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Bulletin No. 16: A Guided Tour of the Connecticut Arboretum

John L. Emery

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A GUIDED TOUR OF THE CONNECTICUT ARBORETUM



CONNECTICUT ARBORETUM

BULLETIN No. 16

CONNECTICUT COLLEGE, NEW LONDON, CONNECTICUT



Map of southwestern part of Connecticut Arboretum showing route of guided tour, and location of stations described in the guide. (Map by John Gardner)

Cover drawing is from *The Appalachians* by Maurice Brooks, illustrated by Lois and Louis Darling (Houghton-Mifflin, 1965)

THE CONNECTICUT ARBORETUM

BULLETIN NO. 16

FEBRUARY 1967

A GUIDED TOUR OF THE CONNECTICUT ARBORETUM

by John L. Emery

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designed and illustrated by

Lois and Louis Darling

station maps by

Sara and Derek Bradford

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Foreword

FOR a long time we have felt the need for a guide to help the visitor find some of the interesting plants that grow unlabelled along the Arboretum paths and interpret the complex interacting forces that determine the pattern of the natural plant communities within the area. This bulletin has been designed for this purpose.

A route through the front part of the Arboretum has been selected and marked, and a number of stations along this trail have been carefully described with the aid of a series of maps. The station map system was developed by the author at the State-owned Shade Swamp Sanctuary, in Farmington, Connecticut. We are most fortunate, therefore, to have enlisted his talents in this enterprise. A trail thus marked requires a minimum of labels and is very easy to maintain. At the same time, the guide provides the unescorted visitor with a wealth of information about the Arboretum and its plantings.

As a teaching device, the guide offers the advantage of providing each student with frequent opportunities to test his learning by trying to identify those plants which appear repeatedly at various points along the trail and then by checking his identifications against the maps. It permits the student to participate with the teacher in finding specimens, thereby engaging his interest. However, use of the guide need not be limited to classes led by teachers. Any interested visitor can use the guide and follow the trail independently.

It is with deep appreciation that I acknowledge Lois and Louis Darling for their superb drawings and Sally and Derek Bradford for the beautifully designed maps. Their efforts have lent an artistic quality to this bulletin that will be enjoyed by those it will guide through the Arboretum.

William A. Niering

Director

The Laurel Walk

INTRODUCTION

THIS GUIDE is intended to help you identify some of the conspicuous plants along a selected route through the Arboretum, to point out a few of the kinds of plant communities you can see in the Natural Area, and to interpret the changes going on within them. In addition, some history of the area is given to help explain the differences you will see in the vegetation.

Since the Arboretum contains an extensive collection of trees and shrubs native to southern New England, the use of this trail guide will give the amateur naturalist a good start in learning to recognize native trees and shrubs. Many species, which did not originally occur within the Arboretum at the time of its establishment, have been planted and many other plants native to the eastern United States, but not to southern Connecticut, have been added to the collection.

It is hoped that this guide and trail will encourage more teachers to use the Arboretum as an outdoor classroom. With the booklet, a teacher taking a class over the trail, even for the first time, will have considerable success in identifying plants along the way. Of course, the instructor will have a more comfortable margin of knowledge over that of his students, if he can make a preliminary visit with the booklet before leading a field trip.

At intervals along the trail, observation stations have been marked and are shown on the map on the inside of the front cover. A map has also been made for each station, locating and naming the principal plants found there. Detailed instructions for the use of the station maps are given on page 7. One advantage of the station-map system is that it enables the instructor to focus the attention of the group on the vegetation at these stations, where the maps make it easy to locate and identify natural features.

The complete trail is about three-quarters of a mile long, not including side excursions into the burn or the Natural Area. Obviously, it can be walked non-stop in 15 minutes, but for any kind of serious observation an hour and a half should be allowed. To identify most of the plants listed in the guide and to observe them closely will easily occupy several hours. The guide is designed so that those with limited time can take an even shorter route, departing from the guided tour at Station E.

To take the shorter trip, leave the marked trail at Station E and take the trail which follows the lake margin to the Outdoor Theatre, past Station G, to the laurel walk and up the slope to the Main Entrance. This route can be covered in an hour or less.

It is strongly recommended that the size of a group for one instructor be limited to fifteen. On narrow trails, students at the end of the line cannot hear or see well, with consequent loss of interest and attention. If assistants cannot be obtained, it is better to take only those students most likely to be interested.

About the Connecticut Arboretum. — The Arboretum at Connecticut College was established in 1931 and is administered by the Botany Department. It covers an area of about 350 acres and contains an extensive collection of native trees and shrubs, a wildflower preserve, several tracts demonstrating different types of vegetation management, and two natural areas for ecological research. Its program is supported by the College and by members of the Connecticut Arboretum Association. It serves the College as an outdoor laboratory, the community as a park, and the State as a nature study area and wildlife refuge. Various publications describing the Arboretum and its plants and animals are listed at the back of the bulletin and can be obtained from the Director of the Arboretum at Connecticut College.

Collecting Policy. — You are asked PLEASE not to collect anything—even leaves. If collecting were permitted, all the unusual plants would be gone in a season or so. Anything that interests you will interest others, too, and should be left for them to see. Snakes, frogs, and other animals should, of course, be left undisturbed.

How to Follow the Trail. — The trail to which this guide applies is marked by blue paint spots on trees, posts, or rocks. Paint spots will appear mostly at trail intersections, to keep marking to a minimum, so watch carefully to avoid taking the wrong trail. Observation stations are marked by white spots and, where possible they are identified by small, metal letters placed about 10 feet above ground.

Definition of Terms — Trees are indicated on station charts by the landscaping symbol resembling a tree. Shrubs are shown by the darker symbols whereas the lighter stippled areas represent the herbaceous cover. Seedlings are trees less than one foot high and saplings are trees over one foot in height, but less than one inch in diameter. Tree diameters are given in inches dbh, meaning "diameter breast high" and taken at 4.5 feet above the ground.





Red Cedar

THE TRAIL GUIDE

From the Arboretum Entrance to Station A. — The trail begins at the Washington Entrance¹ on Williams Street. Directly ahead is the laurel walk leading down to the lake and flanked on either side by mountain laurel, our State flower. This planting makes a spectacular display when it flowers in mid June. An interesting contrast of evergreens can be seen here. Mountain laurel represents one main group, the broad-leaved evergreens, while the large red pines, with their long, needle-like leaves are representative of the conifers. As the name implies, conifers have cones, while the broad-leaved evergreens have flowers and fruits. Another conifer to be found here is the columnar-shaped red cedar with tiny, scale or needle-like foliage. See if you can find any of the interesting bluish, berry-like cones on the cedar. These graceful, pyramidal trees are being crowded out by the taller red pines, as they cannot tolerate shade.

The trail starts to the left of the laurel walk, as indicated by the blue marker. On your right you will pass several large specimens of American beech and the very similar European beech.² These handsome trees with smooth, gray bark make beautiful shade trees, but notice that grass does not grow well under them due to the dense shade and surface roots. In our forests the American species is an important source of wildlife food. The small nuts are covered by prickly burs, like those of chestnuts.

¹The Washington Entrance was built with funds given by the Connecticut Chapter of the Daughters of the American Revolution.

²Leaves of the European beech are smaller with less pronounced marginal teeth.



enlarged about
3x

On your left are several different kinds of hawthorns that provide our wildlife, including game birds such as ruffed grouse, with an abundance of fruit. Although covered with thorns, they are important ornamentals, producing pink or white blossoms in May, and small, apple-like fruits in the summer. Scores of different species and varieties of hawthorn are recognized, making this group of trees one of the largest and most difficult to identify.

