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FORESTS OF MOUNT RAINIER NATIONAL PARK

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Contains descriptions of the flowering trees and shrubs in the park.

Mount Rainier and Its Glaciers, by F.E. Matthes. 1914. 48 pages, including 26 illustrations. 15 cents.

Contains a general account of the glaciers of Mount Rainier and of the development of the valleys and basins surrounding the peak.

Panoramic view of Mount Rainier National Park, 20 by 19 inches, scale 1 mile to the inch. 25 cents.

THE FORESTS OF MOUNT RAINIER NATIONAL PARK.

[Pg 1]

By G.F. Allen, *United States Forest Service*.

GENERAL STATEMENT.

The remarkable development of the forests about the base of Mount Rainier results from climatic conditions peculiarly favorable to tree growth. The winters are mild and short. The ocean winds that pass through the gaps of the Coast Range are laden with moisture which falls in the

form of rain or snow on the west slope of the Cascades. The trees are nourished by this moisture through a long season of annual growth, and form an evergreen forest which is, in some respects, the most remarkable in the world. This forest, distinguished by the extraordinary size and beauty of the trees and by the density of the stand, extends into the deep valleys of the rivers which have their sources in the glaciers. On the dividing ridges and in the upper stream basins the composition and character of the forest change with the increasing severity of the climate.

The distribution of the different species of trees according to the intervals of altitude at which they occur separate the forests of the Mount Rainier National Park into different types. The lines of separation are to some extent also determined by complex conditions of slope, exposure, and moisture. The successive forest belts are uniform in the composition of their central areas, but blend and overlap where they come together.

The low valleys of the main and west forks of White River, of the Carbon, the Mowich, the Nisqually, and the Ohanopecosh are covered with a dense and somber forest of fir, hemlock, and cedar. The trees, pushing upward for light, are very tall and free from limbs for more than half their height. Their tops form a continuous cover which the sunshine rarely penetrates, and on which the light snows of early winter fall and melt, without reaching the ground. Even in midsummer the light is soft and shaded, and the air cool and humid. In the wintertime the young growth is sheltered from wind and the severity of the cold is tempered by the protecting mountain ranges. Saved from fire by the uniform dampness of the air the trees grow until they decay and fall from old age. They are succeeded by the suppressed younger trees. The forest [Pg 2] remains mature, not uniformly sound and vigorous, yet not decreasing as a whole in size and volume. Individuals perish, but the character of the forest is constant. The deep alluvial soil covered with moss and decayed vegetation nourishes a luxuriant tangled undergrowth of vine maple, willow, and devil's-club. The forest floor is covered with a deep layer of decayed vegetation and is encumbered with fallen and mossy logs and upturned stumps. The explorer who leaves the trails must be a strong and active man if he can carry his pack 6 or 8 miles in a long summer day.

Ascending from the river bottoms to the lower slopes of the dividing ridges the forest becomes more open and the trees are smaller. Salal, Oregon grape, and huckleberry bushes take the place of the taller undergrowth of the valleys. Up to 3,000 feet the Douglas fir and the hemlock still are the dominant species. Above this altitude new species are found intermingled with the trees typical of the lowland, but forming a distinct forest type. The noble and amabilis fir appear, sometimes growing in pure stands, but more often associated with the Douglas fir and western hemlock at the lower limits of the type, and with alpine fir and mountain hemlock at the upper limit.

Nearly all the trees of this type have deep and wide-spreading roots which serve to hold in place the surface deposit of volcanic pumice which covers the slopes of the mountain. Evidence afforded by the after effects of forest fires in other parts of the Cascades indicates that the destruction of the forest on the mountain sides is followed by erosion. Heavy rains and the melting of the upper snow banks by warm Chinook winds combine to produce a surface run-off that denudes the steeper declivities down to the underlying bedrock.

At elevations above 4,500 feet the lowland trees have disappeared entirely. Subalpine species adapted to withstand the burden of deep snow take their place. Mountain hemlock, alpine fir, and Engelmann spruce grow singly and in scattered groups or form open groves alternating with grassy parks and rocky ridges. The symmetrical outline of the slender pyramidal crowns and rapidly tapering trunks of the spruce and alpine fir trees that stand singly on the greensward of the open parks bring to mind the closely trimmed cultivated evergreens that adorn city parks and lawns. Their lower branches reach the ground and the tops terminate in slender upright spires.

As timber line is approached tree growth is confined to dwarfed and flattened mountain hemlocks, alpine firs, and the white-bark pines firmly rooted among the crevices of the rocks.

The extreme limit of tree growth on Mount Rainier is 7,600 feet above sea level. There is no [Pg 3] well-defined timber line. Scattered clumps of low stunted trees occur up to 7,000 feet. A few very small and flattened mountain hemlocks grow above this elevation. A very large part of the area above 4,500 feet consists of glaciers, talus slopes, barren rocky peaks, and open parks. Basins at the heads of canyons in the high mountains are usually treeless, on account of the great depth of snow which accumulates in them during the winter. On the steep, smooth upper inclines the snow banks frequently slip and form slides which acquire momentum as they rush down the mountain side and break and carry away large trees. Repeated snowslides in the same place keep the slopes nonforested, and their track is marked by light green strips of brush and herbage.

The transition of the forest from its lowland to its extreme alpine type is one of the most interesting features of a visit to the mountain. Entering the park at the western boundary close to the Nisqually River the road skirts the base of the lightly timbered spurs and passes into a forest of large and old Douglas fir and western hemlock. Red cedars grow along the streams that cross the road. Little yew trees and vine maples mingle with the young conifers that form the undergrowth; the gloom of the forest is occasionally relieved by the white bark of alders and the smooth gray stems of the cottonwoods that grow on the sandy bank of the Nisqually. After the

road crosses the Rainier Fork, noble fir and amabilis fir appear, but the Douglas fir and western hemlock are still the prevailing species.

Above Longmire Springs the noble and amabilis fir, mixed with western hemlock, become the dominant type. The trees are shorter and the branches heavier. Mountain ash and yellow cypress grow on the margin of the mountain streams. Huckleberry bushes take the place of the taller undergrowth of the valley.

Above Narada Falls the forest is more open, and the trees are still smaller. Mountain hemlock and alpine fir succeed the trees of the lower slope. Little glades and mountain meadows are seen. They become larger and more numerous and the traveler soon enters the open park of Paradise Valley, in which are but scattered groves of trees. The same successive altitudinal types are met in ascending to Moraine and Grand Parks by way of the Carbon Valley, and in following the Mowich watershed, Crater Lake, and Spray Park routes.

Approaching the park from the east the routes pass through open western yellow pine forests and western larch stands. Since Mount Rainier is west of and apart from the summit line, these species which are peculiar to the eastern slope are not found within the limits of the park.

EFFECTS OF FIRE.

[Pg 4]

FIG. 1.—Whitened spectral monuments of a former forest which was swept by a severe forest fire in 1885. Taken along the road to Camp of the Clouds at an altitude of 5,500 feet.

Photograph by A.H. Barnes.

