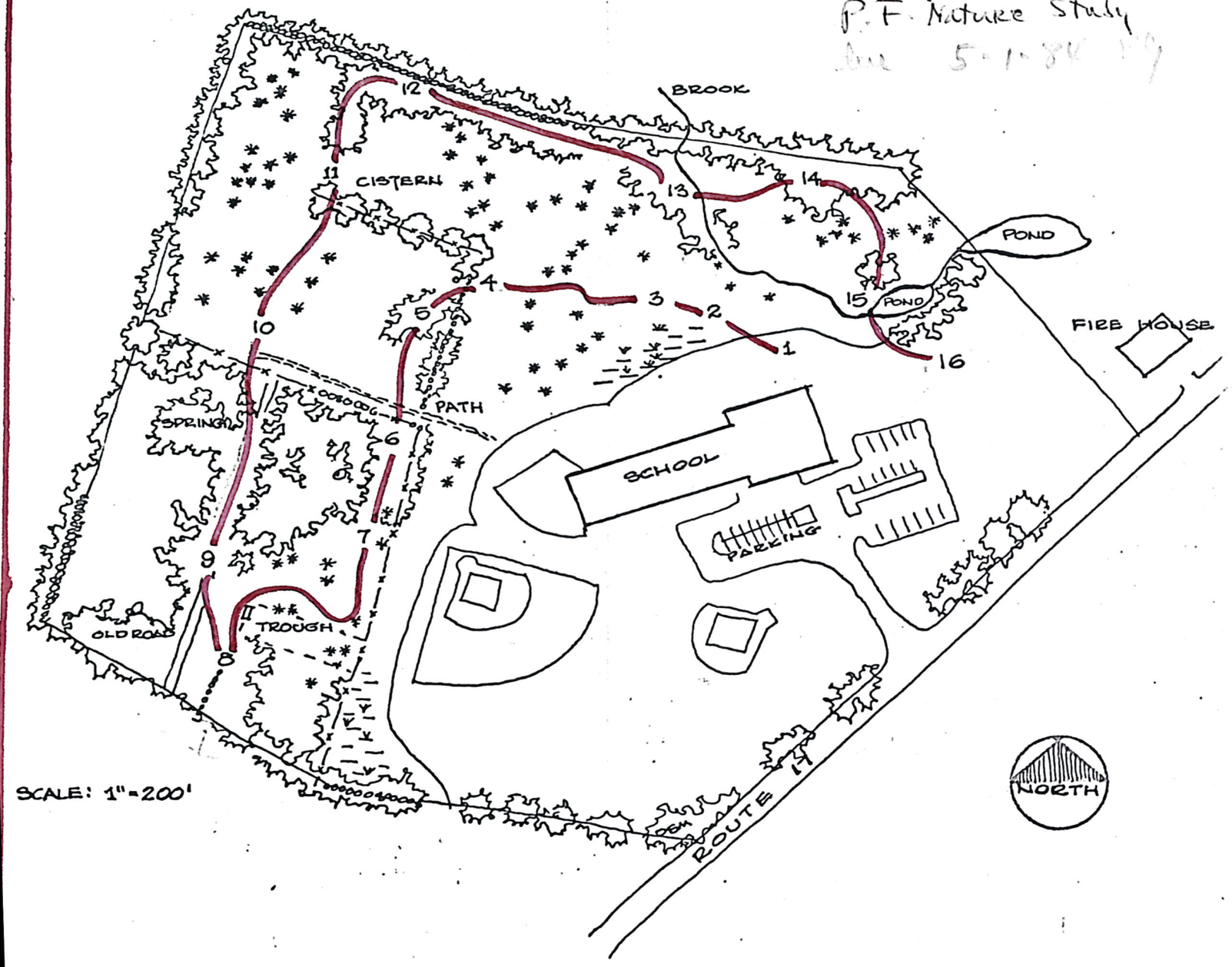
THE NATURE TRAIL



STANLEY T. WILLIAMS SCHOOL

SPONSORED BY

THE NORTHFORD GARDEN CLUB

NORTHFORD, CONN.

AUGUST 1968

THE NATURE TRAIL

STANLEY T. WILLIAMS SCHOOL

NORTHFORD, CONNECTICUT

BY

ELLEN BONWILL

FOR

THE NORTHFORD GARDEN CLUB

ILLUSTRATIONS . . . ANN WETMORE

INTRODUCTION

The idea of creating a nature trail behind the Stanley T. Williams School originally grew from a desire to make use of this interesting natural portion of the elementary school grounds as an outdoor classroom. The aim of the Northford Garden Club is to make this area accessable for study and enjoyment by marking out a trail and providing a trail guide booklet that may serve as a self-guiding trail companion for teachers and visitors of all ages.

Mrs. Ellen Bonwill, Naturalist, known for her Junion Naturalist column in the New Haven Register, and radio program on WELI, was engaged by the club to prepare a guide booklet for the proposed trail. Service Forester Michael Pochan kindly volunteered his professional services to assist in laying out the trail.

The project received the enthusiastic approval of the North Branford Board of Education. Interest has been expressed by schools of neighboring communities in developing similar school nature trails.

Special thanks are due to Superintendent of Schools Burton C. Curtis and Stanley T. Williams Principal Michael D'Ambrose for their co-operation and encouragement. Additional thanks are extended to the many others who have generously given the committee their advice and assistance.

The Stanley T. Williams Nature Trail
Committee of the Northford
Garden Club:

Lydia Davis (Mrs. Frederick A.)
Marty Johnson (Mrs. George K.)
Sue Kolakowski (Mrs. Richard)
Ann Wetmore (Mrs. Edward)
Dorothy McCluskey, Chairman
(Mrs. Donald S.)

NB

DIRECTIONS FOR USE OF THIS NATURE TRAIL

The leader, or teacher, should first walk over the trail, if possible, using this guide.

Background material, together with references, will be found in the back of this booklet.

Consider the length of time available to you. You may plan to cover the entire trail, or use it in sections.

Starting at No. 1, you may go through Station 5, then go up the path to Station 10, and continue to the end, omitting Stations 6, 7, 8 and 9. You may use Station 1-5 only, if desired.

You may go through Stations 1-10, returning by way of the path to the school.

You may start with Station 6, go through Station 10, and return to the school by way of the path.

You may go up the path to Station 10, start there, and continue to the end, and go back to the school.

The interests of the group, the length of time available, the condition of the grounds (wet or dry), should determine your plan for the day.

No NATURE TRAIL is ever completed. Every user will find something new and interesting. Make notes of your finds, so others may profit by your observations. A book will be provided for your use, in recording observations, and experiences. Happy hiking!

The Northford Garden Club,
and
Ellen Bonwill

T H E N A T U R E T R A I L

This trail is planned to help you learn, for yourself, more about the natural world around you.

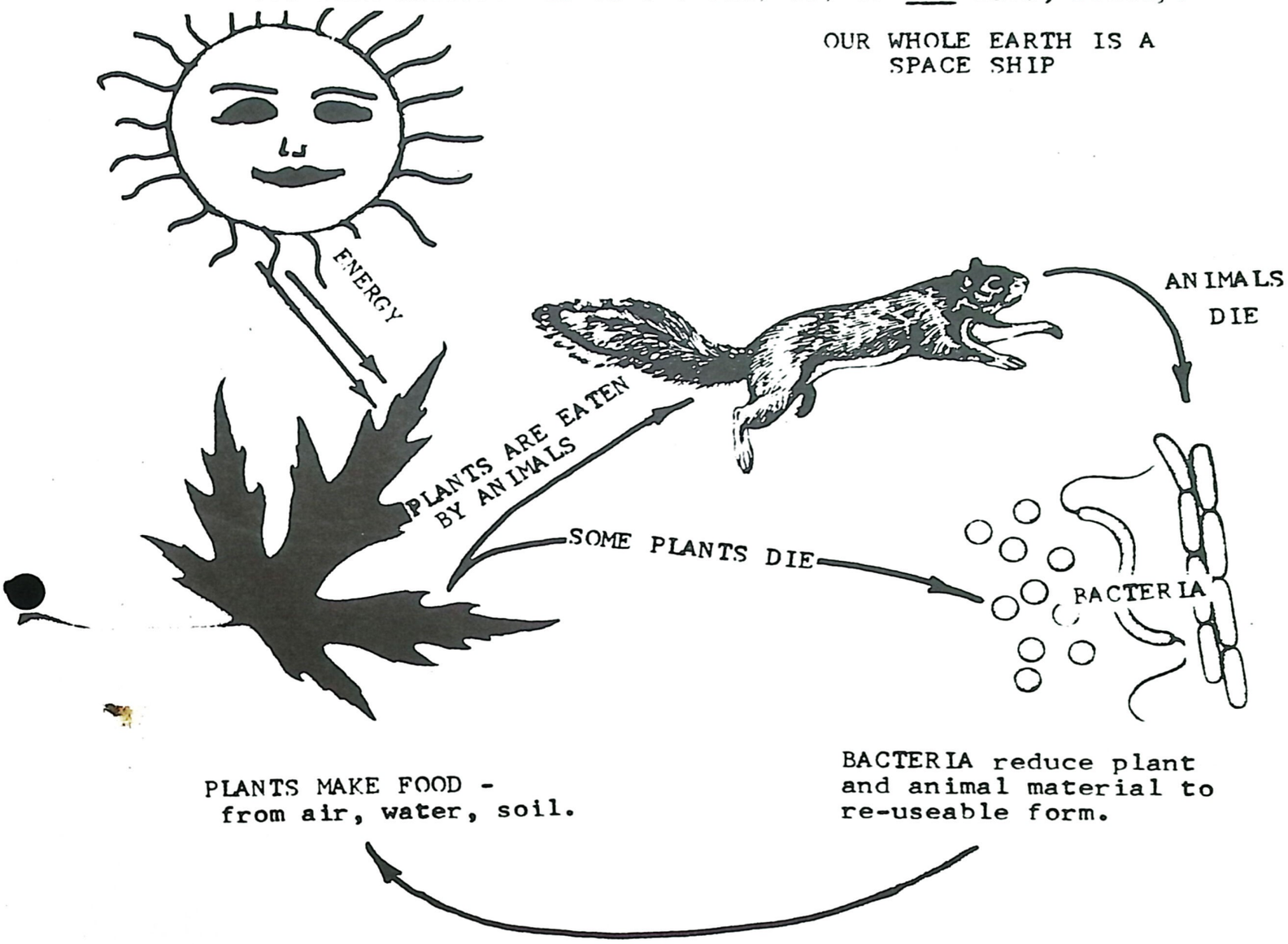
Natural history is not just what is going on today. Today is only a sentence in a long, long story, going backward in time to the very beginning of the world. The story goes forward, too - but no one knows just what the future of the story will be.

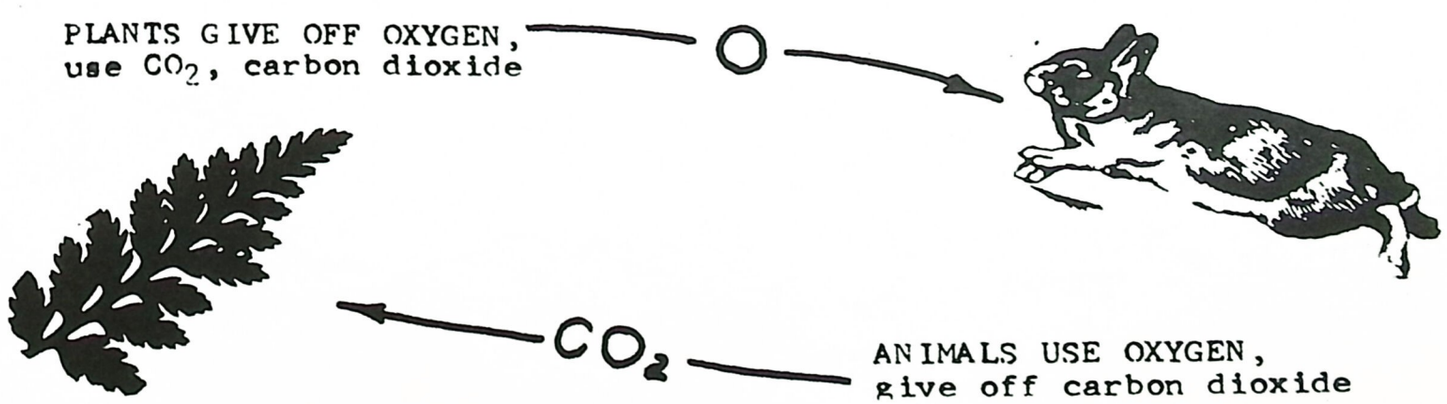
We do know that man must learn to be a cooperative part of the natural world. The air we breathe, the water we drink, the very food we eat are ours only through the productiveness of the web of life that surrounds us.

We must learn to live within this web, without harming it, for it is essential to us. The diagram on the next page shows us some of the relationships between parts of the natural world.

As we walk the nature trail, and observe the things about us, we will see many of these relationships demonstrated. From what we learn here, it is hoped we will develop ideas about man's duty and responsibility to the rest of the world, which makes it possible for him to live so comfortably here on earth.