Descending the hillside, you come to a raised causeway across a red-maple swamp, with its distinctive type of vegetation. Part way across the causeway, on your left, you will find the white spot marking Station A on a red maple about 21 inches dbh. Note the burls on its trunk. In some trees, like sugar maple, such burls make the log very valuable for furniture because of the curious, swirled grain. What causes them is not precisely understood, but it is thought that infection with a virus may be involved.

Use of Station Maps. — Stand on the trail beside the maple at Station A holding the map so that the trail on the map is lined up with the actual trail and the arrow is pointing in the direction you have been walking. Consider, for example, species number 3 on the map. It is shown to be near the edge of the trail and between the second and third circles. Since all points on the first circle are 10 feet from the station center, all points on the second circle 20 feet, and points on the third circle 30 feet away, you can estimate that item number 3 is about 25 feet from the station behind you and is to the left of the trail. Referring to the map, you will see that the number 3 is within the tree symbol representing the white ash. Now see if you can locate the actual tree. Of course you can reverse the process; that is, find a plant first and then look for it on the map. It would be confusing, if not impossible, to list all the plants at any station. Therefore, only a sampling of those conspicuous and of special interest is given on the map.



red maple



sugar maple

STATION A

The vegetation at Station A is typical of that found on swampy ground in this region and is often referred to as a "red maple swamp." The dominant trees are red maple with scattered white ash, while the shrub layer is characterized by sweet pepperbush



white ash

STATION A



TREES

1. Red Maple
2. White Ash (6-7')
3. White Ash (11')

SHRUBS

21. Arrow-wood
22. Sweet Pepperbush
23. Highbush Blueberry
24. Tartarian Honeysuckle
25. Multiflora Rose

HERBS

51. Jewelweed
52. Skunk Cabbage
53. Canada Mayflower
54. Christmas Fern

and highbush blueberry. Two typical herbaceous plants, skunk cabbage and jewelweed, make up the bulk of the ground cover.

Skunk cabbage, the low broad-leaved plant which gives off a skunk-like odor when the tissue is broken, is one of the earliest plants to flower in the spring, the spathe sometimes coming up through the snow in February. Its leaves form an almost continuous cover in wet areas like this in late spring. Jewelweed can be recognized by its delicate, translucent stems and in late summer and early fall, by its orange flower and fascinating fruit which pops open so suddenly when touched as to startle you. This is a unique adaptation for assuring good seed dispersal.



skunk cabbage

From Station A to B.—Toward the end of the causeway, where it leaves the swamp, the trail is bordered by a variety of ferns. Species likely to be found are cinnamon, marsh, New York, hay-scented, lady and sensitive ferns.

This section of the trail and the area around Station B display plants belonging to the heath family, including sweet pepperbush, highbush blueberry, maleberry, sorrel-tree, and several species of azaleas. Three evergreen heaths can be seen here—two species of rhododendron and leucothoe with its arching branches. Of these species, sorrel-tree, leucothoe, flame azalea (orange flowers), and the small-leaved Carolina rhododendron are not native to Connecticut. The pink azalea (pinxter-flower) and larger leaved rhododendron (great laurel) are found naturally in Connecticut but were planted here. The heaths, including mountain laurel, are a highly prized group of native ornamental plants that grow best in an acid soil.

Sweet pepperbush occurs on both sides of the trail and is very common all around the lake. Its white flowers perfume the whole area when it blooms in late July to early August. Its foliage somewhat resembles the azaleas, but its leaves are markedly toothed, while those of the azaleas are essentially entire (not toothed or serrated).

Azaleas are distinguished by their leaves which have hairy margins. Swamp azalea has fragrant white flowers and is one of the last to flower in late June to July. Its leaves are smooth underneath, with a bloom that rubs off (as on a plum). The flame azalea, a native of the southern Appalachians, has hairy leaves and showy orange flowers which open in early June. The pinxter-flower, typical in the surrounding oak woods of this region, has pink flowers which open in May, before the leaves. Under these shrubs wild geraniums form the ground cover adding an array of light purple blossoms in late May.

pink azalea



sweet pepper bush



great laurel



leucothoe



Carolina rhododendron

STATION B

Station B is marked by a white paint spot on a tulip-tree, 17 inches dbh, on the left of the trail at the intersection. This tree and the larger ones across the trail from it were planted around 1936 and have grown rapidly, free from competition from other trees. They usually grow very straight. Due to their soft wood, however, they are very prone to breakage during storms.

Carolina rhododendron is found about fifteen yards north of Station B and can be identified by the many brown scales on the underside of its evergreen leaves. East of it, along the stone wall, is the largest of the rhododendrons, commonly called great laurel, which may be found native in some of our wet boggy areas.

From Station B to C. — Leaving Station B, the trail turns left through a grove of red pines and into an opening overlooking the lake. Before the pines were planted in 1928, this area was

STATION B



TREES

1. Tulip-tree (17'' and 22'')
2. White Ash (8'')
3. Red Pine
4. Sorrel-tree
5. Red Maple
6. Black Birch

SHRUBS

21. Drooping Leucothoe
22. Pink Azalea
23. Swamp Azalea
24. Highbush Blueberry
25. Maleberry

HERBS

51. Violet
52. Wild Geranium
53. Jewelweed

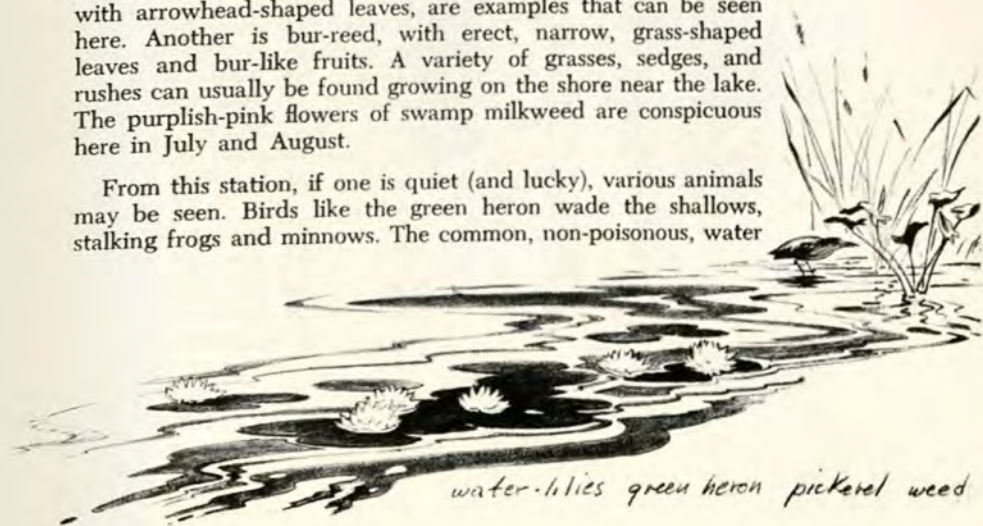
a greenbrier thicket. Although some of the greenbrier has persisted, the pines with the help of man have overtopped them and have produced an environment which is too shady for the briars to flourish. In fact, you will find few green plants of any kind growing on the floor of the pine forest. Several factors are believed to be responsible for this scarcity. One is the deep shade which exists under the pines, even in early spring. Another is the fact that the decaying pine needles produce a soil that is too acid for many plants. Most seeds germinating on the mat of pine needles are likely to die before reaching a source of moisture. Finally, the roots of closely-spaced pines like these interlace in the soil, leaving little moisture or nutrients for new seedlings.

STATION C

In an opening overlooking the lake you will find Station C. This Station is located at a red maple with three stems, on the left-hand edge of the trail. To the left of the trail is a remnant of the greenbrier thicket that covered this area before the red pines were planted.

