

Mohonk Preserve, Inc.

Research Report

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Forest Vegetation Changes:

A Plant Community Transition - per stirpes

by

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(Draft)

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Abstract

The known history of the type of forest cover in this Laurel Ledge Road study area illustrates an interaction between natural forces and human influences - both advertent and inadvertent.

Our conclusion is that this study area includes both a) a sample of present-day mixed deciduous forest and b) a relic representation of the predominantly old-growth hemlock forest of the whole Plateau area, as it probably was in 1850. This combination has helped to fit together what is believed to have probably been the sequence of vegetation changes.

The principle of divergency is manifested by an analysis of the hypothetical per stirpes history of the plant community that has been reconstructed.

Introduction

The study plot is on lower Laurel Ledge Road, 0.3 miles SW of Rock Pass, at a 27.6 in. d.b.h. Hemlock, which stands on the NW edge of the road opposite a rock ledge. Elevation 1,000 ft.

The area studied was approximately 40 m. in diameter, straddling the above road. It is at the upslope angle of a "bench" on the NW side of the mountain. The substrate is conglomerate.

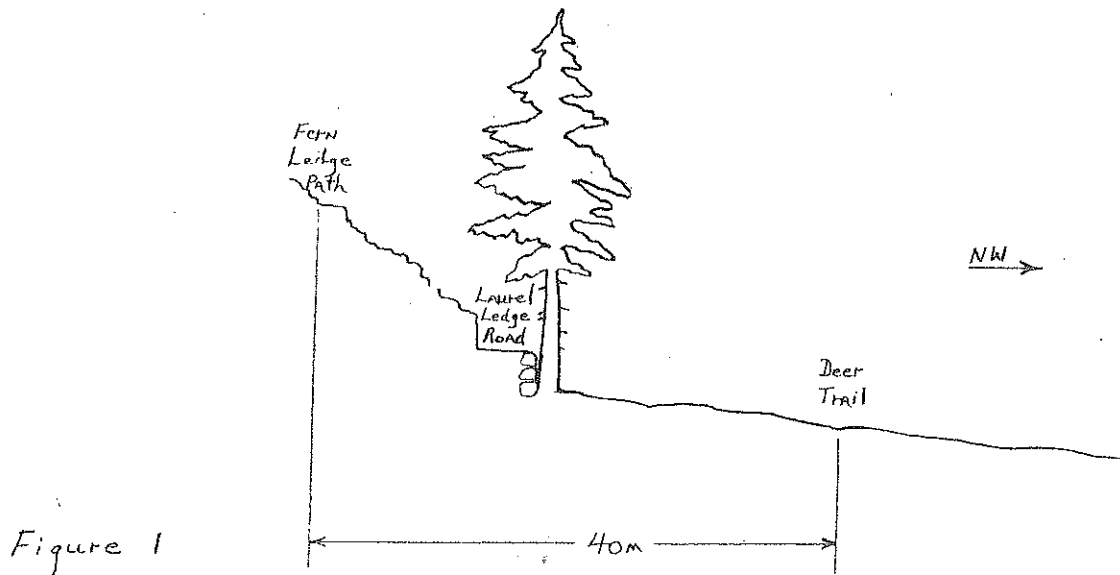


Figure 1

The road is approximately 12 ft. wide, nearly level with a low stone dry-wall on the NW side.

#### Northwest of Road

Mature deciduous forest, with Hemlock occurring as isolated individuals in the canopy and as the principal understory species. It seems to be the only potential canopy species currently reproducing.

#### Southeast of Road

Mature Hemlocks mostly of small stature and an occasional deciduous tree (Chestnut Oak or Black Birch) are the only trees on these rock ledges. There are a few scattered clones of Mountain Laurel as the only shrub layer plant. No ground cover is present.

#### Road Shoulders (verges)

This carriage road was built in 1900, and presumably was surfaced with shale (Martinsburg) at that time. The near neutral pH of the shale, the lack of tree route competition, the occasional summer mowing, and the somewhat greater light combined to create a limited habitat suitable for some 15 herbaceous and woody plants not found in the adjacent forest. The verge plants have been referred to as "ribbons of foreigners." See Appendix A for list.

