

PLANTS
At
CLEAR LAKE
STATE PARK

(Traditional Tribal Land)

Plants at Clear Lake SP Silverado

Group

	Family Common Name	Scientific Name
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FERNS AND ALLIES

Dennstaedtiaceae

<input type="checkbox"/>	bracken	Pteridium aquilinum var. pubescens
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Dryopteridaceae

<input type="checkbox"/>	wood fern	Dryopteris arguta
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Polypodiaceae

<input type="checkbox"/>	California polypody	Polypodium californicum
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Pteridaceae

<input type="checkbox"/>	California maiden-hair	Adiantum jordanii
<input type="checkbox"/>	coffee fern	Pellaea andromedifolia
<input type="checkbox"/>	gold-back fern	Pentagramma triangularis

GYMNOSPERMS

Cupressaceae

<input type="checkbox"/>	Gowen cypress	Cupressus goveniana
<input type="checkbox"/>	incense cedar ✓	Calocedrus decurrens

Pinaceae

<input type="checkbox"/>	bishop pine	Pinus muricata
<input type="checkbox"/>	Douglas-fir	Pseudotsuga menziesii var. menziesii
<input type="checkbox"/>	foothill pine	Pinus sabiniana
<input type="checkbox"/>	Pacific silver fir	Abies amabilis
<input type="checkbox"/>	ponderosa pine	Pinus ponderosa

DICOTS

Aceraceae

<input type="checkbox"/>	box elder ✓	Acer negundo var. californicum
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Anacardiaceae

<input type="checkbox"/>	poison oak ✓	Toxicodendron diversilobum
<input type="checkbox"/>	squawbush	Rhus trilobata

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<hr/>		
Apiaceae		
<input type="checkbox"/>	carrot ✓	Daucus carota
<input type="checkbox"/>	cow parsnip	Heracleum lanatum
<input type="checkbox"/>	Napa lomatium	Lomatium repostum
<input type="checkbox"/>	poison hemlock	Conium maculatum
<input type="checkbox"/>	purple sanicle	Sanicula bipinnatifida
<hr/>		
Apocynaceae		
<input type="checkbox"/>	greater periwinkle	Vinca major
<hr/>		
Asclepiadaceae		
<input type="checkbox"/>	California milkweed ✓	Asclepias californica
<hr/>		
Asteraceae		
<input type="checkbox"/>	biennial sagewort	Artemisia biennis
<input type="checkbox"/>	bull thistle ✓	Cirsium vulgare
<input type="checkbox"/>	California dandelion	Taraxacum californicum
<input type="checkbox"/>	Canada goldenrod	Solidago canadensis ssp. elongata
<input type="checkbox"/>	cocklebur ✓	Xanthium strumarium
<input type="checkbox"/>	common groundsel ✓	Senecio vulgaris
<input type="checkbox"/>	common spikeweed	Hemizonia pungens
<input type="checkbox"/>	common sunflower	Helianthus annuus
<input type="checkbox"/>	coyote brush	Baccharis pilularis
<input type="checkbox"/>	dog-fennel	Anthemis cotula
<input type="checkbox"/>	hayfield tarweed ✓	Hemizonia congesta
<input type="checkbox"/>	milk thistle	Silybum marianum
<input type="checkbox"/>	mugwort	Artemisia douglasiana
<input type="checkbox"/>	rosilla	Helenium puberulum
<input type="checkbox"/>	salsify	Tragopogon porrifolius
<input type="checkbox"/>	smooth mule-ears	Wyethia glabra
<input type="checkbox"/>	western thistle	Cirsium occidentale
<input type="checkbox"/>	yarrow	Achillea millefolium
<input type="checkbox"/>	yellow star-thistle ✓	Centaurea solstitialis
<hr/>		
Berberidaceae		
<input type="checkbox"/>	Cascades Oregon grape	Berberis nervosa
<input type="checkbox"/>	Oregon grape	Berberis aquifolium
<hr/>		
Betulaceae		
<input type="checkbox"/>	white alder	Alnus rhombifolia

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Boraginaceae		
—	grand hound's tongue	Cynoglossum grande
—	orange-flowered Menzies' fiddleneck	Amsinckia menziesii var. intermedia
—	rusty-haired popcorn flower	Plagiobothrys nothofulvus
Brassicaceae		
—	black mustard ✓	Brassica nigra
—	broad-leaved pepper-grass	Lepidium latifolium
—	common fringe-pod	Thysanocarpus curvipes
—	field mustard	Brassica rapa
—	slender tropidocarpum	Tropidocarpum gracile
Caprifoliaceae		
—	blue elderberry	Sambucus mexicana
—	hairy honeysuckle	Lonicera hispidula var. vacillans
—	snowberry	Symphoricarpos albus var. laevigatus
Caryophyllaceae		
—	California Indian pink	Silene californica
—	windmill pink	Silene gallica
Convolvulaceae		
—	field bindweed	Convolvulus arvensis
Cornaceae		
—	American dogwood	Cornus sericea
Cucurbitaceae		
—	coast wild-cucumber	Marah oreganus
—	wild-cucumber	Marah fabaceus
Dipsacaceae		
—	wild teasel	Dipsacus fullonum
Ericaceae		
—	big-berry manzanita	Arctostaphylos glauca
—	white-leaf manzanita	Arctostaphylos viscida

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<hr/>			
Euphorbiaceae			
		<input type="checkbox"/> turkey mullein ✓	Eremocarpus setigerus
<hr/>			
Fabaceae			
		<input type="checkbox"/> bird's-foot trefoil	Lotus corniculatus
		<input type="checkbox"/> black locust	Robinia pseudoacacia
		<input type="checkbox"/> burclover	Medicago minima
		<input type="checkbox"/> common vetch ✓	Vicia sativa ssp. nigra
		<input type="checkbox"/> miniature lupine	Lupinus bicolor
		<input type="checkbox"/> sky lupine	Lupinus nanus
		<input type="checkbox"/> spring vetch	Vicia sativa ssp. sativa
		<input type="checkbox"/> western redbud	Cercis occidentalis
		<input type="checkbox"/> white sweetclover	Melilotus alba
<hr/>			
Fagaceae			
		<input type="checkbox"/> blue oak	Quercus douglasii
		<input type="checkbox"/> California black oak	Quercus kelloggii
		<input type="checkbox"/> interior live oak	Quercus wislizenii
		<input type="checkbox"/> Valley oak ✓	Quercus lobata
<hr/>			
Geraniaceae			
		<input type="checkbox"/> cut-leaved geranium	Geranium dissectum
		<input type="checkbox"/> dove's-foot geranium	Geranium molle
		<input type="checkbox"/> red-stemmed filaree	Erodium cicutarium
<hr/>			
Hippocastanaceae			
		<input type="checkbox"/> California buckeye	Aesculus californica
<hr/>			
Hydrophyllaceae			
		<input type="checkbox"/> baby blue eyes	Nemophila menziesii
		<input type="checkbox"/> California yerba santa	Eriodictyon californicum
		<input type="checkbox"/> meadow nemophila	Nemophila pedunculata
		<input type="checkbox"/> variable-leaved nemophila	Nemophila heterophylla
<hr/>			
Juglandaceae			
		<input type="checkbox"/> Northern California black walnut	Juglans californica var. hindsii

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Common Name

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Lamiaceae

<input type="checkbox"/> common skullcap	Scutellaria tuberosa
<input type="checkbox"/> coyote mint	Monardella villosa
<input type="checkbox"/> giraffe head	Lamium amplexicaule
<input type="checkbox"/> horehound	Marrubium vulgare
<input type="checkbox"/> pitcher sage	Lepechinia calycina
<input type="checkbox"/> southern hedge-nettle	Stachys bullata

Lauraceae

<input type="checkbox"/> California bay	Umbellularia californica
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Limnanthaceae

<input type="checkbox"/> Douglas' meadowfoam	Limnanthes douglasii
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Malvaceae

<input type="checkbox"/> cheeseweed	Malva parviflora
<input type="checkbox"/> white mallow	Eremalche exilis

Oleaceae

<input type="checkbox"/> Oregon ash	Fraxinus latifolia
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Onagraceae

<input type="checkbox"/> autumn willowweed	Epilobium brachycarpum
<input type="checkbox"/> floating water-primrose ✓	Ludwigia peploides
<input type="checkbox"/> purple clarkia	Clarkia purpurea
<input type="checkbox"/> sun-cup	Camissonia ovata

Papaveraceae

<input type="checkbox"/> California poppy	Eschscholzia californica
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Platanaceae

<input type="checkbox"/> California sycamore	Platanus racemosa
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Polemoniaceae

<input type="checkbox"/> bird's eyes	Gilia tricolor
<input type="checkbox"/> showy linanthus	Linanthus androsaceus

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Polygonaceae	
<input type="checkbox"/> curly dock	Rumex crispus
<input type="checkbox"/> water smartweed ✓	Polygonum amphibium var. stipulaceum
Portulacaceae	
<input type="checkbox"/> miner's lettuce	Claytonia perfoliata
Primulaceae	
<input type="checkbox"/> mosquito bills	Dodecatheon hendersonii
<input type="checkbox"/> scarlet pimpernel	Anagallis arvensis
Ranunculaceae	
<input type="checkbox"/> California buttercup	Ranunculus californicus
<input type="checkbox"/> chaparral clematis	Clematis lasiantha
<input type="checkbox"/> red larkspur	Delphinium nudicaule
<input type="checkbox"/> western buttercup	Ranunculus occidentalis
<input type="checkbox"/> yerba de chiva	Clematis ligusticifolia
Rhamnaceae	
<input type="checkbox"/> chaparral whitethorn	Ceanothus leucodermis
<input type="checkbox"/> redberry	Rhamnus crocea
Rosaceae	
<input type="checkbox"/> birch-leaf mountain-mahogany	Cercocarpus betuloides
<input type="checkbox"/> California blackberry	Rubus ursinus
<input type="checkbox"/> California wild rose	Rosa californica
<input type="checkbox"/> chamise	Adenostoma fasciculatum
<input type="checkbox"/> Himalaya-berry	Rubus discolor
<input type="checkbox"/> Klamath plum	Prunus subcordata
<input type="checkbox"/> toyon	Heteromeles arbutifolia
Rubiaceae	
<input type="checkbox"/> California buttonbush	Cephalanthus occidentalis var. californicus
<input type="checkbox"/> common bedstraw	Galium aparine
Rutaceae	
<input type="checkbox"/> hop tree	Ptelea crenulata

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Salicaceae

—	Fremont cottonwood	Populus fremontii ssp. fremontii
—	red willow	Salix laevigata
—	sandbar willow	Salix hinsiana

Saxifragaceae

—	California saxifrage	Saxifraga californica
—	common woodland star	Lithophragma affine
—	woodland star	Lithophragma heterophyllum

Scrophulariaceae

—	bird's-eye speedwell	Veronica persica
—	butter 'n' eggs	Triphysaria eriantha
—	California figwort	Scrophularia californica
—	Chinese houses	Collinsia heterophylla
—	common mullein	Verbascum thapsus
—	foothill penstemon	Penstemon heterophyllus
—	hot-rock beardtongue	Penstemon deustus
—	Indian paintbrush	Castilleja affinis
—	Indian warrior	Pedicularis densiflora
—	moth mullein	Verbascum blattaria
—	sticky monkeyflower	Mimulus aurantiacus
—	tincture plant	Collinsia tinctoria

Simaroubaceae

—	tree-of-heaven	Ailanthus altissima
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Solanaceae

—	Indian tobacco	Nicotiana bigelovii var. wallacei
—	Indian tobacco	Nicotiana quadrivalvis
—	Jimson weed	Datura stramonium

Styracaceae

—	California snowdrop bush	Styrax officinalis var. redivivus
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Tamaricaceae

—	saltcedar	Tamarix ramosissima
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Group	Family	Common Name	Scientific Name
	Urticaceae	— Stinging Nettle	Urtica dioica
	Verbenaceae	— common lippia	Phyla nodiflora
	Viscaceae	— oak mistletoe	Phoradendron villosum
		— pine dwarf-mistletoe	Arceuthobium campylopodum
	Vitaceae	— California wild grape	Vitis californica
	Zygophyllaceae	— puncture-vine	Tribulus terrestris
MONOCOTS			
	Cyperaceae	— tule	Scirpus acutus var. acutus
	Iridaceae	— blue-eyed grass	Sisyrinchium bellum
		— long-tubed iris	Iris macrosiphon
	Liliaceae	— blue dicks	Dichelostemma capitatum
		— fairy lantern	Calochortus albus var. albus
		— golden fairy lantern	Calochortus amabilis
		— Ithuriel's spear	Triteleia laxa
		— soaproot	Chlorogalum pomeridianum
	Poaceae	— Italian rye-grass	Lolium multiflorum
		— Mediterranean beard grass	Polypogon maritimus
		— ripgut brome	Bromus diandrus
		— rye brome	Bromus secalinus
		— wild oats	Avena fatua

