

# CANADIAN HEMLOCK VARIANTS AND THEIR PROPAGATION

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When reproduced from seeds, both in nature and in cultivation, some conifers give rise to many seedlings which are quite unlike the parent plants. These variants, which originate as mutations, generally retain their characteristics when propagated vegetatively. Canadian hemlock (*Tsuga canadensis*) is an excellent example of a conifer which produces seedlings that vary widely in genetic make-up.

Some idea of the extent of variation in Canadian hemlock is brought out by the fact that through the years the Arnold Arboretum has received plants or propagating material of 280 clones. They were discovered in the woods or in nursery rows by contributors who considered them worthy of perpetuation at a botanical institution. A search of the Arboretum's records reveals that hemlock variants were being received in the infancy of this century-old organization. Some were named and others, as is the case with many received more recently, simply bore descriptive notations such as, "dense form", "dense pyramidal", "variety", etc.

Canadian hemlock variations deviate from normal by being slow growing, globose, pendulous, pyramidal, contorted, spreading, fastigate, prostrate, etc. Some have leaves that differ in size, shape, color or arrangement on the branches. Combinations of these various characteristics are not uncommon. An upright plant may have dark leaves while a globose plant may be slow growing.

**Canadian Hemlocks Found in the Wild.** Where did this wide diversity of plant forms come from? Many were discovered and brought from the wild by observant people. Frank Abbott of Saxon River, Vermont has been a hunter, fisherman and woodsman throughout his long life. While traveling in the New England woods he has collected plants or propagating material of numerous Canadian hemlock mutations. Searches made in the wild by Joseph B. Gable of Stewartstown, Pennsylvania have also led to many new discoveries. Each of these collectors assigned numbers to his finds. Some have since been named. Many, however, have no formal cultivar names and are designated only by the original collector's numbers.

Through the years, Henry Hohman of Kingsville Nurseries, Kingsville, Maryland has propagated the Abbott and Gable material together with many selections of his own and made them commercially available. All told he has assembled 84 Canadian hemlock cultivars. In an effort to insure perpetuation Mr. Hohman has thoughtfully donated specimens to botanical institutions.





A



B



C

Figure 1 (A) A Canadian hemlock variant from the New Hampshire woods. Any dwarf tree in a woodland habitat is at a severe competitive disadvantage for it tends to be shaded out by more vigorous plants. (B) Abnormal Canadian hemlocks with like characteristics are often found near each other in the wild and, no doubt, have a common origin. These trees were found growing together in Dover, Mass. (C) *Tsuga canadensis* 'Kelseys Weeping'. This bizarre plant was also a multiple find.



Figure 1A shows a Canadian hemlock variant found in the New Hampshire woods. It is slow growing, and has small needles which are darker than normal in color. Any dwarf or slow growing conifer in a woodland habitat is at a severe competitive disadvantage for it tends to be shaded out by more vigorous plants. Canadian hemlock seedlings however, have the ability to survive and develop in deep shade under conditions where seedlings of other conifers would perish.

Abnormal Canadian hemlocks with like characteristics are often found near each other in the wild and, no doubt, have a common origin. Similar phenomena have been reported frequently in the literature. The plants shown in Figure 1B all exhibit darker than normal leaf color and slow rates of growth. Nine were found growing together in woods at Dover, Massachusetts. A bizarre form called *Tsuga canadensis* 'Kelsey's Weeping' (Figure 1C) was also a multiple find.

Figure 2A shows two trees of particular interest that grow in front of a residence at Sherborn, Massachusetts. The house was at one time the town post office. The trees are estimated to be 150 or more years old. Their positions indicate they were planted as a pair. In those days there were few if any nurseries in the area and it was common practice to carry plants from the woods for landscape use. It seems probable that the trees in question were from that source. One is normal in character and is now approximately three times taller than the other. The slow growing form is unusually dense due to short internodes and a closely set arrangement of the leaves which are darker than normal in color. Its lower branches are gone but those that remain present a perfect pyramidal shape.

Another slow growing form found in the woods along a Connecticut roadside is shown in Figure 3. The plant is about 12 feet tall and perhaps 100 or more years old. It survives despite competition from other trees and the dry impoverished soil in which it grows.

**Vegetative Propagations from Witches'-Brooms.** Canadian hemlock variants have also originated as vegetative propagations from witches'-brooms. Several now under observation at the Arnold Arboretum show similarity. All are vase-shaped with hollow centers.

