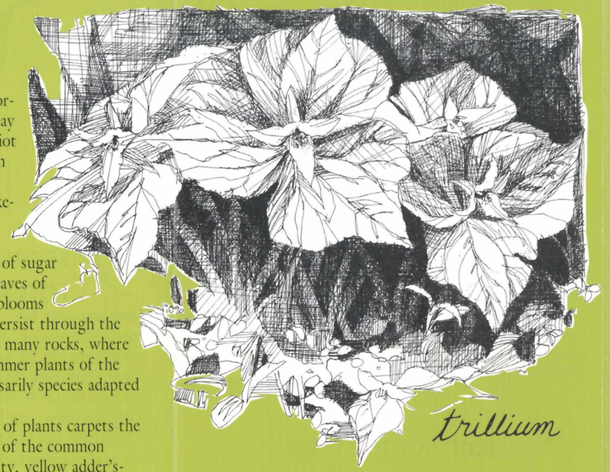
11 life on the floor

Though the middle layers of the forest are very open, you can hardly say that for the forest floor. What a riot of plants cover the ground here! In summer the most common larger plants at this marker are black snakeroot (sharply cut leaves), yellow mandarin (long narrow leaves), common wood-fern, and seedlings of sugar maple. Underneath these are the leaves of sharp-lobed hepatica, a plant that blooms early in spring, but whose leaves persist through the following winter. Mosses grow on many rocks, where most other plants cannot. The summer plants of the cove hardwood forest are all necessarily species adapted to shade.

In April and May, another set of plants carpets the forest floor. Along this trail some of the common spring wildflowers are spring-beauty, yellow adder's-tongue, bishop's-cap, wood anemone, fringed phacelia, Dutchman's-breeches, squirrel-corn, and various species of trilliums and violets. These plants bloom and make food for the following year before the tree leaves are fully out, when much more of the sunlight reaches the ground than it does in summer.



trillium

12 big trees

Conditions for growth are excellent in coves of the Smokies and many trees reach their peak size here. This yellow buckeye is over 12 feet in circumference. The sugar maple, about 30 feet from here with many knobs or burls, is about seven feet around. Both trees are over 100 feet tall and probably exceed 150 years in age. A tuliptree above the Middle Prong of the Little Pigeon River is over 25 feet in circumference; a red maple on the Maddron Bald Trail measures 23 feet around; an eastern hemlock on a tributary of Ramsey Prong has a circumference of almost 19 feet.

A few trees in the Park were alive when Columbus first landed in the Americas. Clearly, this is the land of champions.

13 agents of decay

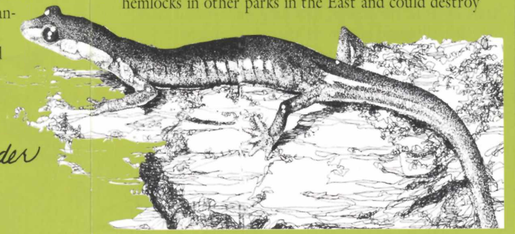
Big trees eventually die. As their vigor wanes with age, fungi and burrowing insects gradually clog the channels through which water and nutrients rise from the roots and manufactured food travels downward from the leaves. Many trees do not die standing. Weakened within, they are snapped or uprooted by the wind. Even young trees may come down this way, as you can tell by the modest size of some of the logs here.

Once down, a tree is attacked even more vigorously by bacteria, fungi, and insects. Mosses and other plants, such as those growing on logs here, further penetrate and break up the wood. All these agents of decay gradually reduce fallen trees to soil, breaking down their substance into nutrients that other plants can use. Some of the nutrients from the decaying logs here might end up in offspring of these very trees. Meanwhile, they continue to serve as shelter for salamanders and other small creatures, as well as the decomposers, and at the same time feed the seedlings of plants.

14 animals of the cove forest

Animals are ultimately dependent on plants, which alone can manufacture food. The great volume of plant life, including trees, means that many animals, from black bears to salamanders, can live here, too. You may have seen few or no birds and mammals thus far on the trail, but the forest nevertheless supports many kinds. In summer, you may hear the repeated whistle of the Red-Eyed Vireo high overhead or the musical tinkling of a Winter Wren in some tangle on the ground. Since most of this forest is mature, there are many dead limbs and trees where woodpeckers, including the Pileated, drill for insects. As the sun drops, Barred Owls become active. The mammals are mostly ground-dwellers. Mice and shrews are probably the most common mammals here, but more conspicuous are the red squirrels, which favor the cone-bearing hemlocks downslope. Chipmunks like the cover provided by rocky areas.