Notwithstanding the shortness of the summer season at high altitudes, the subalpine forests in some parts of the park have suffered severely from fire (fig. 1). The bare white trunks of fire-killed amabilis and alpine firs bear witness to numerous fires which occurred from time to time [Pg 5] before the regulations governing the park went into effect. The little resin pockets in the bark of these trees blaze fiercely for a short time and the heat separates the bark from the trunk. In this way the tree is killed, although the naked trunk is left untouched by fire. The destruction of the alpine forest in this way is often erroneously attributed to disease or to the depredations of insects.

There has been little apparent change in the alpine burns within the last 30 years. Reforestation at high altitudes is extremely slow. The seed production is rather scanty and the ground conditions are not favorable for its reproduction. It will take more than one century for nature to replace the beautiful groves which have been destroyed by the carelessness of the first visitors to the mountain.

At low elevations the forest recovers more rapidly from the effects of fire. Between the subalpine areas and the river valleys there are several large ancient burns which are partly reforested. The most extensive of these tracts is the Muddy Fork burn. It is crossed by the Stevens Canyon Trail from Reflection Lakes through the Ohanopecosh Hot Springs. This burn includes an area of 20 square miles in the park and extends north nearly to the glaciers and south for several miles beyond the park boundary nearly to the main Cowlitz River. The open sunlit spaces and wide outlooks afforded by reforested tracts of this character present a strong contrast to the deep shades and dim vistas of the primitive forest. On the whole they have a cheerful and pleasing appearance, very different from the sad, desolate aspect of the alpine burns which less kindly conditions of climate and exposure have kept from reforestation.

The original forest was fire killed many years before the coming of the white man. A few naked and weather beaten stubs are still standing. Only the larger of the fallen trunks remain, and these are rotten except for a few seasoned and weatherworn shells. The second growth is of all ages, from seedlings to trees 12 to 14 inches in diameter. Vine maple, willow, and mountain ash have sprung up along the streams and the hillsides are covered with huckleberry bushes and a variety of grasses and flowering plants.

Similar old burns are found on the ridge between Huckleberry Creek and White River, in the northeastern part of the park, and on the ridge between Tahoma Creek and Kautz Creek below Henrys Hunting Ground.

The old burns in the middle altitudes of the park occupy regions once frequented by the Klickitat Indians. Every summer parties of hunters and berry pickers from the sagebrush plains crossed the Cascades with their horses. They followed the high divides and open summits of the secondary ridges until they came around to the open parks about Mount Rainier where they turned their horses out to graze and made their summer camp. The woman picked huckleberries [Pg 6] and the men hunted deer and goats. They made great fires to dry their berries and kindled smudges to protect their horses from flies. It was also their custom to systematically set out fires as they returned. Burning made the country better for the Indians. The fires kept down the brush and made it more accessible. Deer could be more easily seen and tracked and the huckleberry patches spread more widely over the hills.

No considerable part of the lower forests of the park has been burned. The principal danger is from lightning. However, few of the trees struck are ignited and these fires are usually extinguished by the rain. On account of the coolness of the air and its greater humidity the fire danger in the forests on the lower slopes of Mount Rainier seems much less than it is in corresponding situations in the main range of the Cascades.

AGE AND DIMENSIONS OF TREES.

Trees grow more rapidly at low altitudes than at higher and cooler elevations. Under similar conditions some species increase in size faster than others, but the rate of growth depends principally upon environment. The average increase at the stump in valley land is about 1 inch in 6 years. A Douglas fir growing along the stage road between the park boundary and Longmire's, at the age of 90 to 120 years may have a breast diameter of 20 inches and yield 700 feet of saw timber. But many of the trees of this size may be much older on account of having grown in the shade or under other adverse conditions. The trees between 200 and 300 years of age are often 40 to 50 inches in diameter and may yield an average of from 2,700 to 5,500 board feet. The largest Douglas firs are sometimes over 400 years old and 60 to 70 inches in diameter. Such trees when sound will produce over 8,000 feet of lumber.

The western red cedar has a shorter and more tapering trunk and its volume in board feet is proportionally smaller. A tree 50 inches in diameter and 175 feet high contains about 3,400 board feet.

The size of the trees decreases rapidly at higher elevations. In the subalpine forest the annual growth is very small. At elevations of 6,000 feet the white-bark pine requires 200 years to attain a diameter of 10 or 12 inches. The annual rings are so close together that they can not be distinguished without a magnifying glass.

DESCRIPTIONS OF SPECIES.

The Douglas fir (figs. 2, 3, 4, and 5) is the best known and the most important timber tree of western North America. It is found from British Columbia southward to northern Mexico. The [Pg 7] finest forests occur in Oregon and Washington at low elevations. The Douglas fir is common in the park up to 3,500 feet, sometimes in nearly pure stands, but more often mixed with other species. It grows in all situations. In the higher mountains it prefers warm southern exposures and is seldom found on wind-swept ridges. It seeds annually, but most profusely at intervals three or four years apart. The red squirrels gather and store large quantities of the cones in order to provide a supply of the seeds for their winter rations. The growth of the young tree is very rapid. As the tree becomes older the rate of growth varies with the situation and the character of the soil so that the size does not closely determine the age of the tree.

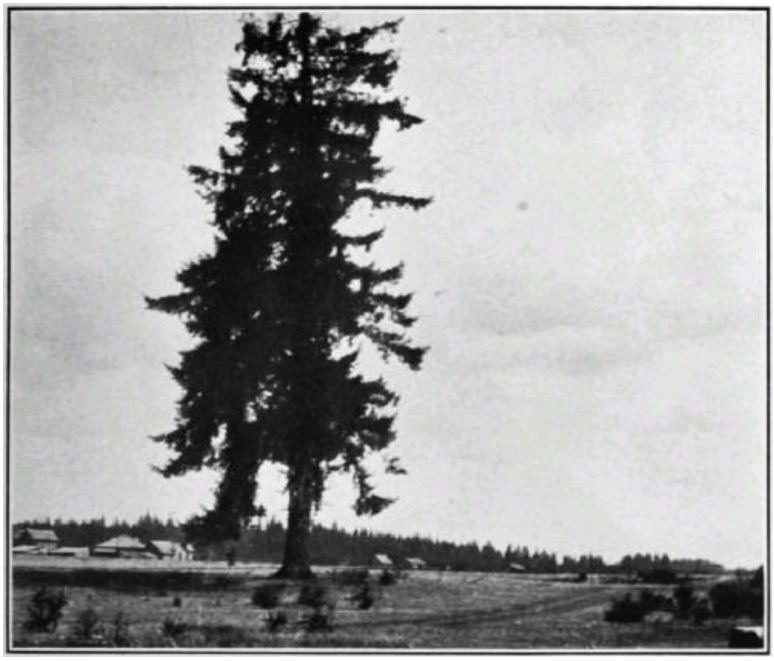

FIG. 2.—Douglas fir (*Pseudotsuga taxifolia*).

The Douglas fir is a long-lived tree, and specimens are occasionally found 250 to 270 feet high and over 8 feet in diameter and between 400 and 500 years in age. It reaches its greatest height and most perfect proportions in mature even-age stands growing on fairly moist well-drained bench lands. Under these conditions it is a very tall and beautiful tree. The trunk is straight, round, and free from branches for two-thirds of its height and tapers gently to the crown. The dark-brown deep-furrowed bark is 5 to 10 inches thick at the base of the tree.

