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POCKET GUIDE TO ALASKA TREES



Agriculture Handbook No. 5
U. S. Department of Agriculture

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POCKET GUIDE
TO
ALASKA TREES

BY

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PREFACE

Pocket Guide to Alaska Trees was first published in 1929 in response to the need of a nontechnical booklet describing Alaska's tree species. Request for another printing has provided the opportunity for revision and enlargement in 1950 to include a few additions, more detailed data on ranges, and other notes resulting from various studies during this 21-year interval, when interest in Alaska has greatly increased.

Identification of the trees of Alaska is not difficult, because relatively few kinds of trees grow in far northern lands toward their limits. Nearly every State in the United States contains within its boundaries at least twice as many native tree species as does this northern Territory.

Alaska has 30 species and 2 important varieties of native trees; that is, woody plants having one well-defined stem or trunk at least 2 inches in diameter at breast height (4½ feet), a more or less definitely formed crown of foliage, and a height of at least 10 feet. One cultivated tree species has become established as naturalized also. Five species and 1 variety of small trees are added here to the 28 species in the first edition, while 2 of the latter have been combined as varieties of the same species. One species formerly reported from Alaska, bigleaf maple, is omitted in this revision in the absence of authentic records.

Visitors will find relatively few unfamiliar trees, as all Alaska tree species except three usually shrubby species of willow and two varieties of paper birch occur also in some part of the United States. Nineteen, or almost two-thirds, of the Alaska tree species grow wild also in some part of California, while seven are widely distributed in the "north woods" across Canada and south into the northeastern States.

Even the low figure of 30 native tree species seems high, because these are not distributed throughout Alaska and because some are of small size; only 15 tree species commonly surpass a height of 30 feet. Nearly all the commercial timber of Alaska is produced by these nine species: white spruce, Sitka spruce, western hemlock, mountain hemlock, western redcedar, Alaska-cedar, balsam poplar, black cottonwood, and paper birch.

For each species there are included: (1) Common and scientific names, those approved by the Forest Service, with other names also in use; (2) nontechnical description with emphasis on the characters useful in identification; (3) notes on size, habitat, and economic importance; (4) range in Alaska and the limits beyond;

and (5) drawings of leafy twigs and fruits or cones. Twelve related shrubby species are briefly described, in order to mention all Alaska representatives of the tree genera except willows and to list shrubs which become small trees elsewhere. Characters for the recognition of the families and genera of Alaska trees are summarized. There are also two keys to species for summer and winter, based as far as possible upon non-technical characters of leaves and twigs.

The notes on size, habitat, and economic importance apply to trees and specimens from Alaska. Trunk diameters are measured at breast height (4½ feet). Most of these species attain larger heights and diameters southward. Also, the woods of some species have other uses in the United States than in Alaska, where the same species may be less accessible to markets, less common, restricted in range, or of smaller size.

A list of selected references on the trees of Alaska has been added. These may be consulted for further information. George B. Sudworth's *Forest Trees of the Pacific Slope*, an early Forest Service publication, included Alaska in its range and described and illustrated 28 Alaska tree species. Besides the five mentioned as of special value in the preparation of the first edition, several important forestry and botanical publications appearing afterward have been helpful in this revision. References on the trees of British Columbia contain the trees of Alaska as well and have been listed.

Uses of Alaska woods are described in the following Forest Service publications, now out of print: L. J. Markwardt, *The Distribution and the Mechanical Properties of Alaska Woods*; B. F. Heintzleman, *Pulp-timber Resources of Southeastern Alaska*; and Alva W. Blackerby, *Opportunities for Minor Wood Product Industries in Alaska*.

Two valuable floras of Alaska, published in serial form, have been consulted freely in this revision. They are: J. P. Anderson, *Flora of Alaska and Adjacent Parts of Canada*, and Eric Hultén, *Flora of Alaska and Yukon*. Anderson's *Flora* is especially useful for its descriptions and small drawings of each species and for its complete keys. Hultén's more technical *Flora* contains detailed botanical notes, exact information on ranges, and a distribution map of Alaska for each species. Special acknowledgment is due Hultén's *Flora* for its detailed ranges, which have been so helpful in this revision. The large Alaska collections in the National Herbarium, United States National Museum, have been studied also.

Illustrations in this revised edition, with three exceptions, are by Forest Service artists, and most of them appeared originally in *Forest Trees of the Pacific Slope*,

by George B. Sudworth. Miss Leta Hughey, scientific illustrator (botany), Forest Service, has made nine drawings for the revision. The figure of tamarack is from W. F. Wight (Smithsn. Inst. Misc. Collect. v. 50, pl. 17. 1907). The drawings of Yakutat willow and Sitka willow are taken from articles by Frederick V. Coville (Wash. Acad. Sci. Proc. v. 2, pl. 15. 1900; v. 3, pl. 33. 1901). All figures have been reduced to a scale of either three-fourths, one-half, or natural size.

The map of Alaska, appearing in the center double page, has been reduced from the large, folded map of Alaska in the first edition. This revised map, drafted by Miss Francene E. Sizer and Miss Hazel M. Hartman, shows the forest regions of Alaska, the boundaries of the Tongass and Chugach National Forests, and most of the place names cited under ranges. For the original map of the forest regions acknowledgment was made to Zon and Sparhawk's Forest Resources of the World, bulletins of the United States Geological Survey, reports of the Alaska-Canadian Boundary Survey, Forest Service timber-cover data, and to the late L. J. Palmer and other individuals.

Grateful acknowledgment is made to J. P. Anderson, formerly of Juneau and now at Iowa State College, Ames, Iowa, for criticism and correction of the manuscript of the first edition and for suggestions about additions for the revision. R. R. Robinson, Division of Forestry, Bureau of Land Management, Anchorage, has contributed for this edition information on tree ranges in the interior of Alaska. Carleton R. Ball, formerly of the United States Department of Agriculture, has examined the revised manuscript on the difficult group of willows (*Salix*) and has made helpful suggestions for the species descriptions and key to the species in this genus.

In order that more detailed information on the trees of Alaska can be assembled, the request in the first edition for corrections and additional data, particularly regarding ranges of trees, is repeated here. This information may be sent to the Regional Forester, United States Forest Service, Juneau, Alaska.

Almost all the coastal forests are within Alaska's two national forests, which are administered by the Forest Service of the United States Department of Agriculture, with regional forester's headquarters in Juneau. Field offices under direction of division supervisors are located in Ketchikan, Craig, Petersburg, Juneau, Sitka, Cordova, and Seward. Headquarters of the Alaska Forest Research Center are located at Juneau, Alaska. Inquiries for information on the forests of Alaska should be addressed to the Regional Forester, United States Forest Service, Juneau, Alaska.

Pocket Guide to Alaska Trees

By RAYMOND F. TAYLOR, *forester in charge, Alaska Forest Research Center*, and ELBERT L. LITTLE, JR., *forester (dendrology), Forest Service*.

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THE FORESTS OF ALASKA

Alaska, with an area of 586,400 square miles, is approximately twice as large as Texas and one-fifth the size of the United States. It has three general kinds of vegetation: the coastal forests, the interior forests, and the treeless vegetation of tundra and grassland. Distribution of the forests is shown on the center map.

COASTAL FORESTS

The dense forests of western hemlock and Sitka spruce, an extension of similar forests along the coast of British Columbia, Washington, and Oregon, extend some 900 miles along the Alaska coast from the south-east tip to Cook Inlet and Kodiak Island. Commercial species extend from tidewater to about 1,500 feet elevation but subalpine species continue to at least 2,500 feet. The climate is mild and cool with a rainfall varying from 40 to 160 inches annually.

Two national forests, totaling almost 21 million acres, contain most of Alaska's coastal forests. The Tongass National Forest with more than 16 million acres includes 70 percent of southeast Alaska forests and is composed of 73 percent western hemlock, 21 per-

cent Sitka spruce, 3 percent each of western redcedar and Alaska-cedar. The Chugach National Forest in the Prince William Sound section, with almost 5 million acres, has 65 percent hemlock, 22 percent Sitka spruce, 11 percent white spruce, and 1 percent each of cottonwood and paper birch. The two national forests include possibly 6 million acres of commercial forest and an estimated 84 billion board feet of virgin timber. Mature trees in merchantable stands range from 2 to 5 feet or more in trunk diameter, and from 100 to 160 feet tall.

The Alaska forests are of immense economic importance. They grow on nonagricultural land and are under scientific forest management, the annual cut never exceeding annual growth. In fact, until wood-using industries are fully developed a very small fraction of yearly potential growth will be utilized. The forests of southeast Alaska can produce at least a million tons of newsprint paper annually. The development of a paper pulp industry is under way. Abundant water power is available at more than 200 sites with a total year-round capacity of about 1,000,000 horsepower. In addition, the coastal forests can supply high-grade lumber, plywood, poles, piling, and shingles.

Scenic grandeur is unsurpassed. The narrow waterways, rugged mountains and glaciers, and a variety of wildlife offer a wealth of recreation values.

INTERIOR FORESTS

The interior white spruce-birch forests, which are frequently mixed with balsam poplar, lie chiefly north of the Alaska Range extending to the Arctic tundra. The type extends across Canada to Labrador and Newfoundland, and south into the northeastern States. The best stands in Alaska occur on the lower slopes of the larger river valleys such as the Yukon, Tanana, Matanuska, and Susitna and their main tributaries. It is a region of cold winters and has an annual rainfall of only 7 to 20 inches. Because of this and the long summer days fire hazard is high. Most of the original forests have been burned over since the gold rush of 1898 and the resulting second-growth stands continue to suffer from repeated fires.

No accurate figures are available but it is estimated that fairly dense stands of mixed white spruce and white birch in interior Alaska cover nearly 40,000 square miles. Possibly 60,000 square miles have more open woodlands which generally lie on the upper slopes. A rough estimate would place the total volume of these interior woodlands at 225 billion board feet.

White spruce and birch grow slowly in comparison to the coastal forests, but compare favorably with this

same type in eastern Canada where pulp and other industries depend upon such stands. Spruce 18 to 24 inches in diameter often occurs where there has been no fire, but the more common size is 8 to 12 inches and 40 to 50 feet in height. White birch 10 to 14 inches in diameter is found on the better sites. These stands are used locally for mine props and timbers, house logs, and sawed lumber.

The dwarfed, slow-growing black spruce forms dense thickets on boggy flats and swamps, and is occasionally mixed with tamarack. Black spruce in Alaska seldom exceeds 6 inches in diameter; a tree 2 inches in diameter may be 100 years old.

The interior forests, if protected from fire, could be immensely valuable in the development of this vast region. The birch timber is satisfactory for cabinet and general use and the larger trees are excellent for peeler logs. It is fortunate that even after several fires, paper birch and white spruce (both valuable species) regenerate rather than a weedlike gray birch which is so prevalent in the northeastern States. It is possible that with an extreme timber shortage in the States, the interior forests will be utilized, particularly near the centers of population.

There are no national forests in the interior; the Bureau of Land Management, United States Department of the Interior, administers these public lands. The Division of Forestry of that bureau at Anchorage can supply further information on interior forests.

NONFORESTED AREAS

Willows and alders form thickets along stream courses and above timber line.

Grasslands occur on the Alaska Peninsula, the Aleutians, and the south slopes of the Alaska Range. Tundra is widely distributed over the vast treeless section bordering Bering Sea and the Arctic Ocean north of the Brooks Range. There are three tundra types: wet, dry, and rocky or ridge tundra. Average composition is 30 percent lichens, 25 percent sedges, 25 percent shrubs, and 20 percent grasses, weeds, and mosses. The ridge type above the timber line on mountains has a larger percentage of lichens, grasses, and weeds and is less densely stocked. In many places the forest is gradually advancing onto the tundra.

Efforts have been made to establish tree growth on the western Aleutian Islands from time to time. Small groves of Sitka spruce planted in 1805 by the Russians at Unalaska have survived but not spread. Bruce and Court (1945) reported the planting of Sitka spruce and other species in the Aleutians by the United States Army during World War II.

IMPORTANCE OF FIRE PREVENTION

Widespread and repeated fires have caused the amazingly large areas of young second growth along the railroads, highways, and water courses in the interior. The Alaska Fire Control Service, organized in 1939 and later merged with the Division of Forestry of the Bureau of Land Management, is making progress in preventing and controlling fires. Alaska citizens are beginning to realize that these fires not only destroy timber, but also cause changes in the food available to fur bearers and other game animals and birds. Habitats are changed or destroyed causing changes in migration routes. Uncontrolled burning affects hunting, trapping, and grazing.

Frequent fires destroy the vegetative cover of watersheds causing flash floods and loss of a stable water supply. Lichens, the mainstay of reindeer herds in winter, require 15 to 40 years to reestablish themselves after a fire, and, of course, it takes at least 80 to 100 years to grow a 10-inch white spruce again.

Only 20 percent of the fires are lightning-caused. The rest are due to carelessness or negligence in extinguishing small fires before they become too large to handle. The six tested fire-prevention rules below are of use only if there is a desire to prevent fires. The desire can come only when inhabitants of interior Alaska realize that the future development of many valuable resources is being jeopardized by fires.

Follow these tested rules for forest fire prevention—

1. *Making camp.*—Before building a fire, scrape away all inflammable material from a spot 5 feet in diameter. Dig a hole in the center, and in it build your camp fire. Keep your fire small. Never build it against trees or logs or near brush.

2. *Breaking camp.*—Never leave a camp until you are sure every spark of your fire is out. Stir the coals while soaking them with water. Wet the ground around the fire. If you cannot get water, stir in damp mineral earth and tread it down until packed tight over and around the fire. Be sure the last spark is dead.

3. *Matches.*—Be sure your match is out. Break it in two before you throw it away.

4. *Tobacco.*—Be sure pipe ashes and cigar or cigarette stubs are dead before throwing them away. Never throw them into brush, leaves, needles, or other vegetation.

5. *Brush burning.*—Never burn brush or slash in windy weather or while there is the slightest danger that the fire will get away.

6. *Fire fighting.*—Put out the small fires and there will be no larger ones. If you discover a large fire do your best to get assistance.

KEYS FOR IDENTIFICATION OF ALASKA TREES

Two nontechnical keys to Alaska trees are provided. The first, based mainly upon leaves, can be used during the growing season or throughout the year for the evergreens. The second identifies deciduous trees which are leafless in the dormant season and is based largely on the winter buds, twigs, and leaf scars.

Keys are outlines for identifying specimen trees through the process of elimination. The tree species of Alaska are divided into two groups according to certain nontechnical, distinguishing characters of leaves, twigs, or winter buds, and each group is divided successively into two smaller groups down to a single species at the end. The name of a particular specimen is found through selection, one by one, of the group in which it fits. Paired groups are designated by the same letter, single and double.

For example, a specimen with broad leaves to be identified by the first key belongs under "AA," not "A," and all the trees under "A," having needlelike or scalelike evergreen leaves, are eliminated. Next, if the leaves and branches are in pairs, this specimen belongs under "MM," not "M," and is a Douglas maple. For verification, comparison is made also with the drawing, description, and range of this species.

In the first key, broadleaf trees are grouped into those with simple leaves ("N") and those with leaves divided into leaflets or compound ("NN"). Leaflets of a compound leaf differ from simple leaves in that they are usually smaller in size, are attached to a common leafstalk that sheds with them, and have no developing bud at the base. So far as known, the only Alaska trees with compound leaves are Sitka mountain-ash and European mountain-ash.

