without his prey. Song birds that nest near the kingbird are similarly protected.

In its food habits the kingbird is largely insectivorous. It is a true flycatcher by nature, and takes on the wing a large part of its food. It does not, however, confine itself to this method of hunting, but picks up some insects from trees and weeds, and even descends to the ground in search of myriapods or thousand legs. The chief complaint against the species is that it preys largely upon honeybees; and this charge is made by both professional bee keepers and others. One bee raiser in Iowa, suspecting the kingbirds of feeding upon his bees, shot a number near his hives; but when the stomachs of the birds were examined by an expert entomologist, not a trace of honeybees could be found.

An examination of 420 stomachs, collected in various parts of the country, was made by the Biological Survey, but only 14 were found to contain

remains of honeybees. In these 14 stomachs there were in all 50 honeybees, of which 40 were drones, four were certainly workers, and the remaining six were too badly broken to be identified as to sex.

The insects that constitute the great bulk of the food of the bird are noxious species, largely beetles—May beetles, click beetles (the larvæ of which are known as wire worms), weevils, which prey upon fruit and grain, and a host of others. Wasps, wild bees, and ants are conspicuous elements of the food, far outnumbering the hive bees. During summer many grasshoppers and crickets, as well as leaf hoppers and other bugs, are also eaten.

KINGBIRD.

THE PHŒBE.

The phœbe subsists almost exclusively upon insects, most of which are caught upon the wing. An examination of 156 stomachs showed that over 93 per cent of the year's food consists of insects and spiders, while wild fruit constitutes the remainder. The insects belong chiefly to noxious species, and include many click beetles, May beetles, and weevils. In their season grasshoppers are eaten to a considerable extent, while wasps of various species, many flies of species that annoy cattle, and a few bugs and spiders are also eaten regularly.

The black phœbe is found from Texas west to the Pacific coast, which it occupies as far north as Washington, replacing through most of this region the common or eastern form. It has the same habits as the eastern phœbe, both as to its food and its selection of a nesting site, preferring for this purpose some structure of man, as a shed, or, better still, a bridge over a stream of water. The preference of the black phœbe for the vicinity of water is very pronounced. The observer will always find one at a stream or pool and often at a watering trough by the roadside. A careful study of the habits of the bird shows that it obtains a large portion of its food about wet places. While camping beside a stream in California the writer took some pains to observe the habits of the black phœbes. The nesting season was over and the birds had nothing to do but eat. This they appeared to be doing all the time.

When first observed in the morning, at the first glimmer of daylight, a phœbe was always found flitting from rock to rock, although it was so dusky that the bird could hardly be seen. This activity was kept up all day. Even after supper was eaten and it was so dark that notes were written by the aid of the camp fire, the phœbe was still engaged at his work of insect collecting, though it was difficult to understand how it could catch insects when there was scarcely light enough to see the bird. It may not have been the same bird that worked from dawn to dusk, but there was some individual of the species always busy; and an exploration of the stream up and down showed that every portion of it was patrolled by a phœbe, and that each one apparently did not range over more than 12 or 13 rods of water, and that some times two or three would be seen near together.

PHŒBE.

THE BOBOLINK, OR RICEBIRD.

The bobolink is a common summer resident of the United States, north of about latitude 40° , and from New England westward to the Great Plains, wintering beyond our southern border. In New England there are few birds, if any, around which so much romance clusters; in the South none on whose head so many maledictions are heaped. The bobolink, entering the United States from the south at a time when the rice fields are freshly sown, pulls up the young plants and feeds upon the seed. Its stay, however, is not long, and it soon hastens to the North, where it is welcomed as a herald of summer. During its sojourn in the Northern States it feeds mainly upon insects and small seeds of useless plants; but while rearing its young, insects constitute its chief food, and almost the exclusive diet of its brood. After the young are able to fly, the whole family gathers into a small flock and begins to live almost entirely upon vegetable food. This consists for the most part of weed seeds, since in the North these birds do not appear to attack grain to any great extent. They eat a few oats, but their stomachs do not reveal a great quantity of this or any other grain. As the season advances they gather into larger flocks, and move southward, until by the end of August nearly all have left their breeding grounds. On their way they frequent the reedy marshes about the mouths of rivers and on the inland waters of the coast region, and subsist largely upon wild rice.

After leaving the Northern States they are commonly known as reed birds, and becoming very fat are treated as game.