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Scientific Name

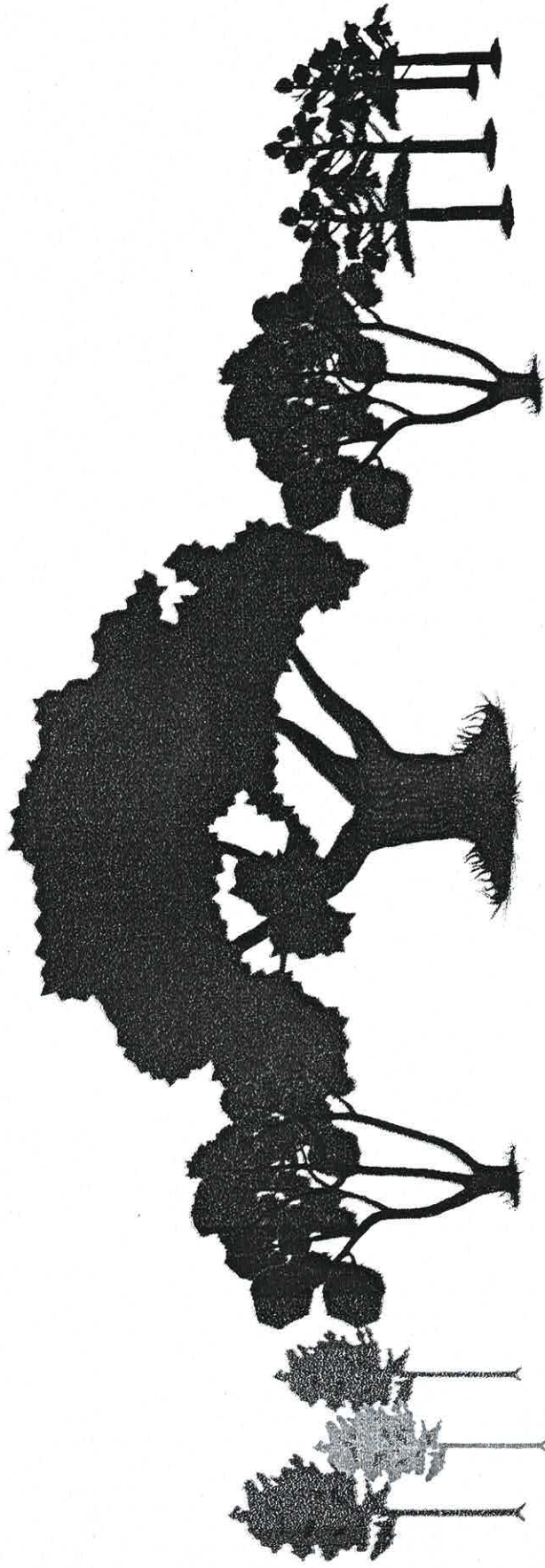
Typhaceae

— broadleaf cattail

Typha latifolia

Records for Clear Lake SP: 173

TREES OF CLEAR LAKE STATE PARK



Sources:

- Forest Trees of the Pacific Slope by George B. Sudworth
- Manual of Trees of North America by Charles Sprague Sargent
- Rocky Mountain Trees by Richard J. Preston
- Guide to Southern Trees by Ellwood S. Harrar and J. George Harrar
- Native Shrubs of the San Francisco Bay Region by Roxanna S. Ferris

Compiled by Holly Lee Palmer 2000

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White Alder.

Alnus rhombifolia Nuttall.

DISTINGUISHING CHARACTERISTICS.

The name "white alder" is not known to be used in the range of this tree, but it is proposed for the want of a distinct common name, and refers to the tree's pale greenish foliage. So far as is now known, the tree's field name is simply "alder."

Similar in general appearance to the red alder, from which it is probably not distinguished by laymen. It differs from the latter tree in having thin, conspicuously scaly, brown bark; the scaly bark extends considerably higher up on the stem than that of red alder, which is commonly unbroken and smooth. The stems are usually straight, from 50 to 75 feet high and from 18 to 24 inches in diameter, often only 30 or 40 feet high and from 8 to 12 inches in diameter. Trunks are clear of branches for about one-half to two-thirds of their length, and the crown is rather broad, open, and dome-like, with middle and lower branches which droop decidedly at their ends. Twigs of the year are smooth, with distant light-colored specks, and reddish yellow; the dull red buds are coated with light-colored, scaly down. Mature leaves are characterized by light yellow-green upper surfaces and, particularly, by their usually fine-toothed, wavy borders (figs. 115, 116), which are curled a little toward the under surface, the gland-tipped teeth, of different sizes, standing out irregularly. The toothed border, only rarely somewhat double toothed, differs greatly from the rather regularly double-toothed borders of leaves on other Pacific alders. Under surface of leaves, including the prominent yellow midveins, their branches, and the leaf stems, have very minute soft hairs. Mature cones (fig. 116) vary from about one-half to nearly seven-eighths of an inch in length. Most of them shed their mature seeds in midwinter, but a few shed them very somewhat lighter weight than that of the red alder. Its principal value is for fuel, but it is suitable for cabinet work.

LONGEVITY.—Little is known of the age limits. Trees from 12 to 15 inches in diameter are from 37 to 50 years old.

RANGE.

From northern Idaho to the eastern slope of the Cascade Mountains of Washington and southeastern Oregon, and southward through California (coast ranges, western slopes Sierra Nevada, San Bernardino, San Jacinto, and Cuyamaca mountains).

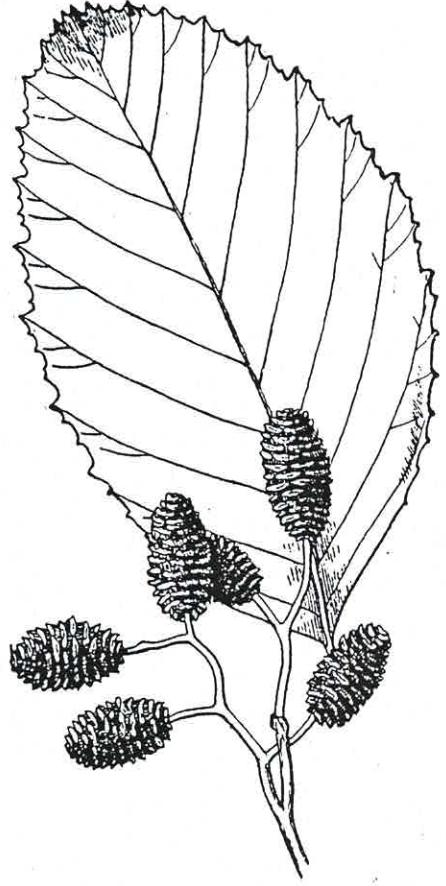
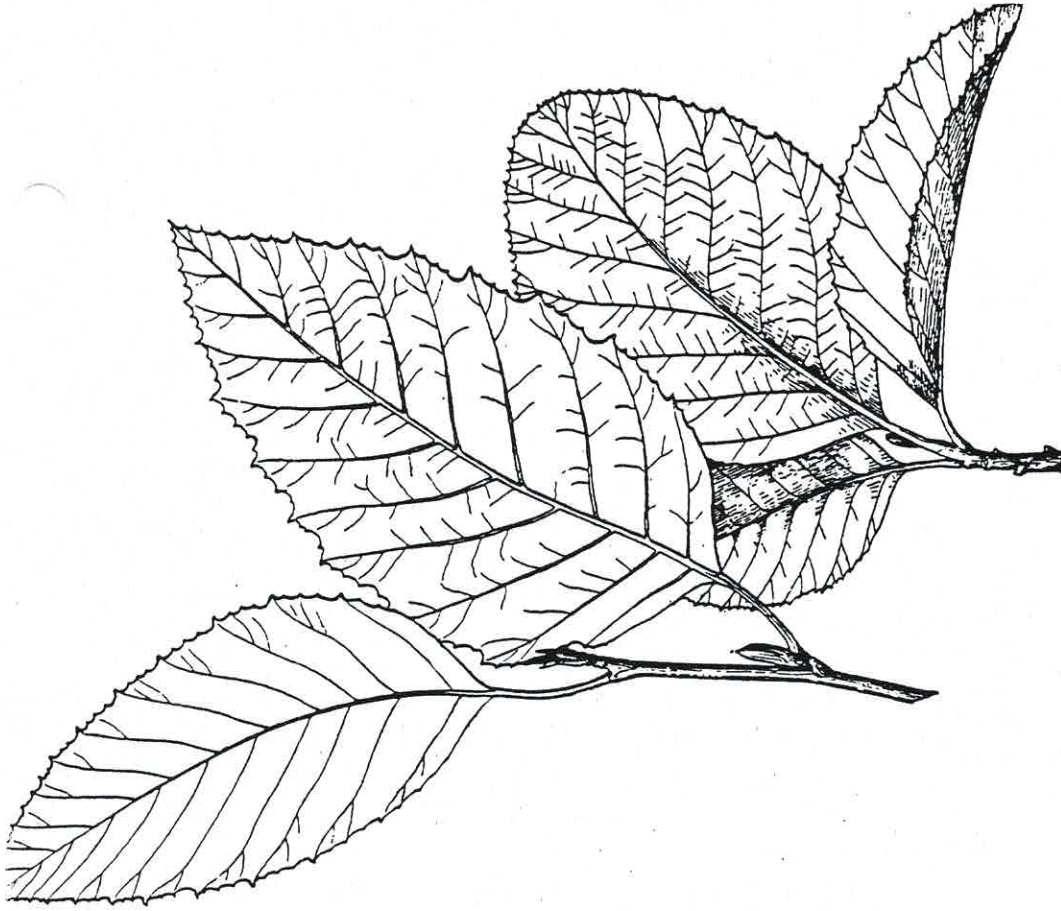
OCCURRENCE.

Canyon bottoms and borders of foothill and lower mountain streams, commonly in moist gravelly or rocky soils. Forms dense stretches, lines, and patches of pure growth, and is often mingled with California sycamore, Oregon ash, western dogwood, and, occasionally broadleaf maple.

CLIMATIC CONDITIONS.—Similar to those of Oregon ash.

TOLERANCE.—Endures great deal of shade throughout life, but requires moderate overhead light for best height growth; dense shade clears and produces long stems.

REPRODUCTION.—Abundant seeder in open stands on stream borders, where crowns are large; much less prolific in dense stands. Reproduction frequent and best in moist or wet sand, gravel, or humous soil, where seedlings grow rapidly.



Oregon Ash.

Fraxinus oregana Nuttall.

DISTINGUISHING CHARACTERISTICS.

Oregon ash, the only timber ash of the Pacific region; is recognized everywhere in its commercial range as one of the most useful hardwoods. Lumbermen call it "Oregon ash," but it is often known simply as "ash."

Forest-grown trees have long, clean trunks and narrow, short crowns of small branches, and are from 60 to 75 feet high and from 16 to 30 inches in diameter; sometimes larger. Trees on the open borders of streams have short trunks and very wide, round-topped crowns with large limbs. In drier parts of its range it is often a crooked tree under 25 feet in height and only from 6 to 8 inches through. The trunk bark, rather thick and soft on the surface, is deeply and regularly furrowed, the wide ridges connected by thinner side ones, and dull gray to grayish brown. Twigs of a season's growth are usually covered with whitish—sometimes brownish—dense, soft, fine woolly hairs, but occasionally are only very minutely hairy or even smooth, with a whitish bloom. Mature leaves (fig. 202), about 6 to 12 inches long, with from 5 to 7 thick, yellow-green leaflets, which are about 3 to 6 inches long by about seven-eighths inch to 1½ inches wide and more or less woolly or downy beneath, as are the grooved leaf stems (fig. 202). Male and female flowers, each borne on separate trees, appear as the leaves begin to come out; only the female trees bear "seed" (fig. 202), which matures in early autumn in large, full clusters. Seeds vary from about 1¼ to occasionally 2 inches in length, and the wings from one-fourth to one-third inch wide. Wood, dull yellowish brown with whitish sapwood. The wood of forest-grown trees is moderately fine-grained and rather brittle, but that of open-grown trees is coarse-grained and elastic—particularly the sapwood of young trees. Of slightly lighter weight than the eastern timber ashes, but in general appearance and quality it compares favorably with them, and is suitable for the same commercial uses for which those timbers are employed.

LONGEVITY.—Age limits of very large trees have not been determined. Trees from 16 to 25 inches in diameter (grown in the forest) are from 95 to 155 years old. The largest trees appear to grow much more slowly after the first century and probably attain 180 to 250 years before becoming decrepit.

RANGE.

From Puget Sound (shores) southward through Washington, Oregon, and California (coast region to San Francisco Bay; on foothills of Sierra Nevada Mountains to mountains of San Bernardino and San Diego counties). Also reported from the southern part of British Columbia coast.

WASHINGTON.—Western part west of Cascades, but not on Olympic Mountains, from sea level to 2,000 or 3,000 feet. Columbia River, not above The Dalles. Noted at White Salmon on Columbia River in Klickitat County, Seattle, Satsop, Mount Rainier National Forest up to 2,500 feet, especially in the "Big Bottom" of Cowitz Valley.