KEY TO ALASKA TREES, BASED MAINLY ON LEAVES

- A. Leaves needlelike or scalelike, evergreen (except in tamarack); trees resinous (except in yew); seeds more or less exposed and not enclosed in a fruit—GYMNOSPERMS (conifers or softwoods).
- B. Leaves needlelike, flattened, abruptly pointed but not prickly, in 2 rows comblike with leafstalks extending down the twig; seeds single in a scarlet juicy disk; tree of southern tip of southeast Alaska—PACIFIC YEW.
- BB. Leaves needlelike or scalelike, not as above; seeds borne on scales of a cone.
- C. Leaves needlelike, more than $\frac{1}{4}$ inch long, single or clustered.
- D. Needles shedding in fall, 12 to 20 in cluster on short, spur branches (or single on leading twigs)—TAMARACK.
- DD. Needles evergreen, single or 2 or 3 in a bundle.
- E. Needles in bundles of 2 (sometimes 3) with a sheath at base—LODGEPOLE PINE.
- EE. Needles single, without a sheath at base.
- F. Older twigs roughened by projections where needles were shed.
- G. Needles sharp-pointed, stiff, without leafstalks—SPRUCE.
- H. Needles 4-angled.
 - I. Twigs hairy; needles mostly less than $\frac{1}{2}$ inch long—BLACK SPRUCE.
 - II. Twigs not hairy; needles more than $\frac{1}{2}$ inch long, with skunklike odor when crushed—WHITE SPRUCE.
- HH. Needles flattened but slightly keeled—SITKA SPRUCE.
- GG. Needles blunt, soft and not stiff, with short leafstalks—HEMLOCK.
- J. Needles flat, appearing in 2 rows—WESTERN HEMLOCK.
- JJ. Needles keeled or angled beneath, on all sides of twig—MOUNTAIN HEMLOCK.
- FF. Older twigs not rough—FIR.
 - K. Needles dark green on both sides—ALPINE FIR.
 - KK. Needles dark green above and silvery white beneath—PACIFIC SILVER FIR.
- CC. Leaves scalelike, usually less than $\frac{1}{8}$ inch long, crowded, forming fanlike sprays.
 - L. Leafy twigs flattened, shiny yellow green; leaves flattened and not spreading, curved—WESTERN REDCEDAR.
 - LL. Leafy twigs 4-angled or slightly flattened, dark blue green; leaves spreading, pointed—ALASKA-CEDAR.
- AA. Leaves broad and flat, shedding in fall (deciduous); trees nonresinous; seeds enclosed in a fruit—ANGIOSPERMS (flowering plants).
- M. Leaves and branches arranged singly (alternate).
- N. Leaves not divided into leaflets (simple).

- O. Leafstalks mostly less than $\frac{1}{2}$ inch long; leaves mostly more than twice as long as broad, with edges finely toothed or without teeth; winter buds covered by a single scale—WILLOW.
- P. Leaf edges finely and distinctly toothed from base to apex.
- Q. Leaves 2 to 5 inches long, long-pointed, mostly rounded at base—PACIFIC WILLOW.
- QQ. Leaves 1 to 3 inches long, mostly short-pointed at both ends—LITTLETREE WILLOW.
- PP. Leaf edges without teeth or only sparsely and indistinctly toothed.
- R. Leaves mostly oblanceolate to obovate, short-pointed at apex and usually tapering to the narrow base.
- S. Leaves thick, mostly with white or gray feltlike or furry coat beneath; catkins stoutish.
- T. Leaves with dense white felt beneath; catkins stoutish, 2 to 4 inches long—FELTLEAF WILLOW.
- TT. Leaves with dense to sparse white or gray furry coat beneath; catkins stout, 1 to 2 inches long—SCOULER WILLOW.
- SS. Leaves thin, rather thinly silvery silky beneath; catkins slender—SITKA WILLOW.
- RR. Leaves broadly elliptical or oval or obovate, broadly pointed to rounded at both ends.
- U. Leaves mostly 1 to 2 inches wide, mostly oval, hairy on both sides while young, becoming hairless; catkins dense at maturity; seed capsules short-stalked—YAKUTAT WILLOW.
- UU. Leaves less than 1 inch wide, elliptical to oblanceolate or obovate-oval, gray-hairy and mostly roughly net-veined beneath; catkins loose at maturity; seed capsules long-stalked—BEBB WILLOW.
- OO. Leafstalks usually more than $\frac{1}{2}$ inch long (often shorter in alder); leaves less than twice as long as broad, with edges finely or coarsely toothed; winter buds with 3 or more scales exposed.
- V. Leaf edges finely toothed with curved and rounded teeth—COTTONWOOD, POPLAR, ASPEN.
- W. Leaves nearly round, less than 2 inches long; leafstalks flattened—QUAKING ASPEN.
- WW. Leaves longer than broad, $2\frac{1}{2}$ to 5 inches long; leafstalks not flattened.
- X. Seed capsules pointed, smooth, splitting into 2 parts; leaves pale green and brownish beneath; tree of interior forests—BALSAM POPLAR.
- XX. Seed capsules rounded, hairy, splitting into 3 parts; leaves whitish beneath; tree of coastal forests—BLACK COTTONWOOD.
- VV. Leaf edges coarsely toothed with sharp-pointed teeth.
- Y. Leaf edges doubly toothed with teeth of two sizes.
- Z. Leaf edges not lobed; bark papery, white, brown, or reddish, peeling off—PAPER BIRCH.
- a. Leaves rounded at base; bark usually reddish brown; tree of southeast Alaska—WESTERN PAPER BIRCH.
- aa. Leaves usually wedge-shaped at base.

- b. Leaves long-pointed; bark usually whitish; tree of interior forests south to Pacific coast—ALASKA PAPER BIRCH.
- bb. Leaves short-pointed and often slightly hairy above; bark usually dark brown; tree of southern and interior Alaska—KENAI BIRCH.
- ZZ. Leaf edges wavy or shallowly lobed; bark usually gray and smooth, not papery nor peeling off—ALDER.
- c. Leaves dark green above, not shiny, not sticky when young; leaf edges with short-pointed teeth; nutlets ("seeds") with 2 narrow wings or none.
- d. Leaves with rusty hairs along the veins beneath; leaf edges curled under slightly; nutlets ("seeds") with 2 narrow wings—RED ALDER.
- dd. Leaves finely hairy or nearly smooth beneath; leaf edges flat; nutlets ("seeds") without wings—THINLEAF ALDER.
- cc. Leaves yellow green above, shiny on both sides and especially beneath, sticky when young; leaf edges with long-pointed teeth; nutlets ("seeds") with 2 broad wings—SITKA ALDER.
- YY. Leaf edges with uniform teeth.
 - e. Leaves rounded at apex—PACIFIC SERVICE-BERRY.
 - ee. Leaves short-pointed, sometimes 3-lobed—OREGON CRAB APPLE.
- NN. Leaves divided into 7 to 17 leaflets (compound), the leaflets attached along the extended leafstalk and shedding with it—MOUNTAIN-ASH.
 - f. Leaflets toothed above middle and rounded at apex, usually 9 or 11 (or 7 to 13)—SITKA MOUNTAIN-ASH.
 - ff. Leaflets toothed near base, short-pointed, 9 to 17—EUROPEAN MOUNTAIN-ASH.
- MM. Leaves and usually branches in pairs (opposite)—DOUGLAS MAPLE.

WINTER KEY TO DECIDUOUS TREES OF ALASKA

- A. Twigs with many wartlike, blackish spur branches about $\frac{1}{8}$ inch long; upright, brown cones usually present; trees with pointed crown—TAMARACK.
- AA. Twigs without spur branches or with longer spur branches; trees with spreading, usually rounded crown.
 - B. Winter buds, leaf scars, and branches arranged singly (alternate).
 - C. Winter buds covered by a single scale—WILLOW (the different species not readily distinguished in winter condition).
 - CC. Winter buds with 3 or more scales exposed.
 - D. Winter buds resinous or sticky, shiny; lowest bud scale centered over leaf scar—COTTONWOOD, POPLAR, ASPEN.
 - E. Winter buds $\frac{1}{4}$ inch or less in length, short-pointed, only slightly resinous—QUAKING ASPEN.
 - EE. Winter buds $\frac{3}{8}$ to 1 inch long, long-pointed, very resinous.

F. Tree of interior forests—**BALSAM POPLAR.**
FF. Tree of coastal forests—**BLACK COTTON-
WOOD.**

DD. Winter buds not resinous or sticky (slightly resinous in Sitka alder) ; lowest bud scales at side of bud.

G. Winter buds stalked, dark red or purple, with the 3 exposed scales meeting at their edges (scales overlapping in Sitka alder) ; old, hard, blackish cones usually present—**ALDER.**

H. Cones short-stalked.

I. Cones $\frac{1}{2}$ to 1 inch long—**RED ALDER.**

II. Cones less than $\frac{1}{2}$ inch long—**THINLEAF
ALDER.**

HH. Cones long-stalked, with stalks mostly longer than the cones—**SITKA ALDER.**

GG. Winter buds not stalked, composed of overlapping scales.

J. Winter buds $\frac{1}{4}$ inch or less in length ; bud scales with few or no hairs.

K. Twigs with many small whitish spots (lenticels and resin) ; bark papery, peeling off—**PAPER BIRCH.**

KK. Twigs with few inconspicuous spots (lenticels) ; bark not papery.

L. Winter buds sharp-pointed, purple—**PACIFIC
SERVICEBERRY.**

LL. Winter buds blunt-pointed, dark brown—**OREGON CRAB APPLE.**

JJ. Winter buds large, usually more than $\frac{3}{8}$ inch long ; inner exposed bud scales densely hairy—**MOUNTAIN-ASH.**

M. Winter buds rusty-hairy—**SITKA MOUNTAIN-
ASH.**

MM. Winter buds white - hairy — **EUROPEAN
MOUNTAIN-ASH.**

BB. Winter buds, leaf scars, and usually branches in pairs (opposite)—**DOUGLAS MAPLE.**

ALASKA TREES

YEW FAMILY (Taxaceae)

The seed plants with the seeds partly exposed (gymnosperms), not enclosed in fruits, are represented in Alaska by two families of conifers or softwoods, the yew family (Taxaceae) and the pine family (Pinaceae). The Alaska examples are evergreen (with one exception) trees and shrubs with narrow or small leaves resembling needles or scales. Pacific yew (*Taxus brevifolia* Nutt.), the Alaska member of the yew family, is distinguished by the seeds borne singly in a scarlet, juicy, cuplike or berrylike disk, by the flat, pointed, non-resinous needles in two rows, and by the twisted leafstalks extending down the twig. In the pine family the seeds are borne in a cone, which, however, is berrylike in the junipers.

PACIFIC YEW (*Taxus brevifolia* Nutt.)

Other name: western yew.

Leaves (needles) in 2 rows, flat, slightly curved, stiff or soft, abruptly pointed but not prickly, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, shiny dark green above, pale beneath, not resinous (fig. 1). **Leafstalks** yellow, extending down the twigs,

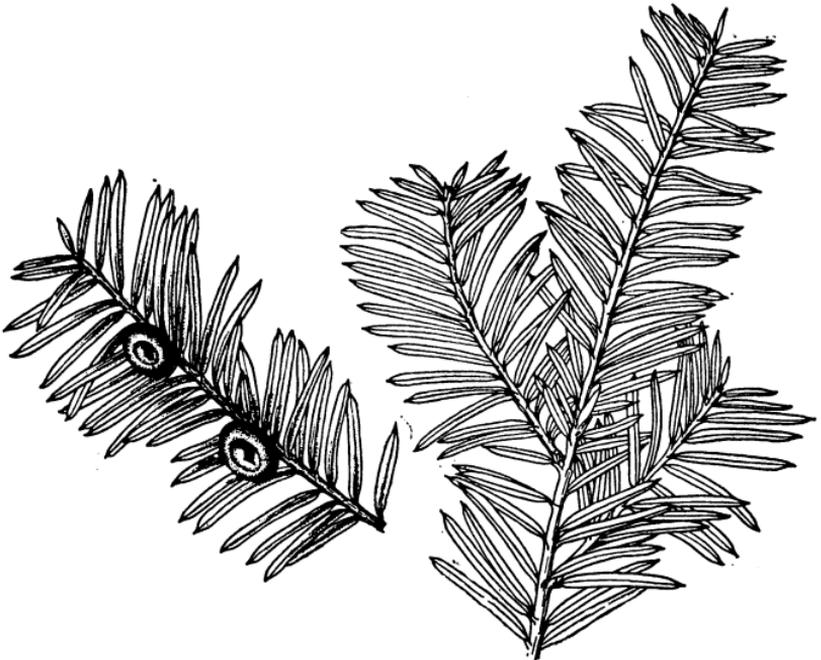


FIGURE 1.—Pacific yew (*Taxus brevifolia*), three-fourths natural size.

twisting to produce an even, comblike arrangement of needles. Pollen and seeds on different trees. **Seeds** single, $\frac{3}{8}$ inch long, exposed at apex but partly surrounded by a scarlet, juicy, cuplike disk or "berry." **Bark** purplish brown, thin, scaly, ridged and fluted. **Wood** bright red with thin light yellow sapwood, fine-grained, heavy, hard, elastic.

Pacific yew is a small tree or shrub up to 30 feet tall with a straight conical trunk 6 to 12 inches in diameter with horizontal or drooping branches but usually much smaller. It is exceedingly scattered, occurring where birds have dropped the seeds. It grows slowly in the undergrowth of dense forests at the heads of streams and moist canyons. The strong, durable wood is used for bows, canoe paddles, and cabinet work but is too scarce in Alaska to be commercially important.

Range: Southern tip of southeast Alaska. Known from Mary, Annette, and Gravina Islands near Ketchikan and from southern end of Prince of Wales Island, but it probably grows in other parts of southeast Alaska. Southeast from British Columbia to Montana and California.

PINE FAMILY (Pinaceae)

The largest and by far the most important family of trees in Alaska is the pine family (Pinaceae), with 7 genera and 11 species of trees and 1 genus with 2 species of shrubs. Members of this family make up nearly all the trees of the forests of southeast Alaska and most of the timber of the interior forests also. They furnish nearly all of Alaska's lumber, pulpwood, and other wood products. These cone-bearing, narrow-leaved, resinous evergreens generally have tall, straight trunks except where dwarfed near the limits of tree growth. The 5 genera having needlelike leaves, with their Alaska species, are: (1) Larch (*Larix*), with 1 species, tamarack, the only Alaska conifer shedding its leaves in the fall; (2) pine (*Pinus*), with 1 species, lodgepole pine; (3) spruce (*Picea*), with 3 species, black spruce, white spruce, and Sitka spruce; (4) hemlock (*Tsuga*), with 2 species, western hemlock and mountain hemlock; and (5) fir (*Abies*), with 2 species, alpine fir and Pacific silver fir. The other 2 genera, with scalelike leaves usually less than $\frac{1}{8}$ inch long, are (6) thuja (*Thuja*), with 1 species, western redcedar; and (7) white-cedar (*Chamaecyparis*), with 1 species, Alaska-cedar. The eighth Alaska genus, juniper (*Juniperus*), with scalelike or awllike leaves and with seeds in a "berry," is represented by 2 species of low shrubs, common juniper (sometimes a small tree in the United States) and creeping juniper.

The characteristics readily used to identify these 7 genera, or the single species of the 4 genera with only 1 Alaska species, are summarized here.

Tamarack (*Larix laricina* (Du Roi) K. Koch). The only Alaska conifer which sheds its leaves in fall and is leafless in winter. The needles are borne 12 to 20 in a cluster on short, spur branches (or single on leading twigs).

Lodgepole pine (*Pinus contorta* Dougl.). The needles are 2 (sometimes 3) in a bundle or cluster with a sheath at base, 1 to 2 inches long. The one-sided, prickly cones remain closed on the tree for many years.

Spruce (*Picea*). The needles are sharp-pointed and stiff, either 4-angled or flattened and slightly keeled, extending out on all sides of twig. There is no leafstalk, but each leaf is attached on a small stalklike projection of the twig. Older twigs without needles are rough because of these projections. Cut branches of spruce and hemlock shed their needles promptly upon drying. (Botanical specimens with most needles remaining attached can be prepared easily by immersing freshly cut twigs in boiling water for a few minutes before pressing.) The cones hang down.

Hemlock (*Tsuga*). The needles are blunt, soft and not stiff, have short leafstalks, and are flat or slightly keeled. As in spruce, the older twigs have become roughened by the stalklike projections where the needles were shed. The cones hang down.

Fir (*Abies*). The needles are flat and without leafstalks. The older twigs are not rough but smooth after the needles are shed. The cones are upright in the highest branches of the narrow, pointed crowns. As the cone scales fall from the central axis at maturity, old cones are not found on or under the trees.