PLANTS, THE PRODUCERS OF ALL FOOD; ANIMALS, THE CONSUMERS; BACTERIA ARE THE DECOMPOSERS. These produce, utilize, and prepare food materials for re-use. This is a closed circle of production and utilization, as in a space ship. Man, alone, does not operate in this way, but pollutes, and wastes raw materials, so nature cannot keep this machinery going. Can we learn to live with nature? It is the only way we <u>CAN</u> live, really.





STATION 1.

Look across the valley, at Totoket Mountain. This mountain is formed of a hard rock, called trap.

Ages ago, all this area was red sandstone, a rather soft rock. From deep in the earth, molten lava was forced upward into cracks in the soft sandstone. This hardened - and became very hard indeed. It is the substance we now call "trap rock".

So we have the soft, red sandstone bedrock, and, here and there in it, great cracks filled with very hard trap rock. When the Great Glacier came pushing along into Connecticut, like a giant bulldozer, which kind of rock would you expect to get pushed away, the soft sandstone or the hard trap? Which would you expect to be left in place?

Looking at the valley in front of us, we can see that where the sandstone was, we now have valley. Where the trap was, we now have trap still - in the form of mountains and ridges.

As the glaciers, those mile-thick sheets of ice melted, there was lots of water to run off, just as there is lots of water to run off after any other great snowstorm starts to melt. That melting water washed all the bits of loose sand, gravel, and other debris down off the hilltops, and spread it out in the valleys.

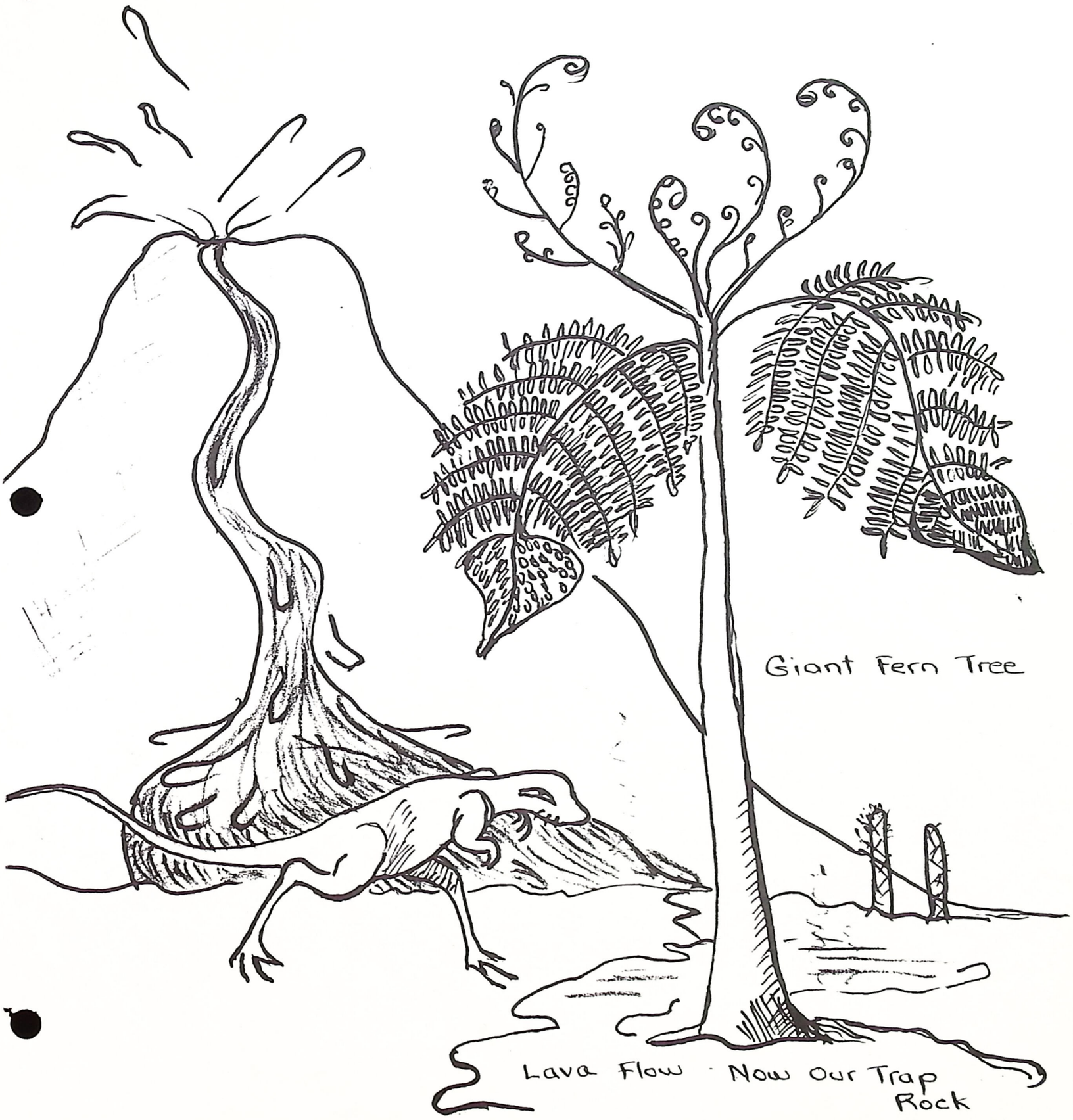
The level area we see between here and Totoket Mountain was formed from this material. We call it a glacial outwash plain. You can see the same thing happening in any gutter, after a rainstorm. Watch and see!

STATION 2.

Nature is always changing. Look about you, and see if you can figure out what this meadow was like 50 years ago. Do you see any trees near you that look 50 years old? Do you see lots of trees that look about ten years old? To help you judge, suppose that a tree about as old as a first grade child is about as tall as a first grade child. Do you see some tree as big as a first-grader?

Ten year old trees would be as tall as a man, or taller. A 50-year old tree would have a trunk as thick as a telephone pole. Do you see any near you like this?

Northford as it might have looked before the glaciers came.



STATION 2.
(Continued)

After you think about what this area was like 50 years ago, think ahead, and try to imagine what it will be like 50 years from now. Will it be open and sunny, or dark and shady? If it goes on as it is doing, will it be a meadow with a few trees, or will it be a woods?

Right now, 1968, this is a young forest, that is called NATURAL OLD-FIELD SUCCESSION. Foresters (those who study woodlands) have named it this, because it is the first step in woodland growth as seen in old fields, after the fields are no longer mowed, plowed, nor grazed. Old fields will have different types of trees in them, depending on what kind of fields we have to start with. This is a wet area, so it has trees and shrubs that do well in that kind of area. We have here a rare tree - the SWAMP WHITE OAK. Others are the alder, hickory, red osier.

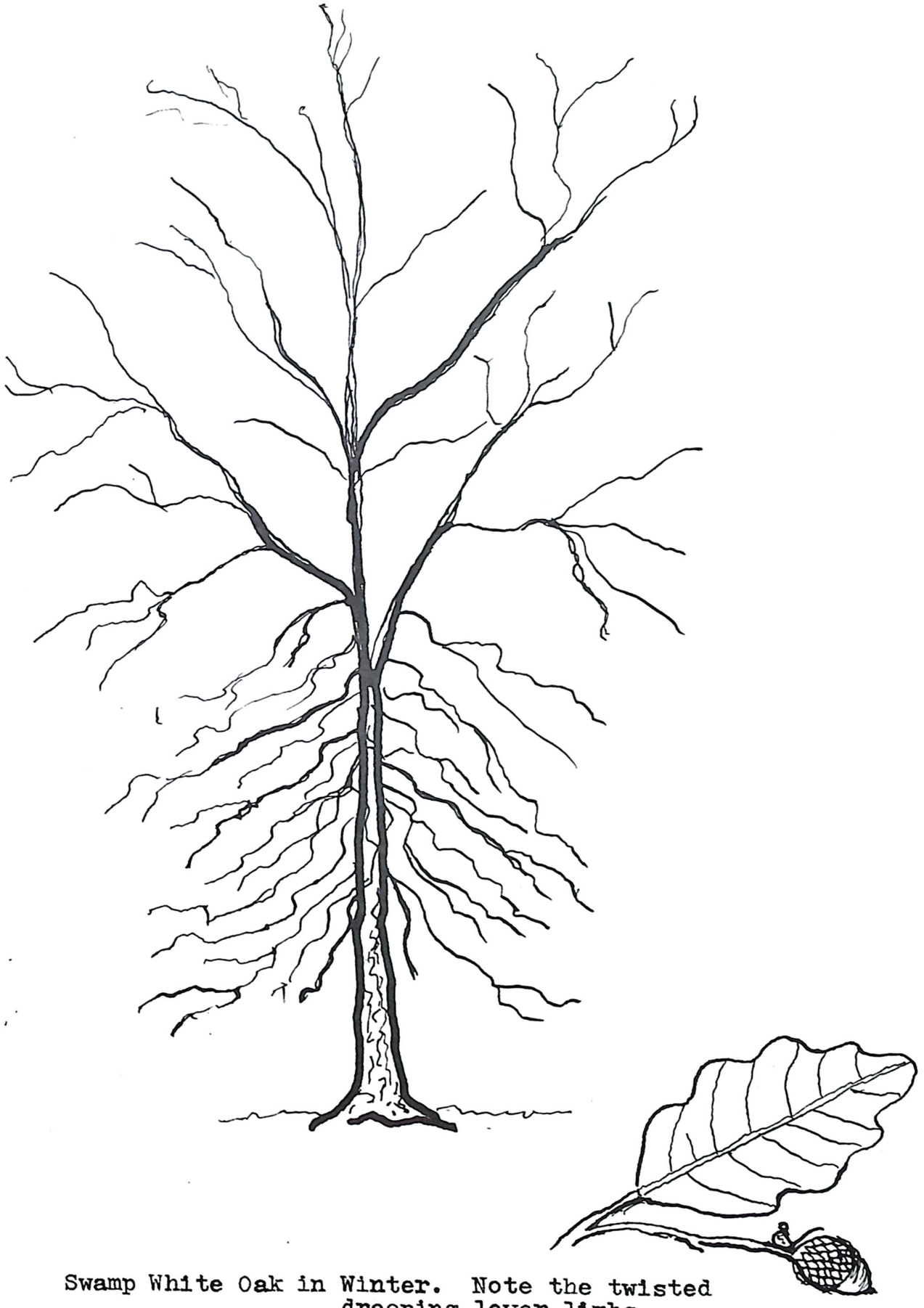
Man did not plant this woodland. Who do you think did? (Look about for signs of birds and animals, or other agencies that might have brought these seeds here.)

STATION 3.

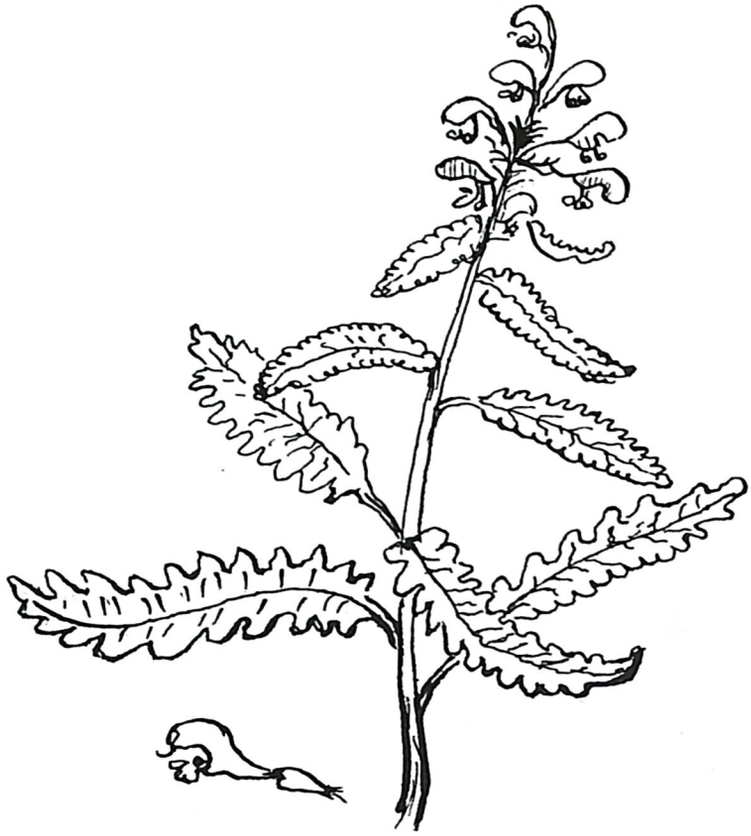
Now we have moved into a dry area. The history of this section is the same as the history of Station 2, but the plants are different. This is because the wet-area plants cannot live here - there is not enough water for them. Look around and see what differences you can see for yourself. Notice the kind of grass that grows naturally here.

This is POVERTY GRASS. Once this must have been pasture, where cows were kept. They could not eat stuff in the wet areas; instead, they grazed, or ate the grass, on this hillside. As they ate off all the grass, the area became denuded -without plant cover, with bare earth showing. When the rains came, the good topsoil was washed downhill by the moving waters. It was hard for trees to get started growing here, for now the soil was very poor, not good for growing plants. POVERTY GRASS however will grow almost anywhere. Once it gets started, it is difficult for other kinds of plants to move in, for this grass is tough and wiry, and can get along in rough places. It prevents other seeds from growing.