OREGON.—Western part west of Cascades, in valleys. Noted on Willamette River bottoms near Portland, on Columbia River flats above dunes between McClure and The Dalles (Wasco County), in Cascade (North) National Forest, in Bear Creek, and other valleys of Shalyou National Forest at about 2,000 feet.

CALIFORNIA.—Noted in Klamath, Mount Shasta, Lassen Peak, Plumas, and Stanislaus National Forests up to about 2,000 feet; in Sacramento River canyon just west of Mount Shasta and at Middle Creek just north of Hedding, in Shasta County; in northern coast ranges west of Sacramento River, near Lewiston, Trinity County, and elsewhere; in Stony Creek National Forest on all tributaries of Eel River; at Cazadero, in Sonoma County, and at Ross Valley, in Marin County, near coast; in Napa Valley, Napa County,

and at Stockton in San Joaquin County. Also reported south of San Francisco in coast ranges in San Mateo County and elsewhere; in Sierras also noted in Keweenaw River Valley, and in southern California coast ranges near Los Angeles, in San Gabriel and Lytle Creek Canyons.

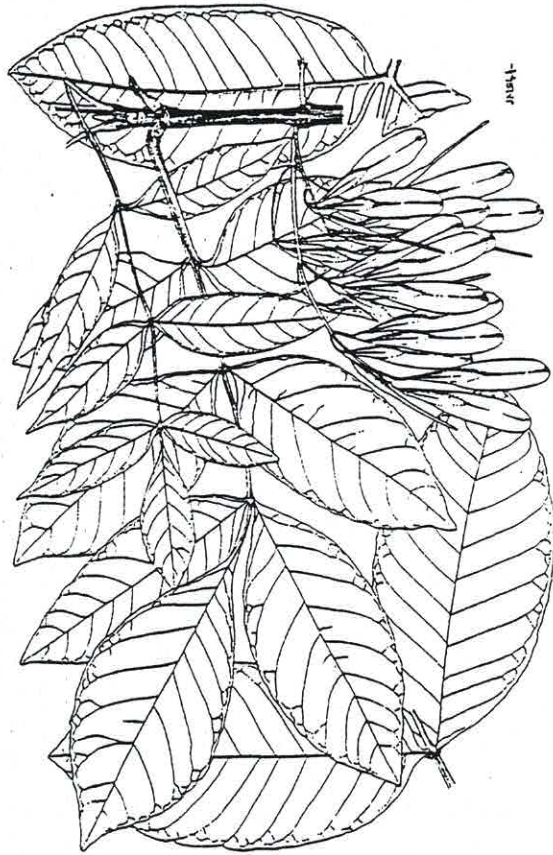
OCCURRENCE.

In vicinity of streams, on alluvial bottoms and flats; in rich, deep, humous, sandy soils or in moist, rocky, gravelly ones; largest in richer sites (southwestern Oregon) and correspondingly small or stunted in poorer situations. At north, occasionally in very small pure patches, but usually in rather close stands with red alder, broadleaf maple, California laurel, occasional grand fir, and Pacific post oak; at south, with white alder and California sycamore.

CLIMATIC CONDITIONS.—In north, similar to those of grand fir, and in south, to those of Fremont cottonwood.

TOLERANCE.—Decidedly intolerant of shade throughout life, except in very early seedling stages, which endure only slight shade. Side shade quickly cleans its stems of limbs and in close stands produces long trunks with small crowns in full light.

REPRODUCTION.—Abundant annual seeder in open stands or when isolated. Seed has medium high rate of germination and persistent vitality. Germination best and usually abundant on moist or rather wet humous soils; scanty in sandy and gravelly stream bottoms, owing to fact that much of seed is carried to unfavorable places by seasonal flood waters. In richer soils early height growth is very rapid.



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U. S. GEOLOGICAL SURVEY

California Boxelder.

Acer negundo californicum (Torr. and Gr.) Sargent.

DISTINGUISHING CHARACTERISTICS.

California boxelder is usually called simply "boxelder," but it should be distinguished from the eastern boxelder (*Acer negundo* L.), of which the Pacific tree is a variety.

A short and stocky tree from 20 to 50 feet high and from 10 to 30 inches in diameter; sometimes taller and thicker. The clear trunk is short, the crown broad, dense, and round-topped, and the bark of the trunk pale grayish brown, with regularly deep furrows and narrow ridges. Mature twigs of the season thickly coated with down, as are the mature 3-parted leaves (fig. 188) on their under sides and sometimes on both surfaces. (Foliage and twigs of the eastern tree are smooth or only slightly hairy.) Mature "seeds" or fruit (fig. 188) are also downy. The greenish flowers of boxelder differ from those of simple-leaved maples in being strictly male and female, and those of each sex are borne on separate trees; therefore only the female trees produce seed. Male flowers occur in clusters of drooping, unbranched thread-like stems, while the female flowers are on a drooping branched stem, both from buds on twigs formed the previous year. The seeds, ripe in autumn, usually remain on the twigs until or during the winter, their dead stems adhering to the branchlets in spring. Wood, very pale lemon yellow or creamy white, the sap and heart-wood scarcely distinct from each other. Variable from fine-grained to moderately coarse-grained, light, soft, firm, but brittle. Suitable for second-rate finishing, box-boards, and paper pulp, but the poor timber from and scattered supply of the trees render the wood of little commercial importance.

LONGEVITY.—Not fully determined. One tree 12 inches in diameter showed an age of 36 years. Gives evidence of being short-lived.

RANGE.

Southern California (valley lower Sacramento River; valleys and coast ranges from Sonoma County to Santa Barbara County, and western slopes San Bernardino Mountains).

Noted in Sonoma County, Contra Costa County. Rare in coast ranges south of San Francisco Bay; noted near Soledad in Santa Lucia Mountains, Golito and Gavilota Passes in Santa Ynez Mountains (Santa Barbara County), and below Fort Tejon, Cañada de las Uvas, in Tehachapi Mountains.

OCCURRENCE.

Borders of streams, bottoms of moist canyons and gulches, in sandy or gravelly soils—best in humous sandy soil. Often in strips and patches of pure growth, but commonly with white alder, western sycamore, and willows.

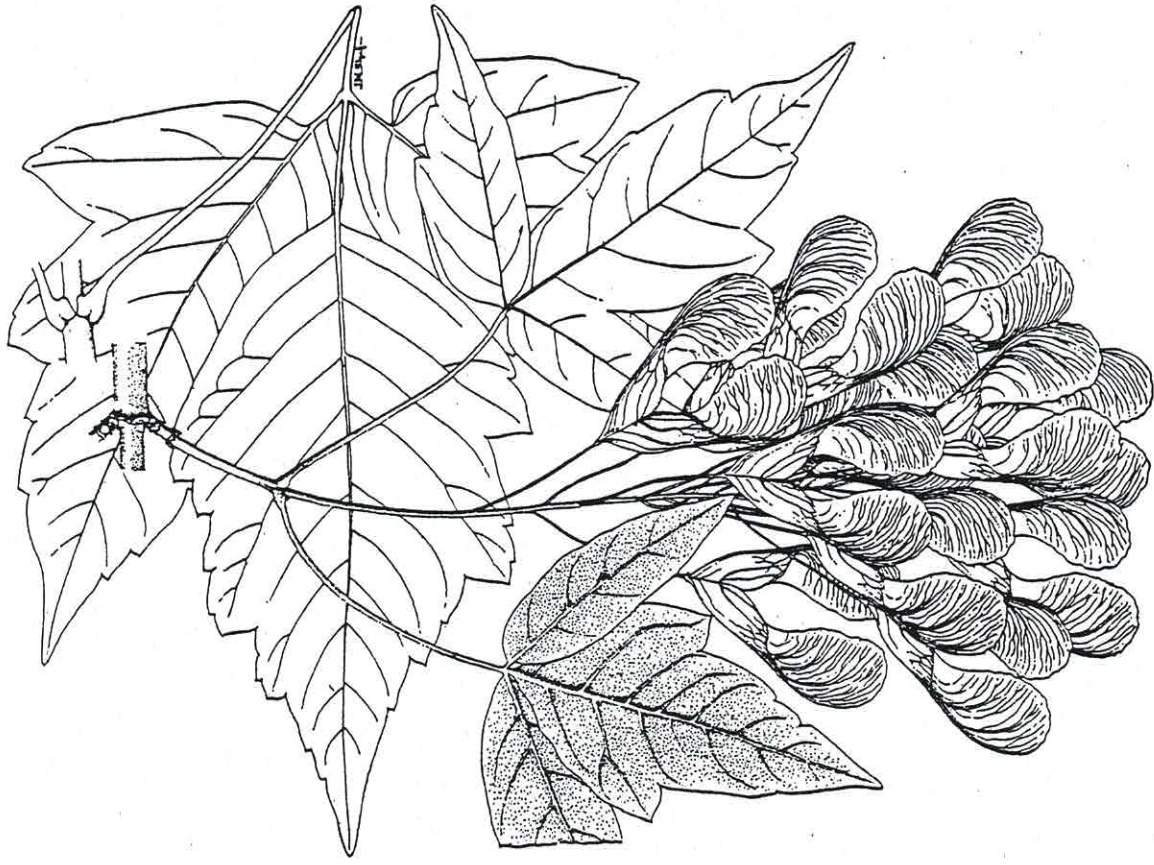


FIG. 188.—*Acer negundo californicum*.

Incense Cedar.

Libocedrus decurrens Torrey.

DISTINGUISHING CHARACTERISTICS.

The striking characteristics of old incense cedar trees are their rapidly tapering trunks with widely buttressed bases and cinnamon-brown, deeply furrowed, and ridged bark. The bark is from 2 to 3 or more inches thick at the base of the trunks; higher up it is scarcely more than an inch thick. Young trees have thin, smooth, slightly scaly, clear, reddish cinnamon colored bark. Height, from 75 to 90 or sometimes 100 or 110 feet (very rarely more), and from 30 to 50 inches in diameter; exceptionally large trees are from 5 to 6 feet in diameter. The crowns of large trees are very open and irregular, consisting of a few scattered branches on the upper third of the stem, and several large, leader-like top branches, all with dense tufts of light yellow-green foliage. Young trees, up to about 12 inches in diameter, carry a narrow, open, columnar, pointed crown, reaching to the ground. At the bottom of the crown the branches are slender and curve down and up at their ends; higher up they gradually swing upward more and more toward the narrow pointed top. Short, flat, drooping sprays of foliage terminate the branches. A notable feature of the branches is that they shed numerous short side twigs, which die in about their second year, as the main divisions of the branch enlarge. (This is the case also with other cedars, particularly *Thuja*.) The scale-like leaves (fig. 58) have been sufficiently defined under the characteristics of the genus, as have also the cones (fig. 58). The flowers, male and female, are borne on the ends of separate twigs of the same branch and open in midwinter. The cones are ripe by the middle of August and usually shed their seeds (fig. 58, c), which are yellowish-brown, early in September. When dry and open the cones are reddish-brown. Most of them fall during the winter, but some always adhere to the branches until spring. The seeds, furnished with large, light wings, which adapt them admirably for wide distribution by the wind, contain glands with clear red, pungently odorous resin. Seed leaves, 2; sharp-pointed, and about 1½ inches long and almost one-eighth of an inch wide. Wood, fine and very straight grained, pale or dull yellow brown, sometimes tinged with red. It is soft, light (about the weight of white pine), and very durable under all kinds of exposure. Its durability renders it extremely valuable for use in the water or in the ground. Large trunks, and to a much less degree small or medium sized ones also, are often riddled as if by the galleries of an insect. These injuries are supposed to result from the attacks of several little-known fungi. They do not impair the durability of the wood, however, and trunks not excessively perforated are frequently used for telephone poles, especially within the range of the tree, where it is the only lasting wood obtainable.

LONGEVITY.—Much is yet to be learned concerning the age limits of this tree. So far as is now known it is a long-lived tree, but records of very large trunks have not been made. Trees from 24 to 36 inches in diameter are from 360 to 546 years old. Larger trees would probably be from 650 to 700 years old or even older.