Looking out across the pond from Station C, you can see several species of water plants, representing three different types of growth. In the deeper water is the fragrant water-lily, which has floating leaves, arising from a thick stem embedded in the mud. Another group of plants, the leaves of which are usually totally submerged, are the pond weeds. These are relished by dabbling ducks. Their growth is limited to water shallow enough for sufficient light to reach the leaves. In clear waters they can grow at greater depths. Along the edge of the pond, growing in a few inches of water or just out of it, are the emergent plants. These have short erect stems that send their leaves and flowering stalks above water. Pickerel weed and arrowhead, two plants with arrowhead-shaped leaves, are examples that can be seen here. Another is bur-reed, with erect, narrow, grass-shaped leaves and bur-like fruits. A variety of grasses, sedges, and rushes can usually be found growing on the shore near the lake. The purplish-pink flowers of swamp milkweed are conspicuous here in July and August.

From this station, if one is quiet (and lucky), various animals may be seen. Birds like the green heron wade the shallows, stalking frogs and minnows. The common, non-poisonous, water



water-lilies green heron pickerel weed

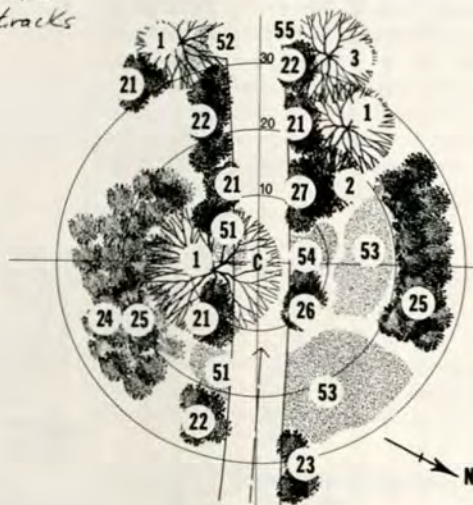
snakes sun themselves on the rocks, as do the painted and snapping turtles. The pond abounds with warm-water fish including sunfish, golden shiners, and catfish. Muskrats have burrows along the shoreline. Look for their tracks in the mud at the lake's margin. At quiet times, mink and deer have been seen along the lake—animals that you might not expect to find within the New London city limits. Foxes, skunks, and raccoons are not uncommon.

From Station C to D. — As you leave Station C, the red maples in the low, wet area give way to more of the red pine plantation. Along the lake edge, sweet pepperbush is the principal shrub, with highbush blueberry next in abundance. As you leave the pine plantation, watch on the right for royal fern, an uncommon one in the Arboretum. It is 2-3 ft. in height, coarser in appearance than others on the trail, and its form is suggestive of locust tree leaves. The trail bears right onto the dam at a large white willow about 17 inches dbh.

At this point you can turn left, if you wish, for a short side excursion to Station Z in the burned-over area and see what happens in a woodland following a fire. The round-trip is about a hundred yards. The station is located at the first stone wall intersecting the trail.

STATION C

muskrat tracks



TREES

1. Red Maple (9", 7", 7")
2. Tree-of-Heaven
3. Red Pine (6")

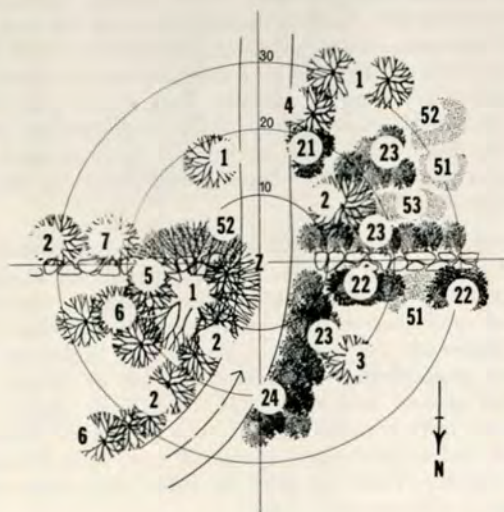
SHRUBS

21. Highbush Blueberry
22. Sweet Pepperbush
23. Winged Sumac
24. Greenbrier
25. Grape
26. Japanese Barberry
27. Multiflora Rose

HERBS

51. Hay-scented Fern
52. New York Fern
53. Jewelweed
54. Goldenrod
55. Cinnamon Fern

STATION Z



TREES

1. Scarlet Oak
2. Sassafras
3. Black Oak (sprouts)
4. Black Birch
5. Red Maple (sprouts)
6. Red Pine
7. Tupelo

SHRUBS

21. Highbush Blueberry
22. Sweet Pepperbush
23. Greenbrier
24. Dewberry

HERBS

51. Cinnamon Fern
52. Hay-scented Fern
53. Bracken

STATION Z AND THE BURNED AREA

As you leave the main trail at the beginning of the dam, you will see on your left a clump of tupelos. These handsome trees can be recognized by their waxy-appearing leaves and their many short, twiggy, horizontal branches. In early autumn their brilliant scarlet foliage is especially beautiful.

The aspect of the vegetation here is noticeably different from what you have seen thus far. The principal and obvious reason for this is that the area was severely burned over in the spring of 1957. Observe that the only large standing trees to survive in quantity and relatively undamaged are red pine. Some were killed, but many others survived, protected by their thick flaky bark which still shows the effects of charring. The stems of most of the deciduous trees and shrubs were killed to the ground but their root systems were not killed. Many new sprouts have arisen from these old roots, resulting in the dense, thickety

sassafras





growth you see today. Oaks and maples, which are especially conspicuous here, are noted for their sprouting ability either after fire or cutting and are often called "sprout hardwoods." Using the food stored in their roots, these new sprouts can grow faster than their competitors which reproduce from seed. Thus, the sprout hardwoods are likely to dominate the next generation of trees here. Other trees represented in the new growth are sassafras, wild black cherry, gray birch, large-toothed aspen, tulip-tree, and black birch. The birch and tulip-tree have come in primarily as seedlings, which became established on the open soil soon after the fire.

The increase in available light after the fire has favored the regrowth of many shrub species, including highbush blueberry, sweet pepperbush, winged sumac, poison sumac, maleberry, sheep laurel, chokeberry, greenbrier, grape, blackberry, and dewberry. However, the dominant shrubs are highbush blueberry, sweet pepperbush, and greenbrier, all of which were killed to the ground and resprouted from their roots. Since occasional fires have been occurring in our forests for thousands of years, we tend to have many species of trees and shrubs that are adjusted to fire. These are often not killed, but rather stimulated to sprout with renewed vigor.

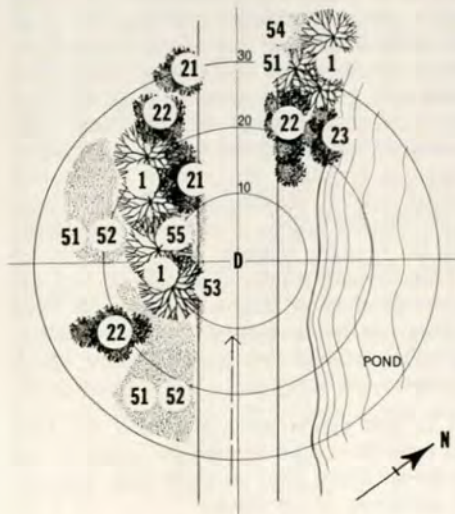
Retrace your steps to the main trail and turn left across the dam.

STATION D

Part way across the dam, you will find the white spot marking Station D on a clump of red maples to the left of the trail.