Western redcedar (*Thuja plicata* Donn). The scalelike leaves $\frac{1}{16}$ to $\frac{1}{8}$ inch long are flat and curved and arranged on the flattened leafy twigs in fanlike sprays. The small cones are clustered at ends of branches and become turned up.

Alaska-cedar (*Chamaecyparis nootkatensis* (D. Don) Spach). The scalelike leaves $\frac{1}{16}$ to $\frac{1}{8}$ inch long are pointed and spreading. Leafy twigs are 4-angled or slightly flattened and form fanlike sprays. The small, hard cones are nearly spherical.

TAMARACK (*Larix laricina* (Du Roi) K. Koch)

Other names: eastern larch, hackmatack, Alaska larch; *L. alaskensis* W. F. Wight, *L. laricina* var. *alaskensis* (W. F. Wight) Raup.

Leaves (needles) shedding in fall (deciduous), in clusters of 12 to 20 on short spur branches or twigs (or single on leading twigs), $\frac{3}{8}$ to 1 inch long, narrow and

3-angled, blue green (fig. 2). **Cones** upright, rounded, $\frac{3}{8}$ to $\frac{3}{4}$ inch long, brown, maturing in early fall. **Twigs** dull tan in winter. **Bark** ashy brown, thin and scaly. **Wood** light brown, hard, heavy, elastic.

Tamarack, a small tree to 30 feet in height with a straight, tapering trunk up to 8 inches in diameter, has a thin crown of foliage and horizontal branches which usually extend to the ground. It grows in muskegs and various moist soils of the interior in open stands with balsam poplar, black spruce, alder, and willow. The



FIGURE 2.—Tamarack (*Larix laricina*), three-fourths natural size.

only Alaska conifer shedding its leaves in winter, this hardy tree can withstand great changes in temperature. The durable, strong wood is used to some extent for poles, railroad ties, and fence posts.

Range: Interior Alaska but absent from southeast Alaska. Interior forests of Tanana, upper Koyukuk, lower Yukon, and upper Kuskokwim River valleys, extending between 63° and 67° in latitude but not north to the limit of trees; west to Unalakleet River near Bering Sea. East across Canada to Labrador and Newfoundland and south in northeastern United States to New Jersey, Illinois, and Minnesota.

LOGEPOLE PINE (*Pinus contorta* Dougl.)

Other names: shore pine, scrub pine, tamarack pine; *P. contorta* var. *latifolia* Engelm., *P. murrayana* Grev. & Balf.

Leaves (needles) 2 in a bundle with a sheath at base, 1 to 2 inches long, stout and often twisted, dark green (fig. 3). **Cones** egg-shaped, one-sided, $1\frac{1}{2}$ to 2 inches long, light yellow brown, with prickly scales, maturing in 2 years and remaining closed on the tree many years; capable of withstanding heat but opening after fire to release the seeds. **Bark** thin, blue brown, deeply furrowed. **Wood** light reddish brown, pitchy, coarse-grained, hard, brittle.

Alaska's only pine, lodgepole pine, is a low scrubby tree 20 to 40 feet tall and 6 to 20 inches in diameter but sometimes larger. Intolerant of shade, it grows in open stands as a scrub pine, straight when young but gnarled in age, with branches extending almost to the ground. This dwarf coastal form of lodgepole pine is common in open muskegs of peat moss and on benches near lakes.



FIGURE 3.—Lodgepole pine (*Pinus contorta*), three-fourths natural size.

In Alaska the wood is used for fuel and minor purposes. The sweet orange-flavored sap served the Indians as a delicacy, fresh or dried. The taller, inland tree form, or lodgepole pine of the mountains, sometimes designated as a separate variety (var. *latifolia* Engelm.), does not reach Alaska from Yukon Territory.

Range: Throughout southeast Alaska north to head of Lynn Canal at Skagway and Glacier Bay. From Alaska and Yukon east and south to Saskatchewan, Colorado, California, and Lower California, Mexico.

BLACK SPRUCE (*Picea mariana* (Mill.) B. S. P.)

Other names: bog spruce, swamp spruce.

Leaves (needles) 4-angled, $\frac{1}{4}$ to $\frac{5}{8}$ inch long, pointed, ashy blue green, standing out on all sides of the hairy twigs (fig. 4). **Twigs** hairy. **Cones** short, $\frac{5}{8}$ to $1\frac{1}{4}$ inches long, dull gray brown, with scales rigid and

brittle, rounded, and slightly toothed; remaining on the trees several years, often conspicuously clustered in the tops. **Bark** thin, composed of gray brown scales. **Wood** yellowish white, fine-grained, lightweight, soft.

Black spruce is a small, often scrubby, tree of the interior forests from a few feet to 15 feet in height or rarely 20 to 30 feet. The branches are short, sparse, and often slightly drooping at the ends. This species is characteristic of cold wet flats, muskegs, and lake margins in the spruce-birch interior forests up to an altitude of 2,000 feet. The wood is of slight importance for lumber because of the small size of the trees.



FIGURE 4.—Black spruce (*Picea mariana*), three-fourths natural size.

Besides the different habitat and smaller size with more compact branching, black spruce is distinguished from white spruce by the shorter and blunter needles, hairy twigs, and smaller cones with brittle, slightly toothed scales. Also the cones remain on the trees several years instead of shedding in autumn, as in white spruce. The twigs of black spruce are reported to be tougher and gummier also.

Range: Interior Alaska in central Yukon and Tanana River valleys west to Elim on Bering Sea; also in a smaller area around Cook Inlet but absent from southeast Alaska. East across Canada to Labrador and Newfoundland, south in northeastern United States from New Jersey to Minnesota.

WHITE SPRUCE (*Picea glauca* (Moench) Voss)

Other names: western white spruce, Canadian spruce; *P. glauca* var. *albertiana* (S. Brown) Sarg.

Leaves (needles) 4-angled, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, stiff, pointed, blue green, standing out on all sides of the twigs except near the ends where they mass on top (fig. 5). Leaves and twigs have a skunklike odor when crushed. **Twigs** not hairy. **Cones** slender, $1\frac{1}{4}$ to $2\frac{1}{2}$ inches long, with scales thin and flexible, rounded, smooth margined; red tinged, at maturity in autumn turning light brown and falling. **Bark** gray or brown,

thin, of small scales, usually rough. **Wood** white, of fine and moderately uneven texture, moderately lightweight.

White spruce, the characteristic spruce and most important tree of the spruce-birch interior forest, is a medium-sized slow-growing tree 30 to 50 feet tall with trunk diameter commonly 6 to 8 inches or in the better stands 12 to 24 inches. The largest individuals are 50 to 80 feet tall and 24 to 36 inches in diameter. The maximum diameter recorded is 54 inches. The crown



FIGURE 5.—White spruce (*Picea glauca*), three-fourths natural size.

is usually narrow and spirelike, composed of drooping branches with upturned ends and numerous small, drooping side twigs. Although not exacting as to habitat, this species grows best on sandy soils along the edges of lakes and rivers and forms the densest forests along the large river valleys. It thrives under the light shade of poplar and birch, which it often replaces after fire or logging. White spruce is the common forest tree of interior Alaska to its upper altitudinal limit of 2,000 to 3,000 feet and is found in open stands throughout the range of its growth, usually with paper birch or in pure stands. In a few places, such as the Chugach National Forest, it extends to tidewater. It supplies most of the lumber sawed in interior Alaska and has contributed greatly to the economic development of the region. Chief uses here include lumber and dimension material for buildings, flumes, sluice boxes, boats, and ladders. A large quantity is cut for fuel also. White

spruce is the most important commercial tree species in Canada and the foremost pulpwood.

Range: Interior Alaska, north and west to the limit of tree growth but not in southeast Alaska, almost the same as the range of the spruce-birch interior forest shown on the map of Alaska. North to latitude 68° in tributaries of Porcupine, Yukon, Koyukuk, Kobuk, and Noatak Rivers, but not found on the Arctic slope. West to upper Fish River on Seward Peninsula, Unalakleet, Mountain Village on the Yukon River, Holitna River on the Kuskokwim, and Nushagak. South to the Pacific side of the Alaska range on Chitina and Copper Rivers, Cook Inlet, and some other bays and inlets. From Alaska east across Canada to Labrador and Newfoundland, south in northeastern United States from New York to Minnesota, in Black Hills, and in Montana.

SITKA SPRUCE (*Picea sitchensis* (Bong.) Carr.)

Other names: yellow spruce, tideland spruce, western spruce, silver spruce, coast spruce.

Leaves (needles) flattened and thin, $\frac{5}{8}$ to 1 inch long, sharp-pointed, slightly keeled or angled above and rounded or slightly keeled beneath, dark green except for 2 whitish bands on each side, standing out on all sides of the smooth twigs (fig. 6). **Cones** cylindrical and narrow, 2 to $3\frac{1}{2}$ inches long, light orange brown, with long, stiff scales, rounded and irregularly toothed, hanging down, falling at maturity. **Bark** dark purplish brown, thin, scaly but relatively smooth, the inner bark whitish with brown dots. **Heartwood** light reddish brown and **sapwood** nearly white. **Wood** of fine and moderately uneven texture, moderately lightweight, moderately soft.

Sitka spruce is the largest of all spruces and the most valuable tree species in Alaska. This common spruce forms more than 20 percent of the hemlock-spruce coastal forests of Alaska and also occurs in pure stands. Sitka spruce has a tall, straight, evenly tapering trunk above the much enlarged base and an open conical crown. It grows more rapidly and to larger size than western hemlock and is more light-requiring. On the Tongass National Forest mature trees average 160 feet in height and are 3 to 5 feet in diameter, but trees 200 feet tall and 7 feet in diameter are common. Maximum size is more than 225 feet in height and 8 feet in diameter on the best sites, which are deep, rich, moist, but well-drained soils. The largest known Sitka spruce in Alaska is $14\frac{1}{2}$ feet in diameter at a point 6 feet above the ground. This species extends from sea level to the timber line at about 3,000 feet elevation in the mountains but grows mainly at altitudes below 1,500 feet. The largest trees have an age of 500 to 700 years or

more. On the Chugach National Forest the trees are smaller. Where they grow in bare or open areas, such as at Glacier Bay, the bushy trees often propagate by layering. The lowest branches touch the ground, become partly covered up, develop roots, and then turn upward to form separate trees. Small groves of Sitka



FIGURE 6.—Sitka spruce (*Picea sitchensis*), three-fourths natural size.

spruce trees were planted as early as 1805 by Russians at Unalaska, near the eastern end of the treeless Aleutian Islands and far outside the tree limits. These trees are still growing and have produced cones, but younger trees are absent, perhaps because of grazing. Both the common and scientific names honor the southeast Alaska town of Sitka where this species was discovered by the German naturalist, Dr. Karl Heinrich Mertens, in 1827.

The wood produces high-grade wood pulp, the best on the Pacific coast, and with western hemlock will be used extensively in manufacture of newsprint in the future. Sitka spruce is the principal saw-timber tree of southeast Alaska and is made into all the usual

forms of lumber. The high-grade lumber has many uses. Sitka spruce is the most important wood for airplane construction and in the last war was used especially in British mosquito bombers. Resonant qualities, large size, and uniformity make the wood valuable for piano sounding boards. Much of the low-grade lumber is made into packing boxes for the Alaska salmon industry. About two-fifths of the total supply of this species is in Alaska.

Range: Coastal forests throughout southeast Alaska north to head of Lynn Canal at Skagway, Glacier Bay, and Yakutat Bay, west to Prince William Sound, south shore of Kachemak Bay in Cook Inlet, and Kodiak Island; the same as the range of the hemlock-spruce coastal forest shown on the map of Alaska. South along the Pacific coast to northern California.

WESTERN HEMLOCK (*Tsuga heterophylla* (Raf.) Sarg.)

Other names: west coast hemlock (lumber), Pacific hemlock; formerly *T. mertensiana* auth.

Leaves (needles) in 2 rows, short-stalked, flat, $\frac{1}{4}$ to $\frac{7}{8}$ inch long, rounded at tips, shiny, dark green above and with two whitish bands on lower surface (fig. 7). **Cones** small, $\frac{5}{8}$ to 1 inch long, brown, hanging down on tips of twigs. **Bark**, reddish brown, hard, furrowed, and thick on old trees; a pocketknife will disclose the red inner bark not found in spruce. **Wood** pale red-



FIGURE 7.—Western hemlock (*Tsuga heterophylla*), three-fourths natural size.

dish brown of moderately fine and even texture, non-resinous, moderately lightweight, moderately hard.

Western hemlock forms about 73 percent of the dense hemlock-spruce coastal forests of southeast Alaska, where it is the most abundant and one of the most important tree species. Usual size at maturity is 100 to 150 feet in height and 2 to 4 feet in diameter, but the largest trees are as much as 190 feet tall and 5 feet or more in diameter. The trunk is long and slender, the crown short and narrow, and the branches are horizontal or drooping. This species attains its largest size on moist flats and lower slopes, but with abundant moisture, both atmospheric and soil, it grows well on shallow soils. It is very tolerant of shade.

The wood, which is stronger and more durable than that of other species of hemlock and which is easily worked, is used for construction lumber, paper pulp, piling (such as for fish traps in the salmon industry), railroad ties, and mine timbers. Principal future use probably will be for pulpwood. The wood is admirably suited for structural timbers, flooring, and street planking. The outer bark contains a high percentage of tannin and is a potential source of this product. Western hemlock is the State tree of Washington.

Range: Coastal forests throughout southeast Alaska north to head of Lynn Canal at Skagway, Glacier Bay, and Yakutat Bay, west to Prince William Sound and Portlock on Kenai Peninsula; almost the same as the range of the hemlock-spruce coastal forest shown on the map of Alaska. Southeast to western Montana and northern California.

MOUNTAIN HEMLOCK (*Tsuga mertensiana* (Bong.) Carr.)

Other names: alpine hemlock, black hemlock.

Leaves (needles) short-stalked, rounded or slightly angled, $\frac{1}{4}$ to 1 inch long, blue green, stouter and blunter than in western hemlock and lacking the whitish lower surface, standing out on all sides of the twigs (fig. 8). **Cones** cylindrical, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long and $\frac{3}{4}$ inch thick, purplish but turning brown, usually hanging down. **Bark** blue gray or brown, thick, deeply furrowed and ridged. **Wood** pale reddish brown, of moderately fine and even texture, moderately heavy, moderately hard.

Mountain hemlock is a small or medium-sized tree, usually short and dwarfed, from 30 to 60 feet tall and 10 to 20 inches in diameter, with marked taper, and with horizontal or drooping branches. It uncommonly reaches a height of 100 to 125 feet and a diameter of 30 to 40 inches at Prince William Sound. It grows in low muskges, as well as on alpine slopes on the ocean side of



FIGURE 8.—Mountain hemlock (*Tsuga mertensiana*), three-fourths natural size.

the Coast Range in southeast Alaska, where it reaches an altitude of 3,000 to 3,500 feet, higher than other trees, and becomes a prostrate shrub. Toward the timber line it replaces western hemlock. In the Prince William Sound and Cook Inlet regions it is found on better drained slopes and near tidewater, partly losing its dwarfed appearance. The wood is used for railroad ties in the Cook Inlet region. However, in the higher altitudes where it is commonly found, mountain hemlock is largely inaccessible and is unimportant commercially. This species is named for the German naturalist, Dr. Karl Heinrich Mertens, who discovered it near Sitka, Alaska, in 1827.

Range: Southeast Alaska from the southern end north to head of Lynn Canal at Skagway, Glacier Bay, and Yakutat Bay, west to Prince William Sound and Cook Inlet. Southeast to western Montana and California.

Douglas-fir (*Pseudotsuga taxifolia* (Poir.) Britton), a common and valuable large tree in the Pacific coast and Rocky Mountain regions in western United States south into Mexico, is not native in Alaska, though a few trees were introduced at Sitka many years ago. It is common in the coast region of southern British Columbia extending north almost to the northern end of Vancouver Island and slightly inland north to Gardner Canal. In the interior it ranges north to Fort McLeod and Tacla Lake at latitude 55°, slightly north of the southern tip of Alaska. The foliage of Douglas-fir sug-

gests that of the true firs, but the cones hang down and indicate relationship with hemlock. Also, the cones, which are 2 to 3½ inches long, have distinctive, prominent, 3-toothed bracts.