The Douglas fir ranks first among the trees of the Pacific slope in importance for the [Pg 8] production of lumber. It is often sold under the name of Oregon pine. Lumber dealers class the coarse-grained reddish wood produced by the young growth in open forests as "red fir." The older growth produced when the forest is more dense is a finer grained and more valuable wood, sold under the name of "yellow fir."

FIG. 3.—Douglas fir (*Pseudotsuga taxifolia*).

The Douglas fir is used for nearly all purposes where durability, strength, and hardness are desirable. It is made into dimension timbers, lumber, flooring, and is particularly adapted for masts and spars. The lumber is shipped by rail to the Middle Western States. The foreign cargo shipments are made to all parts of the world. The greatest amount goes to Australia, the west and east coasts of South America, China, the United Kingdom, and Europe, Japan, and the South Sea Islands. Coastwise shipments are made to California, Alaska, and Panama. Large quantities of the seed of this tree are sent to Europe, where the Douglas fir is grown for timber and for ornament.

[Pg 9]

WESTERN RED CEDAR (THUJA PLICATA.)[1]

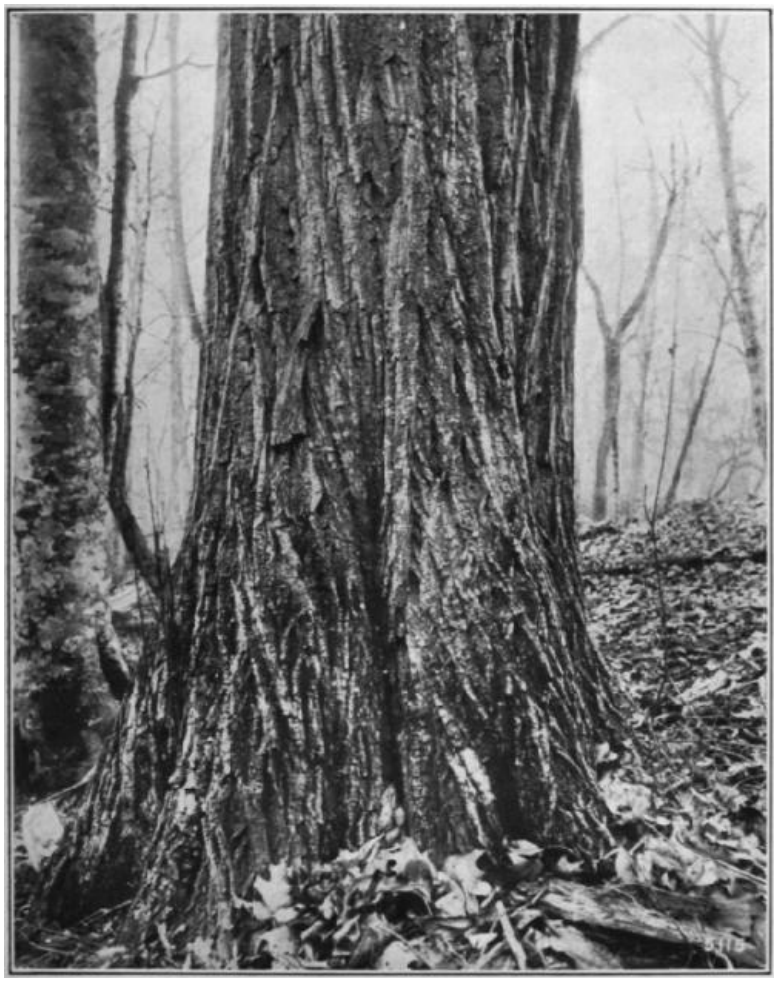

FIG. 4.—Douglas fir (*Pseudotsuga taxifolia*).

The western red cedar (title page and fig. 5) ranges from south-eastern Alaska to northern California. It is a common tree in the park. It occurs in patches along the river bottoms where the flat scalelike foliage is conspicuous among the needle-shaped leaves of the hemlock and fir. The bark is fibrous in appearance and may be readily separated into long strips. The trunks of the older trees are swelled and irregularly fluted at the base. The leaves are fragrant and the wood has a pleasing aromatic odor. Nearly all the large trees are hollow at the butt. The roots spread laterally to a great distance, but extend only for a short distance below the surface of the ground. The tree is easily overthrown by the wind and usually grows in sheltered localities. On account of the thinness of the bark it is easily killed by fire.

[Pg 10]

FIG. 5.—Two big Douglas firs and a western red cedar (on the left) along the road up the Nisqually Valley, Mount Rainier National Park.

Photograph by A.H. Denman.

The red cedar flourishes on fertile and well-watered soils near sea level, where it grows to an enormous size. In the park it is a smaller tree, 150 to 170 feet high and rarely more than 4 or 5 feet through above the swollen butt. It grows occasionally up to an altitude of 4,000 feet, but is a small and insignificant tree in the high mountains.

In the sapling stage the red cedar grows rapidly. The mature tree increases very slowly in size. It exceeds all other trees in the Cascades in longevity. Individuals more than 500 years old are not uncommon and there is a well-authenticated instance where the annual rings indicated a growth of more than 1,100 years.

While the red cedar forms no great proportion of the forest of the Pacific Northwest, it is peculiarly valuable to the pioneer on account of the durability of the wood and the ease with which it can be split into boards, shakes, and planking. The early settlers used cedar split by [Pg 11] hand as a substitute for sawn lumber in flooring and finishing their cabins and for the tables and shelves with which they were furnished. The Indians hollowed the great trunks with fire and made them into canoes, some of which were large and seaworthy enough to be used on the Sound and in making voyages along the coast. They wove the fibrous roots into baskets that carried water and plaited the bark into matting. The wood of the red cedar is reddish brown in color. It is soft, light, and very brittle, but very durable. It is extensively used for shingles, the manufacture of which forms one of the important industries of the State. The clear logs are sawed into lumber used for siding, interior and exterior finish, moldings, tank stock, and similar purposes. Common logs are utilized for shingles. In many localities the entire tree is cut into 52–inch bolts, which are hauled to the mills or floated to them down the streams.

The western red cedar makes excellent posts and rails for farm fences. The young trees are used for telegraph and telephone poles.

WESTERN HEMLOCK (TSUGA HETEROPHYLLA).

Next to the Douglas fir the western hemlock is the most abundant tree in the forests of Oregon and Washington. It occurs from Alaska southward to northern California. About Mount Rainier it is found up to an altitude of 5,000 feet. In the river valleys in moist situations it is a large tree, sometimes reaching a height of 250 feet and a diameter of 5 feet. On the high ridges it is stunted. It grows best on moist deep soils in dense forests, but thrives under almost all conditions of soil and exposure if provided with plenty of moisture.