In the latter part of August the bobolinks begin to arrive on the rice fields, and during the next month make havoc in the ripening crop. It is unfortunate that the rice districts lie exactly in the track of their fall migration, and the abundant supply of food thus offered undoubtedly served to attract them.

BOBOLINK.

THE BALTIMORE ORIOLE.

Brilliancy of plumage, sweetness of song, and food habits to which no exception can be taken are some of the striking characteristics of the Baltimore oriole. In summer it is found throughout the northern half of the United States east of the Great Plains. Its nest commands hardly less admiration than the beauty of its plumage or the excellence of its song. Hanging from the tip of the outermost bough of a stately elm, it is almost inaccessible, and so strongly fastened as to bid defiance to the elements.

Observation both in the field and laboratory shows that caterpillars constitute the largest item of the fare of the oriole. In 202 stomachs they formed 34 per cent of the food. They are eaten in varying quantities

BALTIMORE ORIOLE.

during all the months in which the bird remains in this country. The fewest are eaten in July, when a little fruit is also taken. The other insects consist of beetles, bugs, ants, wasps, grasshoppers, and some spiders. The beetles are principally click beetles, the larvæ of which are among the most destructive insects known; and the bugs include plant and bark lice, both very harmful, but so small and obscure as to be passed over unnoticed by most birds.

THE BULLOCK ORIOLE.

The Bullock oriole is the western representative of the Baltimore oriole, taking the place of that species throughout the Pacific coast region. It does not differ essentially in its habits of nesting or in its food from its eastern relative, but it is less beautiful in plumage. The examination of 70 stomachs shows that 75 per cent of its food consists of insects, mostly of a noxious character. Caterpillars constitute 26 per cent of the food, the rest being made up of wasps, grasshoppers, bugs (Hemiptera), and a few beetles. Among the Hemiptera, perhaps the most interesting is the black olive scale, which was found in 17 stomachs and constituted nearly 7 per cent of the whole food. It is not surprising that these small creatures are eaten by small birds like the titmice, but they must have some very agreeable properties as food in order to attract birds like the oriole. With such a good record as an insect eater one can well afford to spare it a few cherries.

THE SPARROWS.

While sparrows are noted seed eaters, they do not by any means confine themselves to a vegetable diet. During the summer, and especially in the breeding season, they eat many insects, and feed their young largely upon the same food. An examination of the stomachs of three species—the song sparrow, chipping sparrow, and field sparrow—shows that about one-third of the food consists of insects, comprising many injurious beetles, such as snout-beetles or weevils, and leaf-beetles. Many grasshoppers are eaten. In the case of the chipping sparrow, these insects form one-eighth of the food. Grasshoppers would seem to be rather large morsels, but the bird probably confines itself to the smaller species; indeed, this is indicated by the fact that the greatest amount (over 36 per cent) is eaten in June, when the larger species are still young and the smaller most numerous.

In zero weather they twitter and flutter and manifest every evidence of enjoyment and perfect comfort. If one of them is shot, it will be found in excellent condition—in fact, a veritable ball of fat.

The snowbird and tree sparrow are perhaps the most numerous of all the sparrows.

Examination of many stomachs shows that in winter the tree sparrow feeds entirely upon seeds of weeds. Probably each bird consumes about one-fourth of an ounce a day. In an article contributed in 1881 to the New York *Tribune* the writer estimated the

amount of weed seed annually destroyed by these birds in Iowa. Upon the basis of one-fourth of an ounce of seed eaten daily by each bird, and supposing that the birds average ten to each square mile, and that they remain in their winter range two hundred days, we shall have a total of 1,750,000 pounds, or 875 tons, of weed seed consumed in a single season by this one species.

FIELD SPARROW.

THE ROSE-BREADED GROSBEAK.

The vegetable food of the grosbeak consists of buds and blossoms of forest trees, and seeds, but the only damage of which it has been accused is the stealing of green peas. The writer has observed it eating peas and has examined the stomachs of several that were killed in the very act. The stomachs contained a few peas and enough potato beetles old and young, as well as other harmful insects, to pay for all the peas the birds would be likely to eat in a whole season. The garden where this took place adjoined a small potato field which earlier in the season was so badly infested with the beetles that the vines were completely riddled. The grosbeaks visited the field every day, and finally brought their fledged young. The young birds stood in a row on the topmost rail of the fence and were fed

ROSE-BREADED GROSBEAK.

with the beetles which their parents gathered. When a careful inspection was made a few days later, not a beetle, old or young, could be found; the birds had swept them from the field and saved the potatoes.