ALPINE FIR (*Abies lasiocarpa* (Hook.) Nutt.)

Other names: white fir (lumber), balsam, white balsam.

Leaves (needles) flat, ¾ to 1½ inches long, grooved above, blue green on both sides, those on the lower branches rounded or occasionally notched at the tip and in 2 rows, those near the top of the tree pointed and stiff and by twisting massed on the upper side of the twigs (fig. 9). **Cones** in the highest branches, upright,

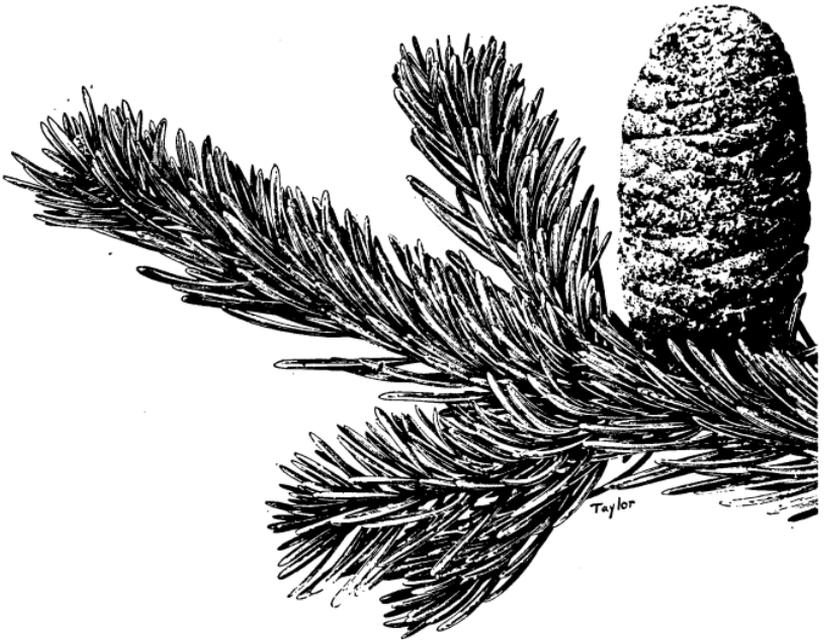


FIGURE 9.—Alpine fir (*Abies lasiocarpa*), three-fourths natural size.

2½ to 4 inches long and 1½ inches in diameter, purple. **Twigs** rusty-hairy. **Bark** ash gray, thin, smoothish, hard, and flinty. **Wood** pale brown, fine-grained, lightweight, soft, usually knotty because of the many persistent branches.

Alpine fir is a small or medium-sized tree with a long, spirelike crown. It is an inland tree, growing in the cool, moist subalpine slopes near timber line, although found in the valley floors as well. At the timber line it becomes scrubby or prostrate.

Range: Mountains of southeast Alaska northwest to Copper River valley or beyond. From the interior of British Columbia it crosses over the divide of the Coast Range west to southeast Alaska at Hyder and Boca de Quadra in the southern end and at head of Lynn Canal

near Skagway in the northern end, where it occurs from sea level to timber line at 3,000 feet. North to Yukon and Mackenzie, east to Alberta, and south to New Mexico, Arizona, and Oregon.

PACIFIC SILVER FIR (*Abies amabilis* (Dougl.) Forb.)

Other names: silver fir, white fir (lumber).

Leaves (needles) flat, $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, deeply grooved and dark green above, silvery white beneath, those on the lower branches notched or rounded at tips, those toward the top of the tree shorter and sharp-pointed (fig. 10). A peculiar twist brings the needles

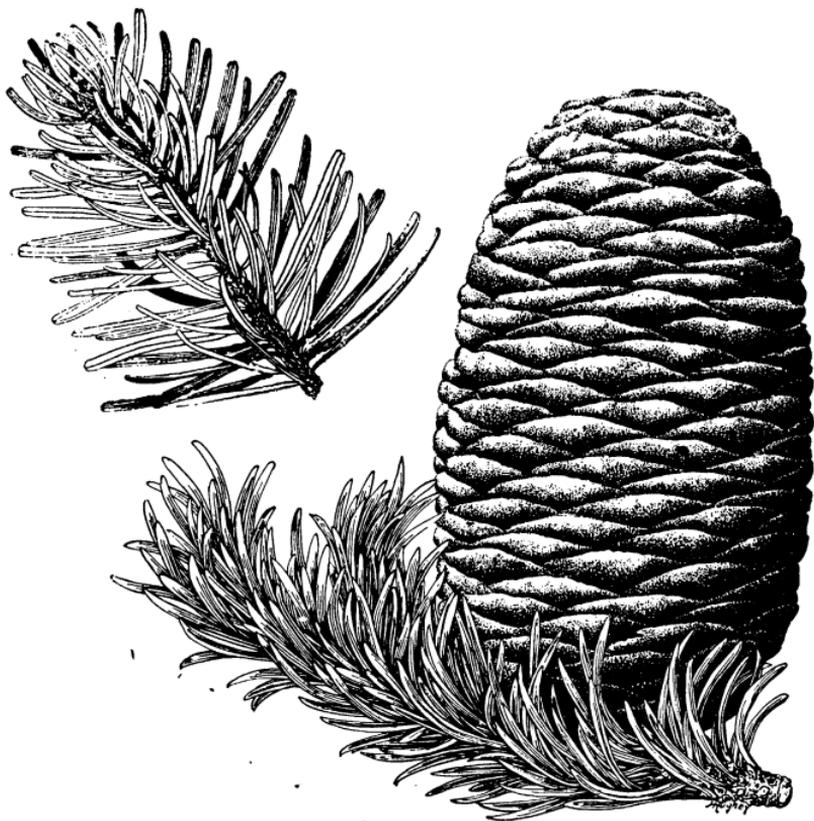


FIGURE 10.—Pacific silver fir (*Abies amabilis*), three-fourths natural size.

in a brushlike mass on the upper side of the twigs. **Twigs** finely hairy. **Cones** in the highest branches, upright, 4 to 5 inches long, bluish tinged, with the scales falling when mature. **Bark** smooth, gray, characteristically splotched with white. **Wood** pale brown with whitish sapwood, fine-grained, lightweight, soft.

Pacific fir is of local distribution near the southeast end of Alaska, where it occurs on well-drained lower slopes of canyons, benches, and flats from sea level to an elevation of 1,000 feet. Here it is a tree as much as 75 feet tall and 2 feet in diameter. The wood is used oc-

asionally for interior finish in Washington and Oregon, where this species is more abundant.

Range: Local in southern part of southeast Alaska at Boca de Quadra, Kosciusko Island, and latitude 56° near northern end of Prince of Wales Island. Reported also from Portland Canal and Behm Canal. South along the Pacific coast to northwestern Oregon.

WESTERN REDCEDAR (*Thuja plicata* Donn)

Other names: giant arborvitae, canoe cedar, shinglewood, Pacific redcedar, arborvitae.

Leaves scalelike, flattened, $\frac{1}{16}$ to $\frac{1}{8}$ inch long (or pointed and $\frac{1}{4}$ inch long on leading twigs), shiny, yellow green above and dull below; arranged on slender twigs in flat, fanlike sprays (fig. 11). **Cones** clustered near ends of branches and becoming turned up, $\frac{1}{2}$ inch long, brown, with tough, leathery scales. **Bark** reddish or cinnamon brown, thin and fibrous, stringy, becoming thick and ridged with age. **Heartwood** reddish brown and the narrow sapwood white. **Wood** with the distinctive odor of cedars, of fine and moderately even texture, lightweight, moderately soft, brittle.



FIGURE 11.—Western redcedar (*Thuja plicata*), three-fourths natural size.

Western redcedar is a large tree of moderately slow growth, characterized by a swollen or buttressed base, tapering trunk, and conical crown, and by branches curving upward at the tips. It becomes 100 to 130 feet or more in height and 3 to 6 feet in diameter. It is found from sea level to 3,000 feet elevation on the west slopes of the Coast Range but is of largest size below an altitude of 500 feet. Although sometimes in pure stands, it usually is scattered or in groups in the hemlock-spruce forest. It is very tolerant of shade. The wood, which is very durable, is used for shingles, lumber, boat building, poles, posts, piling, and fish-trap floats. The Indians employed the wood for totem poles, dugout canoes, houses, and other purposes and made mats, baskets, and ropes from the stringy bark. This is one of the most important timber trees of British Columbia.

Range: Southern half of southeast Alaska, north in decreasing numbers beyond Wrangell to Petersburg and Frederick Sound. Southeast to northwestern Montana and northwestern California.

ALASKA-CEDAR (*Chamaecyparis nootkatensis* (D. Don) Spach)

Other names: Alaska yellow-cedar, Nootka false-cypress, yellow-cedar, Alaska cypress, Sitka cypress, yellow cypress.

Leaves scalelike, $\frac{1}{16}$ to $\frac{1}{8}$ inch long, pointed and spreading, dark blue green, distinguished from western redcedar by their bluish tinge and spreading, pointed or prickly tips (fig. 12). **Leafy twigs** 4-angled or slightly flattened, in flat, spreading sprays on drooping branches. **Cones** nearly spherical, less than $\frac{1}{2}$ inch in diameter, hard, ashy gray, each scale with a pointed projection, maturing in two years. **Bark** shreddy, ash gray and lacking the brown tinge of western redcedar. **Heartwood** distinctive sulphur yellow with narrow band of lighter sapwood. **Wood** with sweet odor and taste, of fine and even texture, relatively straight-grained, moderately lightweight, moderately hard.

Alaska-cedar is a medium-sized slow-growing tree 60 to 100 feet tall and 2 to 4 feet in diameter, with drooping branches and twigs. It extends along the coast of southeast Alaska from sea level to timber line but is best developed between 500 feet and 1,200 feet in elevation. It is scattered or in small groups with western redcedar, Sitka spruce, and western hemlock or, on higher slopes or muskegs, with mountain hemlock. The extremely durable wood is easily worked and takes a beautiful finish. It is used locally for telephone poles, interior finish, furniture, small boat hulls, cabinet work, and novelties. Logs cut into 13-foot lengths formerly were exported to Japan, where they were made into

panels. Indians of southeast Alaska made their canoe paddles from this wood.

Range: Southeast Alaska, north to Lynn Canal and Yakutat Bay, and west to Port Wells on Prince William Sound. South to Oregon and northwestern California.

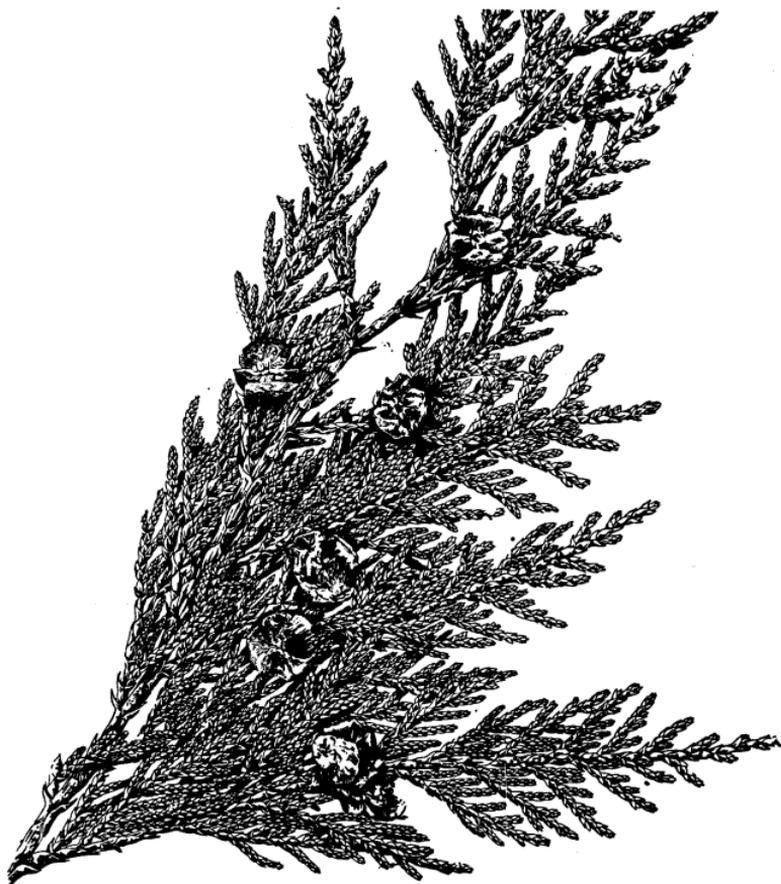


FIGURE 12.—Alaska-cedar (*Chamaecyparis nootkatensis*), three-fourths natural size.

Besides the 12 tree species of conifers, Alaska has 2 shrubby conifers, both junipers. These junipers have short, scalelike or awllike evergreen leaves, and the seeds are in a hard, bluish "berry" about $\frac{1}{4}$ inch in diameter.

Common juniper (*Juniperus communis* L.; mountain common juniper, *J. communis* var. *saxatilis* Pall., syn. *J. communis* var. *montana* Ait.) is a spreading nearly prostrate or trailing shrub forming patches up to 10 feet in diameter, though in the United States it rarely becomes a small tree. The awllike evergreen leaves are in groups of 3, $\frac{3}{8}$ to $\frac{1}{2}$ inch long, sharp and prickly, whitish and grooved above, shiny yellow green beneath. Throughout most of Alaska. From southeast Alaska north in central Alaska to Porcupine, Yukon, and Koyukuk Rivers and west to Bering Sea (Elim) and

west side of Cook Inlet. Across Canada to Labrador and Newfoundland, south in northeastern United States to New Jersey, Georgia (mountains), and Illinois and in western mountains to New Mexico and California. Also across northern Europe and Asia.

Creeping juniper (*Juniperus horizontalis* Moench) is a prostrate or trailing shrub often rooting along the stem. The paired leaves are mostly scalelike, $\frac{1}{16}$ inch long, blue green, making 4-angled stems $\frac{1}{16}$ inch broad, but young plants have awllike leaves less than $\frac{1}{4}$ inch long. Southeastern interior Alaska along Chitina and Copper Rivers and northwest to Mount McKinley National Park. Yukon and British Columbia across Canada to Labrador and Newfoundland south in northeastern United States to New York and Minnesota and in western mountains to Colorado.

WILLOW FAMILY (Salicaceae)

The willow family (Salicaceae), comprising the cottonwoods, poplars, and aspens (all in the genus *Populus*), and the willows (genus *Salix*), has the following characteristics, which are not repeated under the species descriptions: (1) The leaves, borne singly on the twigs, are evenly toothed or smooth but not lobed; (2) the flowers are of two kinds on different trees, the male flowers with pollen on some trees and on other trees the female flowers with seeds; (3) the small flowers in long, narrow clusters known as catkins appear in early spring before or with the leaves; and (4) the seeds, which are borne in seed capsules in spring, have long, white, cottony hairs and are scattered by the wind.

Cottonwoods, poplars, and aspens usually have broad leaves, stout twigs, and large, resinous winter buds with several scales exposed, while willows usually have narrow leaves, slender or wiry twigs, and small winter buds covered by a single scale. Catkins of cottonwoods hang down, while those of willows are upright or slightly spreading. The three Alaska species of the cottonwood genus, all common trees, are quaking aspen, balsam poplar, and black cottonwood.

Alaska Indians and Eskimos use the inner bark of willows for coloring and tanning their beautifully dressed deerskins. The "cotton" on the seeds of cottonwoods was a favorite source of tinder.

QUAKING ASPEN (*Populus tremuloides* Michx.)

Other names: American aspen; *P. tremuloides* var. *aurea* (Tidestr.) Daniels.