Western hemlock (figs. 6 and 7) is usually associated with Douglas fir and red cedar, but sometimes forms a forest of nearly pure growth. The hemlock produces abundant seed each year, although it is more prolific at irregular intervals. The seeds germinate readily on decayed moss and rotten wood as well as upon the mineral soil. Seedlings frequently grow on fallen logs and extend their vigorous roots around the side until they reach the ground and become firmly anchored in it. Young hemlocks thrive in the shade. On logged-off areas which have not been burned over and which are partially shaded by uncut trees, the reproduction of hemlock springs up, to the exclusion of the more valuable Douglas fir.

[Pg 12]

FIG. 6.—The lower slope forest, near Longmire Springs, altitude 3,000 feet, here composed largely of western hemlock (Tsuga heterophylla); the tree on the extreme left is a Douglas fir (*Pseudotsuga taxifolia*).

Photograph by A.H. Barnes.

The hemlock is long lived and grows slowly. The largest trees are from 200 to 500 years old and are usually hollow-hearted. The bark is thin and the tree very easily killed by ground fire. The wood of the hemlock is tough, light, and straight grained. It is not as durable as the Douglas fir and decays rapidly when exposed to the weather. The clear lumber is suitable for interior finish. The wood is also used for flooring, joists, lath, and paper pulp. The common and rough lumber does not find a ready market, except for the limited amount used in temporary construction. The western hemlock is, however, superior to the eastern hemlock, and its value will probably be recognized as its usefulness for many purposes becomes better known. [Pg 13]

WESTERN WHITE PINE (PINUS MONTICOLA).

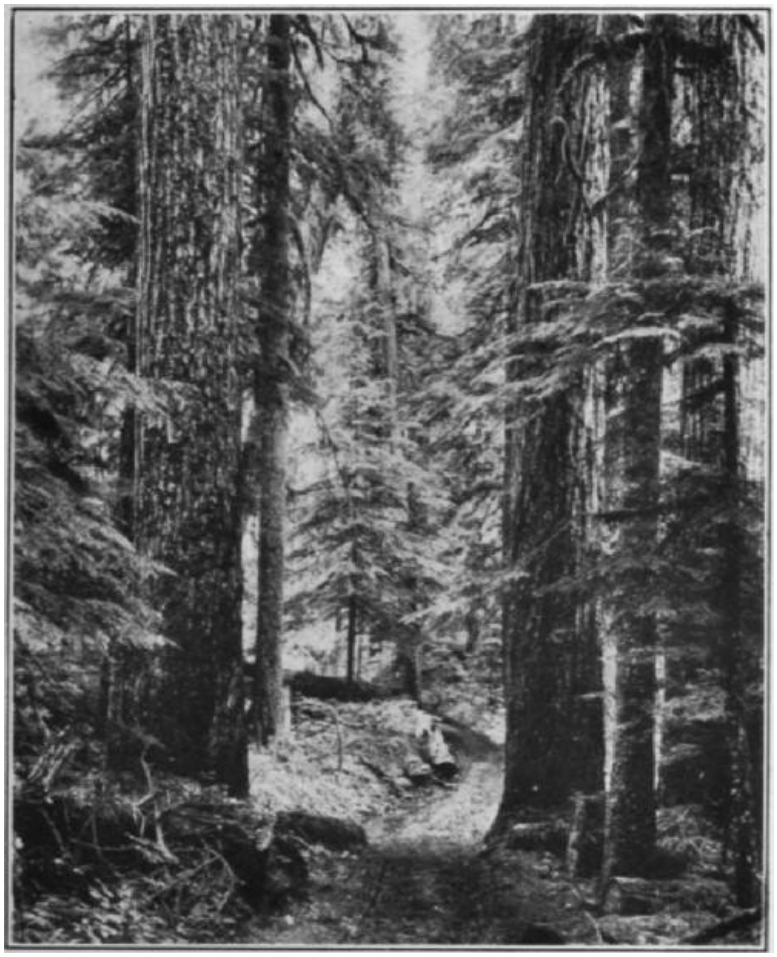

FIG. 7.—A forest of Douglas fir, with an understory of western hemlock, on the lower slopes of the hills, Mount Rainier National Park.

Photograph by A.H. Denman.

The western white pine (fig. 8) is found from southern Alaska to northern California. In the park it occurs occasionally up to 4,000 feet. It usually grows on level benches and gentle slopes associated with Douglas fir, western hemlock, and noble and amabilis fir. It reaches its best development at elevations of from 3,000 to 3,500 feet, where it attains a height of 150 feet and a diameter of 40 inches. The shaft is straight, cylindrical, and clear of limbs. It bears a small, narrow crown of drooping branches. In open areas, where it is exposed to sunlight, its mode of growth is wholly different. The trunk is short, rapidly tapering, and bears wide-spreading branches nearly to the ground. At high elevations the western white pine is very short and stunted. [Pg 14]

FIG. 8.—Western white pine (*Pinus monticola*).
Diameter 24 inches, height 50 feet.

Although the western white pine is not a common tree in the park, it is often noticed on account of its abundance of slender, pendant cones, 6 to 10 inches long. They mature every two years and shed their seed early in September. The seed are provided with long wings and are often carried by the wind for a great distance from the parent tree.

The wood is light, soft, free from pitch, and the most valuable of any of the pines of the Cascades. It is used for interior finish, pattern making, and other purposes. The supply of this tree is so limited that it is not of great commercial importance in the Mount Rainier region.

AMABILIS FIR (ABIES AMABILIS).[2]

[Pg 15]

Amabilis fir (figs. 9 and 10) ranges from southern Alaska to Oregon. It is abundant in the park at elevations from 2,500 to 5,000 feet on level bench lands, and gentle slopes with a northern exposure. It is rarely found in unmixed stands, but is usually associated with western hemlock, Douglas fir, and noble fir. The largest trees are 150 to 180 feet high and 3 to 5 feet in diameter. In dense forests the stem is free from branches for 50 to 100 feet.

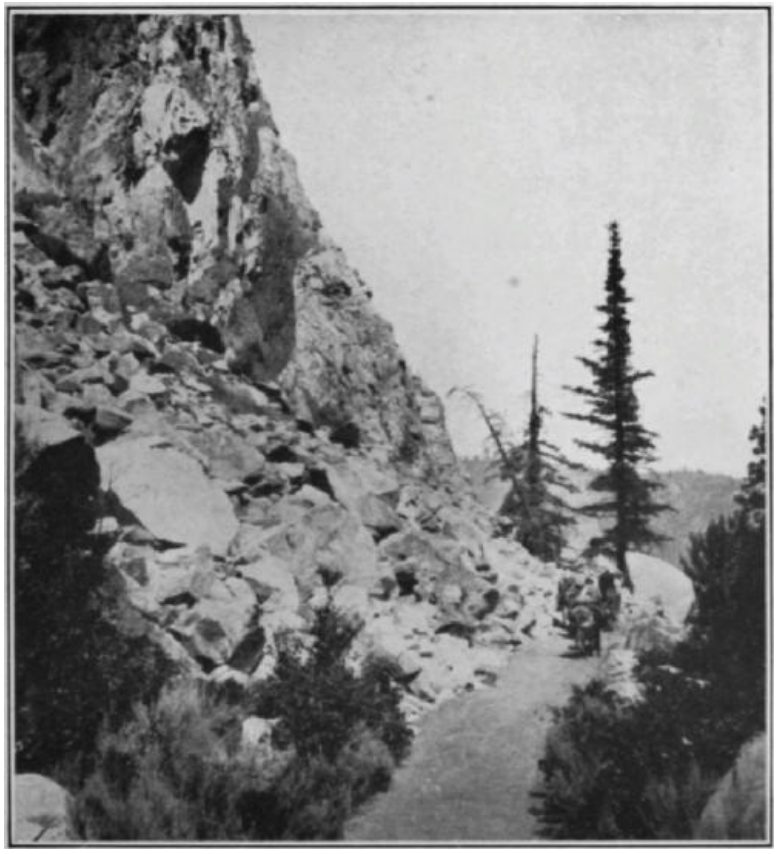

FIG. 9.—Amabilis fir (*Abies amabilis*).