When you begin to learn the names of plants, and to recognize the plants themselves, it is as if you find



Swamp White Oak in Winter. Note the twisted drooping lower limbs.



Early Wood-Betony - Snapdragon family -
a tiny fern-like plant between Stations 2 and 3 -
Yellow, bronze, purple flowers in May

Poverty Grass

STATION 3.
(Continued)

a friend every step you take along the path. Here is one way you can remember some of the tree leaves.

All members of the maple family, the ash family, and the dogwood family, plus the horse-chestnut, have opposite branching. The leaves come out opposite each other on the stem. Just remember: MAD HORSE - maple, ash, dogwood, horse-chestnut.

STATION 4.

As we come close to thisstone wall, we can see the giant hickory trees, their shaggy bark hanging all down the trunk. The field behind us was pasture; the field we will reach when we go through this break in the wall was probably a ploughed field. The stone wall is very old.

If you consider all the facts just given, maybe YOU can figure out why the oldest trees in this section are in the stone wall. If they had tried to come up in the pasture, what would have happened to them? If they had tried to come up in the farmer's field, what would have happened to them? What was the one place where trees could grow without being endangered?

We noticed that many of the trees coming up in the old pasture were hickories, and wild cherry trees. Here are mammoth old trees of both kinds. What is the natural conclusion? Who do you think planted the hickories and cherry trees in the pasture? On purpose, or as a result of natural activity?

A stone wall serves two purposes. One is the usual reason for having a fence on a farm. The other has to do with making the land easier to cultivate. Can you guess these two reasons?

This old elm (the one with the vase-like shape) is succumbing to Dutch Elm Disease, caused by a fungus carried by a small beetle.

The vine on the tree, with the massive hairy main stem, is a large old plant of POISON IVY. Whenever you see a vine with this hairy appearance, it is probably this poisonous one. Do not touch it. Observe its leaves well, and remember the verse:

Leaflets three -
Let it be!

Illustration
for Station 3.

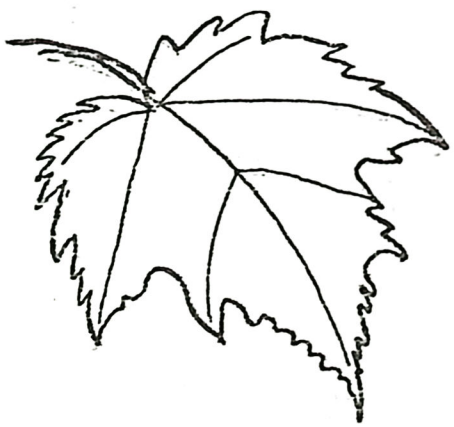
This set of leaves from the tip of a flowering dogwood twig show what we mean by "opposite branching". Each Leaf has another leaf just opposite it on the twig.

Some trees have alternate branching; they NEVER have a leaf exactly opposite; it is always up or down the twig a little bit.

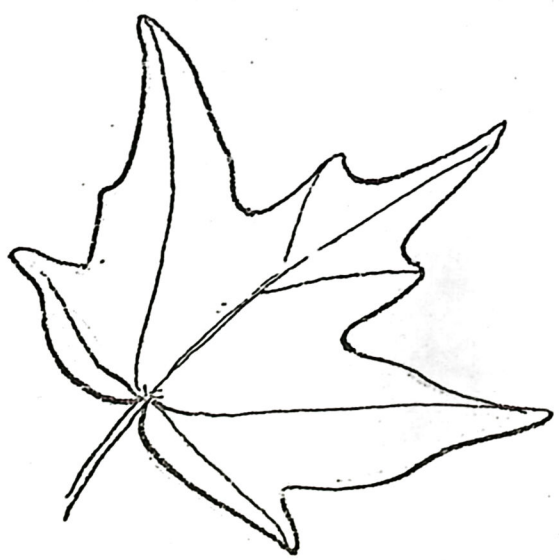
You may know about animal families. Some members of the cat family are lions, tigers, wildcats, and our domesticated pet cats. Plants are arranged in families too.

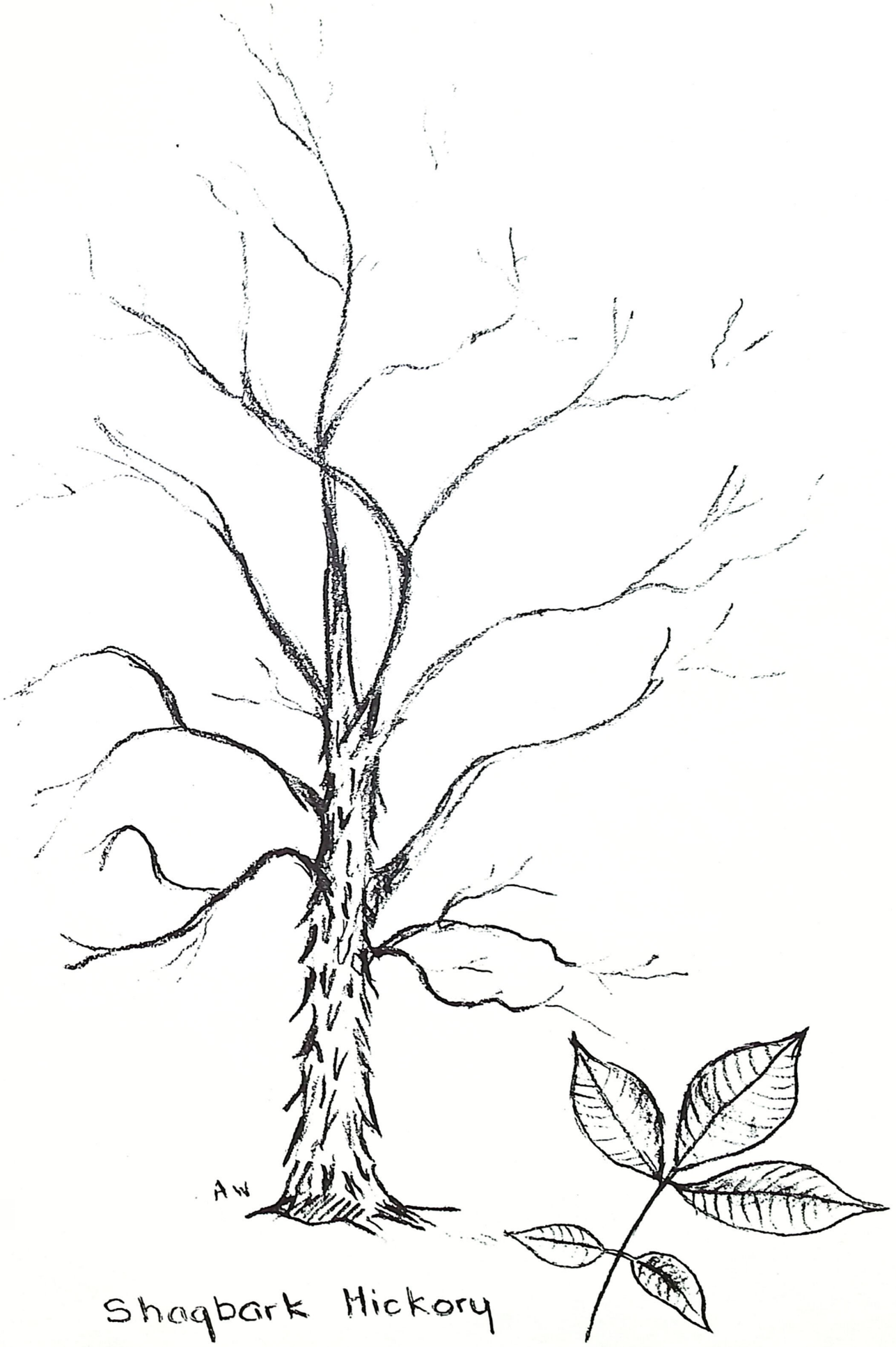
Two members of the maple family are shown below. See that there are some likenesses, and some differences in the two sample leaves - but it's all in the family!

RED MAPLE

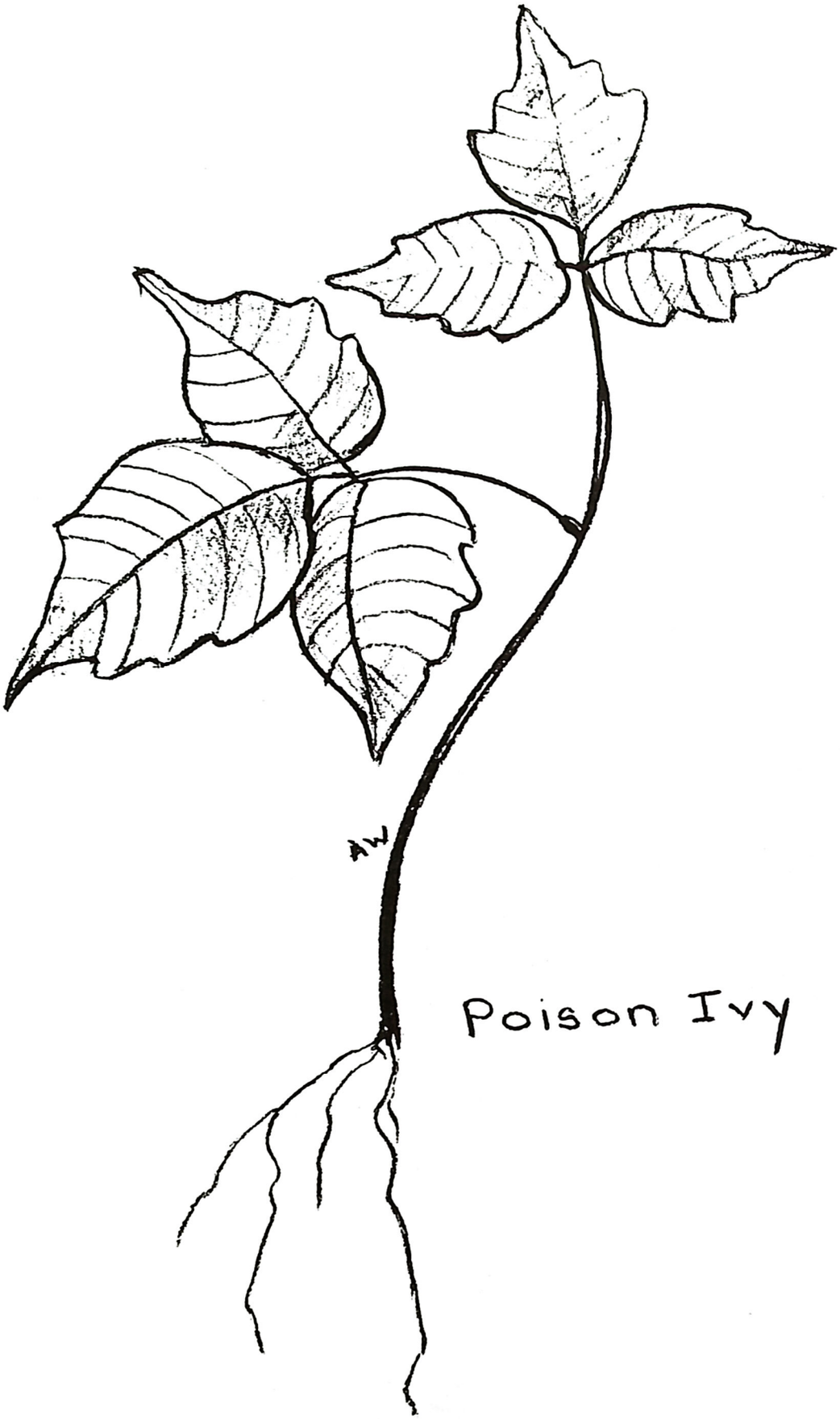


SUGAR MAPLE





Shagbark Hickory



Poison Ivy

STATION 5.

This old ploughed field has a different kind of growth than did the old pasture we walked through before. Notice that the land is more level. Because of this, less of the fertile soil was washed down into the lowlands, the swamp area. More of the rain sank down into the soil, and promoted growth of the plant life upon this area.

Now that the steep hilly part that was once pasture is again woodland, there is less washing of the soil. What does this tell us about wise use of land? When we consider which land should be cleared and used for pasture, what should we look at? Should we consider how much it slopes? Why?

Here we have an aspen grove. Aspen seeds are spread by the wind. Aspen begin to grow in a field shortly after it is no longer ploughed. If we cut one of these larger aspens, we could determine how old it is, by counting the growth rings. What would that also tell us about the date the field was last ploughed?

Aspen trees have the longest east-west range of any tree in the United States. These are called "trembling aspens". Notice how the leaves quiver, when even a slight wind blows. The leaves are hung differently on the stems than are most other leaves.

Do you see any "poverty grass"? What does that tell us about the fertility of this soil? What factors probably helped to maintain the fertility here, as compared with the pasture?