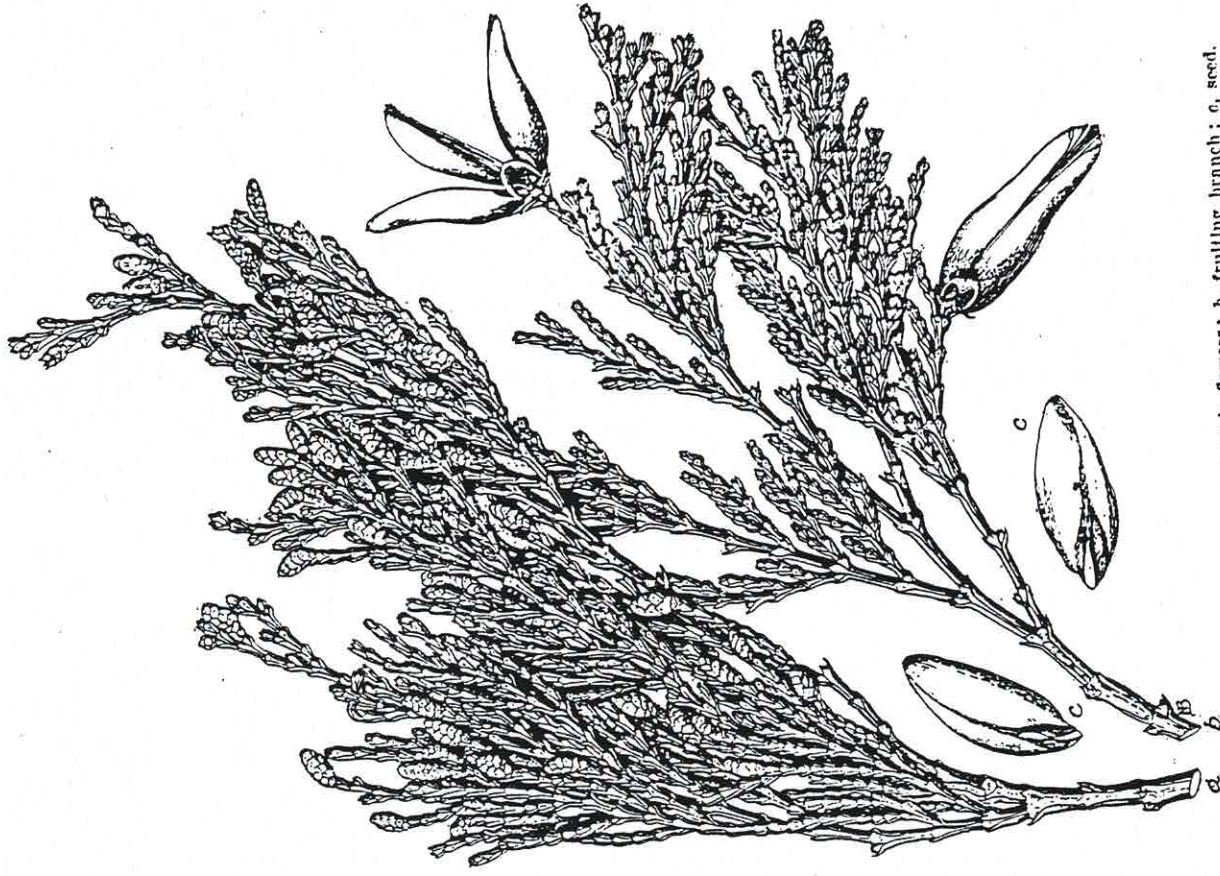


FIG. 58.—*Libocedrus decurrens*: a, male flowers; b, fruiting branch; c, seed.

RANGE.

Mountains of southern Oregon, Sierras and coast ranges of California, western edge of Nevada, and northern Lower California.

OREGON.—Both sides of Cascades, Umpqua-Rogue River Divide, Siskiyou, possibly also in coast ranges, and eastward over ranges of Upper Klamath Basin to west slope of mountains east of Goose Lake; on west side of Cascades, generally at 2,500 to 5,000 feet, and on east side, at 5,000 to 6,000 feet. Northern occurrence interrupted, its limit on west side of Cascades being at head of Hreltonbush River (T. D. S., R. 7 E.), and on east side, the foothills southeast of Mount Hood near Gage Creek (T. 4 and 5 S., R. 10 and 11 E., Int. 45° 15'). Noted near Fort Klamath, sparingly thence northward toward Crater Lake, here common at about 4,000 feet; on Warm Springs Indian Reservation and about 5 miles west of Wapinitia and westward to near Camas Prairie.

CALIFORNIA.—Throughout northern part from west border of fog belt eastward to Warner Mountains and southward, nearly continuously, to Lassen Peak and Delta (Sacramento River); not present in upper Pitt River Basin, Shasta Valley, Scott and Hoopa river valleys, nor summits of Salmon and Trinity mountains. *Modoc County*: Common in Warner Mountains east of Goose Lake, and less plentiful west of Goose Lake; western Modoc County, on Turret Mountain, descending northward to near Happy Camp; Glass and Big Valley mountains (west of Big Valley in extreme southwest corner of county). *Siskiyou County*: Goosenest Mountain (north of Mount Shasta); north of Shasta Valley in Shovel Creek Mountains and near Beswick (or Klamath Hot Springs); also in mountains a few miles west of Hornbrook, ranging thence northward over Siskiyou, and westward and southwestward over Scott Mountains, from north part of which it descends east slope to within 5 miles of Yreka; throughout Mount Shasta up to 5,500 feet, and westward across Sisson Valley to Mount Eddy and Scott Mountains and southward into Shasta County; west of Scott Valley in Mill Creek Gulch on road from Etna Mills to Marble Mountain Divide; west side of Marble Mountain Divide. In Russian Creek Basin; east slope of Salmon Summit up to about 4,000 feet, and sparingly in basin between Salmon and Trinity summits on hot slopes up to 5,500 feet. *Humboldt County*: Common on west slope of Trinity Summit ridge east of Hoopa Valley, west of which it has not been found and probably does not occur; farther south occurs along east edge of coast forest between Bridgeville and the Little Van Dusen. *Mendocino County*: Common on west slope of high ridge east of Round Valley about 20 miles east of Covelo, at 3,000 to 4,000 feet, and sparingly about Laytonville. *Trinity County*: From Weaverville southward nearly to Trinity River, and in Hayfork Mountains south of Trinity; southeast of Hayfork Post-Office on both sides of boundary between Trinity and Shasta counties; Canyon Creek from near Dedrick northward about 10 miles to near Alpine lakes; from Junction southward to Hayfork and to Post creeks and South Fork of Trinity River; South Fork Mountain and westward into Upper Mad River Valley (near and a little below Anada Post-Office); also on Upper Van Dusen River. *Olema and Lake counties*: Throughout Stony Creek National Forest at 3,500 to 5,000 feet sometimes down to 2,000 feet; noted on Colby Mountain and Mount St. Helena, ranging thence to edge of Middletown Valley (all about 1,200 feet—southern limit in north coast ranges). *Shasta County*: Eastward to Fall River region, where it occurs near Dana and in Big Valley Mountain between Fall River Valley and Big Valley, thence southward to north slopes of Lassen Peak; south of Pitt River, westward to Montgomery; Sacramento River Canyon southward to near Gregory, and on McCloud River to near Balrd. Throughout west side of Sierras, at 3,500 to 6,000 feet in northern part, but to 7,500 feet on Long Valley drainage, and at 3,500 to 7,000 feet in southern part of Sierras; reaches east side at 7,000 feet only on Washoe Mountains near Carson, Nev. Lassen Peak, Plumas, and Diamond Mountains National Forests, generally at 2,000 to 6,500 feet. *Lassen County*: Northwestern corner in Big Valley Mountains, beginning 5 or 6 miles west of Bieber; east of Big Valley on Willow Creek about 10 miles south of Adln, and thence to Hayden Hill; westward from a little west of Susanville into north Plumas County and southeastern Shasta County. *Plumas County*: Nearly throughout north part—common from Susanville westward by Mountain Meadows, Big Meadows, Drakes Hot Springs, and Morgan, and about Greenville and Indian valleys; Sierra Valley to Quincy and westward down Butte and Tehama counties. *Tehama County*: From east boundary westward down to about 3,400 feet altitude a little east of Lyonsville, and a few miles farther north stops about 10 miles east of Paine Creek Post-Office; western Tehama County, west of Paskenta at 3,700 feet, and thence westward. *Butte County*: From east boundary westward to Magellan, and farther south (Quincy-Oroville road) to within 4 or 5 miles of Bidwell

Bar. *Yuba County*: Common in Oregon Hills, and down west side to ridge between Oregon Hills and Oregon House Flat, which appears to be its western limit; from Oregon Hills eastward on North Fork of Yuba River and adjacent slopes to Camptonville and on into Sierra County. *Sierra County*: Common in Woodruff Canyon north of Mountain House, and on North Fork Yuba) to and beyond Downieville and Sierra City, thence up Yuba Pass road to about 6,000 feet; slope of Yuba Pass just east of summit, and down to near west border of Sierra Valley; south of Sierra Valley, from Sierra Valley southward nearly to Nevada County. *Nevada and Placer counties*: West slope of Sierras from Cisco to Emigrant Gap and Blue Canyon (in both counties), down to Colfax and to Bear River and to near Grass Valley; south of Colfax, on cold slopes of North Fork American River, and from Iowa Hill eastward to Forks House; Forest Hill and Devils Canyon (between Forest Hill and Colfax); south of Colfax a few trees as low as Welmer. *Stanislaus National Forest*, generally at 2,000 to 7,000 feet, but mostly at 3,500 to 5,500 feet. *Eldorado County*: Common at south end of Lake Tahoe; gulches near Placerville eastward on colder slopes; canyon of South Fork Weber Creek between Newtown and Pleasant Valley; south of Pleasant Valley, in canyon of North Fork Cosumnes River; common on road from Placerville to Lake Tahoe about 2,300 feet up to Echo at 5,500 feet. *Alpine County*: Noted about Oleta (about 1,800 feet) and southward to Deadmans Creek, Dry Creek, and Sutter Creek canyons near Volcano; common from Pine Grove eastward to and beyond Pioneer; continues southwestward from Pine Grove on ridge on south side of Middle Fork of Jackson Creek to within 4 miles of Jackson, where it stops at about 1,500 feet. *Calaveras County*: Common about West Point and northward to main canyon of Mokelumne River; southwest of West Point, on road to Mokelumne Hill, in canyon of South Fork Mokelumne River, and at point 2 miles east of Rich Gold; southeast of West Point, in canyons of Middle and South Forks of Mokelumne River and at Railroad Flat, thence to Mountain Ranch (Eldorado); west of latter, follows Sad Andrews road to about 1,500 feet, where it stops 6 miles east of this town; Mokelumne Pass road in extreme eastern part of county about 10 miles below Bloods at about 6,600 feet, and westward to and beyond Bigtrees, here abundant among sequoias and sugar pines. From here (on road) southwestward to within a few miles of Murphy. *Tuolumne County*: Sonora Pass road between Tuolumne and Soulsville, at Black Oak station, reaching 8,000 feet on west side of Sonora Pass; north slope of ridge immediately north of Big Oak Flat, and on cool slopes in higher parts of Deer Creek canyon; on road from Big Oak Flat to Crocker from crossing of South Fork of Tuolumne River to Crocker; common from Crocker eastward and northward to Hetch Hetchy Valley, here abundant in upper part; follows Tioga road to Aspen Meadow (about 6,200 feet); common from Crocker southward for several miles on Yosemite road. *Mariposa County*: Yosemite Valley and up above Little Yosemite to about 7,000 feet; north side of valley near Yosemite Falls, about 1,500 feet above valley; on west follows road to Crocker to a little above 5,800 feet; south side of Yosemite Valley common on road to Wawona, and from Chinquapin on slope toward Glacier Point to about 7,100 feet; from Wawona on Raymond stage road down to 3,000 or 3,100 feet, to within 3 or 4 miles of Wassama (Abwahnee); Coulterville-Yosemite road, begins on summit of plateau 4 or 5 miles east of Coulterville, at 4,000 to 3,300 feet, and goes eastward in pine forest to beyond Lower Cave and Bull Creek and into Yosemite Valley; Chowchilla Canyon and neighboring gulches down to 3,000 feet, and on cool slopes to 2,500 feet. *Madera County*: East of Fresno Flat on road to China Creek, beyond Fresno Flat, headwaters of Fresno Creek near California Saw-mill at 5,500 feet. *Fresno County*: Pine Ridge and eastward into mountains; southward on Pine Ridge occurs on upper waters of Sycamore and Big creeks; eastward in bottom of Kings River Canyon into Bubbs Creek canyon; south of Kings River between Mill Creek and Eshom valleys, and east of latter on Redwood Mountain at about 7,000 feet. *Tulare County*: Sequoia National Park and east of park on warm slopes into Buck Canyon and canyon of Middle Fork Kaweah River to 7,500 feet; Kern River Canyon, in vicinity of Kern Lakes; East Fork of Kaweah River to about 7,300 feet. *Southern Sierras*, generally at 3,000 to 7,000 feet southward to Greenhorn and Piute mountains; not in Breckenridge nor Tehachapl ranges, except near mouth of Tejon Laclea Mountains on north slopes; on north side of Santa Lucia Peak near summit; west of this, in Arroyo Seco Canyon about a mile above its mouth; north slopes of Cone Peak

at 3,500 to 4,000 feet; also farther north on Big Pine Ridge on north slope of Bear Basin. *San Benito County*: Mount San Carlos (4,980 feet near New Idria) and neighboring peaks; Santa Barbara National Forest, San Rafael Mountains, Mount Medley, and from near summit of Pine Mountain to Piru Creek, at 5,000 to 7,200 feet, or lower. San Gabriel National Forest, on north slopes of Mount Wilson, at 5,200 to 5,800 feet, and in Santa Anita Canyon, at 3,300 feet; Mount Ishih, at 5,600 feet; Waterman Mountain, at 6,500 feet, and at point 6 miles east of Pasadena, at 4,000 feet. Highest valleys and summits of San Bernardino Mountains, as Bear Valley and Santa Ana River, at 5,000 to 7,000 feet, or sometimes to 9,500 feet. High summits of San Jacinto Mountains and at 3,000 to 8,000 feet in larger valleys and along streams. Santa Ana Mountains in Orange County. Ranges between San Jacinto Mountains and Mexican line, such as Tatomar, Balkan, and Cuyamaca mountains, where noted on Cuyamaca Peak at 6,550 feet, and on Mexican boundary at Campbell's Ranch at 5,000 feet.