At altitudes over 4,000 feet, small amabilis firs often occur in clusters and open groves. The trunk is covered with branches which grow to the ground, turning downward and outward in long graceful curves, admirably adapted to withstand the pressure of the frozen snow. The foliage is a deep and brilliant green, forming a strong contrast to the dark-purple cones. The seeds ripen each year early in October. Like the seed of the other alpine species of trees that grow in the cold and humid climate of the high Cascades, they soon lose their vitality when stored in dry places. The amabilis fir is grown in Europe as an ornamental tree. Under cultivation it loses much of the natural grace and beauty which it acquired in adapting itself to the deep snows and long winters of its native environment.

[Pg 16]

FIG. 10.—The forests of western hemlock, amabilis fir, and other species, on the middle slopes of the mountains, along the Crater Lake trail, Mount Rainier National Park.

Photograph by Geo. O. Ceasar.

The bark is thin and the tree is easily killed by fire. The wood is straw colored, compact, and straight grained. It is not strong and splits easily. It is sold to some extent under the name of larch or mixed with inferior grades of fir and hemlock. The lumber is of little value commercially.

NOBLE FIR (ABIES NOBILIS).

The noble fir (figs. 11 and 12) is a common mountain tree in the western parts of Washington and Oregon. Like amabilis fir, it is usually called larch by lumbermen. About Mount Rainier it grows at elevations of from 3,500 to 5,000 feet in dense stands associated with amabilis fir, [Pg 17] western hemlock, and Douglas fir. The noble fir avoids steep side hills and exposed situations. In moist soils on flats and gentle slopes it often reaches a height of from 150 to 200 feet. The tall and upright trunk supports a rounded crown of bluish green foliage, which is very noticeable among the purer green leaves of its associates. The branches are short, thick, and crowded with stiff, flattened leaves, which turn upward and outward. The light-green bract-covered cones are sometimes 6 inches long and nearly 3 inches thick. They ripen early in September. Seed is borne every year, although in some seasons it is much more abundant than in others.

FIG. 11.—Noble fir (*Abies nobilis*).

[Pg 18]

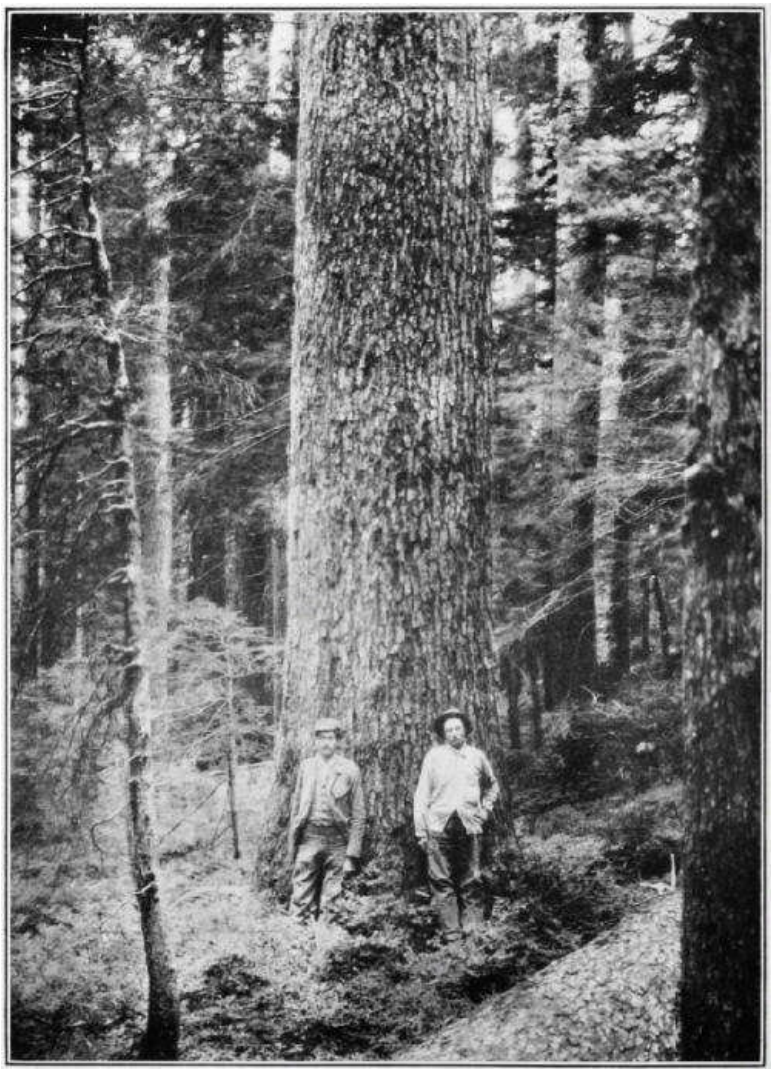

FIG. 12.—Noble fir (*Abies nobilis*), 6 feet in diameter.

The wood is strong, close grained, and elastic. It is used for lumber and particularly for inside

finishing. The noble fir is a slow-growing and long-lived tree. Old trees in mixed forests are easily distinguished from the associated species by the ashy-brown outer bark broken into large irregular plates.

ALPINE FIR (ABIES LASIOCARPA).[3] [Pg 19]

FIG. 13.—A cluster of Alpine firs (*Abies lasiocarpa*), whose spire-shaped crowns are characteristic, at 5,500 feet altitude, in Cowlitz Park, Mount Rainier National Park.

Photograph by A.H. Barnes.

The alpine fir (fig. 13) ranges from Alaska to New Mexico. It is a common tree in the park at elevations above 4,500 feet. It is a tree of the high mountains and with the white bark pine and the mountain hemlock, is found up to the limit of arborescent life. It demands moisture and is [Pg 20] generally restricted to regions of deep snowfall.

The alpine fir occurs in unmixed stands, but is often associated with the mountain hemlock. At the lower levels of its range it is a fair-sized tree 50 or 60 feet high. The crown of deep-green foliage is broad at the base and tapers to the top, where it terminates in a slender, pointed tip. At its upper limit it becomes a stunted shrub, with wide extended branches resting on the ground.