Fertility of a soil is the result of the plants that grew upon it, over a long, long period of time. Grass is a great soil-builder; oaks will build an acid soil; sugar maples will make a sweeter one. Plants capture energy from the sun; using minerals from the soil, water, and CO_2 from the air, they grow, building more plant material. As this decays, and mixes with the mineral soil, it forms humus, a richer plant-growing medium.

STATION 6

As we leave this open field, and move through this stone wall, we come into a different kind of area. Look about you, and see how much evidence you can find that this was NOT a plowed field. What would have happened to a plough-point if it had struck that big rock? Could horses have pulled a farm implement through land where

QUAKING ASPEN

there was so much moisture?

There is definite evidence here that this was once open land, however. What evidence can you find? Do apple trees usually grow in the woods? Do cedar trees ever grow successfully in thick woods? What could this have been used for by farmers?

Woods change the climate of an area, in small ways. They slow down the winds; therefore more delicate wild-flowers can grow. Weeds moderate the changes from wet to dry, keeping the area usually moist. Because of this, mosses and lichens can grow. A rock out in the open sun will stay bare and dry. A rock in the woods will be different. Find a rock, and see what is happening on it. Do not touch nor destroy the tiny growths. They are very slow-growing indeed - a tiny spot of lichen no bigger than a quarter may be older than you are.

Lichens are the pioneers of the plant world; they, alone, can start to grow on bare rock, if sufficient shade and moisture are present. They, like other plants, start to build soil. Find a crack in a rock, and see this process for yourself. You may be lucky, and find spots where moss has begun to grow in the crack. After moss begins to help the lichen make soil, then grasses, or other perennial plants can begin to grow there. If plants had not changed the world in this way, man could not live on it. He would die of heat in the summer, and freeze with cold in the winter. He would have nothing to eat, and would have water to drink only when it rained.

STATION 7.

Succession is a word to describe the natural changes that take place in a given landscape, through the years, through the centuries. Man's influence changes the course of the natural succession.

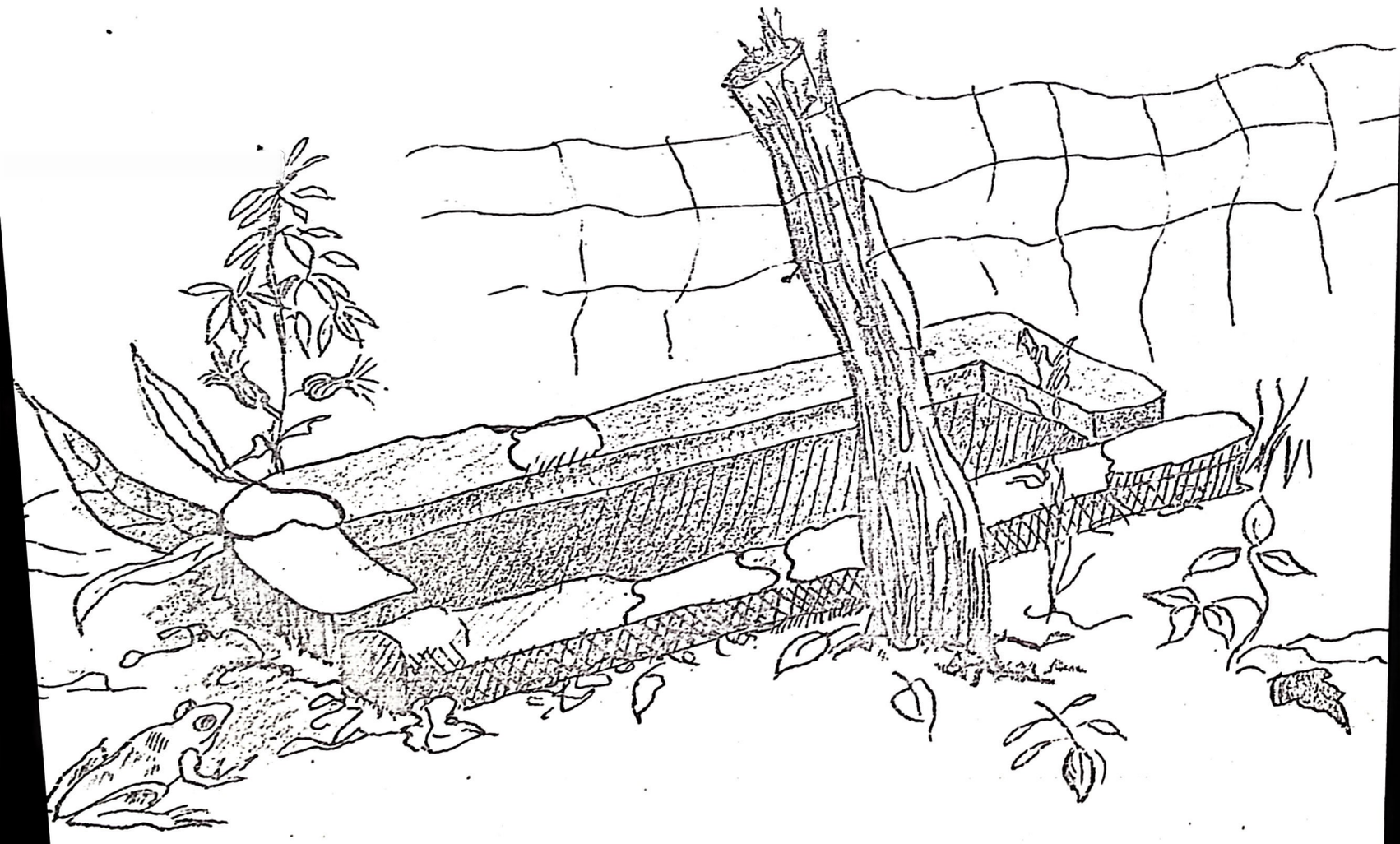
Here, a woodland was once cleared, probably for pasture. Later, man abandoned the field, and nature took up again the natural series of changes toward making this a woodland. The first trees to come in here were bird-seeded, the red cedars; this area was once like the part near Station 3, where we saw red cedar and dogwood, growing in an old pasture. Here we have old red cedars and old dogwood trees. What is happening to the red cedars? What has happened to the old prostrate junipers

THE OLD WATERING TROUGH

Was this a natural stone formation, or did man build it? Where do you think he obtained the material? For what purpose would you suppose it was used? Can you tell what kind of rock was used?

Can you guess where the water to fill it might have been obtained? A visit to a later station on the trail may give us an answer to this question.

Man had to work much harder to earn a living, in pioneer days. Raising animals for food, or for sale, was one of the ways nearly everyone added to his income, or to his home-raised food supply. Consider the hickory nut tree, the apple tree, the blueberry bushes, the maple trees. Have you seen any wild honey bees? How could these have helped the farmer or pioneer with his food supplies?



whose skeletons we see all about us? (The dead low-growing shrubs, whose branches are so sharp and prickly)

Their death was due to lack of sunlight. As their neighbors grew tall and branches out, the new leafy branches cut off the sunlight from these cedars and junipers. Death followed.

Pioneer trees, such as the dogwood, cedar and juniper here, and the aspen in the old ploughed field, help prepare the way for different kinds of trees, such as the oak, maple, beech, and ash, which cannot get started as easily. The pioneers are sometimes called "nurse trees".

Look toward the playing fields, near the school. How are the cedars there getting along? What makes the difference?

In a woodland, the durable skeletons of the pioneer cedars sometimes stand for years, a memorial to the previous growth. Look about you here, and see what differences you can find between this area and those we have examined previously. Which was open land most recently? Which is the older woodland? What changes in the kinds of plants on the floor of the forest can you see? Are they the same kinds of plants?

STATION 8

This old stone wall was put just here because there was a rock too big to be moved - so it was used as the base of the wall. Here, we can see, and feel, the two kinds of rock we talked about at Station 1, when we were discussing the geology of this region. Remember the soft sandy sandstone? See if you can find some of it here. The angular, hard rock, with a rusty color, and a bluish interior is trap, the rock we crush to make roads.

Here in this woodland the work of the natural world is going on all about us.

Plants, the producers, are making the food for all the world. Their raw materials, water, minerals, air, are here in good quantity. Sunlight, the energy by which they do this work, comes from the sun in daily doses. Through the growing season, the plants make their new growth.

STATION 8.
(Continued)

Animals live on this new growth, or on the products of it, such as nuts and fruits and leaves. Some animals, very small ones, live on the wood of the tree, in its growing form, or in its decaying form.

As plant material and dead animal material falls to the forest floor, a new series of creatures, very minute, come into the action. These are the bacteria, without whose help the circle could never be completed. Bacteria break up the dead plant and animal material into simpler forms, resulting in the humus we see on the floor of the forest, under the dead leaves. This is a rich mixture of soil particles, mixed with broken down bits of leaves, and further enriched by the dead bodies of the soil bacteria themselves. These tiny creatures thrive in moist warm soil. There may be as many as thousands of soil bacteria and protozoa in a spoonful of fertile woods soil, on a warm, moist summer day.

STATION 9.

"There was once a road through the woods -
Many a year ago. Weather and rain
Have undone it again, until now you would hardly know
There was once a road through the woods."
- Kipling

What happens to the things man builds, when man no longer takes care of them? This must once have been a well-used road. See how nature's forces of weather, plant growth, erosion and gravity have all played a part in making this road become again a part of the woodland. However, it is not yet gone - we can still see it. When the road comes out into the open to cross the part that was once a ploughed field, let's see what happens to it.

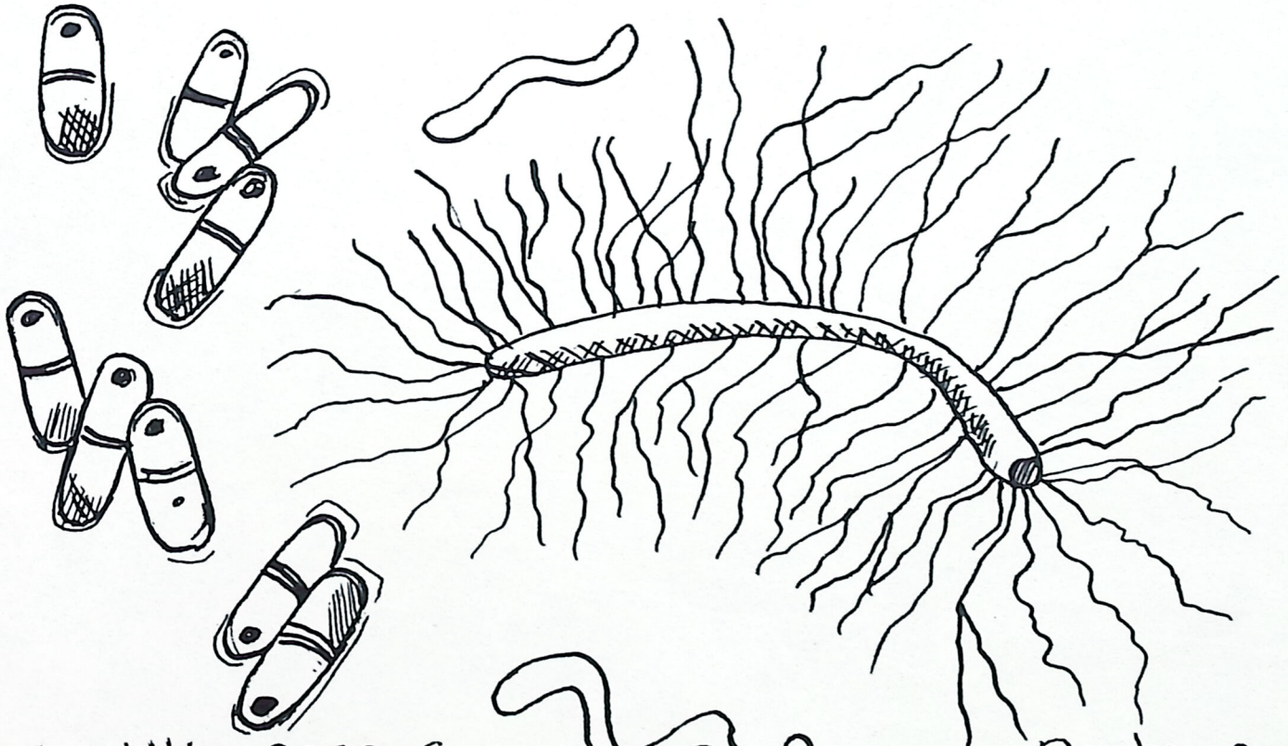
See the wet area here. This is a sort of spring-head, an area where underground water emerges to the surface. Do you see the channel, or perhaps it is a man-made ditch, that goes down-hill? Do you suppose this may have been the source for the water needed to water the animals?

Notice that the vegetation is different in different places, depending upon the amount of sunlight, the amount of moisture, and the amount of shelter, such as fallen trees.

Mosses and ferns are doing well here.

Jack-in-the Pulpit

Some different kinds of Bacteria



Bacillis cereus

Spirillum rubrum

Proteus vulgaris

STATION 9.
(Continued)

Springs occur only where water has been able to sink into the soil and saturate it, emerging farther downhill as streams of water. If all the world were paved over, would we have springs? Where would water go then?