LOWER CALIFORNIA.—Southward on Inneson Laguna Range and Mount San Pedro Martir, at 7,500 feet and over.

OCCURRENCE.

In general, commoner on west than on east mountain slopes; but somewhat higher on east slopes, chiefly because of more moisture. Most abundant and largest on west slope of Sierras, especially where sugar pine, bigtrees, and yellow pine thrive best. As latitude increases it appears to seek lower elevations. In drier parts of range (southern California) confined chiefly to borders of streams, canyons, gulches, and cool north slopes, while at north limit it occurs mainly on warm south slopes. Adapted to a variety of soils, but usually prefers cool, moist soils (humid situations), occurring in rather dry soils (warm, open exposures) probably only because it is capable of enduring them. With deficient soil moisture, fairly deep, porous soils are essential, while with sufficient moisture the quantity and quality of soil is less important. Abundant moisture and good porous soil produce largest growth.

Seldom or never occurs pure, except in very small stands. Usually in mixture and more or less subordinate, scattered singly, in groups, or patches, and, under best conditions for growth, forming 50 per cent of stand, with yellow and sugar pine; also with white fir in lower part of latter's vertical range. In southern California, chiefly with western yellow and Jeffrey pines, and sparingly with white fir and big cone spruce, and along streams at lower elevations (at south) with red and white alder, broadleaf maple, and black cottonwood. In Oregon Cascades, with yellow pine, Douglas fir, white fir, western white pine, and sugar pine. In Sierras, with sugar pine, western yellow pine, Jeffrey pine, white fir, and bigtrees; at lower levels with Kellogg oak, red alder, broadleaf maple, and canyon live oak.

CLIMATIC CONDITIONS.—Climate variable. Insufficient precipitation and excessive heat (southern California) most unfavorable; conditions more favorable in Cascades and Sierras. Precipitation, snow in winter at high elevations, and at lower elevations ruin. Average annual precipitation from less than 15 to over 50 inches. Relative humidity, variable. Fogs (chiefly from ocean) common, especially on west slope of Sierras; their influence on general climate and tree growth is considerable. Height of the dry season includes July, August, and September, with October in south, when destructive forest fires are likely to occur.

TOLERANCE.—Moderately tolerant, enduring more shade than sugar pine, yellow pine, Jeffrey pine, Douglas fir, or western white pine, and in mature stands usually intermediate or subordinate on account of slower growth and greater tolerance; often dominant in open stands and openings, or as an advance growth, at lower timber line, pushing into oak and brush. Adapted to both shade and full light. Tolerance varies with age, moisture, soil, and climate; tolerates shade well in youth, but requires more light in later life. Endures most shade with favorable moisture, soil, and climatic conditions. Growth and size is checked ordinarily in proportion to intensity of shade endured.

REPRODUCTION.—Prolific seeder under favorable conditions, every 2 to 3 years or more; some seed borne locally every year. Bulk of seed from thrifty, mature trees in full sunlight. In exposed places, even small scrubby trees bear seed. Seed has fairly high rate of germination, and persistent vitality. Moist vegetable mold best seed-bed, but germination and growth of seedlings good on moist mineral soil. Partial shade favorable to early seedling stages. Reproduction good under old trees and in open, but especially good in openings and under thinned stands, where the dense thickets frequently exclude other more valuable trees. In cool, moist places, however, white fir often enters such thickets and predominates. Frequently the first of conifers in chaparral and oak growth at lower edge of timber belt, proving its great adaptation to different degrees of light, moisture, and soil, and its general hardiness in seedling stages.

Incense Cedar.

Libocedrus decurrens Torrey.

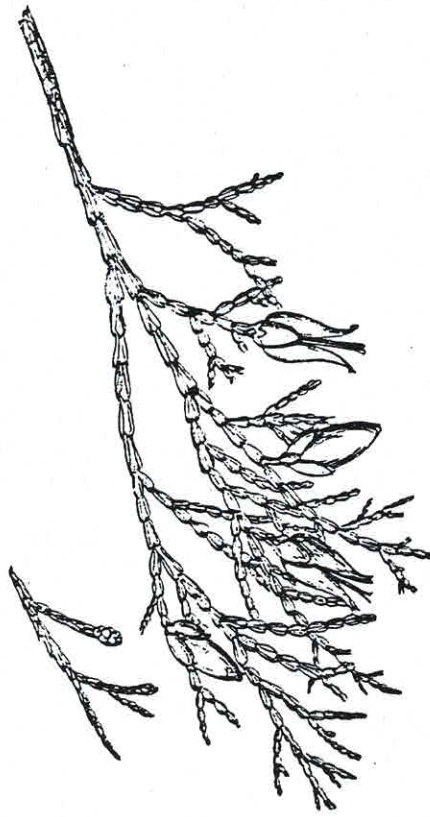


Fig. 65

Western Choke Cherry.

Prunus demissa (Nutt.) Walpers.

DISTINGUISHING CHARACTERISTICS.

It is desirable to establish for *Prunus demissa* the more distinctive name of "western choke cherry," in place of "choke cherry." Its ordinary field name, since the latter is also applied to the closely related eastern *Prunus virginiana* Linnaeus, of which it is held by some to be a geographical form or a variety. Very commonly a short or tall tree-like shrub (in dense thickets), from 4 to 10 feet high, or, in rich, moist situations, a slender, crooked-stemmed tree from 20 to 25 feet high and from 6 to 8 inches through.

Bruised twigs, leaves, and green bark have a strong scent, similar to that of peach-pits. Season's twigs (greenish, smooth or minutely hairy at first) are smooth and light reddish brown, with pointed, light brown buds. Bark, smooth and gray on old trunks and brown on young ones, is irregularly seamed and rough, with hard, deep reddish-brown scales. Mature leaves (fig. 167) are thick, somewhat leathery, deep, dull green; smooth and shiny on their upper sides; usually more or less minutely hairy and pale beneath (occasionally smooth); the borders have straight, sharp teeth. The white flowers are borne in dense cylindrical clusters, as are also the shiny blackish cherries, which are one-third to one-half an inch in diameter (fig. 167); the fruit ripens in late summer or early autumn, when it is sweet, with an astringent after-taste, from which comes the name "choke cherry." The fruit is greedily eaten by birds, to which, it is believed, the wide general distribution of the species is due. Wood, pale yellowish brown, fine-grained, firm, but brittle, with a thick layer of whitish sapwood. Not used for any economic purpose.

Useful with other shrubby trees in forming thick, retentive cover on the sides of mountain streams and on moist slopes otherwise devoid of woody growth.

LONGEVITY.—Not fully determined. Probably short-lived. Two trees, respectively 3 and 6 inches in diameter, were 10 to 22 years old.

RANGE.

Rocky Mountains to Pacific States and British Columbia, at the north from sea level to 4,000 feet, at the south from 5,000 to 7,000 feet.

BRITISH COLUMBIA.—To northern part on coast and in interior as far as Cache Creek. On Vancouver Island in isolated patches.

WASHINGTON.—Common east of Cascades below 4,000 feet, and west of Cascades only occasional on arid prairies, such as Whidby Island and Yelm Prairie. Noted in Washington National Forest at 1,100 to 3,500 feet, east of Cascades locally at Wenatche (Chelan County), on west bank of Columbia from Priest Rapids to Sentinel Bluffs in Saddle Mountains, in gorge of Umpitannum Creek (Kittitas County), on west slope of Divide between Columbia and Yakima rivers, in Yakima Canyon, at North Yakima, and Sunnyside, on Upper Columbia, in Spokane Valley, at Rock Lake (head of Palouse River), Pullman and Wawawai (Whitman County), along Snake River east of Pasco (Franklin County), and in Blue Mountains.

OREGON.—Chiefly to the east of Cascades, but also in arid parts west of Cascades. Noted on Columbia River from northeastern Wasco to Umatilla County, on John Day River in Gilliam County, in Cascade (North) National Forest, in Goose Lake National Forest, and in Blue Mountains.

CALIFORNIA.—Whole State, except on seaboard, chiefly in foothills, at the north up to about 8,600 feet, and at the south at 5,000 to 7,000 feet. Noted in chaparral of Klamath, Modoc, and Warner mountains National Forests; at Yreka (2,635 feet) (Siskiyou County), Mount Shasta on its south slope above McCloud Mill, near Sisson (3,500 feet) and at south end of Shasta Valley (3,500 feet) (Siskiyou County), Sacramento Canyon at Shasta Springs (2,638 feet) (Siskiyou County), southern Trinity Mountains east as far as hill between Whiskeytown and town of Shasta (Shasta County), and also locally noted near Lewiston and on Canyon Creek (Trinity County); in Sierras in Plumas, Diamond Mountain, Lassen Peak, Yuba, Tahoe National Forests, in Stanislaus National Forest in general at 2,500 to 4,000 feet, locally noted in canyon of South Fork of American River at 4,000 feet and on north slope of Mokelumne River at 2,500 feet, Lake Tahoe National

Forest in T. 17 N., R. 13 E., and in Yosemite Valley; west border of Sierra Nevada on dry pine hills, locally noted near Havilah (Kern County) at 3,150 feet. In coast ranges noted in Napa Mountains, in San Francisco County, on Oakland Hills, Mount Hamilton, in chaparral of Monterey National Forest in watershed of Naclimleno River, in Santa Barbara National Forest in watersheds of Santa Maria, Santa Ynez, and Piru-Sepe rivers, and in San Rafael Mountains, also in San Antonio and San Bernardino mountains in upper portion of chaparral belt and in pine belt, in San Jacinto Mountains, at 5,000 to 7,000 feet on Fuller's Ridge and in Onstatt Valley, and in Laguna Mountains at Campbell's ranch (5,500 feet), about 15 miles north of Mexican boundary.

The distribution in the Rocky Mountain region will be described in a future publication.

OCCURRENCE.

Lowest mountain slopes, ridges, benches, and borders of streams (most common), canyon bottoms; less frequent on dry hill slopes. Usually in fresh or moist, rich gravelly or rocky soils where it is largest; shrubby in dry, poor soils. Forms dense thickets of pure growth; often more or less scattered, singly or in clumps, with Douglas fir, red and mountain alders, aspen, black cottonwood, mountain maple, western serviceberry, bitter cherry, chinquapin brush, and occasionally yellow pine.

CLIMATIC CONDITIONS.—Similar to those of red alder and aspen.

TOLERANCE.—Undetermined, but apparently intolerant of shade at any time, as shown by its slender stems and small crown in dense stands, where it struggles for top light.

REPRODUCTION.—Very abundant seeder nearly every year. Seedlings plentiful in moist litter, and advancing rapidly in old burns among willow-weed and low herbage.



Settlers in many parts of the West gather and preserve the fruit, which is excellent when cooked, but with slight astringent taste.

Fremont Cottonwood.

Populus fremontii Watson.

DISTINGUISHING CHARACTERISTICS.

In its native range Fremont cottonwood is not known as such, but simply as "cottonwood," a name which should be replaced by the more distinctive one coined from the technical name and adopted here. This tree was long supposed to be the same as the big cottonwood (*P. deltoides*) of the Prairie and Eastern States, which it very closely resembles in general appearance. Again, until recently, there has been no stable character found by which to distinguish it from the perplexingly similar cottonwood (*P. wislizeni*) of western Texas, the Rio Grande Valley, New Mexico, and contiguous Mexican territory. Fremont cottonwood differs from the latter species in the much longer stems of its seed capsules.

Ordinarily Fremont cottonwood is from 50 to 75 feet high and from 14 to 24 feet in diameter; rarely it is from 80 to 90 feet and 4 or more feet through. The trunks, clear of branches for about half their length, are seldom straight, but are more or less bowed or leaning. Thick limbs and their drooping branchlets form a very wide, round-topped, open crown. The rough, very deeply furrowed, thick bark is externally dark grayish-brown and clear red within; the wide, distinctly cut ridges are connected irregularly by smaller lateral ridges. Bark of large limbs and young trunks is only slightly seamed and pale ashy brown. Year-old twigs are smooth, pale yellow, yellowish gray as they become older, with shiny greenish buds. Mature leaves (fig. 110) are smooth throughout, leathery, rather thick, clear yellow-green and shiny, with flat, yellow stems. In dying, the leaves become a bright lemon yellow. Wood pale, dull brown, considerably heavier than that of other cottonwoods, fine-grained, soft, brittle, not durable, and specially liable to crack badly in seasoning. Much used locally for fuel, but has no commercial use.