If you walk the trail early in the morning or in the evening, you might see one of the large animals. Bears tear open logs to get grubs, and in winter they den in large hollow trees, sometimes high above the ground. Non-native wild hogs leave destructive paths where they root for the underground parts of many spring-blooming plants. Foxes, raccoons, and other animals undoubtedly appear during the dim hours. Smaller forms of animal life are also abundant. In the small streams and under logs and rocks live many kinds of salamanders. Millipedes and centipedes are very common, especially in the summer. Large, mottled brown snails can often be seen on rocks and leaves, and insects in an amazing variety flourish abundantly.



red-cheeked salamander

15 logging line

winter wren

On the way up, it wasn't apparent where logging ended, but just downhill from the marker it is. There the trees are smaller and more closely crowded. After logging cleared much of the ground, many saplings had an equal chance for growth and grew upward at an equal rate. In the years ahead, however, only the most vigorous will survive, eventually producing an open forest of big trees like the section above this point. Such a translation from logged to unlogged forest is apparent on many trails that traverse the Smokies.

16 hemlocks

The trees around you are the eastern hemlock. While a common member of the cove hardwood forest, the hemlock often forms small stands of its own. Such pure stands develop on cool, moist soil and a site such as this offers prime conditions for growth. Once established, only the most shade-tolerant plants grow under them. So dense is the evergreen foliage that the ground cover under it often appears quite different from that which you observed along the way, regardless of the season. In a pristine area, hemlock commonly attains a height of over 100 feet, a diameter of five feet, and lives for centuries.

The hemlock woolly adelgid, a soft-bodied insect native to China and Japan, has been identified throughtout the park. It has already devastated hemlocks in other parks in the East and could destroy thousands of acres of hemlocks in the Smokies and thereby disrupt the habitat of songbirds, squirrels, and trout. The park is trying several strategies to control this adelgid where practical.

17 the next generation

Now we're back into the young stand of tuliptree where farmers worked a few decades ago. But can you see the beginnings of a different forest, like the one you just walked through? With the help of leaf drawings scattered throughout this leaflet, maybe you can identify sugar maple, yellow buckeye, hemlock, and tuliptree, all of which grow within ten yards of this marker. Perhaps in another 100 to 200 years, the cycle from virgin forest to farm and back to mature cove hardwoods will be complete.

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Cove Hardwood

self-guiding nature trail

1 forest of giants

In the sheltered valleys and cool slopes of the Great Smoky Mountains grow forests that contain an unusually large variety of trees and smaller plants. These are the cove hardwood forests. In all probability they are among the most diverse forests known. About thirty species of trees grow in the forest group; however, not all are found in a single stand. In certain areas of the Great Smokies, which escaped logging prior to the establishment of the Park, many of the trees reach great size. You will be introduced to several of them later along this trail.

tuliptree

2 ice age refuge

The southern Appalachian coves have been hospitable to plant life for millions of years, but they served the eastern flora best during the three periods of glacial advance, within the last million years. During those colder times, many species of trees were forced to migrate southward as mile-thick sheets of ice flowed over their homeland. Conditions in the coves probably were more moderate than those outside the mountains, and certainly the soils were rich and the terrain was varied; so, many kinds of trees and other plants survived the glacial periods in these sheltered refuges. As warming melted the last ice sheet, trees migrated northward again, but at different rates and in different directions. Today, there are forests in various parts of our glaciated northern states consisting of beech-maple, white pine, hemlock, yellow birch, or other combinations of species that spread from the shelter of the southern Appalachians. But in these mountains, many of the species are still found together, in the rich variety of cove hardwood forests.

3 vanished farms

Yes, you are standing in an old corn field. In the world of nature there is no vacuum. The forest around you is not static. It is vibrant, changing with seasons and interacting with all the elements in the web of life—the air, soil, sun, water, producers, consumers, decomposers. Early in this century, before the establishment of Great Smoky Mountains National Park, about 75 families lived in the Sugarlands Valley. They were folk who lived off the land. Most of the slopes in this area are steep. At this spot they are less so, and corn and potatoes were grown here by a local family. Two clues tell you this was once a field. First, farmers cleared the field of rocks and put them in piles; some of them can be seen in this area. Second, the trees are species that can get started growing only on open, sunny ground. Most of them, including the large ones near the marker, are tuliptree. Another tree to watch for is the black locust, with its deeply furrowed bark and lacy foliage. Many old fields in the Park can be identified by the presence of these two kinds of trees.