Your local water company sets aside large areas of land to act as catch basins for good water, to be used for the entire community.

F E R N S

Ferns are non-flowering plants, like the lichens and mosses.

Some grow in the form of a circle. The Christmas Fern, named so because the pinnules look like Santa Claus' Boot, is one of those which grow from the circular root-stock. Other ferns grow from a running rootstock, an under-earth root that keeps going, on and on, sending up fronds now and then.

Once ferns grew 60 feet tall. These treeferns were the plants that formed our coal-beds.

Some ferns are evergreen; others die down to the ground in winter. All are perennials, living over from one year to the next, not growing each year from seed.

Some ferns grow only in sun; others prefer semi-shade. Still others are found only in deep, moist woodlands.

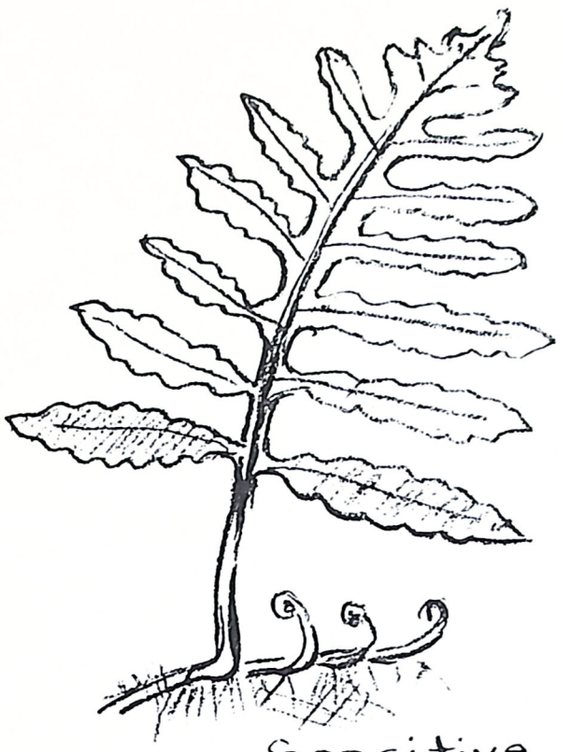
STATION 10.

Here we stand between two different kinds of woodlands. Here we have what is called the EDGE RELATIONSHIP. There are more animals and birds apt to be seen here than in the deep woods or the young, new woods. Creatures come out of the deep woods to feed in the open, new woods, and to enjoy the morning sun. They may go from the new woods into the depths of the old woodland, to hide their young ones.

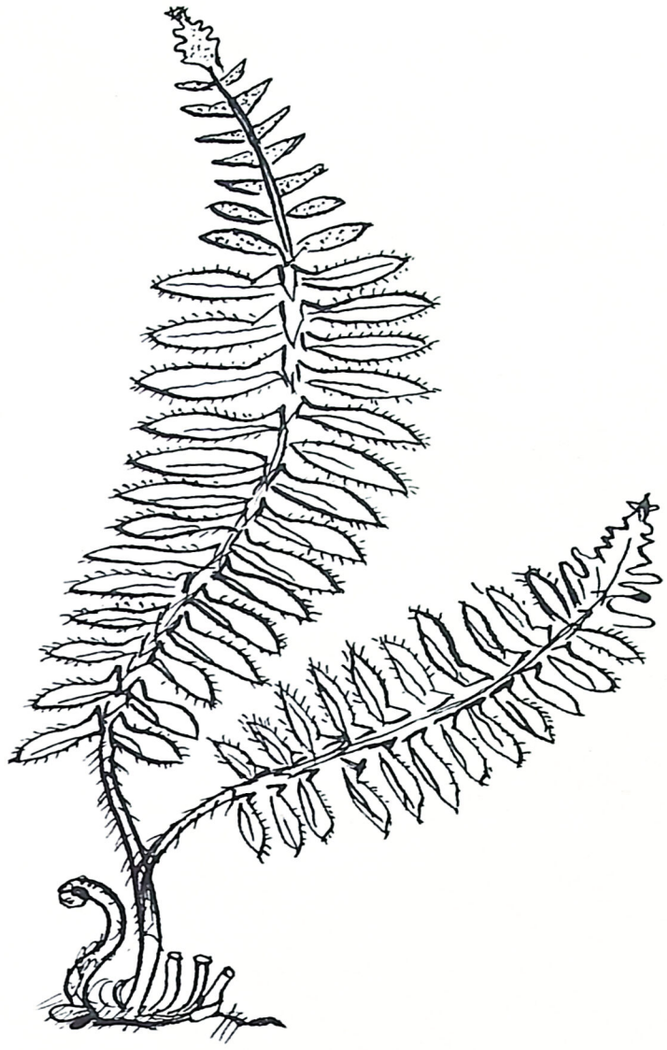
Climate is the weather over a large area, over a long period of time. Micro-climate is the weather in a small pocket, or a small area. If that area is exposed, as on a mountain-top, the micro-climate will be colder. Will flowers begin to bloom as early there? Will animals like to make their winter homes there?

If your small area is a protected pocket, with lots of sunshine, and safe from wind, spring, with unfolding leaves and bright blossoms may come as much as a week earlier because of the warmth. Will animals like this? Why?

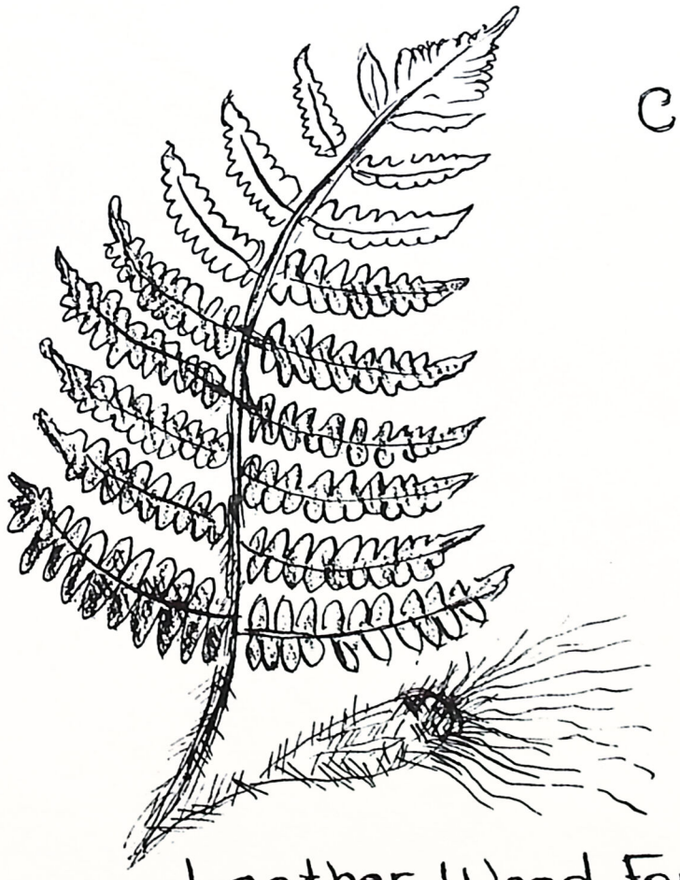
Find These



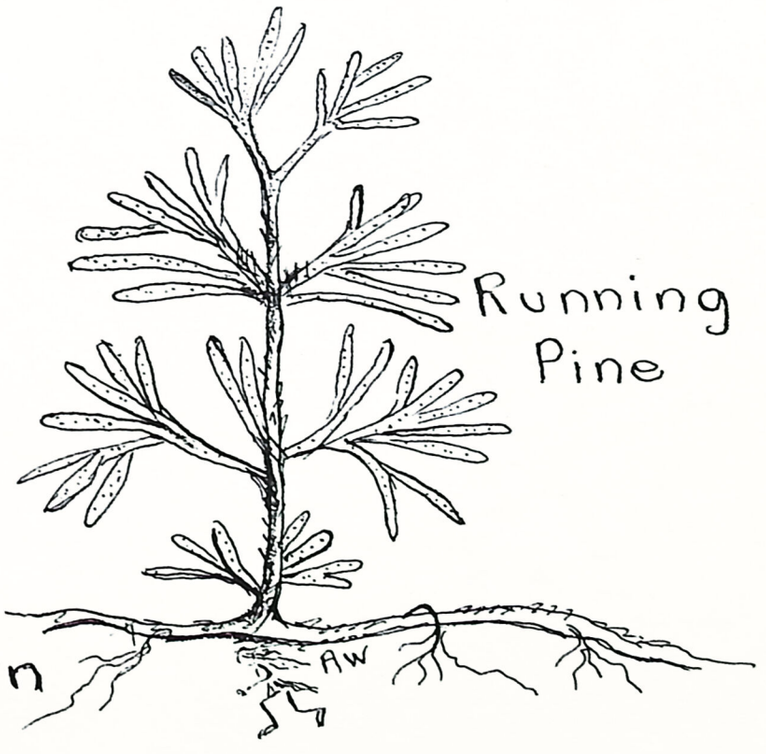
Sensitive Fern



Christmas Fern



Leather Wood Fern



Running Pine

STATION 10.
(Continued)

Climate is different on different sides of a hill. On the north side it will be cooler and more moist with less sun. On the south side it will be warmer, drier, and sunnier. When you get back to the school, check the temperature on the sunny side and on the shady side of the building. You do not need a thermometer - you will be able to tell, just by moving from one spot to the other that the temperature is different. You will find this same change, in smaller degrees, on opposite sides of a big rock, a stone wall, or a woodland. You find a difference under a tree and when you step out of its shadow into the sun. This is called a change in MICRO-CLIMATE, or "little climate".

Nature is dynamic, always changing. As we stand here, we can look back at the "old woods" through which we have been walking, and look forward to this "new woods", into which we are going. There are great differences: different kinds of trees, flowers, undergrowth, all of which we can see. What we cannot see is that the kinds of birds and animals will also be different. This "new woods" will probably be richer in wildlife than the old, for there is more food available here. There is more grass, for rabbits; there are more berries and apples for birds, squirrels and chipmunks.

What is really going on here? There are many, many things. First, the sun's energy is being trapped by the green leaves you see about you. Drawing their raw materials from earth, air and water, these green leaves, by means of this sun-energy, convert those raw materials to carbohydrates. These, either in their plant form or transformed by animals into some other form, are the substances which feed the whole animal world.

Man cannot transform these raw materials into food, no matter how he tries. He MUST have the help of plants.

Second, these green leaves are giving off oxygen, the part of the air that animals MUST have to live and breathe. Without the oxygen plants make, animals would perish.

Third, the plants are building soil as their leaves drop and decay. Fourth, these plants are changing the climate of this area. They cut down the wind; they form warm pockets where wildlife can live. They help keep rainfall from running off, downhill. Plants are our greatest and most essential helpers in our life on earth.

STATION 11.

What evidence do you see here of man? Why do you suppose man built this? Look downhill and walk a little way toward the school. Can you find an overflow from this natural spring area?

Did the man who lived here have electricity? How do you suppose he heated his home?

Can you find the big old trees and bushes, still living, from which he got his winter's fruit supply? Could he go to the store and buy oranges, and bananas, do you think? Perhaps you can look up information about pioneer life and find out how pioneers stored their winter foods.

As this trail came through the fence-row, there was a pink rock, round and smooth. This is a GLACIAL ERRATIC. It is a rock which was brought here by the glacier; it is not like our bedrock.

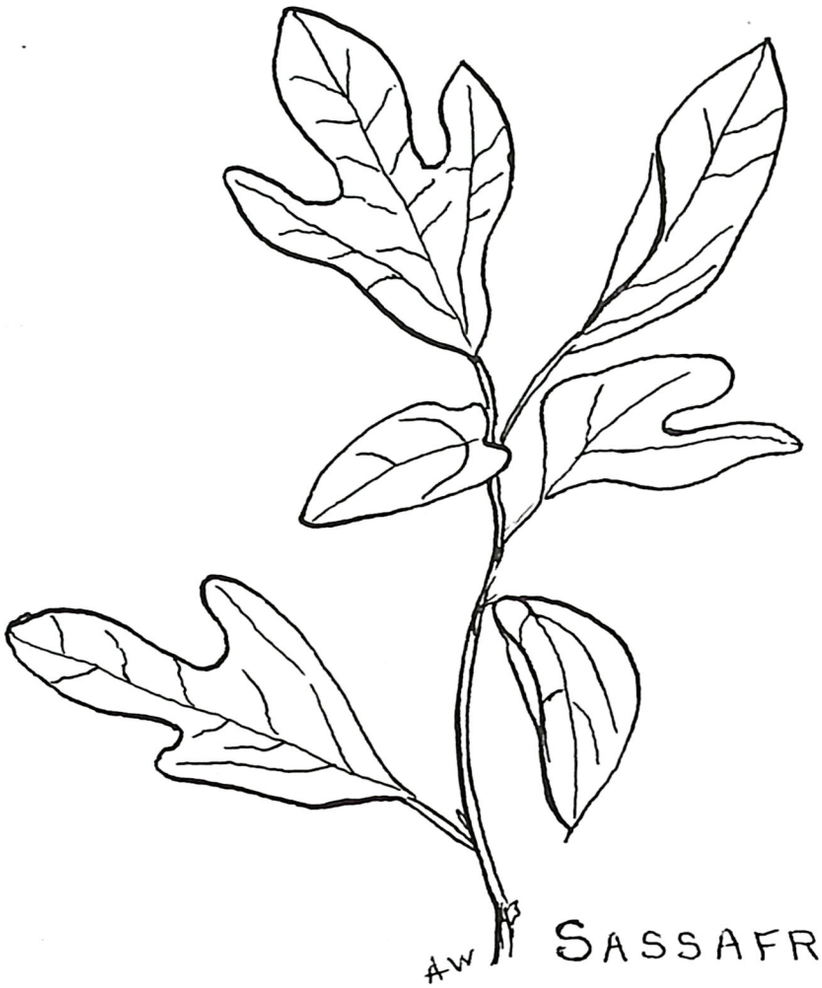
At the right time of year, the view out over your school to the mountain is very beautiful. Could this be one reason the pioneer built here? Think of all the reasons you can for choosing this spot.