**Variants Found in Nursery Rows.** Nurserymen, when transplanting seedlings, ordinarily discard plants of small size and select the largest of the seedling lot. Recent interest in dwarf plants has led to a demand and some nurserymen now put aside these mutations for further observation. John Verkade of Verkade's Nursery, Wayne, New Jersey, has selected many Canadian hemlocks for this purpose. From these he has chosen some very nice diminutive forms which have recently been registered.

When visiting the Weston Nurseries, Hopkinton, Massachusetts, some years ago, we looked at a block of plants which clearly illustrated the wide variation to be found in Canadian hemlock. All

plants which appear in Figure 2B are different. They show variation in growth habit, growth rate, needle color and needle arrangement. Mr. Edmund Mezitt, of Weston Nurseries, commented that these plants were received as small seedlings from one source and are of similar age.

Figure 2C shows one of the original Sargent hemlock plants which is growing in Brookline, Massachusetts. Seedlings from this were started at the Arnold Arboretum in 1965. Fifty-four percent of the offspring are prostrate and increase in diameter at the rate of two feet per year. Another prostrate cultivar, called 'West Coast Spreader', produces annual growth 21 inches long and therefore increases at the rampant rate of 42 inches per year.

Long lists of cultivars available from a few special nurseries emphasize the wide diversity to be found among Canadian hemlocks. Joel W. Spingarn of Baldwin, New York, shows 68 cultivars in his current catalogue, while Lane Ziegenfuss of Hillside Gardens in Lehigh, Pennsylvania, lists 132.

At the Hemlock Arboretum in Philadelphia, Pennsylvania, the late Charles F. Jenkins, the owner, attempted to assemble all the various forms of Canadian hemlock. His collection is reputed to have contained 190 specimens when he passed away in 1951 and the project was discontinued. Little did he realize that such a collection might have involved thousands of plants.