#### History Reconstructed

The center of the site of this study area is a 27.6 in. d.b.h. Canadian Hemlock (*Tsuga canadensis*), which was included in Ed Cook's (Lamont) study: "A Tree Ring Analysis of Four Tree Species Growing in Southeastern New York State." Its estimated height is 80 feet, with a live crown ratio of 60%. Protruding stubs of dead branches are found to within two meters of the ground. The carriage road has a slight curve around this tree (see 1900 photographs - Appendices B & C). An increment core from the Hemlock shows 130 years of growth in the outer five inches of radius (see Figure 1).

A study of the increment core indicates several changes in rate of growth. These divisions are suggestive when considered in relation to the known history of human use and abuse of this portion of Shawangunk forest.

There was an approximate doubling in the rate of growth starting in 1856. A slight slowing of growth is observed in 1875. From approximately 1881 to 1918 growth was slower and steady averaging about half the rate previous to 1856. From about 1918 to the present, growth rate was for the most part uniform, and was more than 1881-1918, but less than that prior to 1856. This chronological summary is integrated with available items of history in the following sections.

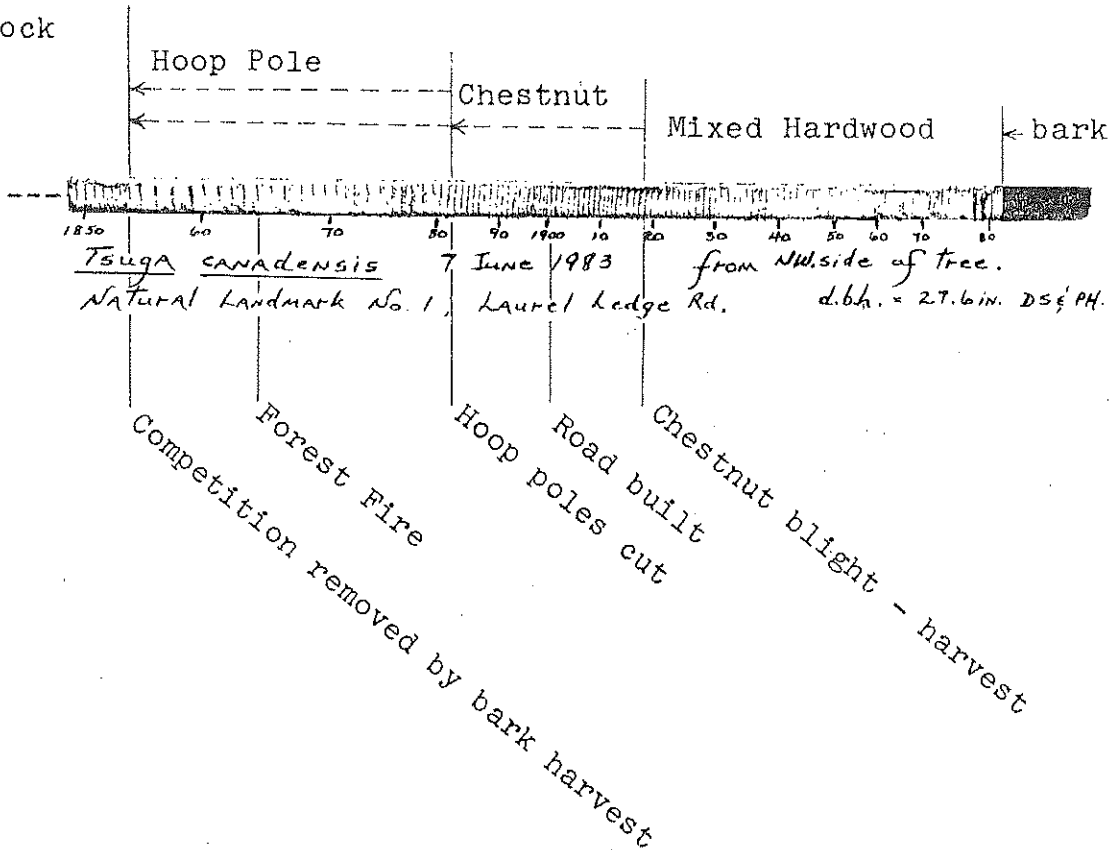
#### Vegetational Sequence

One reason for choosing this site was that topography caused a natural division of the study area into two parts (see Figure 1). A third of the way through the forest history that we are attempting to reconstruct, the building of Laurel Ledge Road was completed apparently without significantly affecting the trees of the area. This is an example of Albert K. Smiley's concern for aesthetics.

Figure No. 1

Plateau Dendrochronology  
N.W. Sector

Hemlock



We have chosen to refer to the following chronological divisions by the name of the canopy species which was present in the north-western half of the study area, based on records of human use. (see Table 1).