If the old road from Station 9, were continued across the field, it would come right near here. This was probably the case.

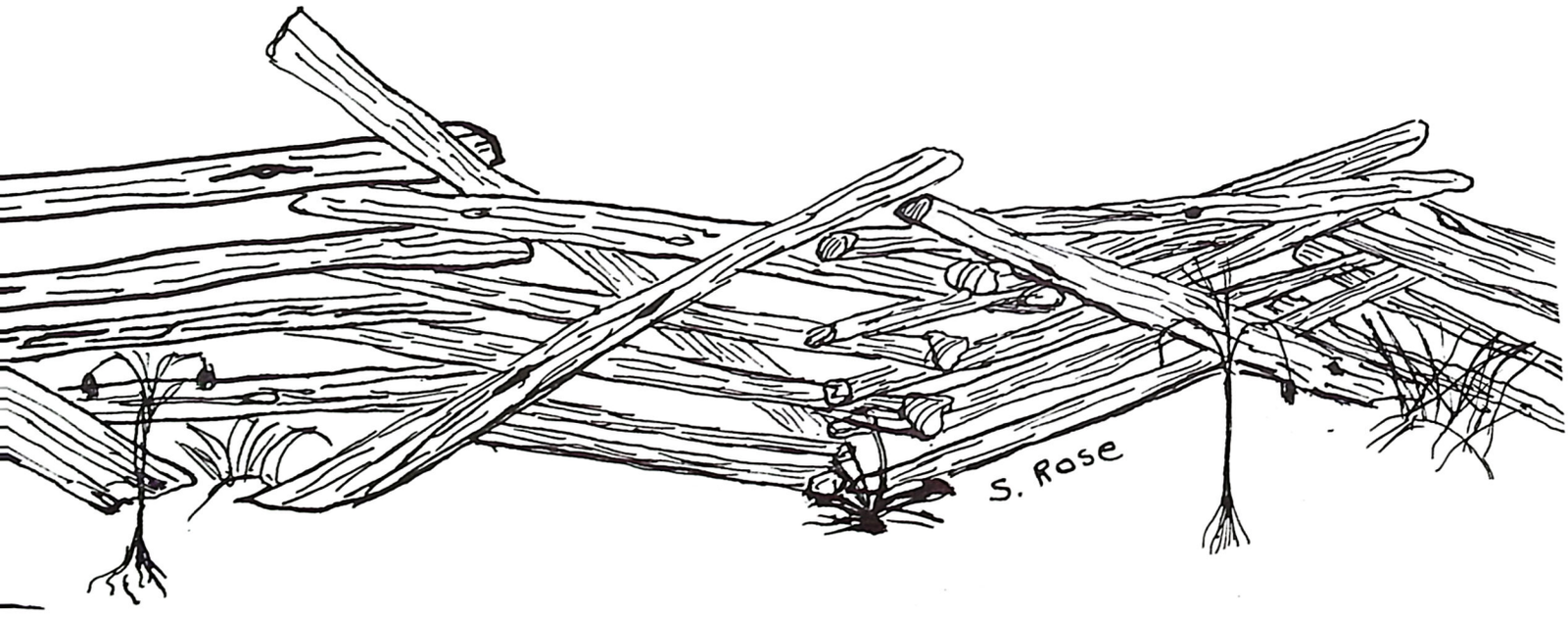
At yourschool are some old nails, hand-made, square-cut. They came from a part of the old rail fence here. Perhaps you can see bits of the old fence, still in place. Why did pioneers build of rails? How did they get the rails for the fences?

We hope to gather more information about this pioneer who lived here. If you know anything of this history, you are invited to add your bit to what has been gathered.

Some rock is easy to 'work', to cut into blocks for building. Sandstone, the rock used for the curb here, is one of these. Find out where sandstone is quarried in your town. What other thing, not far from here, is built of red sandstone?



SASSAFRAS LEAVES



AN OLD WORM FENCE

STATION 12.

Look across the wall, into the deep woods here. These are older woods than any we have seen so far. Do you think this area was ever ploughed? Was lumber ever cut here? Give reasons for your answers.

Growing in this stone wall, we find some trees with deeply furrowed bark. These are SASSAFRAS trees. The leaves, bark and roots are all used in making sassafras tea, and in root beer.

We have seen several springs on our walk. At our right, as we go downhill, we see a ditch. This may have been man-made, to drain off extra water, or it may have been a natural wet-weather overflow from a spring. There must be some good-sized reservoir of water uphill, beyond the school property, which permits the water to seep down, underground, until it reaches what is called an "IMPERMEABLE" layer. This is some hard layer of material, such as clay, that will not let the water sink down. The water runs along this layer, downhill, until it finds a way to the surface. We call such a spot where water comes naturally to the surface, a spring. There has been a whole series of springs as we came along - one by the old road, one by the cistern, and now this.

Observe this old stone wall and see how many kinds of rocks you can identify. You should surely be able to tell sandstone, and trap rock, and pink granite. Do not remove rocks - just look at them. Note their colors; this is one of the best guides to kinds of rocks. If you find a strange one (and you may!) get a rock collector to come tell you what it is.

STATION 13.

This brook is probably fed by springs and by natural run-off water from a large area. There is a difference in the soil at the bottom of the brook from that on the rest of the area we have seen. What is the difference? What do you call the kind of soil you see here?

Notice that the brook has sometimes had more water in it - the soil piled up in a bank was brought down by the spring floodwaters for this brook, just like the rivers, carries off the excess water after the winter snows melt, or after a heavy rainstorm.

This is a good place to look for animals' footprints because they come here to drink. If you put some bait here, such as suet, or a chicken neck, or an apple or carrot, you may be able to see the tracks of the animal which comes to eat your bait.

A very old apple tree. Who planted it?

STATION 13.
(Continued)

Look closely at the flowing water. Is there anything moving besides water? Sometimes you can see grains of sand or mud moving too. At other times, you may see tiny creatures that live in the brook, such as dragonfly larvae, or tadpoles, turtles, or frogs.

The amount of moisture in the soil causes a change in the kinds of plants that grow there. Here you may see some wild iris in bloom, and some different kinds of water-plants, growing right in the water. Pick just one leaf of a water-plant, and see how "watery" and juicy it is. Are dry-land plants like this, most of the time?

These multi-flora roses are often planted to aid wildlife. They provide both food and shelter for birds, and good shelter for animals too. How would you feel about building a nest in a rosebush like this, if you were a small bird? How would you feel about a rosebush, if you were a rabbit?

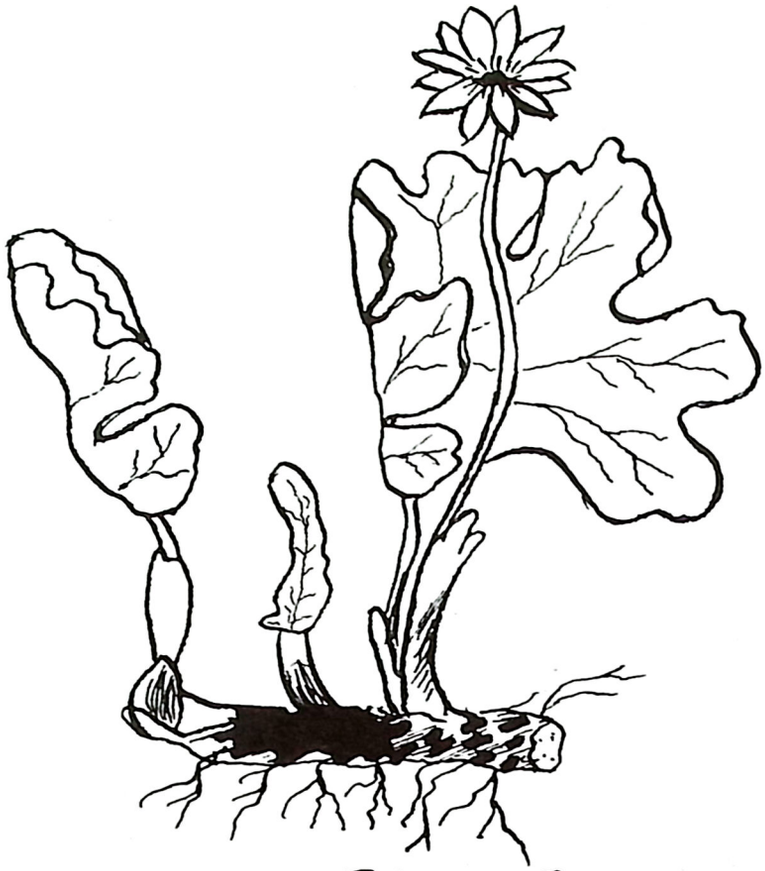
STATION 14.

Here is where we have a great quantity of interesting, unusual spring wildflowers. You will find bloodroot, trillium, tall meadow-rue, and others. Pink ladyslippers have been planted nearby.

Who do you think lives here? How big an animal is he? Is he a good digger? Can you think of any good thing he does for the world?

Look back down at the open meadow between you and the brook. That is a small flood-plain, just like the flood-plain of the great Mississippi River. Like that, too, it is rich soil, and plants grow well there. Probably because the plant life is so rich and thick, trees cannot get started there. Baby tree seedlings are choked out by the growth of meadow-rue, goldenrod, and other herbaceous plants. (Herbaceous means without woody stems) Is a tree herbaceous? Find some plant near you that is herbaceous. (Do not pick it!)

Did you know plants have a DANGER-POINT? A tree's danger-point is passed when you cut the bark, all the way around, girdling it. What will happen to the tree then? Does it hurt a large tree if you pick a leaf? Two leaves? A whole branch? Some plants, however, have only one leaf. If you look closely at the bloodroot, or May-apple, you will



BLOODROOT

TRILLIUM

MOCCASIN ORCHID

STATION 14.
(Continued)

see this is true. What will happen if you pick the May-apple's one leaf? It has a very much lower "danger point" than a tree has. Therefore, it, like other rare wild-flowers on the conservation lists, needs our help and protection. Some flowers, like daisies and buttercups and dandelions, we can pick freely without worry. They do not have a low "danger point".

STATION 15

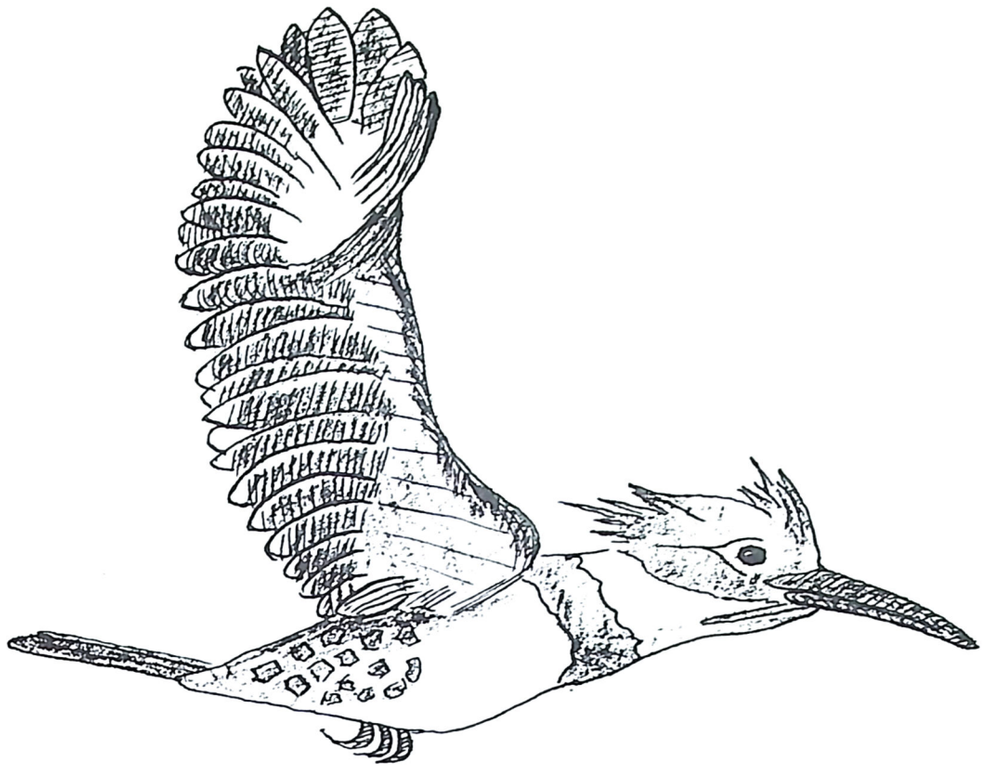
A pond ia a wonderful place to watch all kinds of things. Ponds have different kinds of things living in them. Here you are sure to see tadpoles, dragonflies, and other water-loving creatures.