The alpine fir bears upright clusters of deep-purple cones. It seeds sparingly each year. The seasons of heavy seed production occur at intervals of three or four years. The wood is soft and splits easily. It is of no commercial value. The tree is easily killed by fire, which blisters the thin bark and frequently springs into the drooping lower branches.

GRAND FIR (ABIES GRANDIS.)[4]

The grand fir (fig. 14), like several other species, is generally given the name of white fir on account of its smooth, light-colored bark. It is a common tree in the river bottoms from British Columbia south to northern California. In the Mount Rainier National Park it occurs up to 4,000 feet. The grand fir is a moisture-loving tree and is usually found firmly rooted in deep alluvial bottom lands along the banks of streams. With the Douglas fir, hemlock, and red cedar it forms the dense forest characteristic of the lower mountain valleys.

In favorable conditions the grand fir grows to a height of from 100 to 200 feet and is a noble and stately tree. The trunk tapers rapidly and bears a rounded pyramidal crown. In dense forests the trunk is clear for half its height, but where the trees stand in the open it carries its branches nearly to the ground. The leaves are a bright and shining green. The large light-green cones

mature early in the fall. The wood is soft and very heavy before it is seasoned. It rots in a very short time when laid on the ground. When dry it is white, coarse-grained, light, and odorous. It is used for interior finish and for crates and packing boxes, but is of little value commercially.

ENGELMANN SPRUCE (PICEA ENGELMANNI).

The Engelmann spruce (fig. 15) is a mountain tree ranging from British Columbia to Arizona and New Mexico. It is common along the summit and on the east side of the Cascade Range and occurs on the northeastern and eastern slopes of Mount Rainier at elevations of from 3,500 to 6,000 feet.

This tree requires a moist soil and prefers cool northern exposures. Up to 5,000 feet it commonly grows in sheltered basins at the head of canyons and in stream valleys. At its upper [Pg 21] limits it is common on flats and depressions and about lakes on level summits. It avoids steep mountain sides and exposed situations.

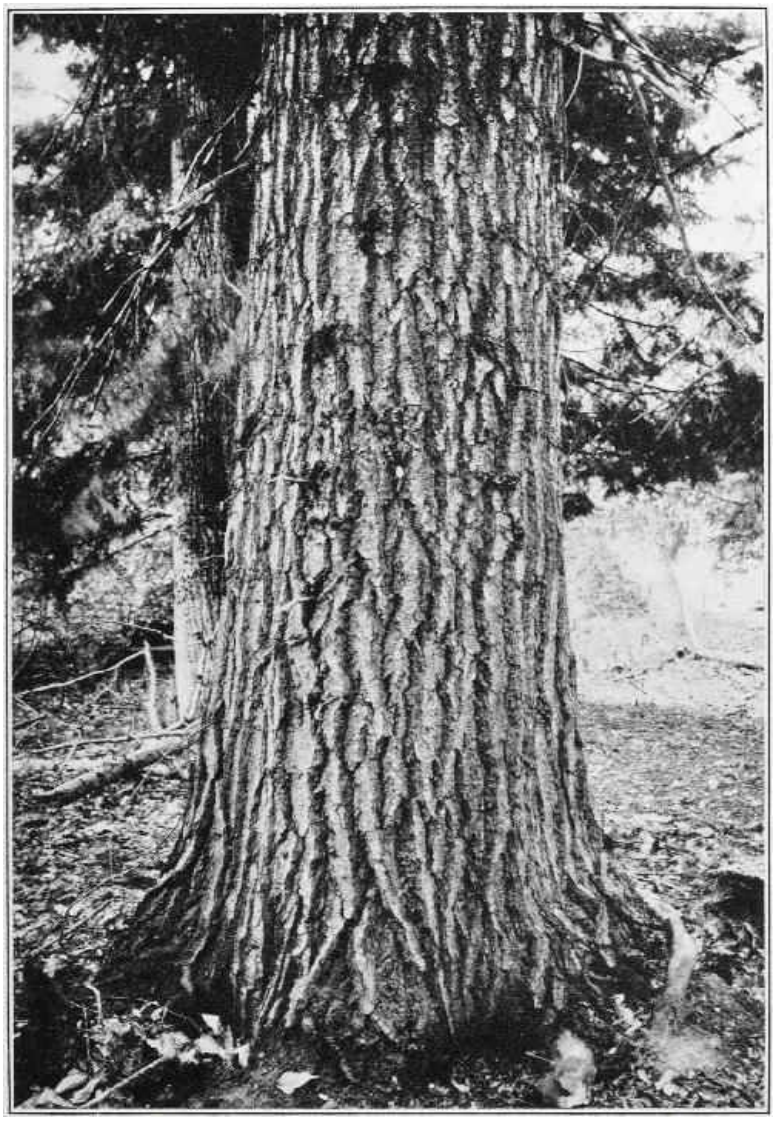

FIG. 14.—Grand fir (*Abies grandis*).

The Engelmann spruce is easily distinguished from its associates by its stiff, bluish-green pointed leaves, which prick the hand when they are grasped. In the mountain parks it is a [Pg 22] handsome tree 50 to 60 feet high. When it stands apart from other trees the lower branches are thick and long and extend to the ground. The crown is very broad at the base, but narrow and spirelike at the top. The Engelmann spruce reaches its best development at low elevations, where it often grows in dense, pure stands. Under these conditions it reaches a height of 100 feet. The bole is straight and free from limbs and the top is short and compact.

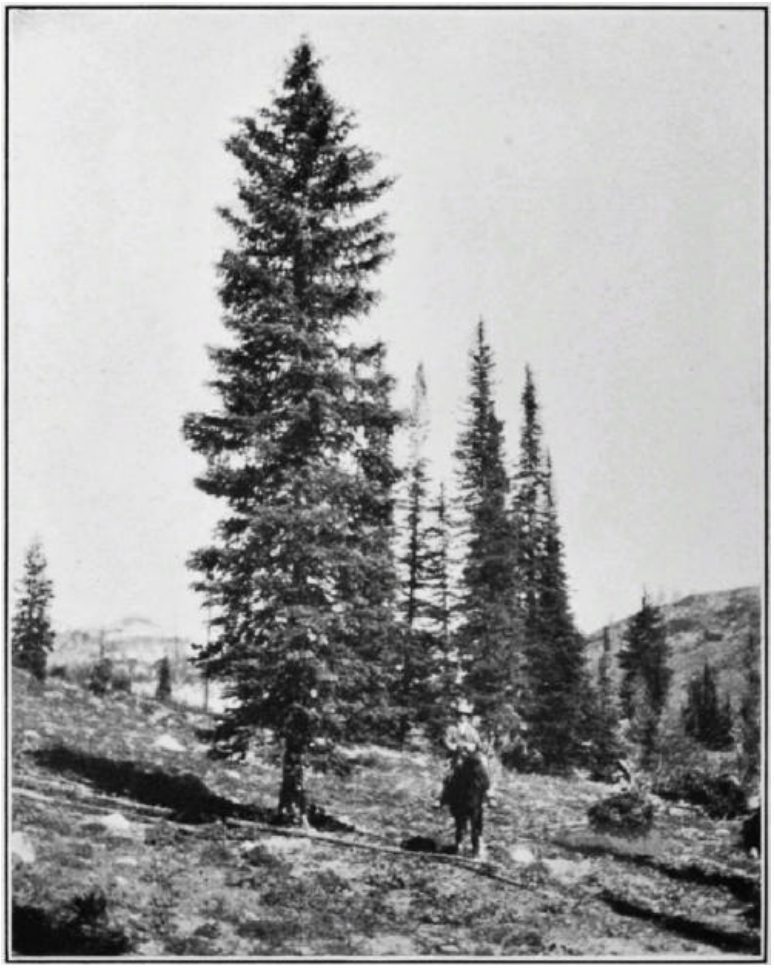

FIG. 15.—Engelmann spruce (*Picea engelmanni*).