Table 1                      Vegetational History at Laurel Ledge

Stages	Mixed Hardwood			American Hemlock		Remarks
	Chestnut Oak	Black Birch	Red Maple	Chestnut		
<u>Northwest Sector</u>						
1. <u>Hemlock</u> 1800(+)-1855						
a. Canopy	?	?	?	?	Yes	
b. Understory		-	-	-	-	
2. <u>Hoop-Pole</u> 1855-1864						
a. Canopy	Yes	?	?	Yes	No	Hemlock slash from bark removal
b. Understory	?	?	?	probable	?	
c. Reproduction	?	?	?	probable	probable	
1864-1882						
a. Canopy	No	No	?	No	No	fire of 1864
b. Understory	?	?	?	No	No	
c. Reproduction	Yes	?	?	coppice	?	
3. <u>Chestnut</u> 1882-1920 (as at 1900)						
a. Canopy	Yes	Yes	?	Yes	Yes	Chestnut dead 1913
b. Understory	Yes	Yes	?	probable	probable	
c. Reproduction	?	?	?	No	probable	
4. <u>Hardwood</u> 1920-1983 (as at 1983)						
a. Canopy	45%	25%	5%	-	25%	
b. Understory	-	-	Yes	-	Yes	
c. Reproduction	Yes	No	Yes	-	seedlings	striped-maple seedlings

1. Hemlock Stage - before 1855  
Northwest of Laurel Ledge Road

D. S. recalls being told many years ago, by local residents, that this area between lower Laurel Ledge Road and Plateau Path was once a stand of Hemlock, which was cut just after the middle of the last century. The bark was peeled and hauled by wagon to piece out the life of regional tanneries which had nearly exhausted the supply of hemlock in the whole area. The only wagon access to this bench would have been via Maple Path and Rock Pass. The harvest of Hemlock in the Shawangunks is described in an account in the "Story of Mohonk", by Frederick E. Partington, 1911, stating that John F. Stokes lost \$1000 worth of bark

(probably near his tavern on the lake) ready for market, in a great forest fire which came up the west side of the mountain during July 1864. It is our assumption, in the light of later history, that this area was burned by that fire.

The large Hemlock, which is at the center of the study area, was some 18 inches in diameter at the time of the bark peeling and would have been of an ideal size for cutting. Thus, its presence today may have been due to: 1) chance - inadvertent human factors; 2) inaccessibility - a thick scattering of glacial erratics near its base; 3) poor form - branches near the ground. The latter seems the likely cause since there is a 1½ inch protruding dead branch 6 ft. from the soil at its base. Adjacent Hemlocks are much smaller, but may well be as old. There are two large Black Birch (20.4 and 20.7 inches d.b.h.) in the study area that have not been aged, because of the difficulty of defining sapwood rings on the cores of this species.

It is our hypothesis that the pre-1855 forest in the Laurel Ledge area consisted of a mixture of coniferous and hardwood trees. Our guess is that this mixture must have had a larger proportion of Hemlocks to make the subsequent harvest worthwhile, yet with a sufficient minority of hardwoods to encourage tall straight growth of Hemlock with natural delimiting making them suitable for tan-bark harvest. Another reason for assuming the presence of hardwoods was the necessity to have a seed and stump sprout source for the subsequent Hoop Pole stage. We are curious about what the understory was composed of during this time, but have no direct evidence about it.

#### Southeast of Laurel Ledge Road

Another reason for choosing this study site was the current vegetation present in this area. We believe that this section represents Shawangunk old growth ("virgin") forest as defined in Natural Science Note No. 34, "Virgin Forests in the Shawangunks" (D.S.). The exception would be the loss of a very minor component of American Chestnut.

On the rock ledges southeast of the road, the canopy is 95% Hemlock with an occasional deciduous tree (Chestnut Oak or Black Birch). A few clumps of Mountain Laurel and widely scattered depauperate Striped Maples and Witch-hazels complete the vegetation picture. Many of the Hemlocks have limbs (both living and dead) nearly to the ground. There are no ground cover plants, except for a few ferns on rock ledges.

We suggest that the present appearance of this sector of the study area resembles closely what it may have looked like previous to 1855, and as it has ever since. The reason for this statement should become obvious as we discuss subsequent stages.