Leaves nearly round, 1 to 2 inches long, short-pointed, finely toothed with rounded teeth, smooth, shiny green above, pale beneath (fig. 13). **Leafstalks** 1 to 3 inches long, slender, flattened at right angles to

leaf blade and enabling the leaves to tremble in the slightest breeze. Young **twigs** reddish, becoming dark gray, with prominent, raised leaf scars. **Seed capsules** less than $\frac{1}{4}$ inch long, smooth, in long catkins up to 4 inches long, with cottony seeds maturing in early spring. **Bark** whitish or pale yellow green, smooth, thin, with characteristic curved scars and black knots. **Wood** of broad white sapwood and light brown heartwood, fine-grained, lightweight, soft, and brittle.

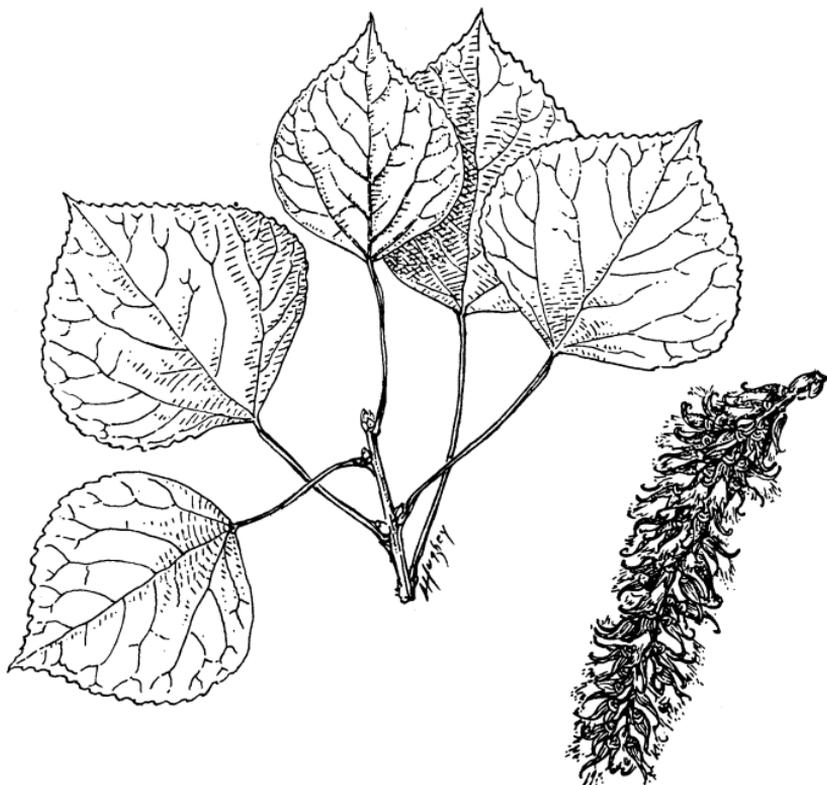


FIGURE 13.—Quaking aspen (*Populus tremuloides*), three-fourths natural size.

Quaking aspen is a small tree 20 to 40 feet tall with straight trunk and short, irregularly bent limbs making a narrow domelike crown. A fast-growing tree with short life, it is common on south slopes, well-drained benches, and creek bottoms throughout the interior of Alaska up to an altitude of about 3,000 feet. It often occurs in dense stands, especially following forest fires. The wood, which is perishable, is not of commercial importance in Alaska at present. In the United States it is used for pulpwood, boxes and crates, and excelsior.

Range: Interior Alaska, north and west to the limits of trees, absent along the coasts and in southeast Alaska; nearly the same as the range of the spruce-birch interior forest shown on the map of Alaska. North to the Arctic Circle and throughout Yukon Valley west to

Bering Sea and south to the north slopes of the coast range and the Pacific side beyond the mountains to Cook Inlet. The most widely distributed tree species in North America, ranging from Alaska east across Canada to Labrador and Newfoundland, south in north-eastern United States to New Jersey and Missouri, and south in western mountains to western Texas and California and northern Mexico.

BALSAM POPLAR (*Populus tacamahaca* Mill.)

Other names: tacamahac, tacamahac poplar, cottonwood; *P. balsamifera* L. in part.

Leaves ovate or broadly lance-shaped, $2\frac{1}{2}$ to 5 inches long, long- or short-pointed, finely toothed with rounded teeth, smooth or nearly so, shiny dark green above, pale green and rusty brown beneath, larger and longer than leaves of quaking aspen (fig. 14). **Leaf-**

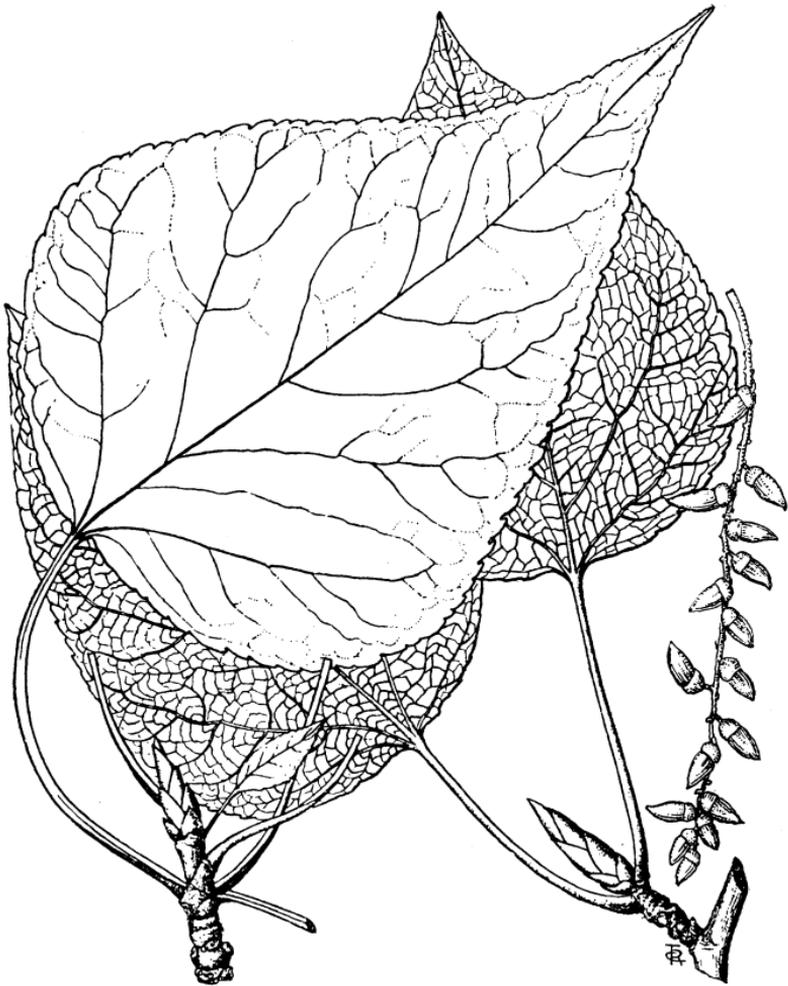


FIGURE 14.—Balsam poplar (*Populus tacamahaca*), three-fourths natural size.

stalks 1 to 2 inches long, not flattened. **Young twigs** shiny red. **Buds** large, long and pointed, sticky, covered with a pungent balsam, the odor of which permeates the air in spring. **Flowers** in long cylindrical catkins hanging conspicuously from bases of buds on twigs of previous year's growth. **Seed capsules** $\frac{3}{8}$ inch long, pointed, smooth, splitting into 2 parts, in long catkins up to 5 inches long, with cottony seeds maturing in early spring. **Bark** deeply furrowed, gray brown. **Wood** with light brown heartwood and thick, whitish sapwood, of fine and even texture, lightweight, soft.

Balsam poplar, sometimes erroneously called balm-of-Gilead, is a medium-sized, rapidly growing tree with a straight trunk and long, thin, open crown. Although usually not more than 50 feet tall, it sometimes becomes 80 to 100 feet in height and 2 feet in diameter. It is common in river valleys and sandy bottoms throughout the interior except near the coasts. In the mountains it extends to somewhat higher altitudes than white spruce, to 3,500 feet or more on the north and west slopes of the Alaska range. Also, it projects farther north to the Arctic slope in a few places. The wood is used chiefly for boxes and crates and pulpwood in the United States but has been of slight demand in Alaska. Rare hybrids of balsam poplar with quaking aspen, which has smaller and shorter leaves and flattened leaf-stalks, have been reported.

Range: Interior Alaska, north and west to the limits of trees, south to Kodiak Island and northern end of southeast Alaska; nearly the same as the range of the spruce-birch interior forest shown on the map. North to drainages of Porcupine, Yukon, Koyukuk, Kobuk, and Noatak Rivers and beyond Aanaktuvuk River and a few other scattered stream bottoms on the Arctic slope. West to Bering Sea at Igloo (longitude 165°) on Seward Peninsula, Unalakleet, and Nushagak, and south to Pacific coast at Katmai, Kodiak Island, and Cook Inlet. East to northern end of southeast Alaska at Chilkat River, head of Lynn Canal at Skagway, and Taku Inlet near Juneau. Widely distributed across Canada to Labrador and Newfoundland, south in northeastern United States to New Jersey and Nebraska and in northern Rocky Mountains to Wyoming.

BLACK COTTONWOOD (*Populus trichocarpa* Torr. & Gray)

Other names: cottonwood, balsam cottonwood, northern black cottonwood, Pacific poplar; *P. trichocarpa* var. *hastata* (Dode) Henry.

Leaves broadly ovate, $2\frac{1}{2}$ to 5 inches long, long- or short-pointed, finely toothed with rounded teeth, smooth or nearly so, dark shiny green above, whitish with rusty specks beneath (fig. 15). **Leafstalks** $1\frac{1}{2}$ to 2 inches

long, finely hairy, not flattened. **Seed capsules** rounded, hairy, splitting into 3 parts, in long, narrow catkins up to 8 inches long, with cottony seeds maturing in early spring. **Bark** gray, smooth at first, becoming deeply furrowed with flat ridges. **Wood** grayish white to light brown, of fine and even texture, lightweight, soft.

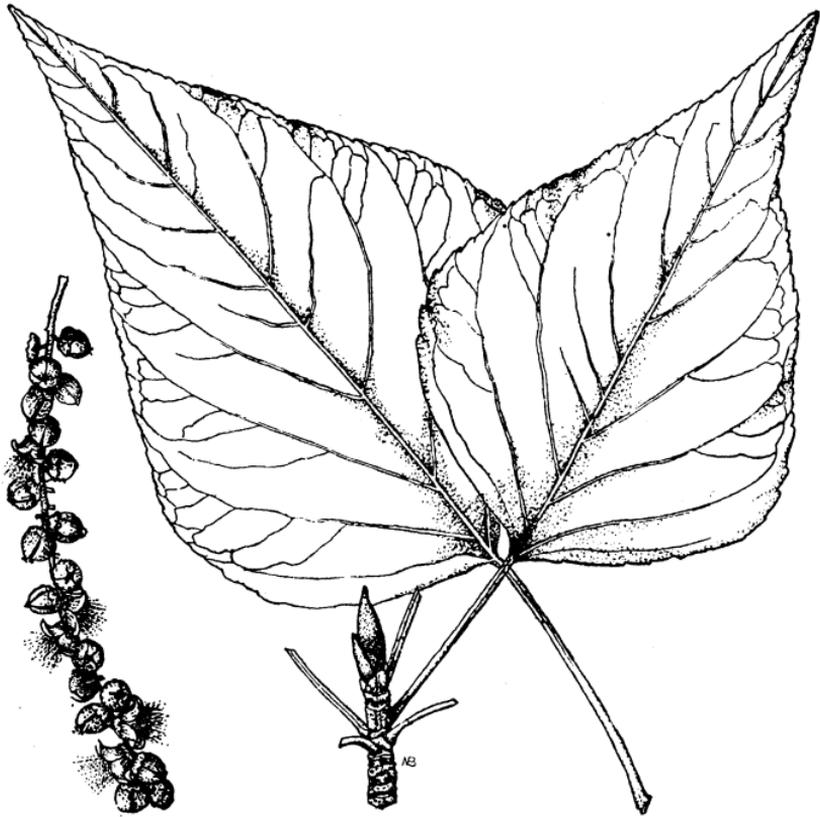


FIGURE 15.—Black cottonwood (*Populus trichocarpa*), three-fourths natural size.

Black cottonwood is not easily distinguished from its close relative, balsam poplar. Both have much the same general appearance and similar habitats. The chief differences are in the seed capsules, which in black cottonwood are hairy and split into 3 parts and in balsam poplar are smooth and split into 2 parts. The leaves of black cottonwood are broader in proportion to length and seem to be whiter beneath. As the ranges of the two species are separate except where they meet, most trees or specimens without seed capsules can be identified by locality. Black cottonwood occurs in lowlands of the coastal forests of southeast and southern Alaska, while balsam poplar is widely distributed in the interior. They seem to meet in the Cook Inlet area, especially from Matanuska to Curry.

The largest broadleaf tree in Alaska, black cottonwood grows rapidly and at maturity is 80 to 90 feet tall and 3 feet (maximum 4 feet) in trunk diameter. It is best developed at lower levels on river bottoms and sand bars. In southeast Alaska it occurs in quantity only on the valley floors of a few large streams, such as Stikine and Taku Rivers. Although of little present economic importance in Alaska, the wood is used in the United States for boxes and crates, pulpwood, and excelsior. The small supply in Alaska is a possible source of paper pulp.

Range: Along the Pacific coast of southeast Alaska, scattered toward southern end, commoner from Stikine River north to head of Lynn Canal at Skagway, Glacier Bay, and Yakutat Bay, west to Prince William Sound, Cook Inlet, and Kodiak Island. Southeast to Wyoming, southern California, and northern Lower California, Mexico.

WILLOWS (*Salix*)

Willows are well represented in Alaska, as in other far northern lands. In habit they vary from prostrate or creeping dwarf shrubs to erect bushes 2 to 6 feet tall and large shrubs or small trees. Seven of the 38 Alaska species of willows (*Salix*) are known to attain the size and habit of small trees, making this the largest genus of trees here. Two additional shrubby species which become small trees southward are mentioned in notes without figures. Numerous variations occur, and some species seem to intergrade or hybridize. Some botanists distinguish by name additional varieties of Alaska tree willows based mainly on differences in hairiness, but these are omitted.

Although field identification is difficult, especially in winter, the willows as a group can be distinguished by the usually slender or wiry twigs, the winter buds covered by a single bud scale, and by the bitter, quinine-like taste of the bark. The short-stalked leaves generally are long and narrow, with smooth or finely toothed edges. The yellowish or greenish male and female flowers are borne in hairy, narrow catkins 1 to 3 inches long, on separate trees in early spring before or as the leaves appear. The fruits in tassellike catkins are pointed, thin-walled seed capsules about $\frac{1}{4}$ inch long, which split open in spring to release the numerous tiny seeds with tufts of cottony hairs.

Shrubby willows are widely distributed almost throughout Alaska, extending beyond the limits of trees to the Arctic coast, Bering Sea, and Aleutian Islands. They are the undergrowth of the open spruce-birch forest of interior Alaska and form thickets on sand bars and other porous soils along streams. Although

not suitable for lumber because of their small size, shrubby willows are important summer and winter browse of reindeer and caribou.

PACIFIC WILLOW (*Salix lasiandra* Benth.)

Other names: western black willow, yellow willow.

Leaves lanceolate (lance-shaped), 2 to 4 or 5 inches long and $\frac{1}{2}$ to 1 inch wide, long-pointed, mostly rounded at base, with edges finely toothed, shiny green above, whitish to white beneath (fig. 16). **Young twigs** and lower side of leaves more or less hairy in the common variety. **Older twigs** stoutish, chestnut to reddish, shiny, without hairs. **Catkins** on leafy stalks, appearing with the leaves, 2 to 4 inches long at maturity; scales



FIGURE 16.—Pacific willow (*Salix lasiandra*), three-fourths natural size.

yellowish. **Seed capsules** without hairs. **Bark** dark brown, fissured. **Wood** pale brown, brittle.

Pacific willow in Alaska is a shrub or small tree to 16 feet in height. In the United States it is usually a small tree 20 to 30 feet tall but becomes a larger tree 50 to 60 feet tall with a trunk 2 to 3 feet in diameter.