THE BLACK-HEADED GROSBEAK.

The black-headed grosbeak is found over the whole Pacific coast and Rocky Mountain region, and takes the place filled by the rose-breasted grosbeak in the eastern part of the United States. In its general habits, including its food, it much resembles its eastern relative, though it lacks the latter's brilliant ornamentation on the breast and under the wings. Seventy stomachs of this bird have been examined, showing 74 per cent of animal and 26 of vegetable food. Caterpillars constitute over 18 per cent of the food, a surprisingly large amount for such a stout-billed bird, which seems better adapted for eating nuts than such soft creatures as caterpillars. One interesting point may be noted in this connection. Thirty-five of the stomachs were from birds taken in an orchard infested with the codling moth. It was a question whether the grosbeaks preyed upon this pest in any of its forms. No moths or larvæ were detected, but pupæ were found and fully identified in 12 of the stomachs and amounted to 8 per cent of the food of the 35 birds. It is unfortunate that the codling moth in the adult form flies by night and in the larval form burrows at once into the apple, so that it is protected from birds in both these stages.

THE BARN SWALLOW.

Field observation will convince an ordinarily attentive person that the food of swallows must consist of the smaller insects captured in mid-air, or perhaps in some cases picked from the tops of tall grass or weeds. This observation is borne out by an examination of stomachs, which shows that the food consists of many small species of beetles which are much on the wing; many species of *Diptera* (mosquitoes and their allies), together with large quantities of flying ants and a few insects of similar kinds. Most of these are either injurious or annoying, and the numbers destroyed by swallows are not only beyond calculation, but almost beyond imagination.

Unlike many other groups of birds the six species of swallows found in the Eastern States extend in a practically unchanged form across the continent to the Pacific coast, where they are reinforced by another species, the violet green swallow.

It is a mistake to tear down from the eaves of a barn the nests of a colony of cliff swallows, for so far from disfiguring a building they make a picturesque addition to it. The presence of swallows should be encouraged by every device. It is said that cliff and barn swallows may be induced to build their nests in a particular locality, otherwise suitable, by providing a quantity of mud to be used by them as mortar. Barn swallows may also be encouraged by cutting a small hole in the gable of the barn, while martins and white-

bellied swallows will be grateful for boxes like those for the bluebird, but placed in some higher situation.

BARN SWALLOW.

The altitude of swallows, in their flight, has always been noticed by observers to indicate the character of the weather. In a dry atmosphere the flies and other insects venture high up; preceding a storm they keep low. Where the flies are there are the swallows.—AUTHOR.

THE TITMOUSE.

The character of the food of titmice gives a peculiar value to their services, for it consists largely of the smaller insects and their eggs, objects that either escape the search of the larger birds or are too insignificant to be considered worthy of notice. Throughout the year most of the species of this group remain on their range, so that they are constantly engaged in their beneficial work, continuing it in winter when the majority of their coworkers have fled to a milder clime. It is at this season that the titmice do their greatest good, for when flying and crawling insects are no more to be found, the birds must feed upon such hibernating species as they find concealed in crevices or upon the eggs of insects laid in similar places.

There are within the boundaries of the United States some 17 species of titmice, with nearly as many races or subspecies, so that there is no portion of the country that does not have one or more forms. In the eastern portion of the country the best-known and most widely distributed species is the common black-capped chickadee. This bird, or some of its subspecies, occupies the whole of that part of the United States north of the latitude of Washington, and extends into Canada. It is a prolific breeder, usually rearing from six to eight young in a brood.

The examination of 289 stomachs of the chickadee shows that its food consists of 68 per cent of animal

matter (insects), and 32 per cent of vegetable matter. The former is made up of small caterpillars, and moths and their eggs. Prominent among the latter are the eggs of the tent-caterpillar moths, both the orchard and forest species. As these are two of our most destructive insects, the good done by the chickadee in devouring their eggs needs no comment. During the winter months the chickadee's food is made up of larvæ, chrysalids, and eggs of moths, varied by a few seeds, but as spring brings out hordes of flying, crawling, and jumping insects, the bird varies its diet by taking also some of these.

HOUSE WREN.

THE BLUEBIRD.

The appearance of bluebirds indicates the breaking up of winter. They frequent orchards and gardens, where they nest in old hollow trees, or take advantage of a nesting box provided by the farmer's boy.