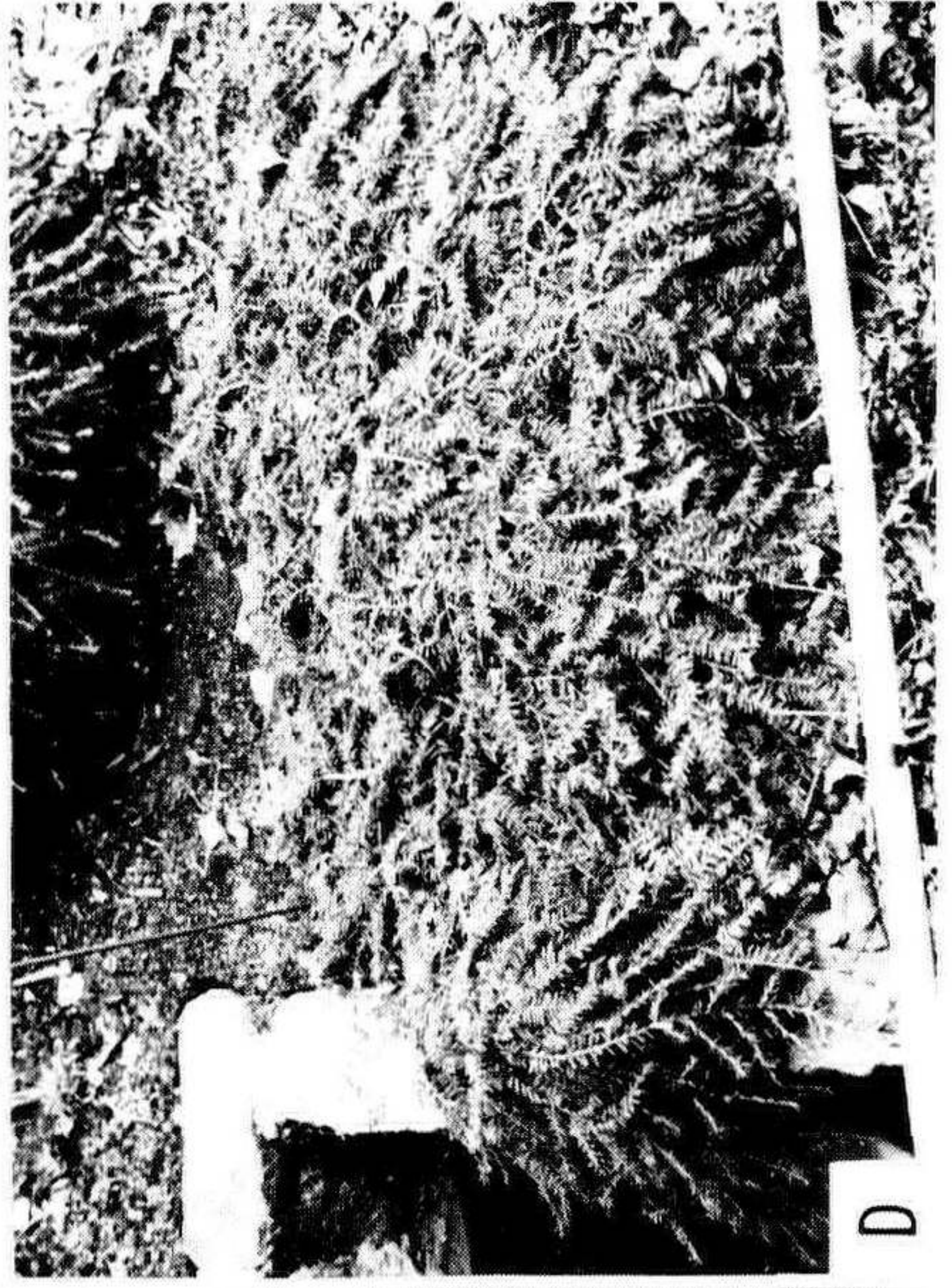
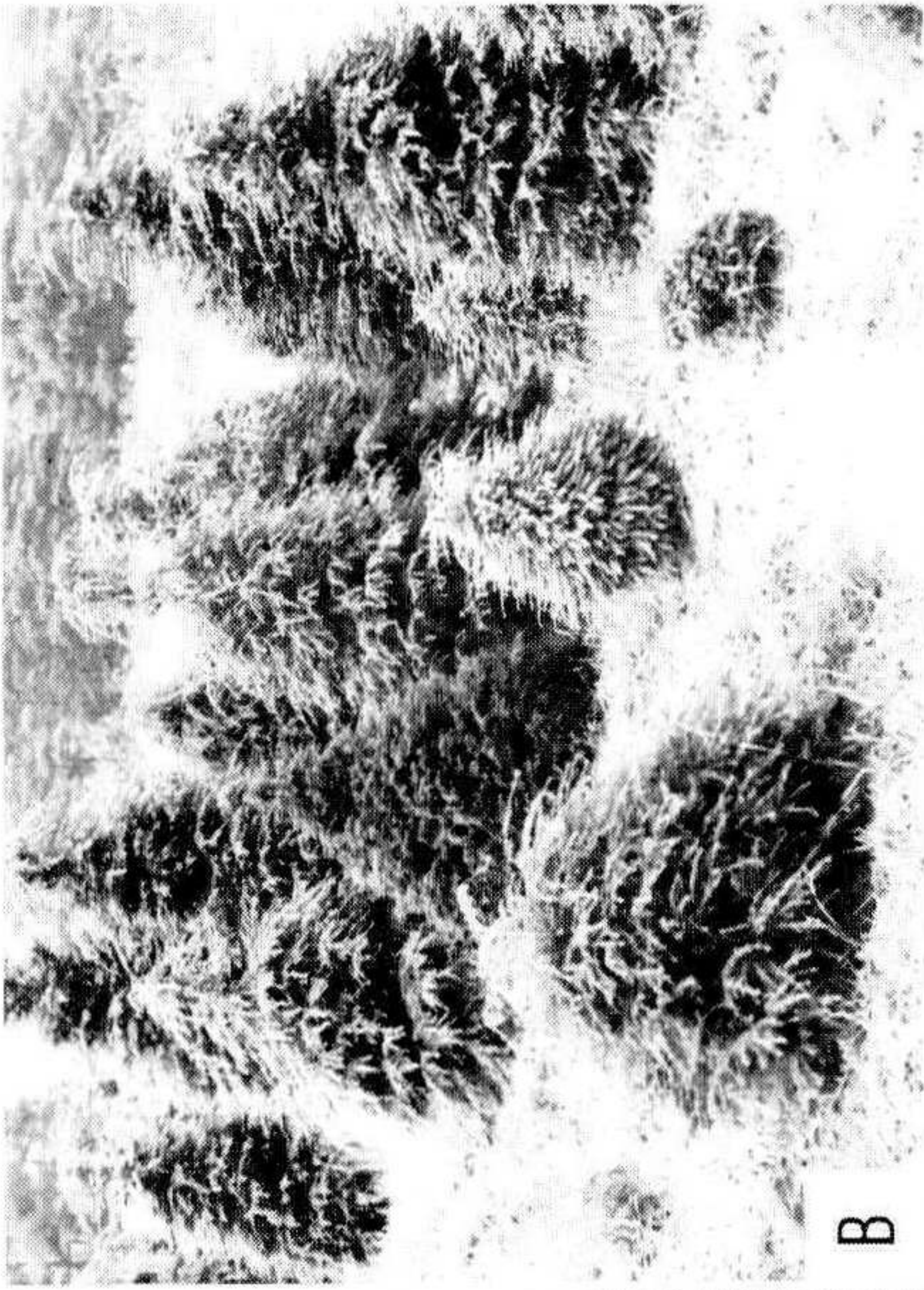
As would be suspected in a subject exhibiting such wide natural variation, a great many forms of Canadian hemlock are similar. Although discovered and collected from widely separated locations, many appear identical. Considering the frequency with which new forms arise it is doubtful whether any possible good can come from continuing to name new variants unless they are particularly different or unusual.