Range: Interior Alaska and southeast Alaska. In southeast Alaska collected only inland along the Canadian boundary at Stikine River and Chilkat River. In interior Alaska from Matanuska north to central Yukon River district and Wiseman and west to Holy Cross on lower Yukon River. Alaska and Yukon east to Saskatchewan, south to New Mexico and southern California.

FELTLEAF WILLOW (*Salix alaxensis* (Anderss.) Cov.)

Leaves elliptical or oblanceolate (reverse lance-shaped), 2 to 4 inches long and $\frac{1}{2}$ to $1\frac{1}{2}$ inches wide, short-pointed, usually tapering to base, edges without teeth or nearly so, above dull green and sometimes somewhat short-hairy, beneath covered with a dense white or creamy-white felt; midrib yellowish (fig. 17). One-year and 2-year **twigs** stoutish, usually white-woolly; in a variety the young twigs and buds are without hairs and often with a bluish-white bloom. **Catkins** stoutish, not stalked, appearing before the leaves, 2 to 4



FIGURE 17.—Feltleaf willow (*Salix alaxensis*), one-half natural size. Male catkins at upper left; seed capsules at lower left.

inches long at maturity; scales blackish. **Seed capsules** long, pointed, white-woolly. **Bark** dark and shiny.

Feltleaf willow is a tree 20 to 30 feet or more in height, with a trunk 4 to 7 inches in diameter, also shrubby and in exposed places dwarfed and sometimes nearly prostrate. This characteristic willow is widely distributed in valleys almost throughout Alaska. Extending beyond the limits of the spruce-birch interior forest, it is the only tree willow in many areas, such as north and west of Kodiak Island. In many places in northern Alaska this willow is important as the only wood available as fuel. Though feltleaf willow is not the common "diamond-willow" from which ornamental canes are made, the trunks sometimes have this pattern of diamond-shaped scars where the lower twigs have died. This willow was first collected at Kotzebue Sound, beyond Bering Strait. The specific name *alaxensis* means Alaskan but is from an old spelling.

Range: Widely distributed and common almost throughout Alaska from the northern part of southeast Alaska to the Arctic Ocean. Southeast Alaska from Wrangell to head of Lynn Canal at Skagway, Glacier Bay, and Yakutat Bay; north through the interior to the Arctic coast and northwest to Cape Lisburne; west to Bering Sea; southwest on Alaska Peninsula and Aleutian Islands to Unalaska Island; and south to Kodiak Island, Cook Inlet, and Prince William Sound. From northern Alaska east to northwest shore of Hudson Bay and south to central British Columbia, but not reaching the United States. Also in eastern Asia.

YAKUTAT WILLOW (*Salix amplifolia* Cov.)

Other name: bigleaf willow.

Leaves oval to broadly obovate or rarely the uppermost ovate, 1½ to 3 inches long and ¾ to 2 inches wide, broadly pointed to rounded at apex, mostly rounded at base, edges without teeth or sparsely wavy-toothed, pale green above, whitish beneath, more or less hairy on both sides while unfolding but becoming hairless (fig. 18). **Twigs** stoutish, brownish, densely white- or gray-woolly for 2 or 3 years. **Catkins** on leafy stalks, appearing with the leaves, up to 2 to 4 inches long at maturity; scales brownish to blackish. **Seed capsules** long, without hairs.

Yakutat willow is a shrub or small tree usually about 10 to 16 feet tall, with a trunk 3 to 4 inches in diameter but attains a height of 25 feet and a diameter of 8 to 15 inches. This local species grows on and near the sand dunes along the shores of Yakutat Bay. Perhaps it was isolated here by ice sheets during the glacial periods.

Range: Local in the Yakutat Bay area at northern end of southeast Alaska coast. Reported farther west



FIGURE 18.—Yakutat willow (*Salix amplifolia*), three-fourths natural size. Female catkin at lower left; male catkin at lower right.

along the Pacific coast at Prince William Sound and from Copper River opposite Childs Glacier, but not known elsewhere.

LITTLETREE WILLOW (*Salix arbusculoides* Anderss.)

Leaves narrowly elliptical-lanceolate, often oblanceolate while unfolding, 1 to 3 inches long, $\frac{3}{8}$ to $\frac{3}{4}$ inch wide, usually short-pointed at both ends, with edges finely but shallowly toothed, green and hairless above, beneath whitish to white and finely silvery-hairy or in an uncommon variety hairless; veins closely parallel (fig. 19). Twigs slender, much branched, the younger yellowish brown and sometimes thinly short-hairy, the older reddish brown, hairless, and shiny. Catkins small, on very short stalks, appearing slightly before or with the leaves, 1 to 2 inches long at maturity; scales blackish. Seed capsules small, thinly silvery-hairy. Bark shiny reddish brown.

Littletree willow is an erect shrub 5 to 10 feet tall or sometimes a small tree as much as 20 to 25 feet in height and 4 inches in diameter. One of the commonest willows forming dense thickets along streams in the interior but absent from southeast Alaska.



FIGURE 19.—Littletree willow (*Salix arbusculoides*), natural size.

Range: Interior Alaska, widely distributed. From Chitina River and Mount McKinley National Park north to Porcupine, Yukon, and Koyukuk River valleys northwest to Kobuk River and southwest to Holy Cross on lower Yukon River. Alaska and Yukon south to British Columbia and Saskatchewan and east to west side of Hudson Bay and to central Quebec. Not native in the United States.

SITKA WILLOW (*Salix sitchensis* Sanson)

Other name: silky willow.

Leaves oblanceolate or narrowly obovate or sometimes elliptical, 2 to 4 inches long, usually short-pointed at apex, mostly tapering to a narrow base, edges with-

out teeth or sparsely and inconspicuously wavy-toothed, above dark green and with sparse short hairs when young, beneath paler and usually with short silvery, silky hairs or in an uncommon variety with few hairs or none (fig. 20). **Twigs** slender, sometimes thinly hairy when young but when older without hairs and



FIGURE 20.—Sitka willow (*Salix sitchensis*), three-fourths natural size. Female catkin at center right; male catkins at lower right.

dark reddish brown. **Catkins** slender, on short leafy stalks, appearing with the leaves, 2 to 4 inches long at maturity; scales small, brown. **Seed capsules** short, silvery hairy. **Bark** red brown, thin and scaly. **Wood** pale red, fine-grained, lightweight, soft.

Sitka willow is a large shrub or small tree 10 to 20 feet in height with a trunk 4 to 6 inches in diameter or rarely 30 feet tall and 12 inches in diameter. However, in exposed places it may be a low shrub or almost prostrate. The satiny sheen on the lower surface of the leaves serves to distinguish Sitka willow from other willows. This willow is fairly common in the coastal forest region of southeast Alaska, growing in sunny locations along streams and beaches or on the upland where the forest is open or absent. The wood is not

used commercially though the Indians burn it in drying fish, as the smoke has no bad odor. The supple twigs have been used by the Indians in basket making and for stretching skins, and the pounded bark has also been applied to heal wounds. Sitka willow was named for Sitka, Alaska, near which it was discovered by Dr. Karl Heinrich Mertens in 1827.

Range: Pacific coast region of southeast and southern Alaska. Throughout southeast Alaska from Ketchikan northwest to head of Lynn Canal at Skagway, Glacier Bay, and Yakutat Bay, and west to Prince William Sound, Cook Inlet, and Kodiak Island. Alaska and British Columbia south along the coast to northwestern California and east to western Montana. Also in eastern Asia.

SCOULER WILLOW (*Salix scouleriana* Barratt)

Other names: mountain willow, black willow.

Leaves very variable, mostly oblanceolate to narrowly obovate or sometimes oblong or elliptical, 2 to 4 or 5 inches long and $\frac{1}{2}$ to $1\frac{1}{2}$ inches wide, mostly very short-pointed at apex and tapering to base, edges with-

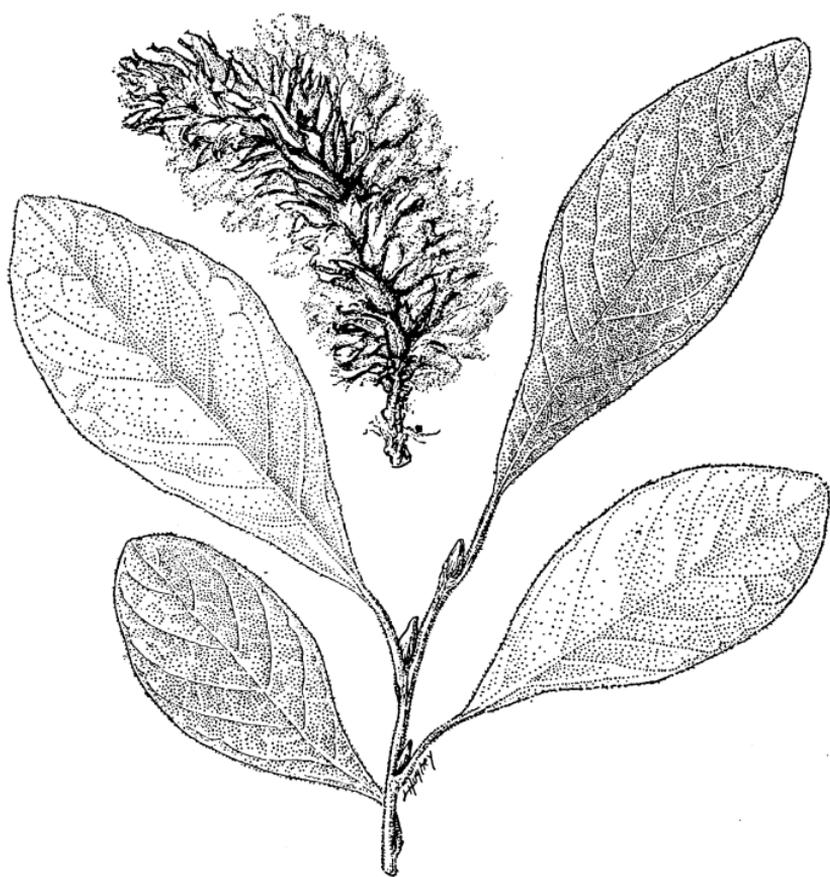


FIGURE 21.—Scouler willow (*Salix scouleriana*), natural size.

out teeth to sparsely wavy-toothed, dark green and nearly without hairs above, beneath whitish to white and more or less white or gray hairy or furry, or becoming rusty hairy when older (fig. 21). **Twigs** stoutish, yellowish and densely hairy when young; reddish to dark brown and nearly hairless when older. **Catkins** stoutish, stalkless or on very short stalks, appearing before the leaves, at maturity 1 to 2 inches long and dense; scales obovate, black. **Seed capsules** long, slender, gray-woolly. **Bark** dark brown, thin, divided into broad flat ridges. **Wood** light brown tinged with red and with thick whitish sapwood, fine-grained, lightweight, soft.

Scouler willow is a shrub or small tree with compact rounded crown and becoming 15 feet tall and 4 inches in diameter. It is often called "fire willow" because of its rapid occupation of burned areas.

Range: Pacific coast region of southeast and southern Alaska. From the southern end of southeast Alaska northwest to head of Lynn Canal at Skagway, Glacier Bay, and Yakutat Bay. Southern coast from Cook Inlet north to Talkeetna and Mount McKinley National Park, and west to Takotna, Katmai, and Kodiak Island. Also in the upper and central Yukon River districts of Yukon Territory, Canada, north to Dawson. East to Saskatchewan, south to Black Hills, New Mexico, and California.

BEBB WILLOW (*Salix bebbiana* Sarg.)

Other names: beak willow; *S. rostrata* Richards.

Leaves elliptical and pointed at both ends to broadly oblanceolate or obovate-oval and very short-pointed at apex and broad at base, 1 to 2½ or 3½ inches long and ¾ to 1 inch wide, edges without teeth or somewhat wavy, dull green above, gray or whitish and roughly net-veined beneath, more or less hairy on both sides but becoming less hairy with age (fig. 22). In an uncommon variety the smaller leaves are hairless or nearly so beneath and often less rough. **Twigs** slender, branching at wide angles, yellowish to brown, gray hairy when young but afterward becoming hairless. **Catkins** on short leafy stalks, appear before or with the leaves, at maturity 1 to 2 or 3 inches long and loose, scales narrow, yellowish with reddish tips, hairy. **Seed capsules** long, very slender, with short hairs on long, slender, sparsely hairy stalks. **Bark** reddish, thin and slightly fissured. **Wood** lightweight, brittle.

Bebb willow is a shrub 10 feet tall or a small, bushy tree 15 to 25 feet tall (rarely 30 feet) with a trunk diameter of 6 to 9 inches. It forms thickets along streams, swamps, and lakes. Though of little commercial importance in Alaska, it has been used for baseball bats,

charcoal, gunpowder, and withes for furniture and baskets.

Range: Widely distributed in interior Alaska, south to Pacific coast and northern end of southeast Alaska. From Glacier Bay north to Porcupine, Yukon, and Koyukuk River valleys, west on Yukon River to Holy Cross, and south to Katmai, Kodiak Island, Cook Inlet, and Prince William Sound. East across Canada to Hudson Bay, Labrador, and Newfoundland, and south in northeastern United States to New Jersey and Nebraska and in western United States to New Mexico and central California. Also in eastern Asia.



FIGURE 22.—Bebb willow (*Salix bebbiana*), three-fourths natural size. Male catkin at upper right.

Two species of Alaskan shrubby willows are mentioned here because southward they become small trees.

Sandbar willow (*Salix interior* Rowlee; syn. *S. longifolia* Muhl., not Lam.), a shrub 10 to 12 feet tall in Alaska, has long and very narrow, light green leaves $1\frac{1}{2}$ to 4 inches long and less than $\frac{1}{4}$ inch wide, with few small teeth along the edges; seed capsules smooth or hairy. In the United States it is usually a small tree about 20 feet tall but attains a maximum height of 70 feet with trunk diameter of 2 feet. Found in central interior Alaska in Yukon, Porcupine, and Tanana River Valleys and from Alaska and Yukon across Canada to New Brunswick, south across the United States to Virginia, Louisiana, New Mexico, and northern Mexico.

Serviceberry willow (*Salix pseudomonticola* Ball; park willow), so named because the leaves suggest those of serviceberry, is a shrub 3 to 10 feet tall in Alaska but

becomes a small tree in Saskatchewan. The leaves are oval or elliptical, 1 to 3 inches long, usually short-pointed, finely glandular toothed, yellowish red when young, shiny green and smooth above, pale and smooth beneath; seed capsules smooth. Central interior Alaska on Yukon and Tanana Rivers, southeast to Copper River, and at Skagway near northern end of southeast Alaska. Alaska and Yukon south to Saskatchewan, Black Hills, Colorado, and Oregon.

BIRCH FAMILY (Betulaceae)

The Alaska tree representatives of the birch family (Betulaceae), birches (genus *Betula*) and alders (genus *Alnus*), have the following distinguishing characteristics: (1) The broad leaves, borne singly (alternate) on the twigs, are sharply toothed, usually doubly toothed with teeth of two sizes, and in alders usually slightly lobed; (2) the twigs have no terminal buds at the tip; (3) the flowers are of two kinds on the same tree in early spring; (4) the male flowers with pollen are in long, narrow catkins at the end of the twig, usually partly formed the preceding summer; and (5) the female flowers in short clusters farther down the twig develop into cones $\frac{1}{2}$ to 2 inches long.

The tree birches of Alaska are easily recognized by their smooth, thin, creamy white, reddish, or brown bark which peels off in papery strips. Alders generally have smooth gray bark, which is not papery, and usually have at all seasons some old, dead, hard, blackish cones remaining on the twigs. Alaska has three species of tree alders, red alder, thinleaf alder, and Sitka alder, and a fourth, low shrubby species, American green alder.

BIRCHES (*Betula*)

The birches of Alaska are variable and intergrade and hybridize with one another wherever their ranges meet. Three closely related kinds of paper birches occur in geographically separated regions of Alaska. Some authors interpret them as geographical varieties of a single transcontinental species of paper birch, while others regard them as separate species. Two species of dwarf, shrubby birches are widely distributed in Alaska and hybridize with the tree birches to produce intermediate forms, some of which are of tree size.