4 bear marks

yellow buckeye

In addition to man, other animals have also left their mark on the land. Some scratches on this yellow buckeye were made by a bear. No one knows for sure why bears claw trees; it may be to advertise their presence to other bears—a territorial sign. Though bears are around, you probably won't see one on this trail, because they are shy. You are more likely to see red squirrels, chipmunks, and birds.

5 loggers

Unlike some sections of the Smokies, Sugarlands Valley was not subjected to heavy industrial logging. However, small sawmills were set up and choice trees were cut from many small areas, which might be visited again and again as the trees matured. For the next 200 yards or so, before the trail turns uphill, you walk through a section of forest that was last logged in the early 1900s. Therefore, most of the trees are small or medium sized; but there are some larger ones that were bypassed by the lumbermen. Perhaps you can spot some of them farther along the trail. Most of the stumps have long since rotted away, but directly ahead of you are the outer remains of a huge tuliptree. The yellow birch growing out of it, which probably germinated around 1930, indicates how fast trees grow in a moist cove of the Smokies.

6 how mountains wear down

Most of the rocks on this slope probably came from outcrops farther up the mountainside during the last glacial period, more than 12,000 years ago. The glaciers did not reach this far south, but the climate was strongly affected. Freezing and thawing, which occurred through much of the year at high elevations, broke off rocks and caused them to move downhill. In many places this movement continues today, though at a much slower rate.

On some occasions, rocks move with a rush. A short distance to your right is a boulder-filled ravine. How long have these rocks remained in place? A long time, judging from the lichens, mosses, and trees growing in and around them. However, an exceptionally heavy rain could start a landslide here. On the steep slopes in the Park you can see landslide scars where soil and trees gave way, exposing the solid rock underneath. These are all part of the erosional process that gradually wears mountains down. But the slopes erode so slowly that there is time for trees to grow big and die, generation after generation.

7 big locust

black locust

Before half of it it fell, this was the biggest black locust known in the Park. Since black locust seedlings need lots of sunlight, why did this one grow here? Perhaps a disturbance caused by logging or windfall in the distant past opened this spot in the forest enough for it to get started. You are not likely to find any locust seedlings on the shady ground under this old tree. Black locust is one of the most rot-resistant of all Smokies trees. The soil will not claim this patriarch for many years.

8 meet some trees

Now we're getting above the limit of logging on this mountainside and into cove hardwood forest. Here, and just ahead by the trail, are large specimens of white basswood, one of the principal species of cove hardwoods. Basswood sends up sprouts from the base—a good identifying characteristic. Often the original tree dies and several of the sprouts take its place, growing into tall trees. That appears to have happened with the group ahead. Yellow birch, hemlock, and sugar maple are also among the dominant species of cove hardwoods. Silverbell, yellow buckeye, tuliptree, and beech are also common in this type of forest, and many other kinds of trees occur in small numbers. So tall are the trees that you may need binoculars to identify them by their leaves.

sugar maple

hemlock

9 structure of the forest

Note how open the lower parts of the forest are and how widely spaced the big trees. The trees that gained a place in the canopy have eliminated their competitors by intercepting sunlight and taking much of the soil moisture and nutrients with their widespread root systems. They also allow very few shrubs or small trees to grow. This is how much of the astern virgin forest looked—not at all the dense, tangled growth you might have imagined.

10 living conditions

Conditions are ideal for growth in the valleys and cool slopes of the Smokies. The climate is temperate, rainfall is heavy, and the soil is favorable to growth. That is why the trees grow so big and there are so many kinds of plants. But sunlight is at a premium. On this slope, the hours of sunlight are shortened by the surrounding ridges. In summer, most of the sunlight is intercepted by the tree canopy, leaving little for the lesser plants beneath. Tree seedlings, therefore, grow very slowly until a large tree falls, letting in more sunlight. Here is a sugar maple toppled and overgrown with small plants. In the light of the open canopy a number of tree saplings have shot up to compete for the temporary sunlight. Only a few will survive to maturity.