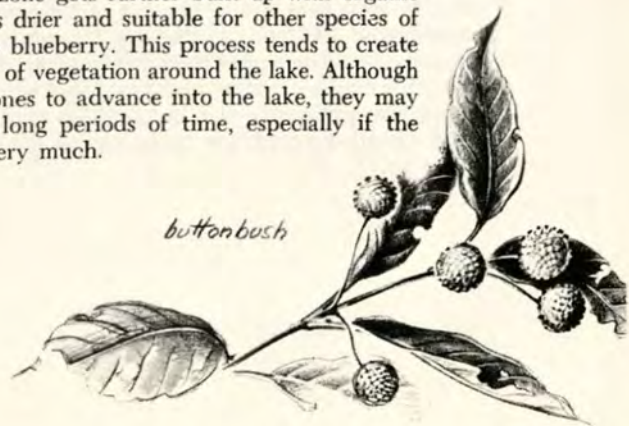
From Station D you see again the various types of aquatic plants described at Station C. Water lilies originally occupied only the very shallow water around the margin of the lake, but from the west shore (left side looking toward Outdoor Theater) they have advanced about fifty feet farther into deeper water in the last ten years. This is a visible indication of the changes in vegetation which normally take place in shallow lakes and which, in time, tend to fill them in and convert them into swamps. Each winter the stalks and leaves of the water lilies die and sink to the bottom, along with all the many other submerged aquatic plants, including algae. In time this builds up the bottom and reduces the water depth, so that the submerged forms and lily pads can move farther out. The remains of dead

STATION D



- TREES**
1. Red Maple
- SHRUBS**
21. Highbush Blueberry
22. Sweet Pepperbush
23. Common Alder
- HERBS**
51. Cinnamon Fern
52. Skunk Cabbage
53. Goldenrod
54. Interrupted Fern
55. Lady Fern

aquatic animals: insects, amphibians, reptiles, fish, etc., also add to the bottom sediments. Many of these animals depend directly or indirectly on the water plants for food or shelter. As the lake becomes shallower, it tends to get warmer and sunlight can reach a greater part of its bottom. This increases the rate of plant growth, and so the process accelerates as the depth decreases. Eventually shrubs like buttonbush which grow on the lake margins may move farther out, and the area of the lake begins to shrink. In this way the lake tends to fill in gradually with dead plant and animal debris. As the shoreline behind the buttonbush zone gets further built up with organic matter, the site becomes drier and suitable for other species of plants, such as highbush blueberry. This process tends to create belts or concentric zones of vegetation around the lake. Although the trend is for these zones to advance into the lake, they may be relatively stable for long periods of time, especially if the water level fluctuates very much.



Prior to building the Arboretum pond in 1924, this area was a red maple swamp similar to the one you now see below the dam. Swamps like this are often considered worthless because they cannot be farmed or built on, but they have tremendous value as water storage and flood control areas. They help slow the run-off of rain water and give it time to seep down into the ground to recharge underground water sources. Such wetlands also offer temporary storage for great volumes of water and thus reduce downstream flooding. The swamp below this dam is roughly an acre in size. If flooded to a depth of one foot, it would hold about 330,000 gallons of water. Thus, whenever a swamp is filled or drained, another large quantity of water is lost from the underground supply and made to run off more quickly to aggravate flooding problems downstream. This is why our wetlands must not be destroyed. Too few people realize the value of our wetlands, and they are still being filled, dredged, or otherwise destroyed.

The orange deposits in wet spots below the dam are iron compounds precipitated from the water by certain bacteria and called "bog iron." In colonial times some of these bog iron deposits were sufficiently extensive to be mined.

On the left of the trail, about 40 yards beyond Station D, you will see a black birch tree about 8 inches dbh which has been disfigured by nectria canker, a fungus disease which is particularly damaging to birch trees and is prevalent in the Arboretum.

At the far end of the dam the vegetation changes from a red maple swamp to an oak forest.

STATION E

Station E is located at the large white oak (23" dbh) just beyond the end of the dam. The open spreading habit of this tree indicates that it grew up when the area was more open and was being used for agriculture.

The Natural Area lies to the left of this section of the trail. Established in 1952, this part of the Arboretum is one in which the natural development of the forest is allowed to proceed with as little interference from man as possible. The only management involves fire protection and keeping the trails clear of fallen timber. Detailed records are being kept of the vegetation which

grows in certain permanently-marked sections of the Natural Area. New data are taken periodically, and it is expected that this information will be of great value to future ecologists studying the changes that have taken place in the vegetation and associated animal life over the years. Natural areas serve as important control areas, for we must know what happens under undisturbed conditions if we are to manage our forests and other vegetation types intelligently.

The tree species found at Station E are a fair sample of those in the Natural Area. The oaks around this station, and the understory shrubs as well, are typical of the forests of south-eastern Connecticut. The scattered red pines have all been planted.

From Station E to F. — Leaving Station E, you pass through a forest in which various oaks are dominant. Red maple and black birch are also plentiful. A few gray birches and aspens are to be seen, some of them in a dying condition. Along this sec-

STATION E



TREES

1. White Oak (23')
2. Black Oak
3. Flowering Dogwood
4. Gray Birch
5. Black Birch
6. Red Pine
7. Hemlock
8. Sassafras
9. Wild Black Cherry

SHRUBS

21. Mountain Laurel
22. Greenbrier
23. Highbush Blueberry
24. Arrow-wood
25. Sweet Pepperbush
26. Swamp Azalea
27. Maple-leaved Viburnum

tion of the trail are a fair number of healthy young hemlocks, trees which can be distinguished from other evergreens by their short, blunt, flat needles with two whitish stripes on the underside.

Mountain laurel is the dominant shrub here, instead of the sweet pepperbush, highbush blueberry, and azaleas, which you have seen along the trail thus far. This area was formerly pastured, a factor which may have favored the entry of laurel.

Now the trail turns westward, away from the lake, and soon enters a relatively open grove of hickories and walnuts. These were planted in an old pasture in the mid-1930's, and the undergrowth on the slope has been kept open by mowing.

Grasses and other flowering herbaceous plants are present, and in many places the spiny sawbrier is very plentiful. This vine is similar in appearance to its close relative, greenbrier. One conspicuous difference between them is that sawbrier has finer, bristle-like thorns, and more of them.

Note that greenbrier forms an almost continuous shrubby layer under the gray birch stand in the unmowed thicket to the left of the trail. Thicket-loving birds such as the towhee, catbird, chestnut-sided warbler, and yellow-throat frequent this habitat. The greenbrier-gray birch thicket has developed since pasturing was discontinued. The scattered hemlocks were planted before the area was set aside as a Natural Area. If they are not choked out by the briars they may eventually overtop the short-lived birches. Reading or interpreting the changes in vegetation following abandonment from cultivation or pasturing is a fascinating study. If you are interested in more of this story and how it relates to what you have seen, turn to page 26.

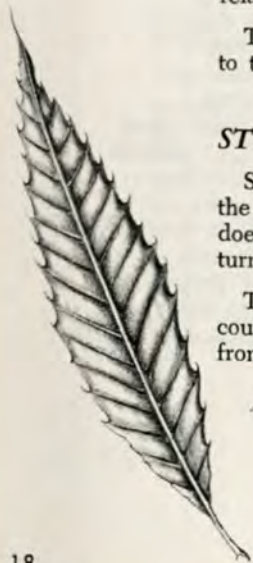
The trail now bears left, along the edge of the plantation next to the greenbrier-birch thicket, and up the slope to Station F.