Because a pond produces a lot of food, such as hatching mosquitoes, tadpoles, small fish, and others, larger creatures come there to eat. You may see a king-fisher, or even a heron. They will be trying to catch themselves a dinner from the pond.

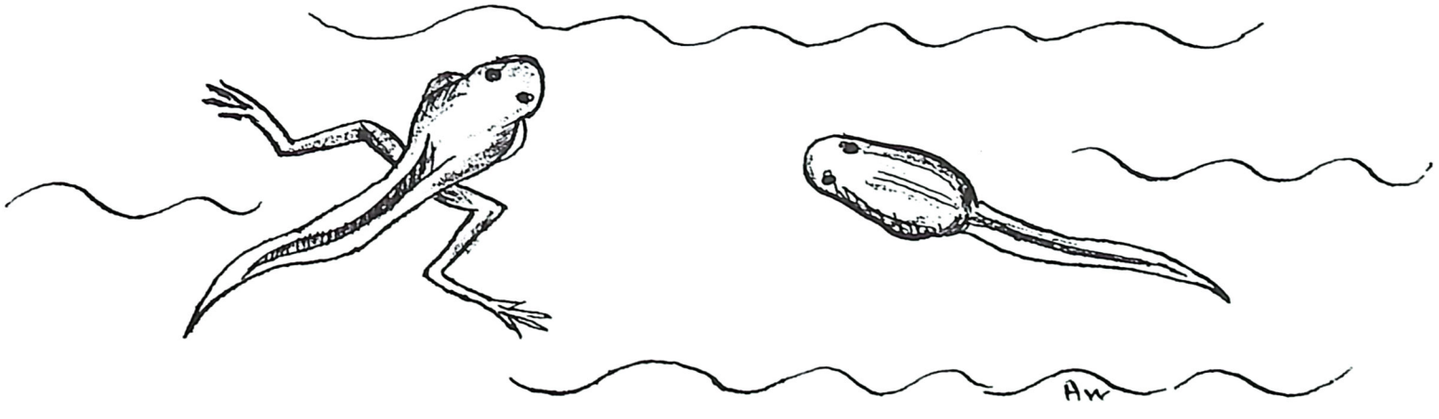
In early spring, frogs will congregate here, to lay their eggs. Later, we can find the jelly-like strings of eggs, and hatch some out in a glass jar. Or you may catch some tadpoles, keep them in an aquarium until their legs grow, then let them loose in the fields back of the school. You can feed them bits of lettuce, the inside of a tulip leaf, then later, tiny bits of hamburger, or fish food.

Around the edges of a pond, we can sometimes see ZONATION. Water plants grow in the shallow water. Cattails will grow along the edge, where land and water meet. Land plants then begin to grow where the bank begins. See what kinds of plants you can find here, that have not been seen on other parts of the school property.

We saw soil being carried downstream by the brook. The brook stops running so fast, when it comes to the pond. What happens to the soil? If you probe in the bottom of this pond, you would probably find a layer of SILT. This is fine-grained soil, water-deposited. It is usually quite rich in plant nutrients. Water that has been carrying sediments, drops the sediments when the flow slows down. If there is much erosion of soil from banks and fields, the sediments may fill up a pond, so it is nothing but a mud pond, with no space left for water. Can many things live in it then? What holds the soil in place on the banks, so this will not happen here?



You can see the kingfisher beating his wings furiously 15 or 20 feet above the pond. He will stay put in space then drop like a bullet into the pond when he spies a polliwog.



STATION 16.

We have seen many stages of development of plant cover, and we have seen the different kinds of plants that grow in moist, or in dry places. Here we see a place where the plant cover has been totally removed. Check to see what the micro - climate is like here. When the sun shines, is it warmer or cooler here? At night, will it be warmer, or cooler than in a woodland?

When it rains, what will happen to the rain-water? When the weather is dry, where will it be drier, here or in a woods?

Turn back to the information on STATION 10, to check your answer, and to find the reason for what occurs.

If you were an animal, would you like to live in an area like this? What would you eat? Where would you hide? What would you drink?

The material exposed here is the sort if stuff that was washed down off the hills, when the glaciers melted. This is part of an OUTWASH PLAIN, and this is composed of layers of sediments.

Remembering that as water slows down, it drops its sediments, and that only fast-moving water can carry heavy pebbles, what would you deduce about the water which brought these sediments here?

Do you think these sediments were dropped all at once or over a long period of time?

First lichens, then perennial plants, then trees, or grasses, will be the natural succession here. It takes grasses about 1,000 years to build an inch of topsoil. How many years might it take before this area became rich enough to grow trees? Think back to what the soil was like in the woods, and on the old road where you walked.

CONCLUSION

Nature is like a great engine, or a tremendous factory. All around us, we see her at work.

She is building soil, making food, making oxygen. Through her plants, she is changing the climate, she is causing water to act differently than it would if the plants were not there.

Man could not live without the help of nature; she is the supplier of his food, his drinking water; his helper in living in the world.

When man dumps garbage into the streams, he is interfering with the natural production of food for wildlife, and for himself. This is because that pollution goes on downstream, to pollute larger rivers, and the Sound where our fish, oyster and clams grow.

When man strips the hills of all plant life, he lets the rain carry off the richness of the soil, so no food can now be grown on that section.

When man lets smoke and chemicals go off into the air, he is poisoning the plants touched by that air. The plants can then no longer give off oxygen - and this man needs, as do all other animals.

When man pumps pesticides onto plants, he may be poisoning many different kinds of wildlife, such as earthworms, birds, bees, butterflies. Some of these, such as bees, are necessary to us, to pollinate our fruit trees; other, such as the butterflies, are living works of art, not to be destroyed.

Man must learn to live with nature, as a cooperative part of the natural world. Only by learning about the relationship between plants, animals, man, and the rest of nature, can we begin to appreciate the great interdependence of each part with the other.

Conservation is WISE USE, for all, forever. Not just for man, not just for the birds, not just for the forest - but for all.

Conservation Pledge

"I give my pledge as an American to save and faithfully to defend from waste the natural resources of my country — its soil and minerals, its forests, waters and wildlife."

Smokey says PREVENT FOREST FIRES!

U.S. Department of Agriculture
Forest Service 65-CFFP-21

Connecticut State Park and Forest Commission

☆ GPO : 1964—O-744-544

SMOKEY THE BEAR

By STEVE NELSON and JACK ROLLINS

1. With a Ranger's hat and shovel and a pair of dungar-ees you will find him in the forest always sniffin' at the breeze. People
2. You can take a tip from Smokey that there's nothin' like a tree, cause they're good for kids to climb in and they're beaut-i-ful to see, you just
3. You can camp upon his doorstep and he'll make you feel at home, you can run and hunt and ramble any - where you care to roam. He will
4. If you've ever seen the forest when a fire is running wild, and you love the things within it like a moth-er loves her child, then you

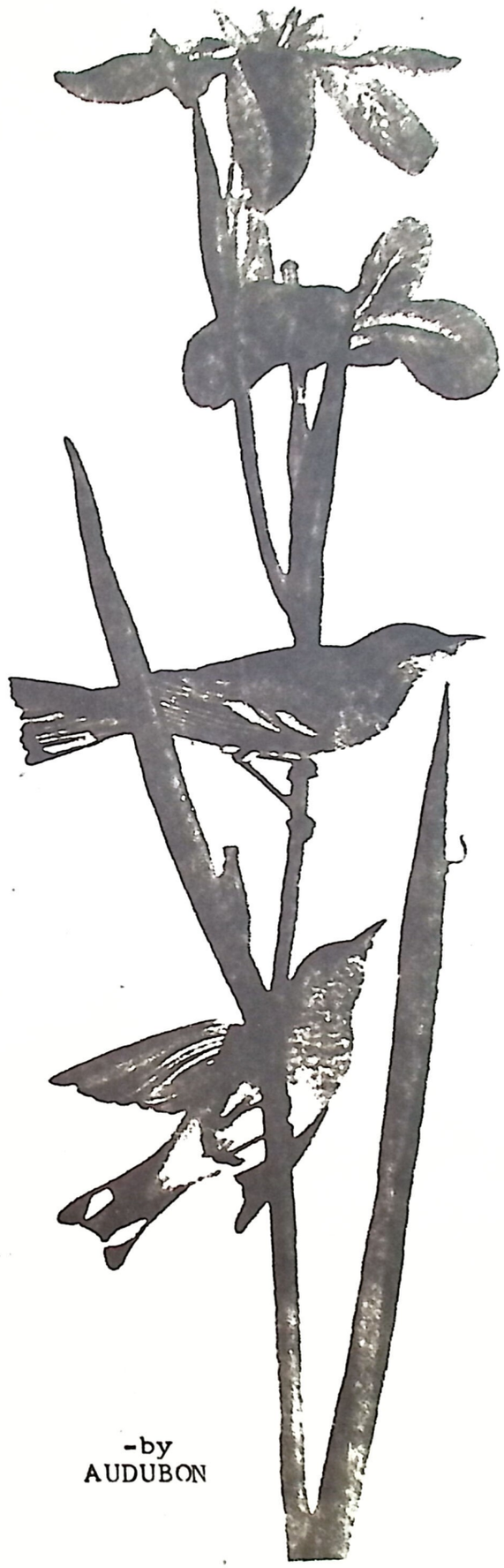
stop and pay at-ten-tion when he tells 'em to be- ware, 'cause
have to look a-round you and you'll find it's not a joke, to
let you take his hon-ey and pre- tend he's not so smart, but
know why Smok-ey tells you when he sees you pass-ing through, "Re-

ev'- ry - bo-dy knows that he's the Fire Pre- ventin' Bear.
see what you'd be mis-sin' if they all went up in smoke.
don't you harm his trees for he's a Ran-ger in his heart.
member... please be care-ful... its the least that you can do."

Smokey - the Bear, Smokey - the Bear. Prowlin' and a growlin' and a

sniffin' - the air. He can find a fire - before it starts to flame. That's

why they call him Smokey, that was how he got his name.



-by
AUDUBON

15. PARULA WARBLER

(COMPSOTHLYPIS AMERICANA)

TEACHER'S GUIDE

for

NATURE TRAIL

Stanley T. Williams School,

Northford, Connecticut

NOTE:

This material has been prepared by Ellen Bonwill, for use by the NORTHFORD GARDEN CLUB, and the staf of this school, for educational and recreational uses, at the schoo

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TEACHER'S GUIDE

GEOLOGY:

Dana: WALKS AND RIDES IN CENTRAL CONNECTICUT AND MASSACHUSETTS is an excellent small book, giving the geologic background of this area.

A sample of trap rock, and of sandstone, should be carefully examined before you take children on this trail, for the pleasure will be multiplied for them, if they can collect specimens. These may be obtained adjacent to a road, or parking lot, often.

With the geology, as with the rest of the material, the teacher, or several together, should use the book, and go over the trail, BEFORE taking a group on it.

BOTANY: Become familiar with ASPECT, ZONATION, and MICRO-CLIMATE.

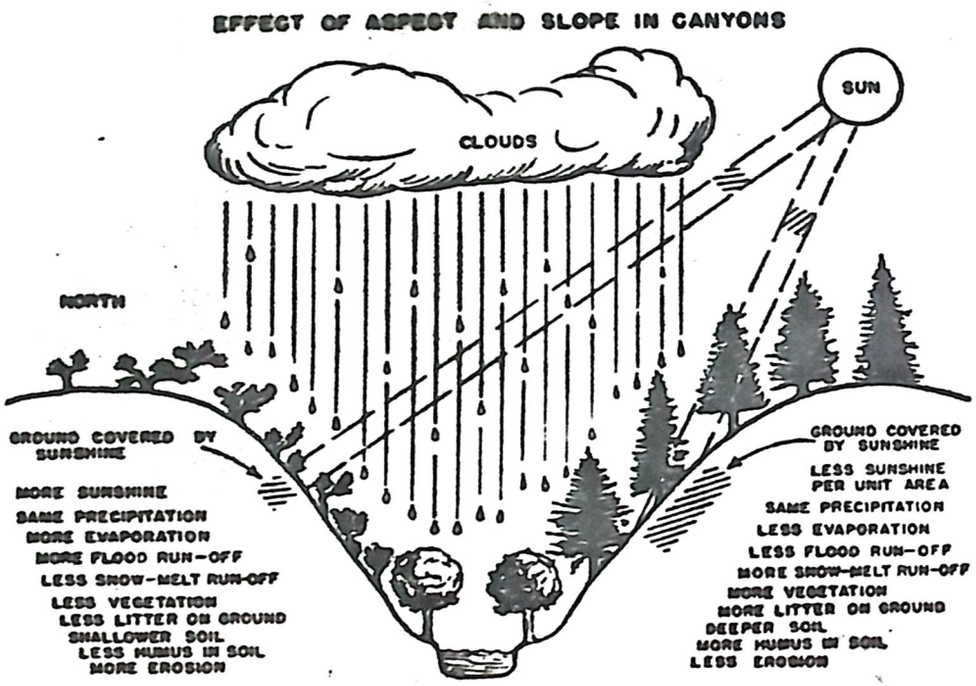


FIG. 83. Sketch showing effects of aspect and slope in an east-west canyon

ZONATION: This can be noticed around pond, & by stream.