In this guide the tree birches of Alaska are treated as a single species, paper birch (*Betula papyrifera* Marsh.), represented by three geographical varieties: western paper birch (var. *commutata* (Reg.) Fern.), of southeast Alaska, with leaves rounded at base and usually reddish brown bark; Alaska paper birch (var.

humilis (Reg.) Fern. & Raup), of interior forests south to Pacific coast, with rather long-pointed leaves usually wedge-shaped at base and usually with whitish bark; and Kenai birch (var. *kenaica* (W. H. Evans) Henry), of southern and interior Alaska, with relatively thick, usually short-pointed leaves and usually dark brown bark.

PAPER BIRCH (*Betula papyrifera* Marsh.)

Other names: white birch, canoe birch.

The general description and range of this species are summarized here, followed by similar notes for the three varieties occurring in Alaska. **Leaves** ovate, 2 to 4 inches long, long-pointed, wedge-shaped or rounded at base, coarsely and usually doubly toothed, dull dark green and smooth above, light yellow green and smooth or slightly hairy beneath. Young **twigs** reddish brown with many small whitish spots. Male and female **flowers** on the same twig in early spring. Male flowers in narrow catkins partly developed the preceding summer, 3½ to 4 inches long; female flowers in clusters 1 inch long. Fruiting **cones** narrow, 1 to 2 inches long and ⅜ inch wide, slender-stalked and hanging down. **Bark** smooth, thin and papery, creamy white (or reddish or brown in varieties), separating into papery strips and peeling off; inner bark orange. **Wood** of light reddish brown heartwood and whitish sapwood, of fine texture, moderately heavy and moderately hard.

Paper birch is a slow-growing hardwood tree usually 30 to 50 feet tall and 6 to 12 inches in diameter but becoming larger. It is the most important of the few native hardwoods. Near cities of interior Alaska, paper birch has been an important source of fuel. The wood has been used locally for mine props also. Tests indicate that it is satisfactory for furniture, cabinet-making, veneer, handles, boxes and crates, clothes pins, shoe pegs, spools, and bobbins. In the United States paper birch is used for spools and other turned articles, toothpicks, and toys. The bark was used by northern Indians for canoes and various small articles.

Range: Widespread across northern North America from Alaska east across Canada to Labrador and Newfoundland, south in northeastern United States to Pennsylvania, North Carolina (high mountains), and Minnesota and in northwestern United States to Black Hills, Colorado (one locality), and Oregon.

ALASKA PAPER BIRCH (*Betula papyrifera* Marsh. var. *humilis* (Reg.) Fern. & Raup)

Other names: *B. papyrifera* var. *occidentalis* auth., *B. papyrifera* subsp. *occidentalis* auth., not *B. occidentalis* Hook.

Leaves ovate, 3 to 4 inches long, long-pointed, rounded at base, coarsely and doubly toothed with unequal teeth, dark green above, beneath pale yellow green with angles of veins hairy (fig. 23). **Leafstalks** slightly hairy and glandular. **Young twigs** with few hairs and slightly resinous, becoming smooth and orange brown. **Male flower** catkins 3 to 4 inches long, narrow. **Fruiting cones** 1 to 1½ inches long, finely hairy, spreading. **Bark** usually reddish brown, or whitish, papery and peeling off.



FIGURE 23.—Western paper birch (*Betula papyrifera* var. *commutata*), three-fourths natural size.

WESTERN PAPER BIRCH (*Betula papyrifera* Marsh. var. *commutata* (Reg.) Fern.)

Western paper birch is found along the mainland coastal river drainages and lakes in the northern part of southeast Alaska, separated from the other Alaska tree birches. It is a tree 8 inches or more in diameter.

Range: Northern part of southeast Alaska in vicinity of Lynn Canal, from Juneau to Skagway. East to Mackenzie and Saskatchewan and south to Montana and Oregon and also in the East from Labrador to Massachusetts.

Other names: Alaska white birch, Alaska birch, canoe birch; *B. nealaskana* Sarg., *B. papyrifera* var. *nealaskana* (Sarg.) Raup, *B. resinifera* auth., not (Reg.) Britton.

Leaves ovate, $1\frac{1}{4}$ to $2\frac{1}{2}$ inches long, rather long-pointed, sharply to broadly wedge-shaped at base, coarsely toothed, yellow green and smooth above, beneath pale yellow green, dotted with glands and usually with angles of lower veins hairy (fig. 24). **Leafstalks** smooth. **Twigs** with conspicuous resinous spots.



FIGURE 24.—Alaska paper birch (*Betula papyrifera* var. *humilis*), three-fourths natural size.

Male flower catkins 1 inch long, thick, greenish brown. **Fruiting cones** 1 to $1\frac{1}{4}$ inch long, smooth, hanging down or spreading. **Bark** whitish or sometimes reddish, papery and peeling off. The heartwood is light reddish brown and the sapwood white. **Wood** of fine and even texture, moderately heavy (the densest of Alaska commercial woods), moderately hard.

Alaska paper birch, the variety of birch common throughout the spruce-birch interior forests, is a tree usually 30 to 50 feet tall and 6 to 12 inches in trunk diameter, with a maximum of 75 feet in height and 2 feet in diameter. It is found near streams and on warm slopes with moist porous soils, generally in mixture with white spruce and other trees. The most important birch forests in Alaska are at Cook Inlet, where the

interior forest reaches the coast. Here paper birch has its best development on the rolling benchlands and lower foothill slopes up to an elevation of about 800 feet, becoming 60 to 70 feet tall and 10 to 14 inches or occasionally 24 inches in trunk diameter, though it averages about 9 inches. Paper birch has been used for ornamental and street planting in Alaska.

Range: Common in spruce-birch interior forest almost throughout the interior of Alaska but not in southeast Alaska. From the eastern border north and west to the limits of trees, north to central Yukon River district to Wiseman, west to Bering Sea at Unalakleet and south to the Pacific coast at Cook Inlet and Kenai Peninsula. In central and southern Alaska it intergrades with Kenai birch. Alaska, Yukon, and Mackenzie, south to Saskatchewan and British Columbia.

KENAI BIRCH (*Betula papyrifera* Marsh. var. *kenaica* (W. H. Evans) Henry)

Other names: Kenai paper birch, black birch, red birch; *B. kenaica* W. H. Evans.

Leaves ovate, 1½ to 2 inches long, relatively thick, usually short-pointed, broadly wedge-shaped or rounded at base, coarsely and often doubly toothed, dark green and often slightly hairy above, beneath pale yellow green and dotted with glands, the leaf edges with long white hairs (fig. 25). **Leafstalks** usually smooth. Young **twigs** reddish brown and resinous spotted. Male **flower** catkins 1 inch long, narrow, dark brown. Fruiting **cones** about 1 inch long, smooth, not hanging down. **Bark** usually dark brown, or grayish white, papery and peeling off.

Kenai birch, named from Kenai Peninsula, is a tree 30 to 45 feet tall and 6 to 12 inches, occasionally 18 inches, in trunk diameter. It is found in the southern portion of the spruce-birch interior forests.

Range: Southern and interior Alaska but not in southeast Alaska. Kenai Peninsula, Cook Inlet, Kodiak Island, and Katmai, west to Bering Sea (Nushagak, Unalakleet, and Kuzitrin River), and north to central Yukon River and Tanana River. This variety is restricted to Alaska. In central and southern Alaska where the ranges of Kenai birch and Alaska paper birch overlap, intermediate trees are common.

The two Alaska species of shrubby or dwarf birches, mentioned below, hybridize with the tree birches as well as each other. The dwarf birches have round, rounded-toothed leaves less than ¾ inch long.

Resin birch (*Betula glandulosa* Michx.; glandular scrub birch, bog birch), a shrub 1½ to 5 feet tall, has small, nearly round leaves ¾ to ¾ inch long, longer than broad and wedge-shaped and toothless at base, and the

twigs densely resinous and with a gray layer of wax. Interior of Alaska, widely distributed. East to Labrador and Greenland, south in northeastern United States to New York and Michigan and in western mountains to Colorado and California.

Dwarf arctic birch (*Betula nana* L.; dwarf alpine birch, *B. nana* subsp. *exilis* (Sukatch.) Hult.), a smaller shrub usually $\frac{1}{2}$ to 3 feet tall, has small, rounded leaves



FIGURE 25.—Kenai birch (*Betula papyrifera* var. *kenaica*), three-fourths natural size.

less than $\frac{1}{2}$ inch long, often broader than long, straight or rounded at base, and twigs slightly resinous and slightly hairy. Very widespread in Alaska over the coasts and in mountains of interior from northern part of southeast Alaska to western end of Alaska Peninsula and Bering Sea, north to Arctic coast. Arctic regions across northern Canada to Labrador and Greenland and in northern Europe and Asia. Not reaching the United States.

As the various hybrid birches have characteristics intermediate between those of their parents growing nearby, additional descriptions are unnecessary here. The tree birches now interpreted as hybrids of Alaska paper birch with the two species of dwarf birches were originally described as distinct tree species and are

named as follows: \times *Betula eastwoodae* Sarg. (*B. glandulosa* \times *B. papyrifera* var. *humilis*; syn. *B. commixta* Sarg.) and \times *Betula beeniana* A. Nels. (*B. nana* \times *B. papyrifera* var. *humilis*). Reports of water birch (*Betula occidentalis* Hook.; syn. *B. fontinalis* Sarg.) from Alaska probably refer to the first cross above. The hybrid of Kenai birch with dwarf arctic birch, first described as a shrubby species 3 to 6 feet tall but sometimes becoming a small tree 10 to 15 feet in height, is named \times *Betula hornei* Butler (*B. nana* \times *B. papyrifera* var. *kenaica*). The bark of these hybrids is like that of the tree parent but does not peel off.

RED ALDER (*Alnus rubra* Bong.)

Other names: western alder; *A. oregona* Nutt.

Leaves ovate or elliptical, 3 to 5 inches long, short-pointed, both coarsely and finely toothed, shallowly lobed, dark green and nearly smooth above, pale beneath with rusty hairs along the veins, the leaf edges curled under slightly (fig. 26). **Young twigs** slightly hairy,



FIGURE 26.—Red alder (*Alnus rubra*), three-fourths natural size.

becoming dark red with light dots. **Buds** dark red, covered with scaly down. **Male flowers** in narrow catkins 4 to 6 inches long, in early spring, partly developed the preceding summer; female flower clusters less than

$\frac{1}{2}$ inch long, developing into hard **cones** $\frac{1}{2}$ to 1 inch long, which mature and scatter the narrow-winged nutlets ("seeds") in late fall and early spring. **Bark** ashy, splotched white in places, smooth and thin. **Wood** nearly white when freshly cut, soon turning to light reddish brown, of fine and even texture, moderately lightweight, soft.

Red alder is a tree 35 to 40 feet tall with a straight trunk to 16 inches in diameter. It is common throughout southeast Alaska on stream bottoms with rich, rocky, moist soils and along beaches where creeks enter the sea. On landslides it forms almost impenetrable thickets. Of little economic importance in Alaska, red alder is the leading hardwood in the Pacific Northwest States, where it is made into furniture. The Indians use it in smoking meat and fish and for wood carving.

Range: Throughout southeast Alaska northwest to Yakutat Bay. South along the Pacific coast from Alaska and British Columbia to southern California.

THINLEAF ALDER (*Alnus tenuifolia* Nutt.)

Other name: *A. incana* auth.

Leaves ovate or elliptical, $1\frac{1}{2}$ to 4 inches long, short-pointed, rounded at base, shallowly lobed and both coarsely and finely toothed, dull dark green and smooth



FIGURE 27.—Thinleaf alder (*Alnus tenuifolia*), three-fourths natural size.

above, pale green and hairy or nearly smooth beneath (fig. 27). Young twigs gray or reddish. Male flowers in narrow catkins $1\frac{1}{2}$ to 3 inches long. Cones $\frac{3}{8}$ to $\frac{1}{2}$ inch long, the nutlets ("seeds") without wings. Bark grayish on young trees but becoming reddish brown, thin and scaly. Wood light brown.

Thinleaf alder is a large shrub or small tree up to 30 feet in height and 8 inches in trunk diameter. With the larger willows it commonly forms thickets along streams. By some authors this alder is included in *Alnus incana* (L.) Moench, a closely related species of Europe and Asia.

Range: From northern end of southeast Alaska to southern and central Alaska. From vicinity of Juneau and Glacier Bay west along the coast to Katmai and north to Fort Yukon and Fort Gibbon in central Yukon River district. Alaska and Yukon east to Saskatchewan, south to New Mexico, California, and Lower California, Mexico.

SITKA ALDER (*Alnus sinuata* (Reg.) Rydb.)

Other names: *Alnus crispa* (Ait.) Pursh subsp. *sinuata* (Reg.) Hult.; *A. fruticosa* Rupr. var. *sinuata* (Reg.) Hult., *A. sitchensis* (Reg.) Sarg., *A. fruticosa* auth.

Leaves ovate, $2\frac{1}{2}$ to 5 inches long, short-pointed, the edges with many shallow, wavy lobes and both coarsely and finely toothed with long-pointed teeth, sticky when young, speckled yellow green and shiny above, beneath lighter, shiny, and smooth (fig. 28). Young twigs slightly hairy and with resinous specks, orange brown and shiny. Male flowers in narrow catkins 3 to 5 inches long. Cones several in a cluster, long-stalked, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, the nutlets ("seeds") with 2 broad wings. Bark dark blue gray, smooth and thin.

Sitka alder is a spreading shrub 4 to 6 feet tall, forming dense thickets from sea beaches to timber line but sometimes 30 feet or more in height and as much as 8 inches in trunk diameter. Although tolerant of shade in early life, toward maturity it thrives with overhead light. The wood produces good fuel and charcoal, and the larger trees furnish lumber.

Range: Southeast and southern Alaska along the Pacific coast. Throughout southeast Alaska from Ketchikan northwest to head of Lynn Canal at Skagway and Yakutat Bay, west along the coast to Kodiak Island, Alaska Peninsula, and eastern Aleutian Islands; also on Bering Sea (Nushagak and Nome). Intergrades with American green alder (*Alnus crispa* (Ait.) Pursh), a shrubby species, especially northward in interior. Alaska and Yukon southeast to Alberta

and western Montana, Oregon, and northern California. Also in eastern Asia.

The only other Alaska species of alder is a shrub closely related to Sitka alder:

American green alder (*Alnus crispa* (Ait.) Pursh; green alder), a low spreading shrub less than 2 feet tall or becoming larger, has ovate or broadly elliptical



FIGURE 28.—Sitka alder (*Alnus sinuata*), three-fourths natural size.

leaves $1\frac{1}{2}$ to 3 inches long, short-pointed, sharply and finely toothed with long-pointed teeth and with the leaf edges even and not lobed. Interior of central and northern Alaska, widely distributed. North to Porcupine, Yukon, and Koyukuk Rivers and west to Bering Strait. Toward the southern coast it intergrades with Sitka alder. Alaska and Yukon across Canada to Labrador, Newfoundland, and Greenland, south to New

York, North Carolina (high mountains), Michigan, and Oregon. Also across northern Europe and Asia.

ROSE FAMILY (Rosaceae)

The rose family (Rosaceae) has about 60 species native in Alaska, nearly all of which are herbs or low shrubs, with only 3 native genera and species and 1 naturalized species of small trees. These trees, all members of the apple subfamily, are distinguished by the following: (1) The leaves are toothed and borne singly (alternate) on the twigs, in mountain-ash compound with 7 to 17 leaflets; (2) the flowers are showy and usually white, either large or, if small, many in a cluster; and (3) the fruits, $\frac{3}{8}$ to $\frac{3}{4}$ inch in diameter, are juicy or mealy and resemble small apples.

The serviceberries (genus *Amelanchier*), represented in Alaska by Pacific serviceberry and the shrub, Saskatoon serviceberry, have the leaves rounded at apex and purplish, sweet and juicy fruits, known as serviceberries. Oregon crab apple (genus *Malus*), has pointed leaves, sometimes 3-lobed, and yellow or red, acid crab apples as fruits. The mountain-ashes (genus *Sorbus*), represented by Sitka mountain-ash, the naturalized European mountain-ash, and two shrubby species, have compound leaves composed of 7 to 17 leaflets and clusters of many small flowers and reddish, berrylike fruits.