STATION F

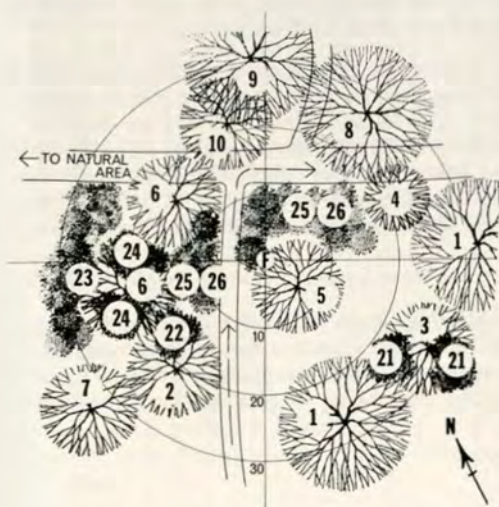
Station F is marked by a white paint spot on a boulder in the trail just before the next main intersection. The Nature Trail does not go into the Natural Area; but if you wish to see it, turn left here.

The "chestnut blight," a fungus disease introduced into our country in 1904, eliminated within a few decades the chestnut from the American forests. Only stump sprouts of this important

American chestnut



STATION F



TREES

1. Hybrid Chestnut
2. Large-toothed Aspen
3. Pignut Hickory (7")
4. Gray Birch
5. Black Walnut
6. White Oak
7. Sassafras
8. Black Oak (7")
9. Red Pine
10. Flowering Dogwood

SHRUBS

21. False Indigo
22. Bayberry
23. Greenbrier
24. Winged Sumac
25. Dewberry
26. Sawbrier

food and timber tree can be found in our woodlands today. The hybrid chestnut trees planted near Station F (see station map) resist the disease well enough to produce nuts. Much experimental work is being done, especially in Connecticut, in an effort to breed hybrids which are even more resistant to the blight. In the fall the spiny burs can be seen on or under the trees, and in early July the six-inch-long spikes of flowers called catkins are in evidence.

From Station F to G.—Leaving Station F, the trail turns right, along the upper edge of the nut plantation past the quarry picnic area. A few yards farther on you pass under a scarlet oak, about 6 inches in diameter. Note the deeply-cut leaves which help distinguish this from other oaks. On your left are planted red pines similar to the trees you saw along the Laurel Walk.



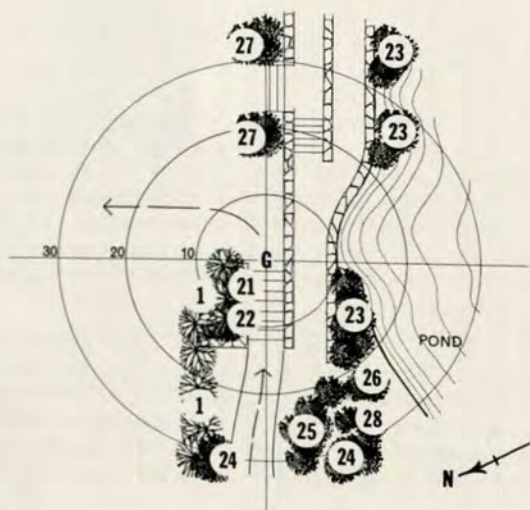
Here you can examine their coarse needles, about 5 inches long and in bundles of two. Red pine is a native tree of the Lake States. Also on the left edge of the trail is a big columnar specimen of red cedar that became established during or shortly after this field was abandoned from agricultural use.

At the eastern edge of the plantation turn right, downhill. On your left you will see planted white pine for the first time on this trail. Compare it with red pine. White pine needles are shorter, finer, a different shade of green, and in bundles of five. ("White" has five letters and five needles.) Occasionally found native in this area, it becomes more prevalent as one goes northward. On your right is butterfly weed, a tall plant which displays bright orange flowers in July. Well named, it does attract butterflies and is one of our most beautiful flowers in old fields.

At the foot of the hill, keep left under the double-stemmed tupelo, follow the rocky path down to the wide, mowed path in front of Buck Lodge, and then turn right to the lake. At the lake turn left, along the shore, to Station G at the Outdoor Theatre.



STATION G



TREES

1. Arbor Vitae

SHRUBS

21. English Ivy
22. Boston Ivy
23. Buttonbush
24. Bayberry
25. Common Juniper
26. Highbush Blueberry
27. Japanese Yew
28. Sweet Pepperbush

STATION G

As you stand at Station G (at the top of the stone steps) with the lake to your right, it will be observed that the Outdoor Theatre is ringed with hemlocks, perhaps our most graceful native evergreen. Note the fine foliage, and the delicate weeping tip, by which the tree can be recognized even at a distance. The stone bench¹ at the rear is flanked by flowering dogwood and rhododendron and backed by a screen of arborvitae.

From Station G to H. — Go around the bench and take the wide path leading directly away from the lake. In about 25 yards you pass under two large sugar maples which cover the trail. Both sides of the trail are bordered by mountain laurel.

STATION H

This station is marked by a white paint spot on a boulder to the right of the large, circular clump of huckleberry and shadbush where four trails meet. An unusually large specimen of tree-of-heaven is to be seen about 25 yards to the southwest of Station H. Introduced from China, it is a rapidly growing tree and is often found growing under very adverse conditions in our cities.

Of special interest at this station is the naturalistically landscaped area to the right. This area, along with much of the Arboretum, was originally a pasture. When pasturing and mowing ceased, various pioneer trees and shrubs began to invade the grassland. Here, some of the less desirable of these, including wild black cherry, poison ivy, blackberry, and some sumacs have been eliminated or reduced in density by the use of chemical herbicides (weed-killers). The more attractive native species, such as red cedar, flowering dogwood, gray birch, huckleberry, and chokeberry have thus been favored. The beautiful, native grass, red top, and clumps of goldenrod have also been preserved. This area was established and is being maintained by Connecticut College students studying ornamental plants. A how-to-do-it guide² to the use of herbicides in the removal of unwanted species, including techniques for creating similar naturalistically landscaped areas, is available from the Connecticut Arboretum. Many homeowners with an acre or two of land growing up to thicket or woodland will find this bulletin invaluable.

¹This bench was given by the Federated Garden Clubs of Connecticut as a memorial to Mrs. Prudence Demarest, First President.

²Creating New Landscapes with Herbicides. A Homeowners Guide. Available from Arboretum Director, \$1.00.



huckleberry

STATION H



TREES

1. Sorrel-tree
2. Shadbush
3. Red Cedar

SHRUBS

21. Huckleberry
22. Mountain Laurel
23. Sweet-fern
24. Meadowsweet
25. Arrow-wood
26. Common Barberry
27. Chokeberry
28. Bayberry
29. Staghorn Sumac
30. Smooth Sumac
31. Winged Sumac
32. Fragrant Sumac

HERBS

51. Goldenrod
52. Wild Indigo
53. Red top

Across the trail from the landscaped area one can compare the three common species of sumac found in this area—all non-poisonous. Those with hairy twigs are staghorn sumac; those with smooth twigs covered with a bloom are smooth sumac; and those having small leaves with a winged central mid-rib are the winged sumac. All are typically found in such abandoned fields or pastures.