Certain plants occur in wet areas; as the land grows drier, a different plant growth is seen, arranged in ZONES.

ASPECT is relation of slope of land to rays of sun.

ZONATION is often a result of aspect. See diagram at left.

MICRO-CLIMATE: A change in the climate of a very small area, as the space under a bush, or on the shady side of a wall, or where a spring bubbles out.

Don't be afraid to say, I DON'T KNOW! But be sure to add, LET'S FIND OUT!

Diagram from Woodbury: GENERAL ECOLOGY. Used by permission.

NATURE IS DYNAMIC:

Things are always changing. There is nothing constant, except change. The observation of these changes is a fascinating hobby, and one you should point out to your children.

Change, going on about us, points the way toward the future. That future is what we will make it. We have the opportunity to make small changes, now, which will affect the future. Example: Plant a small pine tree. As it grows, its seeds may spread, and centuries later there could be a pine forest. You can hurry, or postpone, the changes nature makes.

.....

SUCCESSION:

In open areas, a PRIMARY succession is seen. This may be grasses, or other pioneer plants, such as lichens. This is followed by a SECONDARY SUCCESSION, trees and shrubs. Their varieties will depend upon the surroundings, from whence the seeds come, and upon the terrain, where they will grow. Plants adapted to wet ground will not take root and thrive on dry ground, and vice versa.

PIONEER PLANTS: Those which can get started under difficult conditions, as on rock, or open areas. These, in time, change the area so they can no longer grow there.

CLIMAX PLANTS: These develop where pioneer plants have made a start. These perpetuate themselves, unless man, or some other catastrophe, changes things. (Such as fire or flood).

A red cedar is a pioneer tree. An oak is a climax tree. You will see examples of both these, and the changes they go through, along the Nature trail.

SPECIAL THINGS TO WATCH FOR: Examples of EROSION, SEDIMENTATION, EFFECT OF BIOTIC GROWTH, EFFECT OF MAN.

SUGGESTED REFERENCE LISTS

for use with

THE NATURE TRAIL

1. Field Guides, the Roger Tory Peterson series; BIRDS, TREES, WILDFLOWERS, TREES AND SHRUBS	Houghton-Mifflin
2. READING THE LANDSCAPE: Watts	Macmillan
3. THE LIVING FOREST: McCormick	Harper
4. THE WEB OF LIFE: Storer (Paperback edition)	
5. FIELDBOOK FOR BOYS AND MEN: (See the sections on WILD PETS and THINGS TO DO)	Boy Scouts
6. FIELD BOOK OF PONDS AND STREAMS: Morgan	Putnam
7. FIELD BOOK OF ANIMALS IN WINTER: Morgan	Putnam
8. FIELD BOOK OF INSECTS: Lutz	Putnam

For reading by the elementary school students:

The series put out by the MAXTON PUBLISHING CORPORATION are well illustrated and interesting.

Suggested subjects in this series:

Birds, Insects, Trees, Flowers, Reptiles and Amphibians, Rivers, Wild Birds, Butterflies.

For library use:

NATIONAL WILDLIFE MAGAZINE
RANGER RICK"S MAGAZINE.

Both published by
National Wildlife Federation,
1214 16th St., N.W.
Washington, DC

SPECIAL GEOLOGY REFERENCE:

DANA: Walks and Rides in Central Connecticut and Massachusetts
(Available at Peabody Museum)

PARTIAL LIST OF FLOWERS, TREES, SHRUBS AND VINES

This list of some of the flowers, trees, shrubs and vines to be found along the Nature Trail is not intended to be complete.

FLOWERS

Skunk cabbage, symplocarpus foetidus - February-March
Eastern trout lily, erythronium americanum - April
March marigold, catha palustris - April
Jack-in-the-pulpit, arisaema triphyllum - April
Hepatica, hepatica americana - April
Birdfoot violet, viola pedata - April-May
Bloodroot, sanguinaria canadencis - May
Wood anemone, anemone quinqufolia - April-May
Early wood betony, pedicularis canadensis - May-June
Cranesbill (wild geranium), geranium maculatum - May-July
Pink lady's slipper (moccasin flower), cypripedium acaule - May-June (introduced)
Bluets (quaker lady), houstonia caerulea - April-June
Wild iris, iris versicolor - May-June
Star of Bethlehem, ornithogalum umbellatum - May-June
False Solomon's seal, smilacina stellata - May-June
Spotted wintergreen, chimaphila maculata - June-July
St. Johnswort, hypericum - July-September
Wild rose, rosa carolina - June-July
Indian pipe, monatropa uniflora - July-August
Pearly everlasting, anaphalis margaritacea- July-September
Queen Anne's lace, daucus carota - July-September
Jewelweed, (touch-me-not), impatiens biflora - July-Sept.
Cardinal flower,lobelia cardinalis - August-September
Milkweed, asclepias syriaca - early fall
Aster, aster - August-September
Goldenrod, solidago - August-September
Joe-pye-weed, eupatorium purpureum - August-September
Sunflower, helianthus - August-September
Fringed gentian, gentiana crinita - September-October (introduced)

TREES

Dogwood, cornus florida
Ash, fraxinus - (several varieties?)
Maple, acer - (several varieties)
Black cherry, prunus serotina
Shagbark hickory, carya ovata
Grey birch, betula populefolia
Eastern red cedar, juniperus virginiana
Swamp white oak, quercus platanoides
White oak, quercus alba
Black oak, quercus velutina
Hawthorne (thornapple), crataegus
Apple

TREES (continued)

White elm (ulmas americana)
Wild crabapple, malus coronaria
Quaking aspen, populus tremuloides
American hornbeam (ironwood), carpinus caroliniana
Tulip tree, liriodendron tulipifera
Sassafras, sassafras albidum
Black tupelo (sourgum or pepperidge), nyssa sylvatica
Beech, fagus grandifolia

SHRUBS AND VINES

Red osier, cornus stolonifera
Highbush blueberry, vaccinium corymbosum
Pussywillow, salix discolor
Maple-leaved viburnum, viburnum acerifolium
Smooth sumac, rhus glabra
Staghorn sumac, rhys typhina
Black alder (winterberry), ilex verticillata
Juniper
Honeysuckle
Poison ivy, rhus toxicodendron
Wild grape, vitus labruscana
Virginia creeper, parthenocissus quinquefolia

REFERENCES

Matthews, F. Schuyler, Field Book of American Wild Flowers, Putnam's, 1955
Rogers, Julia Ellen, Tree Guide, Doubleday, Page & Co. 1916
Collingswood, G. H., & Brush, Warren D., Knowing Your Trees, American Forestry Association, 1965
Bush-Brown, James & Louise, America's Garden Book, Scribner's, 1958

FUTURE PROJECTS

Comments and suggestions are welcomed, as is assistance on projects. There are many opportunities here for scout activities in connection with civic, conservation and natural science badges.

1. Complete plant and tree lists, including ferns and mosses.
2. Compile lists of wildlife expected to be found - birds, mammals, etc.
3. Introduce more wildflowers and other native plants.
4. Identifying labels for plants and trees.
5. Construction of dry walks over swampy areas; rustic bridges or rock walkways over brook, rustic steps on steep area near Station #15.
6. Construction of permanent station markers - cedar posts set into the ground with station numbers carved into them.
7. Geology wall.
8. Bluebird houses to be placed on southern edge of school grounds.
9. Slice of time tree.
10. Possible extension of Nature Trail.

PLANTS PROTECTED BY STATUTE IN CONNECTICUT

A. FULL PROTECTION (only landowners may destroy or collect)

1. Hartford Fern (Lygodium palmatum)
2. Trailing Arbutus (Epigaea repens)

B. PARTIAL PROTECTION (Written permission of landowners required to gather)

1. Wild Lily-of-the-Valley, (Convallaria majalis)
2. Partridge-berry, (Mitchella repens)
3. Bunchberry, (Cornus canadenis)
4. Checkerberry, (Gaultheria procumbens)
5. Climbing nightshade, (Solanum dulcamara)
6. Black-alder, (Ilex verticillata)
7. Bittersweet, (Celastrus scandens)

The above are protected because of their value as game food.

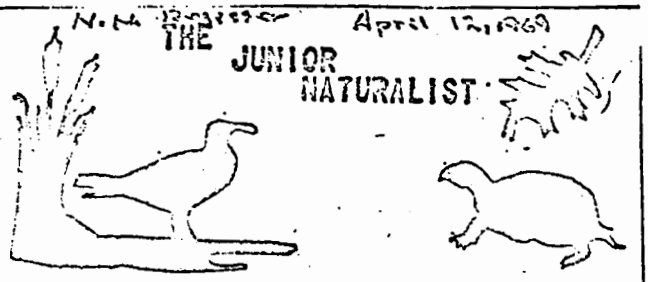
8. All evergreens, especially Mountain Laurel, (Kalmia latifolia), ferns, vines and foliage, branches of trees and shrubs.

Flowers and plants may not be picked from another person's property without the owner's permission.

Prepared by the Connecticut Park & Forest Commission
Hartford 15, Connecticut.

N.H. Register April 12, 1969

THE JUNIOR NATURALIST



By ALLAN and ELLEN BONWILL

Some Objectives In Conservation

With the growing interest in conservation education, we are being asked more and more, often nowadays, "Just what is a conservation project?" Teachers are interested in this, with plans for spring field trips; Scouts, and Scout leaders have merit badges and rank requirements in their minds; garden clubs are thinking ahead to work they plan with their junior groups.

Here are some ideas about conservation projects that will help get you started on your own spring efforts.

First, here are the criteria we set up for our course for teachers at Southern Connecticut State College:

A conservation education project should be:

1. Ecologically oriented activities, designed to teach facts, then develop attitudes and lead to action in some field of conservation.

2. Land-oriented in the broadest sense; developed in relation to the outdoor world.

3. Based on scientific principles, but the project must also inculcate ethical concepts of conservation, and foster the desire to apply these.

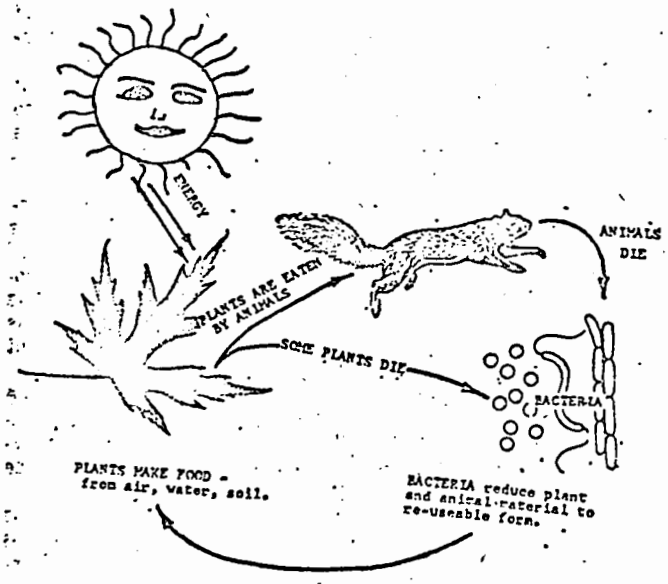
4. Concerned with outdoor activity, and real. The feel of cold wind is a richer experience than reading about wind.

5. Open to student participation in the preparation, and for student and/or community use afterward.

A conservation project differs from a science project, which establishes facts only. We seek to develop attitudes based on those facts, and encourage future action arising from those attitudes. We should lead children, and through them the community, into wider views of their environment, and into a broader appreciation of man's responsibility in the world.

This sounds like a pretty large order, doesn't it? It is, of course — but like all worthwhile things, it cannot be accomplished overnight, nor by one person, nor in one piece. Rather, this is a guideline, useful in planning. To quote one museum director, down Stamford way: "Every museum or educational exhibit in this field should go the one additional step beyond teaching science or ecology, and should teach conservation concepts, also — the idea that no man is an island, but all are basically dependent upon one-another — plants, animals, the earth, and man as part of the complex."

Perhaps one of the best ways of showing this is through this diagram, taken from the Trail Guide at the Stanley T. Williams School, in Northford.



Plants, the producers; animals, the consumers; bacteria, the decomposers — these produce food materials, utilize them and prepare them for re-use. Man alone throws a monkey wrench into this closed circle of production and utilization — by pollution, overconsumption and waste. Can we learn to live with nature's machinery?

The dandelion can be picked!