#### 2. Hoop Pole Stage 1855 - 1864

If our assumption - that the Hemlock bark harvest occurred in the mid-1850s - is correct, we believe that in the area outside (NW) of the study plot the ground was probably littered with peeled trunks and slash. This presumably set the stage for the extensive fire in

July 1864. It seems likely that there was a scattering of canopy hardwoods (including Chestnut) which were killed by the intensity of this fire. The following quote appeared in a letter from Alfred to Albert Smiley dated 16 October 1870:

"For a day or two I have been looking up the matter of fires & where thy greatest risk of loss lies. I think decidely it is on the East where we are at work. On the West side the fire has recently run & there are few chestnut & other leaf shedding trees left."

Probably any reproduction of Hemlocks and hardwoods would have also been killed by the fire.

As indicated in the introduction, we judge the study area had not been suitable - due to terrain and tree form - for bark harvesting, thus there was very little or no fuel to support the 1864 fire, which may have gone through the study area and upslope as a light ground fire.

#### 1864 - 1882

We presume that the fire left a nearly clean, ash-enriched forest floor. Probably there was hardwood reproduction from coppice reproduction and buried and blown-in seeds. It seems likely that reproduction was vigorous and sprouts thick, with hardwoods able to compete with Hemlocks whose seed could only have been blown into the area. The hardwood reproduction would have produced within some 20 years what was locally known as a "Hoop Pole stand." This is confirmed by the following quotation from a "Memorandum" book of Daniel Smiley (Sr.), under the date of 2 December 1882:

"Contracted with Case Elmendorf to cut hoop poles on land below Pine Hill this winter. He to cut as this day shown not taking any by roads or paths to have one of our teams to haul them out, he to shave and market them handing over to us one half the receipts."

We infer from this that as of the above date there were a goodly number of one to two inch hardwood saplings. The poles were cut eight feet long for barrels and five feet long for kegs. Splitting and shaving them was winter's work. Probably not too many Chestnuts were cut for hoop poles because their vigorous growth had made them too large to harvest.

### 3. Chestnut Stage 1882 - 1918 (as at 1900)

We feel that the hoop pole cutting left a mixture of Oak, Maple, Birch, and Chestnut, with the Chestnut able to dominate the other hardwoods because of its sprouting ability and rapid growth. As indicated previously, there was a slight slowing of growth of the reference Hemlock during the Chestnut stage.

"I remember that my Father used to say that in the period 1905 to 1920, when they wanted a long straight Chestnut pole, the men would be sent to lower Laurel Ledge Road, for that is where good poles could be found in numbers." (D.S.)

The blight had become epidemic at Mohonk in 1913. By the early 1920s, it had killed most of its host. During the twenties the Chestnut was extensively salvaged for lumber, rustic construction material and fuel wood. We are assuming that the traumatic removal of the Chestnut released the other species of hardwoods which benefited from reduced competition and increased availability of sunlight.

4. Hardwood Stage  
1918 - 1983 (as at 1983)

This stage is fairly well represented by the forest to the northwest of Laurel Ledge Road. Our estimate of canopy area is: Chestnut Oak 45%, Black Birch 25%, Red Maple 5%, and Hemlock 25%. The proportion of Hemlock decreases, as one goes northwest on slightly flatter, less boulder-strewn ground. The understory and shrub zone has Chestnut, Witch-hazel, and Mountain Laurel. There is almost no ground cover except for a few specimens of Wintergreen (*Gaultheria procumbens*), and Starflower (*Trientalis borealis*). Reproduction consists of Striped Maple (numerous seedlings where there is a slight opening in the canopy) and a few small Hemlocks of various heights from one foot up.

For the sector of the study area southeast of Laurel Ledge Road, we have already discussed (p. 2) our hypothesis of its vegetational history. Observations of the existing tree cover of this steep, ledge area suggests to us that it is an important example of a self-perpetuating old growth forest.



Appendix A - Plants on road shoulders (verges)

A. Plants confined to verge

Northwest side of road

grass "A"  
grass "B"  
fern (New York ?)  
Potentilla simplex - Old Field Cinquefoil  
Rubus strigosus - Red Raspberry  
Oxalis (europaea) - Sorrel  
Parthenocissus quinquefolia - Virginia Creeper  
Circaea quadrisulcata - Enchanter's Nightshade  
Aster sp.  
Eupatorium rugosum - White Snakeroot