PACIFIC SERVICEBERRY (*Amelanchier florida* Lindl.)

Other names: western serviceberry, June-berry.

Leaves oval or oblong, 1 to 2 inches long, rounded at apex and base, coarsely toothed above middle, dark green and becoming smooth above, pale green and smooth or slightly hairy beneath (fig. 29). **Young twigs** reddish brown. **Flowers** about 1 inch across, white, fragrant, several in a cluster, in June. **Fruit** round, $\frac{3}{8}$ to $\frac{1}{2}$ inch in diameter, smooth and covered with a bloom, purple, sweet and juicy, edible, ripening in August or September. **Bark** brown or gray, thin, smooth or slightly fissured. **Wood** light brown, fine-grained, heavy, hard.

A shrub or small tree to 16 feet tall and 5 inches in trunk diameter, occurring in open stream banks and meadows. The sweet fruits were eaten fresh or dried by the Indians and are sought by birds.

Range: Pacific coast of southeast and southern Alaska from Hyder to Chilkat River at head of Lynn Canal and west to Cook Inlet and Katmai region on Alaska Peninsula. Alaska and British Columbia south along the coast to northwestern California.

Saskatoon serviceberry (*Amelanchier alnifolia* Nutt., northwestern serviceberry), the only other

serviceberry native in Alaska, is a shrub 6 feet or less in height, though it becomes a small tree southward. It has nearly round, thick, firm leaves 1 to 1½ inches long and smaller flowers about ½ inch broad. Interior Alaska from Chitina River and head of Cook Inlet north to central Yukon River; also at Chilkat River at northern end of southeast Alaska. Yukon and British Columbia east and south to Manitoba, Nebraska, Colorado, and Oregon.



FIGURE 29.—Pacific serviceberry (*Amelanchier florida*), natural size.

OREGON CRAB APPLE (*Malus diversifolia* (Bong.) Roem.)

Other names: western crab apple, wild crab apple; *M. fusca* (Raf.) Schneid., *M. rivularis* (Dougl.) Roem., *Pyrus diversifolia* Bong.

Leaves ovate or elliptical or lance-shaped, 1½ to 4 inches long, short-pointed, sharply toothed and sometimes slightly 3-lobed, shiny green and becoming smooth above, beneath pale and usually slightly hairy (fig. 30). **Twigs** hairy when young, becoming red and shiny and later brown or gray, stiff and almost thorny. **Flowers** ¾ inch broad, white or pink, several in a cluster, in June. **Fruit** oblong, about ½ inch long, yellow or red, acid, suggesting a miniature domestic apple, ripening in September or October. **Bark** red gray, thin and scaly. **Wood** light brown, fine-grained, heavy, hard.

Oregon crab apple is a slow-growing, much branched, small tree rarely more than 20 feet tall or usually a shrub forming dense thickets. It is scattered to plentiful on low slopes, river bottoms, beach fringes, and heavy wet soils along the Pacific coast. Where the

trees are not too stunted to be of economic use, the wood is suitable for tool handles. The crab apples were eaten by the Indians and are used in jellies and preserves.

Range: Pacific coast of southeast and southern Alaska. From Ketchikan and Hyder north to Lynn Canal and west to Prince William Sound. Southward along the coast to northern California.



FIGURE 30.—Oregon crab apple (*Malus diversifolia*), one-half natural size.

Black hawthorn (*Crataegus douglasii* Lindl.) has been collected as a shrub at Hyder, on the boundary with British Columbia near the lower end of southeast Alaska. It becomes a small tree 25 to 40 feet tall elsewhere in its range from British Columbia east to Montana and Wyoming (also in Michigan and Ontario), south to northern California. Leaves obovate to ovate, 1 to 3 inches long, broadest toward the short-pointed apex, base wedge-shaped, sharply toothed and often slightly lobed; the reddish twigs often with stout spines; the white flowers $\frac{3}{8}$ inch broad, several in a cluster; the black fruits round, $\frac{1}{2}$ inch or less in diameter, sweetish and mealy but somewhat insipid.

SITKA MOUNTAIN-ASH (*Sorbus sitchensis* Roem.)

Other names: western mountain-ash, Pacific mountain-ash; *S. americana sitchensis* (Roem.) Sudw.

Leaves compound, 4 to 8 inches long (fig. 31). **Leaflets** usually 9 or 11 (sometimes 7 or 13), oval or oblong, $1\frac{1}{4}$ to $2\frac{1}{2}$ inches long, rounded or slightly pointed at apex, with edges coarsely and sharply toothed above the middle, dull blue green and smooth above, pale and smooth or nearly so beneath. **Young twigs** and winter buds rusty-hairy. **Flowers** small, $\frac{1}{4}$ inch across, white,

15 to 60 in a cluster 2 to 4 inches broad. **Fruit** rounded and berrylike, $\frac{3}{8}$ to $\frac{1}{2}$ inch in diameter, red but becoming orange and purple, ripening in early fall, the showy clusters remaining attached in winter. **Wood** pale brown, fine-grained, lightweight.

Sitka mountain-ash is a shrub or small tree as much as 15 to 20 feet in height and 5 inches in diameter, with a handsome, round-topped head. In rocky alpine situa-

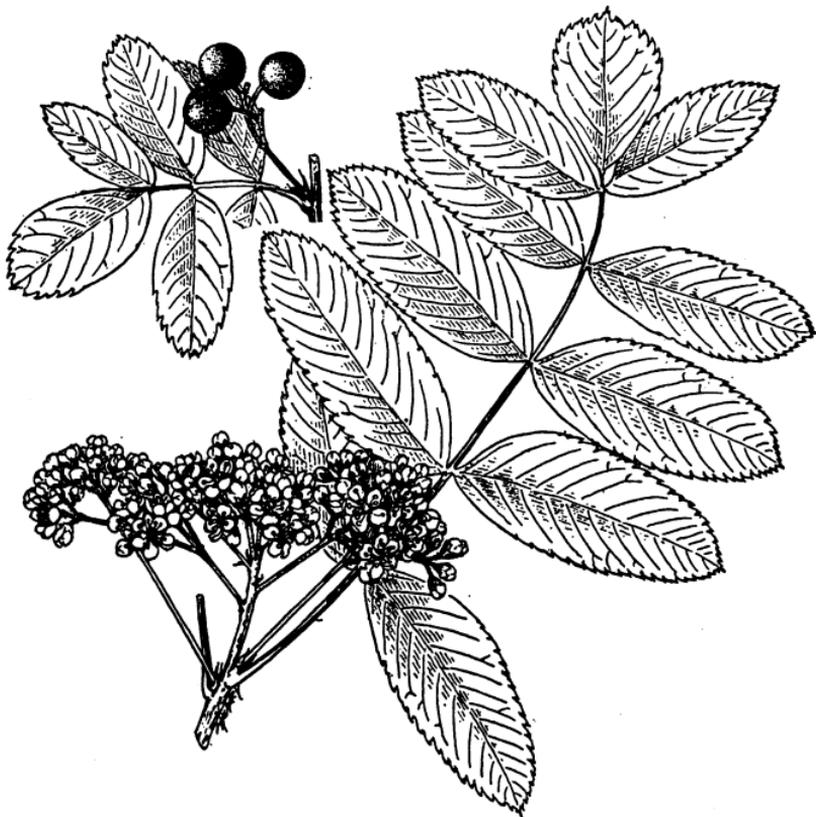


FIGURE 31.—Sitka mountain-ash (*Sorbus sitchensis*), one-half natural size.

tions at higher elevations it is a low shrub often only 1 to 2 feet tall. It occurs sparingly in southeast Alaska but is often cultivated as an ornamental. This species can be distinguished easily from European mountain-ash by its leaflets, which are toothed only above the middle (or slightly below), somewhat rounded at the apex, and fewer in number. Also, the fruits are slightly larger and in narrower clusters. The form of the tree is usually less regular than that of European mountain-ash. Birds eat the fruits. Sitka mountain-ash is named for Sitka, Alaska, where it was discovered.

Range: Pacific coast of southeast and southern Alaska. Throughout southeast Alaska from Ketchikan and Hyder northwest to head of Lynn Canal at Skagway, Glacier Bay, and Yakutat Bay, west along the

coast to Prince William Sound, Cook Inlet, and Katmai region. Alaska and Yukon southeast to southern British Columbia, Alberta, northwestern Montana, and northern Idaho.

EUROPEAN MOUNTAIN-ASH (*Sorbus aucuparia* L.)

Other name: Rowan-tree.

Leaves compound, 4 to 8 inches long (fig. 32). **Leaflets** 9 to 17, oblong or lance-shaped, 1 to 2 inches long, short-pointed, with edges coarsely toothed except near



FIGURE 32.—European mountain-ash (*Sorbus aucuparia*), one-half natural size.

base, dull green and becoming smooth above, pale and whitish hairy beneath. Young **twigs** and winter buds densely white-hairy or woolly. **Flowers** $\frac{3}{8}$ inch across, white, 75 to 100 in a cluster, 4 to 6 inches broad. **Fruit** round and berrylike, $\frac{3}{8}$ inch in diameter, bright red, ripening in August in Alaska. **Bark** smooth and aromatic.

European mountain-ash is a symmetrical, round-headed tree 20 to 45 feet tall. It is planted as an ornamental tree in the towns along the coast of southeast Alaska, where it spreads rapidly from cultivation and is sparingly naturalized. Not a true ash, European mountain-ash is the only exotic tree to become estab-

lished in Alaska and grow as if wild. Its specific name refers to the use of the fruits by fowlers in making bird lime.

Range: Naturalized in southeast Alaska, where it is planted as an ornamental tree. Native of Europe and Asia but widely planted and naturalized in many places across Canada and northern United States.

Two other, shrubby species of mountain-ash are native in Alaska:

Greene mountain-ash (*Sorbus scopulina* Greene; western mountain-ash; syns. *S. alaskana* G. N. Jones, not Hollick, *S. andersonii* G. N. Jones), a shrub 3 to 13 feet tall, has 11 to 15 shiny, short-pointed, oblong or lance-shaped leaflets toothed almost to base, and the young twigs and winter buds are more or less white-hairy. Found in southeast and southern Alaska west to Katmai, north in interior to central Yukon River and westward to Bering Sea. Alaska and British Columbia southeast to Alberta, South Dakota, New Mexico, and California.

Siberian mountain-ash (*Sorbus sambucifolia* (Cham. & Schlecht.) Roem.), an Asiatic shrub 6 feet or less in height, occurs also on a few of the westernmost Aleutian Islands. It has 7 to 11 shiny, long-pointed, lance-shaped leaflets broadest at base and toothed almost to base and the young twigs and winter buds rusty-hairy.

MAPLE FAMILY (Aceraceae)

The maple family is represented in Alaska by Douglas maple in the southeast part, though a second species formerly was reported also. Maples have the following characteristics for recognition: (1) The broad, long-stalked leaves are paired (opposite), 3-lobed or 5-lobed, and toothed; (2) the flowers, male and female on the same or different trees, are small and yellow, in clusters appearing with the leaves; and (3) the fruits are paired, winged, 1-seeded keys. In winter the paired (opposite), U-shaped leaf scars aid in identification.

DOUGLAS MAPLE (*Acer glabrum* Torr. var. *douglasii* (Hook.) Dipp.)

Other names: dwarf maple, *A. douglasii* Hook.; variety of Rocky Mountain maple, *A. glabrum* Torr.

Leaves paired (opposite), slightly heart-shaped or ovate, 2 to 4 inches long and broad, 3-lobed with the lobes long-pointed, deeply, sharply, and irregularly toothed, dark shiny green and smooth above, pale beneath with yellowish veins (fig. 33). **Leafstalks** 1½ to 4 inches long, reddish tinged. **Twigs** and buds reddish, smooth. Male and female **flowers** on separate

plants, $\frac{1}{8}$ inch long, greenish yellow, several in a cluster, appearing with the leaves. **Fruit** of paired, winged, 1-seeded keys $\frac{3}{4}$ to 1 inch long, usually red until shed, then turning to light brown. **Bark** reddish brown, smooth. **Wood** light brown, fine-grained, heavy, hard.

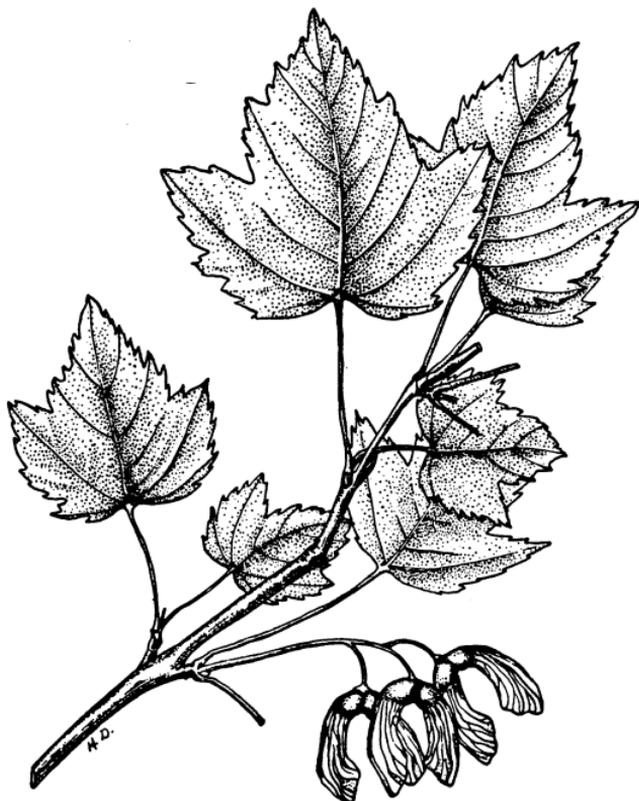


FIGURE 33.—Douglas maple (*Acer glabrum* var. *douglasii*), one-half natural size.

Douglas maple is sometimes a tree 20 to 30 feet tall and 6 to 12 inches in trunk diameter but more often a shrub 4 to 6 feet tall. It is occasional in rich moist soils on forested slopes. The trees are seldom large enough for commercial purposes.

Range: Southeast Alaska, common all along the coast north to the head of Lynn Canal at Skagway. Alaska east to British Columbia and Alberta, south to Wyoming and Oregon. Rocky Mountain maple (*Acer glabrum* Torr., including this and other varieties) extends southward to Nebraska, New Mexico, and California.

Bigleaf maple (*Acer macrophyllum* Pursh), which is omitted in this revision, has been reported to extend north to the southern end of southeast Alaska and is listed from Alaska in a few references. This species, the only large tree maple in the Pacific region, ranges from western British Columbia south along the coast

to southern California. However, in the absence of specimens and definite locality records, the occurrence of bigleaf maple in Alaska remains doubtful. Any specimens confirming these reports would be especially welcome. Bigleaf maple is readily distinguished by the paired (opposite) long-stalked, very large leaves 5 to 14 inches in diameter, which are heart-shaped, deeply 5-lobed with additional smaller lobes, and with few teeth. The clustered fruits are paired, winged, 1-seeded keys $1\frac{1}{4}$ to 2 inches long and $\frac{1}{2}$ inch wide, bristly hairy at base.

DOGWOOD FAMILY (Cornaceae)

Redosier dogwood (*Cornus stolonifera* Michx.; syns. *C. stolonifera* f. *interior* (Rydb.) Rickett, *C. instolonea* A. Nels.), a common shrub 6 to 10 feet or infrequently 15 feet tall in Alaska, sometimes becomes a small tree in the United States, though usually shrubby. It has paired (opposite), elliptical or lanceolate leaves 2 to 4 inches long with smooth edges, finely hairy or smooth reddish twigs, many small white flowers in compact clusters, and white fruits $\frac{1}{4}$ inch in diameter. Southeast and interior Alaska north and west to central and lower Yukon River districts. Alaska east to Labrador and Newfoundland, south in northeastern United States to Virginia and Kansas and in western United States to New Mexico, California, and northern Mexico.

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