From Station H to I.—A few yards after leaving Station H, you turn right at the next trail intersection. The white birch on the northwest corner of the intersection is the only one on this trail. It can be distinguished from the gray birches by its whiter

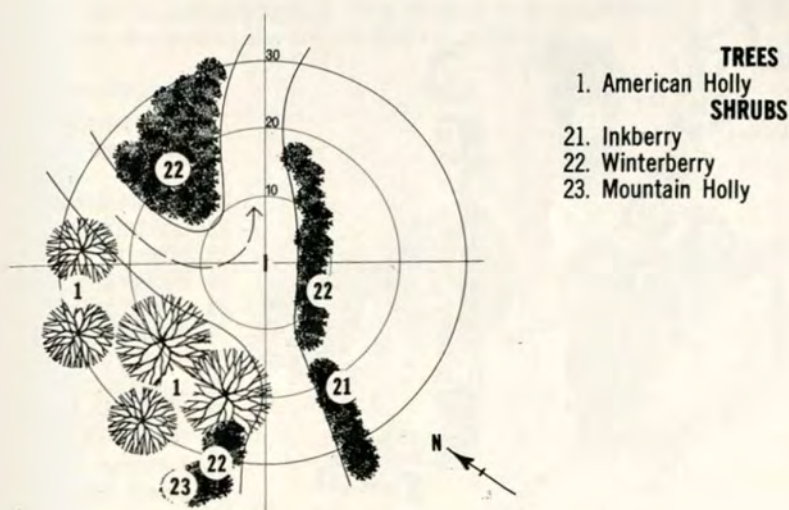
and chalkier bark, and by the shape of its leaves. This is the typical birch of central and northern New England.

As you approach the next intersection, you enter the holly collection. This area includes a number of different species and varieties of hollies, most of which can be located from the map of Station I.

STATION I

The station is marked by a stake sunk in the center of the trail intersection. As the map shows, the larger trees here are American holly, whose prickly, evergreen leaves are familiar to all as Christmas decorations. The shrubby evergreen is inkberry, easily recognized by its black fruit and shiny leaves with a few marginal teeth near the tip.

STATION I





winterberry

Along the trail are several specimens of black alder or winterberry, producing lovely red berries that often persist until Christmas. You will notice that not all the hollies produce fruit. There are male and female plants, and only on the female are the fruit borne.

From Station I to J. — At Station I the trail doubles back to the left, as shown on the station map, and runs northeastward to the Viburnum collection. Watch on your right for mountain holly, one of the taller hollies to be found around Station I. By late July this attractive shrub can be recognized by its velvety red berries, as well as by its thin, smooth, dark-green, deciduous leaves.

Both sides of the trail are also lined with winterberry until you approach the next trail intersection. There are several varieties, which are difficult to distinguish unless you are a trained botanist. Four varieties are found on this section of trail.

STATION J



TREES

1. American Beech (17")
2. Black-haw

SHRUBS

21. Maple-leaved Viburnum
22. Cranberry-tree
23. Witherod
24. Nannyberry
25. Smooth Witherod
26. Arrow-wood
27. Swamp Azalea
28. Japanese Barberry
29. Highbush Blueberry
30. Meadowsweet
31. Tartarian Honeysuckle
32. Sweet Pepperbush

STATION J

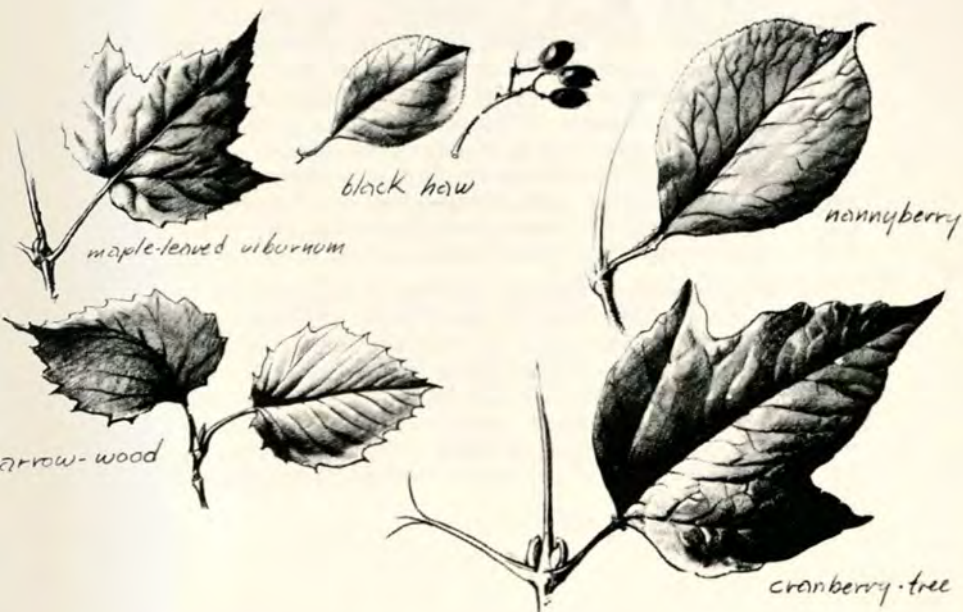
This, the last station, is located about 10 paces beyond (east of) the trail intersection in the Viburnum collection. It is in the center of the trail and beside a large American beech.

The low evergreen shrub on your left, about 20 paces past Station J, is common juniper. Notice its tiny, sharp, needle-like leaves and their resemblance to red cedar, its close relative, which was discussed at the beginning of the trail. As you might guess from this resemblance, red cedar is not a cedar at all, but a juniper.¹ Like red cedar, the juniper is typical of old pastures, since cows dislike the foliage.

Next Section of Trail. — Just before you reach the main entrance, where you began, there are several large pines, about 10 inches dbh, above the upper trail. At first glance they look like the red pines which are scattered throughout the Arboretum. However, a closer look will disclose that their bark is grayer and less red-brown than that of the red pines on the other side of the trail and that their needles are smaller, shinier, and stiffer, but less brittle. These are Austrian pines introduced from Europe.

Although a mere introduction into the fascinating natural world around you, it is hoped that this guide has increased your enjoyment and understanding of your natural environment as revealed in the Arboretum. Your comments or suggestions concerning this publication and the trail are welcomed.

¹*Juniperus virginiana*



FIELD TO FOREST DYNAMICS

A FOREST or a thicket is a community or ecosystem of plants and animals, each member of which affects the others to some degree and, in turn, has interactions with its environment—the air, soil, and water. Not all plant communities are stable. Some are changing at a relatively rapid rate, just as many human communities are undergoing rapid changes in character. The forest between stations E and F has changed greatly in the recent past. A few decades ago (until about 1911) much of the Arboretum was pasture land. Since abandonment, one group of plants (grasses and field flowers) has been replaced by another composed of trees, shrubs, and woodland wildflowers. What are the factors that caused these changes? The full explanation is long and complex. Yet, even if one does not know all the reasons, it is still useful to know what is likely to happen, so that one can attempt to predict such changes the next time he meets a similar situation. Some day you may wish to keep a field from turning into a birch thicket or an oak forest.

A hundred and fifty years ago Connecticut was one-third forest; today it is about two-thirds forested. This is, of course, an expression of the fact that much agricultural land has been abandoned and has reverted to forest. Very little of this land has been reforested by planting. Thus, it is clear that fields and pastures in this region tend to revert to forest if left undisturbed by man. In other words, the forest community is more stable than other vegetation types over much of Connecticut. Certain areas, such as marshes, flood plains, and sand plains, are exceptions, for obvious reasons.

The pattern of vegetation development varies, depending on many local factors, but its direction is from conditions of more change toward those of less obvious change. In Connecticut this generally means a progression: from field, to thicket (usually comprising a mixture of trees and shrubs), to forest. This is not to imply that one can predict exactly which species of plant will replace another. A meadow may turn into a thicket of birch, or the dominant trees in the thicket community might be poplar, maple, or some other species, depending on the seed available, soil conditions, etc. In former pastures, red cedar or pines may be the pioneer trees, because they are distasteful to cattle. Shrubs such as bayberry, sumac and blueberries may dominate the thicket, or a greenbrier and grape tangle may completely cover the area.