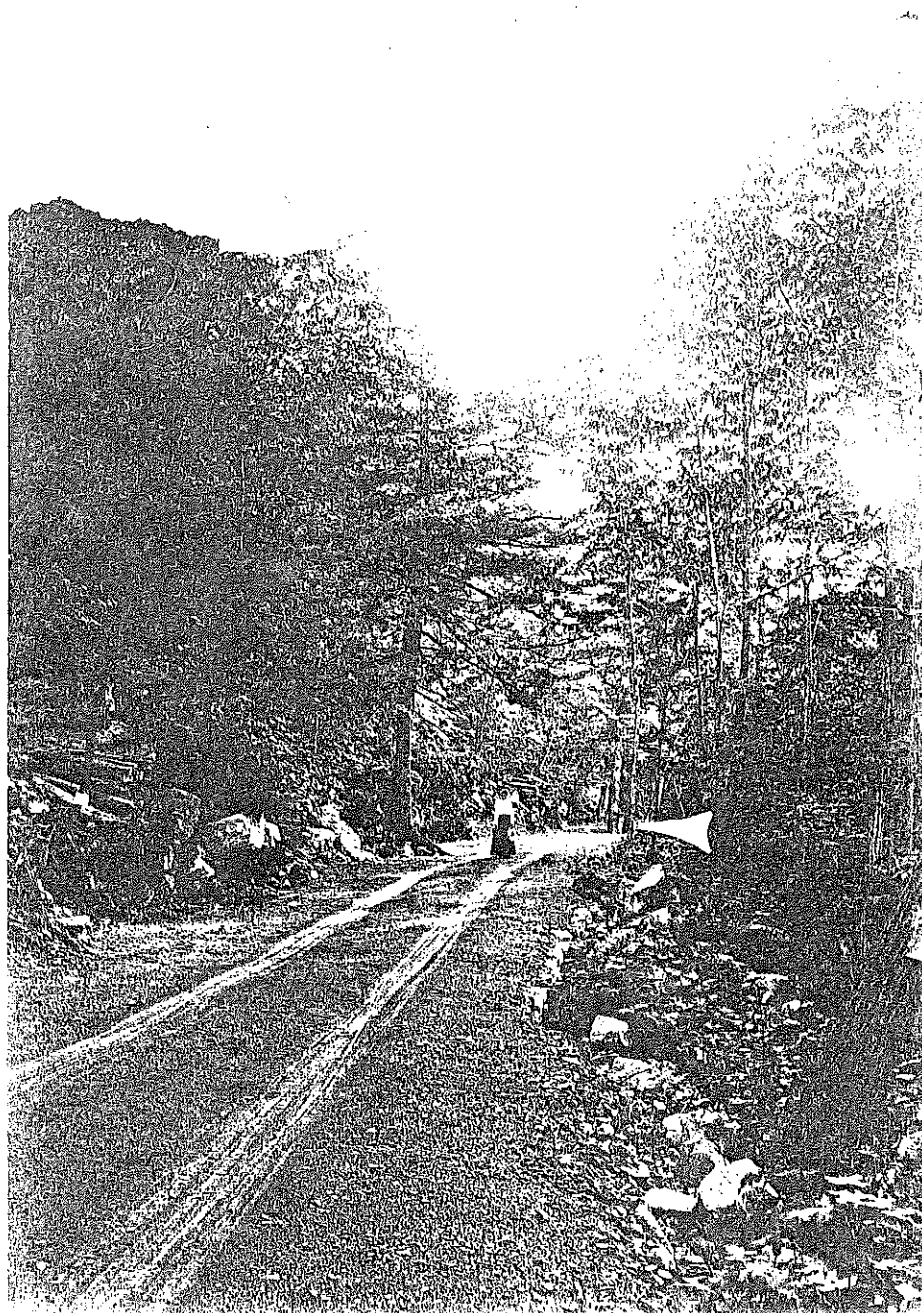
Southeast side of road

Dennstaedtia punctilobula - Hay-scented Fern  
Maianthemum canadense - Wild Lily-of-the-Valley  
Monotropa uniflora - Indian Pipe  
Mitchella repens - Partridge-berry  
Aster acuminatus - Whorled Aster

B. Other plants found on verge and in neighboring woods of the study plot

Tsuga canadensis - Hemlock (seedlings)  
Quercus borealis - Red Oak "  
Q. prinus - Chestnut Oak "  
Acer pensylvanica - Striped Maple "  
Trientalis borealis - Starflower

Appendix B



Chestnut Poles

Hemlock

Laurel Ledge Road  
looking S.W.

1900

*21 Dec. 2000, Hemlock tree down, broken off at base.*