The young cones are massed in upright green and purple clusters at the tips of the upper branches. They are notable for the purity and brilliance of their coloring. As they mature they become pendant and fade to a light brown. The seed is produced in abundance nearly every year, although small and seedling trees are not usually numerous.

The wood is soft, white, compact, and even grained. It is free from pitch and odor. It is valuable for boxing, cooperage, and certain kinds of finish. It is also an excellent material for the tops of violins and other stringed instruments. The Engelmann spruce is, however, of little importance as a timber tree on account of its scarcity and the scattered stands in which it grows. It is a long-lived tree unless attacked by fire, to which it is very vulnerable. [Pg 23]

FIG. 16.—A group of yellow cypresses (*Chamaecyparis nootkatensis*) on the high slopes of Mount Rainier National Park, altitude about 6,000 feet.

Photograph by A.H. Barnes.

YELLOW CYPRESS (CHAMAECYPARIS NOOTKATENSIS).

Yellow cypress (fig. 16) ranges from the seacoast of southern Alaska south to the mountains of Washington and Oregon. It occurs in the park up to the elevation of 7,000 feet. It is common on [Pg 24] northern exposures, along streams, and in basins at the head of canyons. It also grows on crests and ridges, where the frequent showers and fogs supply the moisture which it demands. In sheltered localities it grows to a height of 75 or 80 feet, but it is commonly a small tree with, a bent and twisted stem, which, with its pendulous branches, presents a somewhat scrubby appearance. The foliage is green, sometimes with a bluish tinge. It resembles that of the common western red cedar, but the leaves are sharper, more pointed, and rougher to handle. The small, rounded, inconspicuous cones are produced somewhat sparingly. The bark of the young tree is red. On the mature tree it becomes gray and fibrous. The wood is yellow, close grained, and aromatic. Unlike that of the western red cedar, the trunk is usually sound to the center. The wood is used for boat building and cabinetwork. It is very durable.

The yellow cypress grows very slowly, particularly at high elevations. The number of annual rings on trees 15 to 20 inches in diameter indicate that they are over 200 years old.

LODGEPOLE PINE (PINUS CONTORTA).

Lodgepole pine (fig. 17) is widely distributed from Alaska to Lower California and eastward through the Rockies to Dakota and Colorado. It occurs sparingly in the park up to 5,000 feet above sea level. It adapts itself easily to the different conditions of soil, moisture, and exposure.

FIG. 17.—Lodgepole pine (*Pinus contorta*), 60 inches in diameter.

This tree varies greatly in the different regions where it is found. About Mount Rainier it does not often exceed 20 to 40 feet in height and is often a much smaller tree. It produces cones at the [Pg 25] age of 5 to 7 years. The foliage is a yellowish green. At high elevations the leaves have a peculiar whorled appearance which gives it a different aspect from that of the other pines. The short, heavily limbed trunk bears no resemblance to the tall and slender shaft of the lodgepole pine of the Rocky Mountains. The root system is shallow and the tree is easily fire killed. The wood of the variety which grows in the park is of no commercial value.

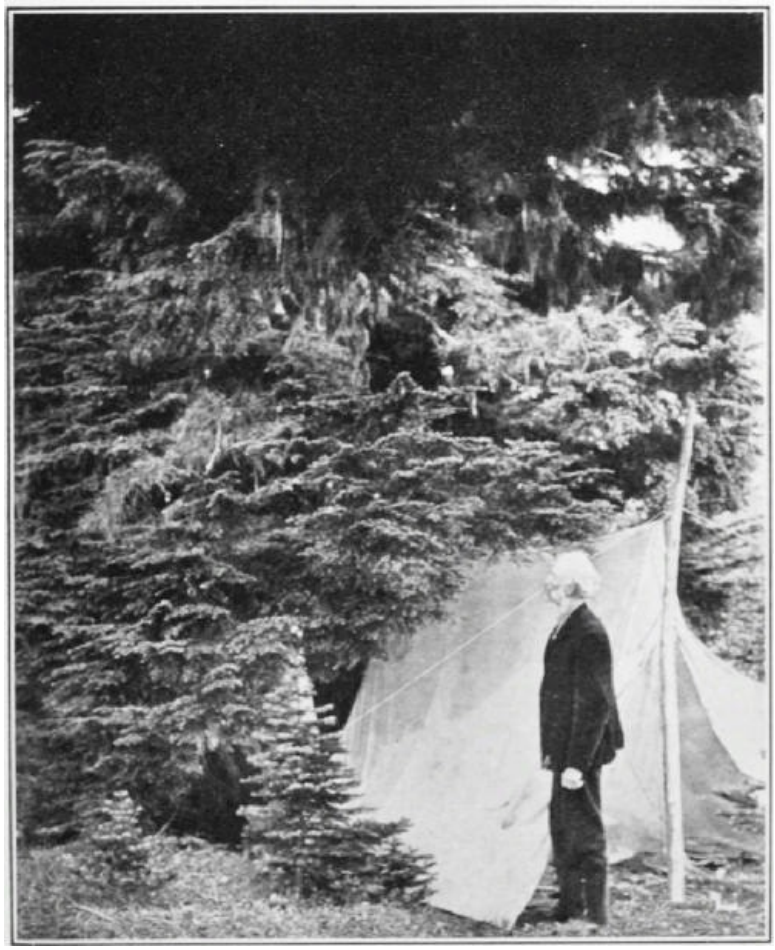

FIG. 18.—The feathery foliage of mountain hemlock (*Tsuga mertensiana*), Grand Park, Mount Rainier National Park.

Photograph by A.H. Denman.

MOUNTAIN HEMLOCK (TSUGA MERTENSIANA).

The mountain hemlock (figs. 18, 19, and 20) is found on the Pacific coast from the Sierras of California to the northern part of Alaska where it grows at sea level. On Mount Rainier it occurs [Pg 26] at altitudes of from 3,500 to 7,500 feet. It forms dense forests under 4,500 feet, where it is often a fair-sized tree 50 to 90 feet high. With the ascent of the mountain it diminishes in height and the branches become gnarled and twisted. Near timber line the trunk is dwarfed and bent at the base and the crown becomes a flattened mass of branches lying close to the ground (fig. 20).

FIG. 19.—Two solitary mountain hemlocks (*Tsuga mertensiana*), Spray Park, Mount Rainier National Park.

Photograph by Geo. O. Ceasar.