Not only the pattern, but also the rate of change toward forest is extremely variable, depending on many factors. Certain grasses (blue-stem, for example) form a turf into which seedlings of woody plants penetrate only slowly, thus maintaining the field stage for many years. Given favorable conditions, certain shrub species may form dense, relatively stable thickets which prevent reforestation for long periods. Such shrub communities are sometimes cultivated in order to stabilize the vegetation on rights-of-way where trees would be undesirable.

Although the process of vegetation development is extremely variable in detail, one can often reconstruct past conditions and predict probable future changes, given a certain combination of existing species. For example, in the oak-laurel forest at Station E, one clue to the origin of the community is the presence of gray birch. As this species does not reproduce in the dense shade of a forest, one can deduce that this area must have been relatively open when these birches were seedlings. Another clue, the abundance of mountain laurel, suggests not only a field, but a grazed field. Laurel often gets a start in run-down pastures, because cattle tend to browse tree seedlings and avoid the laurel. Thus laurel is given an advantage over some of its competitors.

A few years after the pasture was abandoned and grazing stopped, this area was probably a thicket of gray birch, red maple, large-toothed aspen, wild black cherry, laurel, greenbrier, and other species that thrive in open situations. Old fields growing up to combinations of these species are a common feature of the Connecticut landscape.

But this is not what we see here now. Oaks are the predominant trees. How and when did they enter this community? Some of them, like the big white oak marking Station E, escaped destruction by cattle and the farmer, and grew to good size while the pasture was still open. This is evident from their spreading, open-grown shape. Other oaks got started during the grazing period, along with some of the birches and maples, but were suppressed by browsing. Following abandonment, the open areas were further invaded by woody plants, including oak seedlings.

Now the shade-intolerant gray birches and aspens have been overtopped by the oaks and are dying out. Conditions in the forest have become too shady and otherwise unfavorable for them to reproduce, and they will diminish in importance in the community. Here we see a forest that has not yet reached equilibrium—its composition is still changing.

For the near future, we can predict that oaks will increase their dominance as the pioneers fade out. For the distant future, however, there are indications that further changes may occur; namely, another species may challenge the oaks' dominance. Young hemlocks are present under the oaks here in fairly large number, but you might not guess that they could provide serious competition for the oaks unless you knew some of the characteristics of this species. Young hemlocks will tolerate deep shade and may persist for decades as small trees while they work their way up into the canopy. Once they have a place in the sun, few trees can compete successfully against them. They grow taller and live longer than most other native species, and are almost free of serious insect attack and disease. Most tree species are unable to reproduce in their shade, as you can see in hemlock stands in the Natural Area. Thus, as the hemlock population increases, the oaks are less able to reproduce. In some more northern sections of Connecticut and on certain favorable

sites, such as rocky ravines, this process continues until hemlock is the dominant tree. However, this is not to imply that all our oak forests will give way to hemlock.

When a community has developed to the point where all its plant species are those capable of reproducing themselves generation after generation, the composition of the community becomes relatively stable. The community is in equilibrium with its total environment. This is not to imply, however, that the community is static. It is disturbed by periodic changes in the environment, such as droughts, fires, and hurricanes. But as a pendulum eventually returns to its most stable position after a disturbance, so a plant community tends to return to its most stable configuration after a disturbing event. When, as in this case, the most stable community is a forest, it is called a relatively stable or climax forest.

It is, of course, impossible to predict exactly what the composition of this relatively stable forest will be on this site, but if fire is kept out, hemlock if present as a seed source may become the dominant tree.¹

¹Hemlock is one of the most fire-sensitive of our local species.

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SPECIES LIST

THE SCIENTIFIC names on this list are, with a few exceptions, from *Gray's Manual of Botany*, eighth edition, by M. L. Fernald and the *Illustrated Guide to Trees and Shrubs*. by A. H. Graves.

I. TREES, SHRUBS AND VINES

ALDER

Black (*Ilex verticillata*)

Common (*Alnus serrulata*)

ARBOR VITAE, American (*Thuja occidentalis*)

ARROW-WOOD (*Viburnum dentatum*)

ASH

Northern Prickly (*Xanthoxylum americanum*)

Wafer (*Ptelea trifoliata*)

White (*Fraxinus americana*)

ASPEN, Large-toothed (*Populus grandidentata*)

AZALEA

Flame (*Rhododendron calendulaceum*)

Pink (*Rhododendron nudiflorum*)

Swamp (*Rhododendron viscosum*)

BARBERRY

Common (*Berberis vulgaris*)

Japanese (*Berberis Thunbergii*)

BAYBERRY (*Myrica pensylvanica*)

BEECH

American (*Fagus grandifolia*)

European (*Fagus sylvatica*)

BIRCH

Black (*Betula lenta*)

Gray (*Betula populifolia*)

White (*Betula papyrifera*)

BLACKBERRY (*Rubus*)

BLACK-HAW (*Viburnum prunifolium*)

BLUEBERRY, Highbush (*Vaccinium corymbosum*)

BUTTONBUSH (*Cephalanthus occidentalis*)

CHERRY, Wild Black (*Prunus serotina*)

CHESTNUT

American (*Castanea dentata*)

Hybrids (*Castanea*)

CHOKEBERRY (*Pyrus floribunda*)

CRANBERRY-TREE (*Viburnum trilobum*)

DEWBERRY (*Rubus flagellaris*)

DOGWOOD, Flowering (*Cornus florida*)

FALSE INDIGO (*Amorpha fruticosa*)

GRAPE (*Vitis*)

GREENBRIER, Common (*Smilax rotundifolia*)

HAWTHORN (*Crataegus*)
 HEMLOCK (*Tsuga canadensis*)
 HICKORY, Pignut (*Carya glabra*)
 HOLLY
 American (*Ilex opaca*)
 Mountain (*Nemopanthus mucronata*)
 HONEYSUCKLE, Tartarian (*Lonicera tartarica*)
 HUCKLEBERRY, Common (*Gaylussacia baccata*)
 INKBERRY (*Ilex glabra*)
 IVY
 Boston (*Parthenocissus tricuspidata*)
 English (*Hedera helix*)
 Poison (*Rhus radicans*)
 JUNIPER, Common (*Juniperus communis*)
 LAUREL
 Great (*Rhododendron maximum*)
 Mountain (*Kalmia latifolia*)
 Sheep (*Kalmia angustifolia*)
 LEUCOTHOE, Drooping (*Leucothoe editorum*)
 MALEBERRY (*Lyonia ligustrina*)
 MAPLE
 Red (*Acer rubrum*)
 Striped (*Acer pensylvanicum*)
 Sugar (*Acer saccharum*)
 MEADOWSWEET (*Spiraea latifolia*)
 NANNYBERRY (*Viburnum lentago*)
 OAK
 Black (*Quercus velutina*)
 Scarlet (*Quercus coccinea*)
 White (*Quercus alba*)
 PINE
 Austrian (*Pinus nigra*)
 Red (*Pinus resinosa*)
 White (*Pinus Strobus*)
 PINXTER-FLOWER (*Rhododendron nudiflorum*)
 POPLAR (*Populus grandidentata*)
 RED CEDAR (*Juniperus virginiana*)
 RHODODENDRON, Carolina (*Rhododendron carolinianum*)
 ROSE (*Rosa multiflora*)
 SASSAFRAS (*Sassafras albidum*)
 SAWBRIER (*Smilax glauca*)
 SHADBUSH (*Amelanchier*)
 SORREL-TREE (*Oxydendrum arboreum*)
 SUMAC
 Fragrant (*Rhus aromatica*)
 Poison (*Rhus vernix*)

SUMAC (cont'd.)