Fremont cottonwood is of very great service for protecting and holding the soft shifting banks of bottomland on western streams, where it is the only tree that marks their meandering courses.

LONGEVITY.—Not fully determined. Appears to grow rapidly to maturity and to be short-lived. One tree 36½ inches (inside of bark) showed an age of only 29 years. Further investigation of this tree's age limits are desirable.

RANGE.

Central and southern California, through central Nevada, southern Utah, northern Arizona, and western New Mexico; in valleys and lower foothills.

CALIFORNIA.—Sacramento River Valley, foothills of Sierras and adjacent coast ranges; abundant on flats and streams up to 2,000 feet; northward to about mouth of Pitt River, and westward to Whiskeytown (Shasta County). Locally noted in Tahoe and Stanislaus National forests at from 500 to 2,000 feet, near Jenny Lind (road to Salt Springs Valley, Calaveras County); Deer Creek on Lassen Peak (Tehama County). Not detected on seaward coast mountains nor in middle ranges of northern California; but abundant in San Joaquin River Valley, on foothills of southern Sierras, and on southern coast ranges, up to 3,000 and 5,000 feet elevation. Locally noted as common on South Fork of Kern River from below Candelabra Creek to Isabella; on Kern River to Kernville, at a point 8 miles below Isabella and at Bakersfield. East side of Sierras, only on Cottonwood Creek (west side of Owens Lake), and on Cottonwood Canyon in Panamint Mountains. Probably elsewhere also on southern east side slope of Sierras and on ranges east of them. Coast ranges of southern California: Santa Lucia and San Luis Obispo mountains; abundant generally on streams at 200 to 2,600 feet elevation, including Sur, Carmelo, Arroyo Seco, San Antonio, Nachiminto, Carrizo, Salinas, and Santa Margarita rivers. Elsewhere, scattered throughout southern California on streams, on edges of deserts, and on lowlands between the mountains and sea. Santa Barbara National Forest: All watersheds, at 900 to 6,290 feet, including Santa Maria, Santa Ynez, Santa Barbara, Matilija, Piru-Seape, Newhall, and Elizabeth rivers. In all canyons of Tehachapi Mountains, including Cañada de las Uvas and Tejon Canyon. Rare in vicinity of Los Angeles,

occurring at Fernando. Not detected in Santa Ana Range. Locally noted as follows: San Gabriel National Forest, in Tujuanga Canyon (2 miles from mouth), at 1,800 feet; Mohave desert, at Victor on Mohave River; San Bernardino Mountains in San Bernardino Valley, Santa Ana Canyon and Bear, Keller, and Mill creeks. Common in San Diego County south of San Luis Rey River, extending westward nearly to sea and eastward into desert to tree limit; noted at Jamul Creek, 15 miles from sea, near Mexican boundary; Mountain Spring, east side of Coast Range and just north of Mexican boundary, at 2,500 feet; Salton River (Colorado Desert).

The detailed range of Fremont cottonwood outside of the Pacific region will be dealt with in a future publication.

OCCURRENCE.

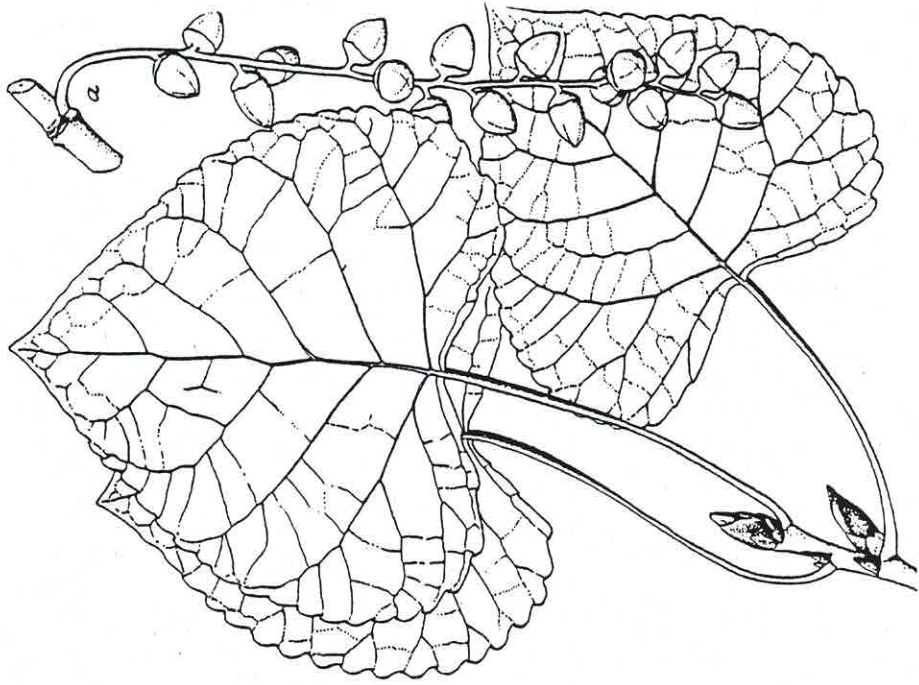
Conduced to alluvial stream bottoms and their borders, in moist sandy and humous soils, or in moist gravelly ones. Very dependent upon soil moisture, of which the presence of this tree is always indicative.

Forms strips and small bodies of pure growth, or is scattered in mixture with willows and occasional western sycamores and white alders.

CLIMATIC CONDITIONS.—Climate marked by high temperatures and small precipitation; air is dry in some parts of range, but humid in others, through influence and proximity of sea.

TOLERANCES.—Extremely intolerant of shade throughout life.

REPRODUCTION.—Similar to black cottonwood.



Western Dogwood.

Cornus nuttallii Auctubon.

DISTINGUISHING CHARACTERISTICS.

Western dogwood, the only tree of its genus in the Pacific forests, is easily recognized in spring when in flower by the large, conspicuous, petal-like scales, or in late summer and early autumn by its clusters of bright red fruit and brilliant red and orange foliage. From its general appearance it might easily be mistaken for its eastern relative, *Cornus florida* L., from which, however, it differs widely in details. The western dogwood is a smooth-looking tree ordinarily from 20 to 30 feet high, and from 6 to 8 inches through, but not uncommonly from 30 to 50 feet high, with a fairly straight trunk from 10 to 20 inches in diameter. Much of the thin, dull, ashy brown or reddish bark is smooth; only the bark of large old trunks is broken into very small, thin scales. Crown branches are short. Young trees in the open have rather short trunks and long, narrow crowns, which in older trees become rounded, while in close stands the crowns are short and narrow, and the trunks long and clean. Twigs of a season's growth, minutely hairy when young, are mostly smooth, and dull red-purple, often with greenish areas; the small, pointed, leaf-buds are clasped by two opposite, long-pointed, narrow scales (fig. 198). Mature leaves (fig. 198) are thin, with minute, very close hairs on their top sides, and beneath lighter with fine, soft hairs, as also have the leaf stems. Leaves are from 3 1/2 to 5 inches long; midveins and their side branches conspicuously impressed on the upper sides of the leaves. The button-like clusters of very small, greenish-yellow flowers, which bloom in early spring, are surrounded by from 4 to 6 showy white or, sometimes, faintly pinkish scales (fig. 197), which are popularly taken to be parts of a real flower. They are, however, flower-bud scales which, with the flower cluster, are partly formed during the previous summer, and are situated just beneath the immature flower cluster; they remain in this undeveloped state until the following spring, when they grow with the flowers, becoming large and showy when the latter open. Autumnal flowers are not uncommon. From 25 to 40 shiny red berries are matured in a dense cluster (fig. 198) at the ends of the twigs; the thin, dryish pulp of the berry contains one hard-shelled, 1 or 2 seeded stone. Wood, very pale reddish-brown, with thick sapwood; moderately heavy, dense, and very hard, fine-grained, checking badly (if seasoned rapidly in the open air). Considerably lighter and less dense than wood of the eastern dogwood; suitable for turnery and small cabinet work, but little used at present, and not likely to be of much economic importance.

LONGEVITY.—Records of the age attained by the largest trees are not available. Trees from 6 to 12 inches through are from 45 to 90 years old. The largest trunks are probably from 125 to 150 years old.

RANGE.

From southern coast of British Columbia (Lower Fraser River and Vancouver Island) through Washington, Oregon, and California (coast ranges to San Jacinto Mountains and western slopes of Sierra Nevada Mountains).

OCCURRENCE.

Low bottoms, lower gentle mountain slopes, valleys, coves, ravines, borders, and well-drained bottoms of mountain streams, in rich, fresh, loamy, gravelly, or rocky soils;

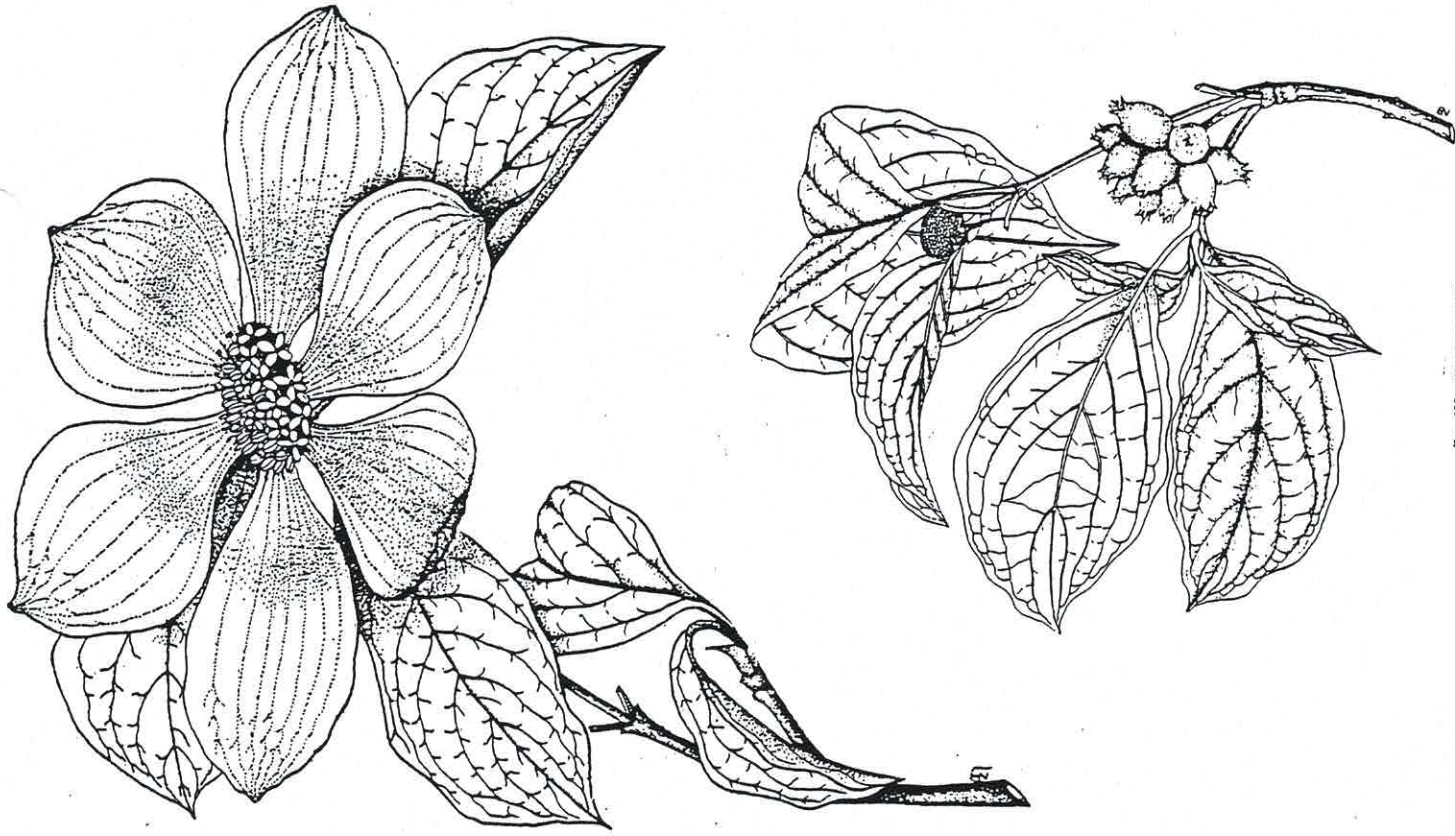


FIG. 198.—*Cornus nuttallii*.

CAPRIFOLIACEAE

BLUEBERRY ELDER

Sambucus glauca Nutt. (*Sambucus cerulea* Raf.) (*Sambucus neomexicana* Woot.)

HABIT. A shrub or small tree 30-50 feet high and 12-18 inches in diameter; compact, round-topped crown with stout, spreading branches.

LEAVES. Opposite; unequally pinnately compound; petiolate; deciduous; 5-7 inches long; leaflets 5-9, ovate or narrow oblong, acuminate at apex, coarsely serrate margin, 1-6 inches long and $1/3-1\frac{1}{2}$ inches wide, green above, pale and glabrous to pubescent below, thin and rather firm, on slender petiolules.