So far as known, the bluebird has not been accused of stealing fruit or of preying upon crops. An examination of 300 stomachs showed that 76 per cent of the food consists of insects and their allies, while the other 24 per cent is made up of various vegetable substances, found mostly in stomachs taken in winter. Beetles constitute 28 per cent of the whole food, grasshoppers 22, caterpillars 11, and various insects, including quite a number of spiders, comprise the remainder of the animal diet. The destruction of grasshoppers is very noticeable in the months of August and September, when these insects form more than 60 per cent of the diet.

It is evident that in the selection of its food the bluebird is governed more by abundance than by choice. Predaceous beetles are eaten in spring, as they are among the first insects to appear; but in early summer caterpillars form an important part of the diet, and are replaced a little later by grasshoppers. Beetles are eaten at all times, except when grasshoppers are more easily obtained.

So far as its vegetable food is concerned, the bluebird is positively harmless. The only trace of any useful product in the stomachs consisted of a few black-

berry seeds, and even these more probably belonged to wild than cultivated varieties. Following is a list of the various seeds which were found: Blackberry, chokeberry, juniperberry, pokeberry, partridgeberry, greenbrier, Virginia creeper, bittersweet, holly, strawberry bush, false spikenard, wild sarsaparilla, sumac (several species), rose haws, sorrel, ragweed, grass, and asparagus. This list shows how little the bluebird depends upon the farm or garden to supply its needs, and indicates that by encouraging the growth of some of these plants, many of which are highly ornamental, the bird may be induced to make his home on the premises.

BLUEBIRD.

“TREE DOCTORING.”

FOUR years ago, the author of this work published a book which he called “The Tree Doctor.” This book started a revolution in tree culture, but, immediately there sprang up—all over the land—a class of presuming persons who posed as “Tree Doctors.” They have various kinds of *dopes*, the character of which is guarded and concealed with the greatest secrecy. They have “powders” which they put into the trunks of trees after boring it full of holes. They have “*washes*,” the receipts for which would cost you thousands of dollars to purchase! But to show you what these “dopes” will accomplish, Mrs. Willock, of Sewickley, Pa., had a “Tree Doctor” fix some twenty-six trees, and he so *thoroughly* “*fixed*” them that he killed sixteen! I use this lady’s name not only by permission, but put the fact in print by request. It is bad enough to have our trees in such a sad plight as they are without victimizing those who are already the sufferers.

Tree surgery, proper, is one of the highest professions. In our work we select the finest type of young men we can find. In the group here given, they are all free from the tobacco and liquor habits, trained and well educated. We pay good wages and insist on the highest grade of work. If a young man does not fill the bill, he is discharged.

Any who wish trees treated on scientific and common sense principles, should address

DAVEY SCHOOL OF PRACTICAL FORESTRY,
KENT, O.

All kinds of bugs and worms are sent me to classify, tell how to destroy, etc. If you send these to your experiment station you will get much earlier reply. I am sometimes absent for weeks, lecturing or inspecting trees.

JOHN DAVEY,

KENT, O.

(163)

LECTURE ON TREES

*Illustrated by 150
Actual Photographs*

THIS lecture was given at the Auditorium of the Chautauqua Assembly, on July 12th, 1905. Those who wish to learn of the merits of this lecture may address

MR. SCOTT BROWN, Manager,
CHAUTAUQUA, N. Y.,
or

MR. J. HORACE MCFARLAND,
Pres. American Civic Association,
HARRISBURG, PA.

One thing is true of this lecture, *i. e.*: nothing has aroused people more to a realization of the sad state of our trees, and the remedies to be applied.

Those who desire this lecture should address

JOHN DAVEY,
KENT, O.

MORE FLOWERS AND LESS CRIMINALS

TO EDUCATE the child to be kind to animals, to admire a tree or love a flower, is to restrain him from acquiring criminal habits; therefore I submit the following as a standing proposition, namely:

“For the lecture, mentioned on the opposite page, I charge \$25 and expenses. To any individual, society or community who will arrange for this lecture and guarantee expenses I will refund fifteen of the twenty-five dollars, same to be invested in penny packages of flower seeds to be distributed among children of the very poor or neglected districts. I beg to suggest, also, that societies be formed to reach and teach these unfortunates to beautify their desolate places of abode.”

To *prevent* crime is cheaper and wiser than punishing it.

Those who learn all that is in this “primer,” and need more advanced lessons in order to be enabled to instruct, may do well to procure a copy of “The Tree Doctor,” from

JOHN DAVEY,
KENT, OHIO.

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