**Propagation of Canadian Hemlock.** In the past it was customary to propagate Canadian hemlock cultivars by grafting. In fact, *Tsuga canadensis* was considered a suitable understock for all other *Tsuga* species. However, we have experienced instances of incompatibility when abnormal hemlocks were grafted on their own species.

Overgrowth of the scion or girdling, brought about by circling roots which arose on understocks established in small pots, can both lead to failure of the plants either shortly after grafting or in subsequent years. Therefore, we now propagate these subjects only by cuttings.

Cuttings, consisting of two or more growth flushes, are taken in autumn (October, November). A five-second dip, using IBA plus NAA at 5,000 ppm each, has proven the most satisfactory root-inducing substance. The cuttings are placed either on an open greenhouse bench







or in polyethylene chambers. In either case a high percentage of rooting can be expected.

Figure 2D shows a specimen of *Tsuga canadensis* 'Cole' growing at the Gray & Cole Nurseries, Ward Hill, Massachusetts. It is about 3 feet in diameter and 4 inches tall. Henry C. Cole found this cultivar near the base of Mount Madison in New Hampshire. Cuttings taken from it root easily. Cole described an incident where he took prunings from a plant he was moving and stuck them into the ground in the shade of a nearby plant—all initiated roots.



Fig. 3. This slow-growing *Tsuga canadensis* tree was found in dry impoverished soil along a Connecticut roadside.

A definitive study of the Canadian hemlock problem has been undertaken by Dr. John Swartley of Ambler, Pennsylvania. His extensive knowledge of the subject should provide a guide to those interested in naming new variants and thereby help to bring order out of chaos.

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Figure 2 (opposite page). (A). A residence at Sherborn, Mass. Two Canadian hemlocks were brought from the woods for landscaping about 150 years ago and provide dramatic evidence of difference in growth rate. (B) Canadian hemlocks at the Weston Nurseries, Hopkinton, Mass. The seedlings, which came from one source, show remarkable variation. (C) One of the original Sargent hemlock plants located in Brookline, Mass. (D) *Tsuga canadensis* 'Cole', found at the base of Mount Madison, New Hampshire, is easily propagated from cuttings.



MODERATOR FORDHAM: Bruce Briggs would like to show us some slides of a new yellow rhododendron.

BRUCE BRIGGS: Dave Leach mentioned this rhododendron yesterday and it is called 'Hotie'. We released this plant this past year. You will notice it is a deep yellow and it keeps its color when the flower opens fully; many of the yellows have a tendency to fade. One of the first things you people here wanted to know is how much cold will it take; this I cannot answer except to say that a few years ago we had a cold snap in December and this plant was one of the very few which came out with a perfect truss. I believe it will be as hardy or hardier than 'Goldsworth's Yellow'. It propagates very easily. We were very happy to find a yellow which propagated easily. Its habit of growth is very compact; it makes many breaks, and grows a little larger than 'Unique'. Its leaves are long and dark green. It has about the same rate of growth as x 'Cunningham's White'.

MODERATOR FORDHAM: Thank you, Bruce. Next Tony Shamarella has a slide he would like to show.

TONY SHAMARELLA: This is the hardiest blood-red azalea that I know of. It is about 7 years from seed. It is being introduced with the name 'Red-Red'.

I also have a group of Yakusimanum hybrids in a range of colors. These plants will bud well at 2 years of age and, as with all of the Yakusimanum hybrids, they are fairly resistant to root rot diseases. They are mostly in colors of which the ladies can't seem to get enough. I hope to introduce these in the fall of 1972 and they will carry various names such as 'Yahoo King', 'Yahoo Queen', 'Yahoo Prince'. There will probably be four or five clones introduced.

MODERATOR FORDHAM: Joe McDaniel has some slides he would like to show.

JOE McDANIEL: I have talked at previous meetings about both hackberries and magnolias. Today, I have slides showing a hackberry and a magnolia species both native farther south, but thriving in and around Urbana, Illinois, and some selections of both which appear worthy of clonal propagation as good shade trees for Zones 5 and 6.