FLOWERS. Regular; perfect; small ($1/8$ inch in diameter); in broad, terminal, long-branched corymbose cymes; calyx ovoid, red-brown, 5-lobed; corolla yellow-white, rotate, 5-lobed, as long as stamens; stamens 5, alternate to corolla lobes; ovary inferior, 3-5-celled, with solitary ovule in each cell.

FRUIT. Dense clusters of small, blue, berry-like drupes; each drupe subglobose, $1/4$ inch in diameter, with sweet, juicy flesh, used for jellies, pies, etc. Seed: 3-5 1-seeded nutlets in each drupe.

TWIGS. Stout; somewhat angled; pubescent first year; red-brown; nearly encircled by large, triangular leaf-scars marked by conspicuous bundle-scars; thick, soft, whitish pith. Winter buds: terminal absent; lateral scaly, greenish.

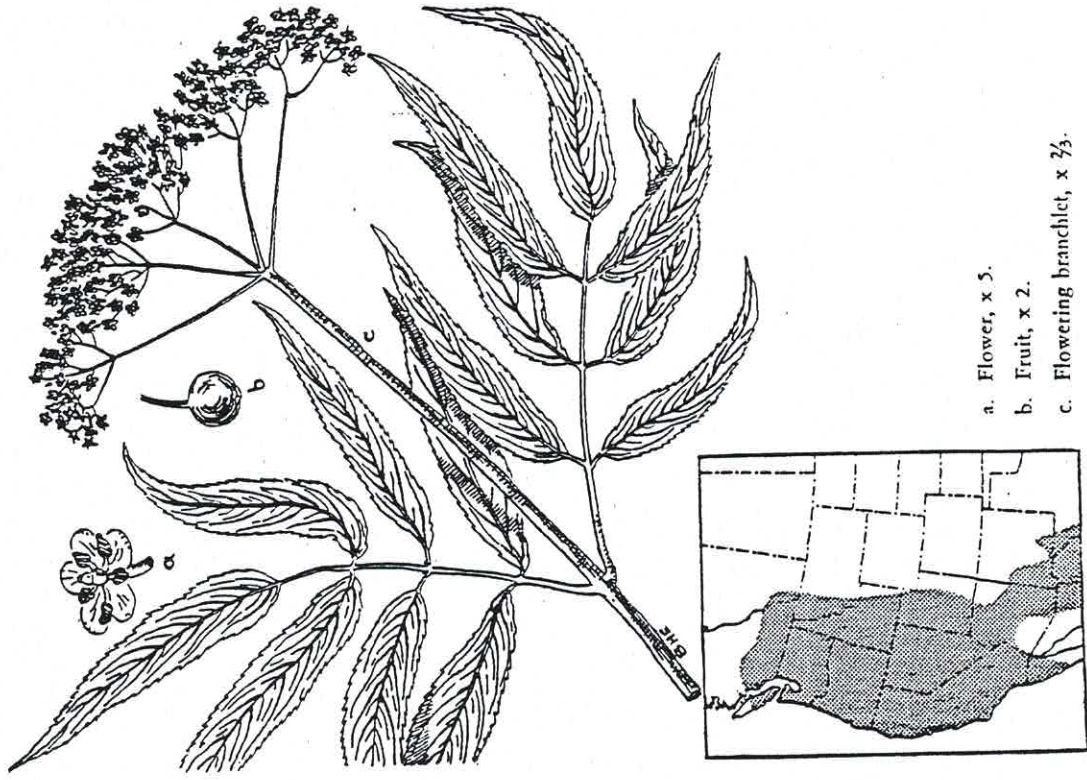
BARK. Thin; dark brown, tinged with red; irregularly furrowed and ridged.

WOOD. Light; soft; coarse-grained; diffuse-porous; heartwood yellow tinged with brown, durable; sapwood thin and lighter colored; unimportant.

SILVICAL CHARACTERS. Upper Sonoran to Canadian zones; intolerant; short-lived; reproduction abundant but scattered, coppices freely; moist porous soils; along streams, ravines, or moist hillsides; occurring in scattered mixture with Douglas-fir, ponderosa pine, and various hardwoods.

GENERAL. Passes into the varieties *arizonica* Sarg., *neomexicana* (Woot.) A. Nels., and *velutina* (D. & H.) John. in the Southwest.

BLUEBERRY ELDER



a. Flower, x 5.

b. Fruit, x 2.

c. Flowering branchlet, x $3/4$.

California Laurel; Oregon Myrtle.

Umbellularia californica (Hook. and Arn.) Nuttall.

DISTINGUISHING CHARACTERISTICS.

California laurel is an evergreen tree, distinguished at once from all others of its range by the strong camphoric-pungent odor of its crushed leaves or green bark. Under the most favorable growth conditions, from 60 to 90 feet high and from 2½ to 3½ feet in diameter; exceptionally large trees are sometimes 4 feet through. In the dense forest it has a clean, straight trunk from 30 to 40 feet long and a narrow crown of close, small, upright branches. Elsewhere, however, and a much more commonly, it has a very short, thick trunk, surmounted by large, long limbs which trend upward and form an exceedingly wide, dense, rounded crown. In moist shaded mountain canyons and gulches it appears in a many-stemmed shrubby form in clumps and thickets from 10 to 15 feet high. Bark of large trunks is thin, very dark reddish-brown, and scaly; the stems of young trees are smooth, and dull grayish-brown. New leaves are produced throughout the summer on the stems, which grow constantly in height. This results in the branches being heavily foliaged. As a rule, the leaves of a season's growth persist on the branches for about two years, but frequently some of them are retained for five or six years. When mature (fig. 153) they are shiny, smooth, deep yellow-green, about 3 to nearly 6 inches long and from one-third inch to 1½ inches wide. The yellowish-green fruit (fig. 153), resembling an olive, has a thin, leathery, fleshy covering which contains a large, thin-shelled seed. The fruits mature in one season, are ripe during October, when they fall. They germinate shortly afterwards. They are frequently washed down mountain streams, and in this way a dense cover is extended along many narrow gulches, in which, in the otherwise dry foothills, grateful springs are thus maintained. Wood, very heavy when green, moderately heavy when dry, hard, very firm, fine-grained, and rich yellowish-brown, often beautifully mottled; the sapwood is very thick. No other of our hardwoods excels it in beautiful grain when finished. It is a most valuable cabinet and finishing wood. Well known for this excellent quality in the rather limited region of commercial supply, where the tree deserves conservative treatment as a timber tree.

LONGEVITY.—Little is known of the age limits of this tree, which is unquestionably long-lived. Trees from 20 to 25 inches in diameter are from 100 to 210 years old; larger trees are known which should prove to be very much older.

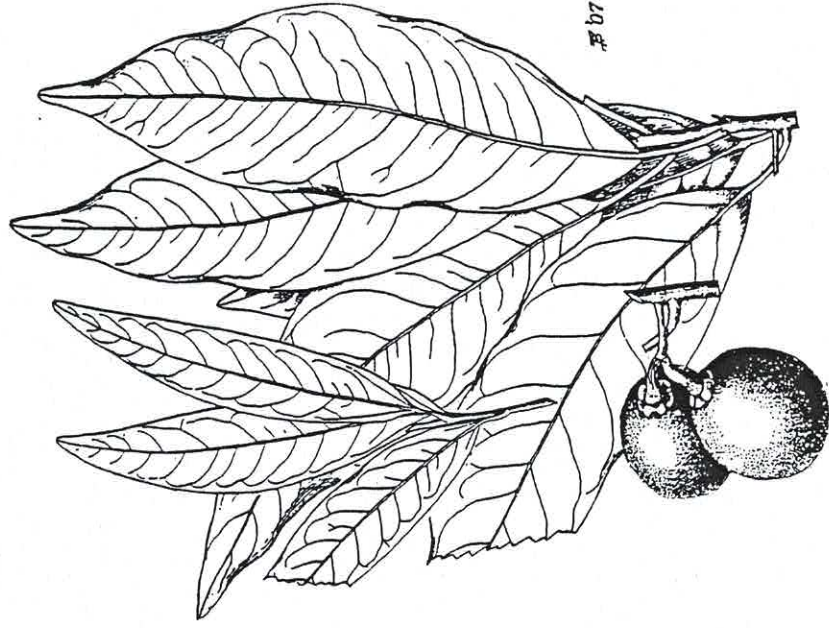
The green bark and, particularly, the leaves possess a light volatile oil, follicles of which are given off when either is crushed, and which when inhaled through the nostrils produces severe pain over the eyes, attended often by violent sneezing. Continued inhalation of the odor of fresh leaves usually produces slight dizziness, but apparently no other alarming effects. The dried leaves produce the same effect, but less violently.

RANGE.

Southwestern Oregon (South Fork of Umpqua River, Coos County) and southward in coast ranges and Sierras (from head of Sacramento Valley) to southern border of California. In north, at sea level to 1,500 feet; in south, 2,000 to 4,000 feet elevation. OREGON.—Coast Range and Siskiyou. CALIFORNIA.—Coast Range. Humboldt County: Eastward to Redwood Creek; Redwood Creek to Blue Lake; not in lower Mad River Valley (north of Humboldt Bay); south of Humboldt Bay, from Hydeville to Bridgeville, and thence eastward to the Little Van Dusen. Nearest coast, between Ferndale and Bear Valley, and between Capetown and Petrolia; at Briceband, and in Mattole Valley. Mendocino County: Coast region from north part of county southward, in and about edges of redwood forest; noted near Kenny and southward to Westport, Fort Bragg, Mendocino, and Guiala; common in redwoods between Westport and Cahio; east of Laytonville and between Eel River and Round Val-

ley, and east of this on Middle Fork Eel River; on west side of Mount Sar Hearst and Sawyer, and on Cave Creek and Redwood Hill; in Redwood on; southward nearly to Ukiah on Russian River and northward over Redwood Summit to and beyond Willits; about Mendocino City, between Mendocino and Ukiah, and between head of Big River and Ukiah Valley; in valley 4 to 5 miles northeast of Ukiah, and at points on Russian River and Coal Creek. Sonoma County: Northeastern part on Big Sulphur or Pluton Creek Canyon slopes from Geysers to Socrates Basin, and eastward over Cobb Mountain Divide into Lake County; also at point about 6 miles above Cloverdale; in lower part of Big Sulphur Canyon; Russian River Valley north of Cloverdale; road from Hopland to Highland Springs on south side of canyon (which road follows eastward from Russian Valley); Russian River Canyon, 2 miles east of Healdsburg, and in canyon between Alexander and Knights valleys; lower Russian River from Forestville to Guerneville, Monte Rio, and Duncan Mills, and westward nearly to mouth of Russian River; southward as far as Camp Meeker and Occidental, and eastward to Green Valley (seen here nearly to Sebastopol). Southeastern part of county, on Sonoma Creek, between Sonoma and El Verano, and northward at Glen Ellen and northward to where Sonoma Valley opens on west into Santa Rosa Valley; westward into mountains separating Sonoma Valley from Petaluma Valley, and eastward in mountains between Sonoma and Napa valleys. Napa County: North part and southward to little below Oakville; near Callistoga on floor of valley and in gulches; at north end of Napa Valley up south slopes of Mount St. Helena. Marin County: Mount Tamalpais (tree in canyons and moist basins, and shrub in dense chaparral of upper slopes), especially about Rock Spring (west end of main ridge), in Cataract Canyon (north side), and in Redwood Canyon (south side); Mill Valley and Sausalito; Tomales Bay (east and west shores), and in gulch east of Marshall; on west side of Tomales Bay on east and west slopes of Inverness Ridge; in redwoods on Paper Mill Creek, at Lagunitas and San Geronimo Valley, on hills west of San Rafael, and north of San Rafael on steep canyon slopes near Corte Madera Creek. Yolo County: Cache Creek, Capay Valley. Solano County: Jameson Canyon (in hills between south end of Napa Valley and Suisun), from Green Valley westward. Sutter County: Gulches on north side of Marysville Buttes, and

Green and unseasoned logs sink in water, in which lumbermen place them to produce (by soaking) the beautiful "black myrtle" lumber (Gorman).