The mountain hemlock is abundant on high, rocky ridges, but the best stands are on cool, moist soil at the heads of ravines, on flats, and on gentle slopes with a northern exposure.

This tree seeds every year. In good seed years the upper branches are laden with a profusion of beautiful, deep-purple cones, often in such abundance as to bend down the branchlets with their weight. The reproduction is slow. In the high mountains the trees are buried in snow from October to late in June, and the growing season is very short. [Pg 27]

WHITE-BARK PINE (PINUS ALBICAULIS).

FIG. 20.—A gnarled, wind-swept mountain hemlock (*Tsuga mertensiana*), near the upper limits of tree growth, Spray Park, Mount Rainier National Park.

Photograph by A.H. Denman.

The white-bark pine (fig. 21) grows close to timber line in the mountains of the Pacific coast from British Columbia to southern California. In the Canadian Rockies it extends north to the fifty-third parallel. It is the most alpine of all the pines. Its lower limit on Mount Rainier is about 5,000 feet above sea level. In sheltered places where the soil is deep the trees are sometimes 30 to 40 feet high and 20 inches in diameter. The trunks are free from limbs for 8 or 10 feet. The outer bark, from which the tree derives its name, consists of thin, light-gray scales.

As the white-bark pine advances up the mountain its habit changes rapidly. The stem shortens and becomes gnarled and twisted. The tough, flexible branches reach the ground and spread over it to a great distance from the tree. On rocky summits and the bleak crests of wind-swept ridges [Pg 28] the twisted trunk and branches are quite prostrate and the crown is a dense flattened mass of foliage.

The roots of the tree are deep, long, and tenacious. They spread wide and deep and cling so firmly to the rocks that the tree is rarely overthrown by the violent winds that sweep over the mountain.

FIG. 21.—A white-bark pine (*Pinus albicaulis*) in its characteristic mountain habitat, Mount Rainier National Park.

Photograph by A.H. Denman.

The thick, purple cones require two years to mature. They ripen early in September and produce chocolate-brown seeds a little larger than a grain of corn. They are much relished by the Klickitat Indians, who go to considerable pains to secure them. The wood is close grained and resinous. It makes excellent fuel for the camp fires of sheep herders and mountain travelers.

[Pg 29]

WESTERN YEW (TAXUS BREVIFOLIA).[5]

The western yew is found from southern Alaska to northern California. It occurs in the park up to 4,000 feet, growing in rich, gravelly soil on moist flats and benches and in deep ravines. It is a small branching tree, rarely over 20 feet high. The bark is purple or reddish brown. The branches extend almost to the ground. It bears a small, bright, amber-red berry.

The dark-brown or red heartwood is very tough, hard and heavy. It takes a fine polish and is used for fancy cabinetwork. The Indians use it for spear handles, bows, and fishhooks.

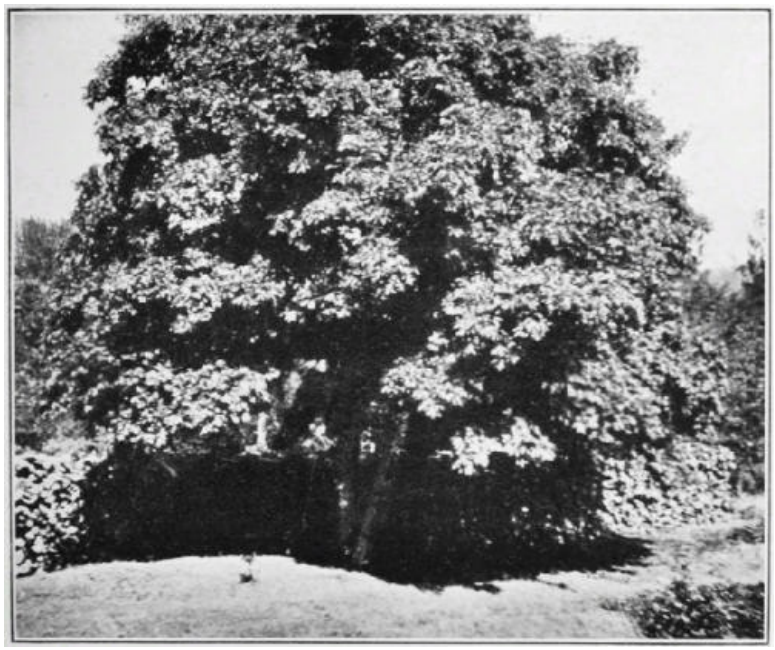

FIG. 22.—Broadleaf maple (*Acer macrophyllum*).

DECIDUOUS TREES.

The silva of the Western Cascades is rich in evergreens remarkable for their size and beauty. The deciduous trees are few and insignificant. The forests of the park are almost wholly coniferous. Vine maple and willow are found as undergrowth. On the margins of rivers there are occasional groves of alders and cottonwoods. The lighter hues of the branching trunks and the changing tints of the foliage in these patches of broad-leaved woodland present a pleasing diversity to the evergreen forest.

[Pg 30]

Broadleaf maple (*Acer macrophyllum*) (fig. 22), the largest of the Pacific coast maples, ranges from Alaska to southern California. Near sea level it often attains a height of 50 or 60 feet. In the park it is a short-stemmed, branching tree, occasionally found on the borders of streams. It grows at elevations under 3,000 feet.

FIG. 23.—Vine maple (*Acer circinatum*).

Vine maple (*Acer circinatum*) (fig. 23) is abundant from British Columbia to northern California. On rich river bottoms it is sometimes 15 to 20 feet high and 6 inches in diameter. In the park it is usually a bush or low shrub with a bent and curiously crooked stem, growing along streams and as undergrowth in the forest. It is very common up to 3,000 feet. In autumn the leaves are a bright scarlet. The wood is tough and elastic and makes a hot and lasting fire.

[Pg 31]

FIG. 24.—Red alder (*Alnus oregona*).

FIG. 25.—Black cottonwood (*Populus trichocarpa*).

Red alder (*Alnus oregona*) (fig. 24) occurs from Alaska to southern California. It is common about Mount Rainier, in river bottoms, on the banks of large streams, and in swampy places. It usually grows to a height of 30 or 40 feet. The bark varies from nearly white to light gray. It is the most abundant of all the deciduous trees in the park. [Pg 32]

Black cottonwood (*Populus trichocarpa*) (fig. 25) is common from Alaska to southern California. It is occasionally found in the park up to 4,000 feet. It grows along streams and on sandy river bottoms often associated with the alder. The leaves are almost always in motion, very gentle winds being sufficient to make them twinkle and turn.

The wood is soft, but tough and compact. It is used for staves, woodenware, wood pulp, trunks, barrels, and for drawer bottoms.

FOOTNOTES

[1] This species is known as arbor vitæ in Glacier Park.

[2] This species is known as silver fir in Crater Lake Park.

[3] This species is known as balsam in Glacier and Yellowstone Parks.

[4] This species is known as silver fir in Yellowstone and Glacier Parks.

[5] This species is known as Oregon yew in Crater Lake National Park and as yew in Yellowstone and Glacier Parks.

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