- Smooth (*Rhus glabra*)
- Staghorn (*Rhus typhina*)
- Winged (*Rhus copallina*)
- SWEET-FERN (*Comptonia peregrina*)
- SWEET PEPPERBUSH (*Clethra alnifolia*)
- TREE-OF-HEAVEN (*Ailanthus altissima*)
- TULIP-TREE (*Liriodendron Tulipifera*)
- TUPELO (*Nyssa sylvatica*)
- VIBURNUM, Maple-leaved (*Viburnum acerfolium*)
- WALNUT, Black (*Juglans nigra*)
- WILLOW, White (*Salix alba*)
- WINTERBERRY (*Ilex verticillata*)
- WITHEROD (*Viburnum cassinoides*)
 - Smooth (*Viburnum nudum*)
- YEW, Japanese (*Taxus cuspidata*)

II. HERBACEOUS PLANTS

- ARROWHEAD (*Sagittaria Engelmanniana*)
- BLUE-STEM (*Andropogon scoparius*)
- BUR-REED (*Sparganium*)
- BUTTERFLY WEED (*Asclepias tuberosa*)
- CANADA MAYFLOWER (*Maianthemum canadensis*)
- FERN
 - Bracken (*Pteridium aquilinum*)
 - Christmas (*Polystichum acrostichoides*)
 - Cinnamon (*Osmunda cinnamomea*)
 - Hay-scented (*Dennstaedtia punctilobula*)
 - Interrupted (*Osmunda Claytoniana*)
 - Lady-fern (*Athyrium Filix-femina*)
 - Marsh (*Dryopteris Thelypteris*)
 - New York (*Dryopteris noveboracensis*)
 - Royal (*Osmunda regalis*)
 - Sensitive (*Onoclea sensibilis*)
- GERANIUM, Wild (*Geranium maculatum*)
- GOLDENROD (*Solidago*)
- JEWELWEED (*Impatiens capensis*)
- PICKERELWEED (*Pontederia cordata*)
- POND WEED (*Potamogeton*)
- RED TOP (*Agrostis alba*)
- SKUNK CABBAGE (*Symplocarpus foetidus*)
- SWAMP MILKWEED (*Asclepias incarnata*)
- VIOLET (*Viola*)
- WATER-LILY, Fragrant (*Nymphaea odorata*)
- WILD INDIGO (*Baptisia tinctoria*)
- WILD LILY-OF-THE-VALLEY (*Maianthemum canadensis*)

The Connecticut Arboretum

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Association membership comprises organizations and individuals interested in supporting the Arboretum and its program. Members receive Arboretum publications and enjoy other privileges, including notices of special field trips and lectures, and the use of the Arboretum facilities.

Individual memberships: annual, \$5; sustaining, \$10; supporting, \$100; life, \$500.

Organization memberships: annual, \$10; sustaining, \$25; supporting, \$100.

Checks should be made payable to the Connecticut Arboretum and sent to the Director, Connecticut College, New London, Conn. 06320.

THAMES SCIENCE CENTER

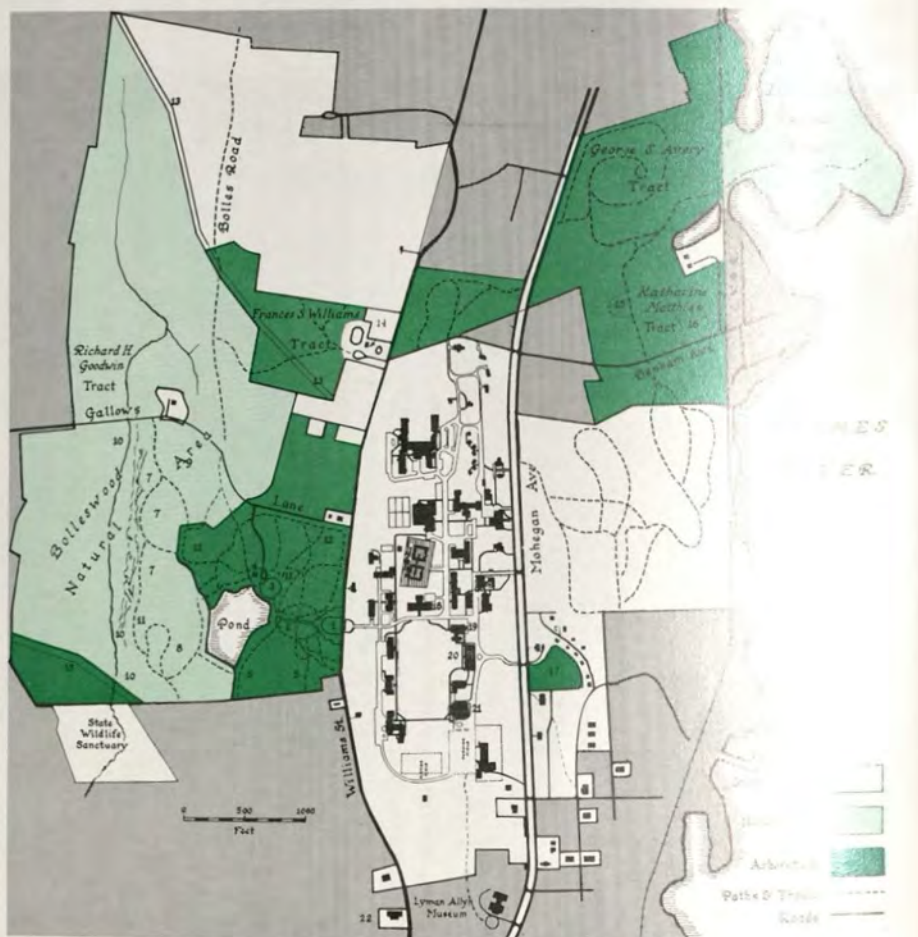
The Thames Science Center is closely associated with the Connecticut Arboretum. It is located on Gallows Lane within the Arboretum and utilizes its natural ecosystems in its environmental education programs. Membership entitles individuals to receive its publications, notices of field trips, lectures and events, and to participate in its educational activities.

For further information write to the Thames Science Center, Gallows Lane, New London, Conn. 06320.

Connecticut Arboretum Bulletins

- No. 6 Check List of Woody Plants growing in the Connecticut Arboretum and Guide to the Arboretum. Richard H. Goodwin, Katherine H. Heinig and Kaleb P. Jansson, pp. 32. 1950. .35
- No. 7 The Connecticut Arboretum: Its History and the Establishment of the Natural Area. pp. 16. 1952 .15
- No. 8 The Connecticut Arboretum: The Mamacoke Acquisition and Our Research Program. pp. 20. 1955 (out of print)
- No. 9 Six points of Especial Botanical Interest in Connecticut. pp. 32. 1956. The areas described are the Barn Island Marshes, the Connecticut Arboretum, the North Haven Sand Plains, Catlin Wood, the Cathedral Pines, and the Bigelow Pond Hemlocks. .40
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THE CONNECTICUT ARBORETUM AT CONNECTICUT COLLEGE



LEGEND

- | | |
|------------------------------------|---|
| 1 Main Entrance | 12 Picnic Areas |
| 2 Laurel Walk | 13 Utility Right-of-Way Demonstrations Areas |
| 3 Outdoor Theatre | 14 College Riding Stable |
| 4 Buck Lodge | 15 Landscaping with Herbicides Demonstration Area |
| 5 Edna Edgerton Wildflower Area | 16 Arboretum Field |
| 6 Red Pine Grove | 17 Caroline Black Botanic Garden |
| 7 Bolleswood | 18 Palmer Library |
| 8 The Bog | 19 New London Hall: Matthies Botanical Lab and Greenhouse |
| 9 Red Maple Swamp | 20 Fanning Hall: Administration |
| 10 The Ravine | |
| 11 Open Ledge with Glacial Erratic | 21 Palmer Auditorium |
| | 22 Thames Science Center |