north slope of North Butte. *Colusa County*: East slope of Snow Mountain above Fout Springs, and along Stony Ford; Cook Springs, Bear Valley, and hills between Bear Creek and Cortena Creek. *Lake County*: Blue Lakes to Saratoga Springs and valley about Upper Lake (town); east shore of Clear Lake (between Upper Lake and Bartlett Landing), and up on hills into lower edge of pine forest; east side of Bartlett Mountain on spur reaching to edge Bartlett Creek Valley; about Bartlett Springs; east end of Sulphur Bank arm of Clear Lake on shore facing Eilem Island; west side of Clear Lake from old mission near Kelseyville to Soda Bay, and on base slope of Mount Konokti; Lake from Soda Bay to Horseshoe Bay; south of Mount Konokti on west shore of Lower Lake; west of Clear Lake, near Highland Springs and westward on road to Hopland; 5 miles south of Kelseyville, and southward to near Middletown, and at point (2,000 feet) about 8 miles northwest of latter; near Adams Springs; Middletown westward over Cobb Mountain Divide; on road from Middletown to within 7 miles of Lower Lake, and along St. Helena and Putah creeks from Middletown eastward; common on St. Helena Creek from edge of Middletown valley southward and up Mount St. Helena (3,000 feet). *Santa Clara County*: Coyote Creek near Gilroy Hot Springs; highest parts of Mount Hamilton and adjacent ridges near Lick Observatory. *Alameda County*: Canyons of Mission Peak (near Mission San Jose). *Contra Costa County*: Upper part of Marsh Creek Canyon at east base of Mount Diablo, and Mitchell Canyon; hills near Martinez, and westward on bay shore. *Santa Cruz County*: Abundant in most parts of Santa Cruz Mountains, including Boulder Creek Valley; on railroad from Los Gatos to Fulton Grove of redwoods; scarce in south part of Santa Cruz hills east of north end of Monterey Bay, and for several miles northwest of Watsonville does not occur at all. *Monterey County*: Probably absent (or rare) in Monterey-Pacific Grove region; Santa Lucia Peak to within about 600 feet of summit; Arroyo Seco Canyon and north of peak in Arroyo Seco Valley above junction of Willow Creek. *San Benito County*: West side gulch of San Juan Valley and at north base of Fremont Peak. *Los Angeles County*: Near Alpine Tavern (Mount Lowe) and canyons lower down. *Riverside County*: Canyons on west side of San Jacinto Mountain. Noted also near Mexican line near north end of (southern limit in) Coast Range. Noted as follows on lower west slope of Sierras: *Shasta County*: Canyon of Sacramento River (few miles above Redding); lower McCloud River (above and below Baird). *Tehama County*: About 10 miles east of Payne post-office. *Butte County*: Westward to a little above Bidwell Bar (1,200 feet) and eastward to near Berry Creek (1,700 feet). *Yuba County*: Southwest slopes of Oregon Hills, but not west of these nor east of North Yuba Canyon (east of Oregon hills). *Placer County*: North Fork American River Canyon, near Colfax; Devils Canyon (between Colfax and Forest Hill); east of latter and east of Iowa Hill; on railroad between Dutch Flat and Blue Canyon (at about 4,000 feet). *Amador County*: Deadmans Creek to Dry Creek (road between Oleta and Volcano); between Oleta and Sutter Creek, and above Defender Mine in Mokelumne River Canyon. *Calaveras County*: Between Mokelumne Hill and West Point. *Tuolumne County*: Chinese to Crocker's, mostly from crossing of South Fork Tuolumne River eastward; middle fork of latter to about 3,500 elevation; road from Crocker's to Hetch-Hetchy at point between Hog Ranch and Canyon Meadow; Hetch-Hetchy Valley and south slope (800 feet) and north side (1,500 feet). *Mariposa County*: On hill above Bull Creek Gulch, between Coulterville and Bower Cave; near creek directly northwest of Mariposa, and south of Mariposa in Chowchilla Canyon (at about 2,500 feet); abundant on north side of ridge west of Wassama, between latter and Wawona, and between Wawona and Yosemite; Yosemite Valley and Merced River to top of Nevada Fall and into Little Yosemite Valley. *Madera County*: Fresno Flat and above latter on China Creek; gulch (2,600 feet) on road from O'Neal to North Fork; at latter place and on North Fork San Joaquin River Canyon near Kitanna Creek. *Fresno County*: Gulches of Pine Ridge (north of Kings River), from Sycamore Creek eastward to beyond Rush Creek; South Fork Kings River, near Converse Basin and between Mill Creek and Badger, thence to Eshom Valley. *Tulare County*: Badger to about 6 miles of Auckland; occasional in gulches of Kaweah River Canyon between Redstone Park and Sequoia National Park; lower canyon of East Fork Kaweah River from Three Rivers to Mineral King; east half of Tule Indian Reservation (South Fork Tule River Basin) (southern limit in Sierras).

OCCURRENCE.

Borders and vicinity of higher foothill streams, spring-watered gulches, lower mountain slopes and canyons; in moist gravelly, rocky, or rich humous soil; constant, abundant soil moisture essential. Forms dense clumps and small patches (as a shrubby tree), or is scattered singly and in groups (as a larger tree) with broadleaf maple, California sycamore, red and white alders, madroña, and tau-bark and canyon live oaks. Largest in southwest Oregon and adjacent California; smaller elsewhere, especially in Sierras.

CLIMATIC CONDITIONS.—Similar to those of red and white alders.

1. *Ptelea trifoliata* L. Hop-tree. Wafer Ash.

Leaves rarely 5-foliolate on vigorous shoots; leaflets sessile, ovate or oblong, pointed, the terminal leaflet generally larger and more gradually contracted at base than the others, entire or finely serrate, covered at first with short close pubescence, becoming glabrous and rather coriaceous at maturity, dark green and lustrous above, pale below, 4-6' long, 2½-3' wide, with a prominent midrib and primary veins; turning clear yellow in the autumn before falling; petioles stout, thickened at base, 2½-3' in length. Flowers appearing in early spring on slender pubescent pedicels 1-1½' long, the pistillate and staminate flowers produced together, the staminate usually less numerous and falling soon after the opening of the anther-cells; calyx and petals pubescent; ovary puberulous. Fruit with a thin almost orbicular sometimes slightly obovate wing, nearly 1' across, on a long slender flexed pedicel, in dense drooping clusters remaining on the branches through the winter; seeds ½' long, dark red-brown.

A round-headed tree, rarely 20°-25° high, with a straight slender trunk 6'-8' in diameter, small spreading or erect branches, and slender branchlets covered at first with short fine pubescence, becoming glabrous, dark brown and lustrous, and marked by wart-like excrescences and by the conspicuous leaf-scars; more often a low spreading shrub. Winter-buds depressed, nearly round, pale or almost white. Wood heavy, hard, close-grained, yellow-brown, with thin lamellally distinguishable supwood of 6-8 layers of annual growth. The bitter bark of the roots is sometimes used in the form of tinctures and fluid extracts as a tonic, and the fruit is occasionally employed domestically as a substitute for hops in brewing beer.

Distribution. Generally on rocky slopes near the borders of the forest, often in the shade of other trees; Long Island, New York, Pennsylvania, and westward through southwestern Ontario (Point Pelee) and southern Michigan to southern Iowa, southeastern Nebraska, and southward to Georgia, Alabama, eastern Louisiana and through Missouri and Arkansas to southeastern Kansas, eastern Oklahoma and eastern Texas. A form with leaflets soft-pubescent on the lower surface (var. *mollis* T. & G.) occurs in the south Atlantic states from North Carolina to Florida.

Often planted as an ornament of parks and gardens.

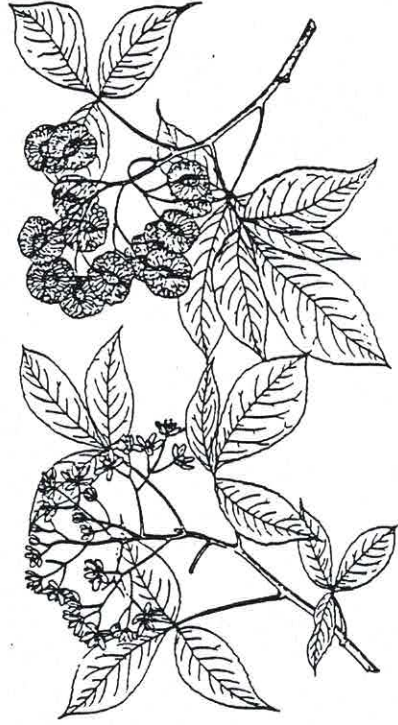


Fig. 582

MANZANITA

Manz. sa (*Arctostaphylos*)

Arctostaphylos, like *Ceanothus*, is one of the larger genera in number of species in the state, and many of the species grow in the Bay Region counties. The growth form is variable: some kinds are creepers, some form mounds and have trailing branches that root readily, some are erect branching shrubs 10 to 20 feet high. Some of the erect shrubs are killed by fire, but others of the shrubby species sprout again after fire from a woody basal platform or burl. One finds a conspicuous lack of unanimity in the scientific names applied to manzanitas in the books on western plants. One botanist's species may be only a subspecies or even a synonym in another botanist's opinion. It would appear that not all the species—often hybrids that occur in nature—are yet stabilized and thus have not had time to spread into adjacent localities. Quite a few that are recognizably distinct are very limited in distribution, such as *A. silvicola* (fig. 19), which grows only in a small area in Santa Cruz County, and *A. crustacea rosei*, which is found only in the coastal scrub in San Francisco County. Other species, like the Big-berried Manzanita (*A. glauca*) (fig. 20), seem "old" and well established. Big-berried Manzanita has an extensive range from Mount Diablo southward to Baja California. For your convenience all the species known to grow in the ten Bay Region counties are listed here by growth form. For convenience, also, the scientific names in the lists are taken from one book only: *A California Flora* by Philip A. Munz.

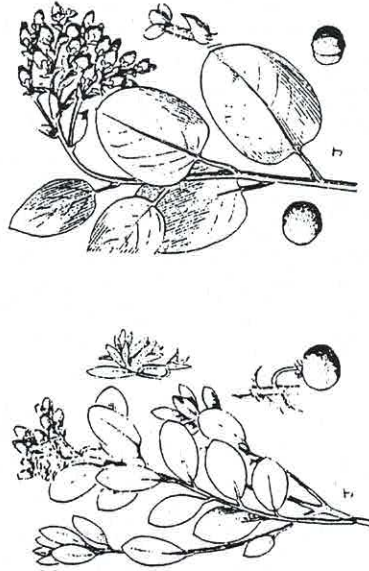


Fig. 19 *Arctostaphylos silvicola* Fig. 20 Big-berried Manzanita

1. *Heteromeles arbutifolia* Roem. Tollyon. Toyon.

Leaves appearing with the flowers in early summer, 3'-4' long, 1'-1½' wide, usually persistent during at least two winters; petioles ¼'-½' in length. Flowers opening from June to August in clusters 4'-6' across and often more or less hidden by young lateral branchlets rising above them. Fruit ripening in November and December, mealy, as-triangular and acid, scarlet or rarely yellow, ¼' long, remaining on the branches until late in the winter.

A tree, sometimes 30' high, with a straight trunk 12'-18' in diameter, dividing a few feet above the ground into many erect branches forming a handsome narrow round-topped head, and slender branchlets covered at first with pale pubescence, in their first winter dark red and slightly pubescent, ultimately becoming darker and glabrous. Winter-buds ¼' long. Bark ¼'-½' thick, light gray, with a generally smooth surface roughened by obscure reticulate ridges. Wood very heavy, hard, close-grained, dark red-brown, with thin lighter colored sapwood of 7 or 8 layers of annual growth. The fruit-covered branches are gathered in large quantities and used in California in Christmas decorations.

Distribution. Usually in the neighborhood of streams or on dry hills and especially on their northern slopes, and often on steep sea-cliffs; California: coast region from Mendocino County to Lower California; most common and of its largest size on the islands off the California coast; on the foothills of the Sierra Nevada and on the San Bernardino Mountains up to altitudes of 9000' above the sea and usually shrubby; very abundant and forming groves of considerable extent on the island of Santa Catalina.

Occasionally cultivated as an ornamental plant in California, and rarely in the countries of southern Europe.



Fig. 349

Birch-leaf Mahogany; Mountain Mahogany.^a

Cercocarpus parvifolius Nuttall.

DISTINGUISHING CHARACTERISTICS.

Birch-leaf mahogany is usually shrubby, with several long, sparingly branched stems, and under 10 feet in height; occasionally a tree 15 to 25 feet high, with a rounded crown of straight, upright, stiff, slim branches and a short trunk 4 to 8 inches in diameter. The bark of large limbs and small trunks is smooth and dull gray to brownish; that of large trunks is thin, flaky, and reddish-brown. The more eastern form appears to have much firmer bark with shallow seams, and its scales are much less easily detached. Mature leaves (fig. 159), with prominent straight veins, are thickish, smooth, sometimes minutely hairy, deep yellowish-green on their top sides and whitish, occasionally brownish, beneath. Leaves of a season's growth persist as a rule for about two seasons; very commonly, however, they persist only for one summer and winter, falling as the new ones appear the succeeding spring. The long-tailed, hairy fruits are enclosed in a tubular case which has a distinct slender stem, instead of being stemless like the preceding species. The silky young twigs have a pleasant slightly aromatic flavor. Twigs of the low shrubby forms of this species are often extensively eaten by cattle, in some sections furnishing a considerable part of the mountain browse on which range animals depend for food. Wood, of somewhat lighter weight, is otherwise very similar to that of the preceding tree; rarely used except locally for firewood.

LONGEVITY.—Very slow-growing tree. Stems from 5 to 6 inches thick are from 50 to 60 years old. Further study of its growth and age limits is desirable. Three varieties of this species have been described. These are distinguished on the basis of characters which the writer believes to be only such natural modifications in leaves and fruit as are to be expected in individuals growing under varying soil and climatic conditions. Through all of the forms it seems possible to trace the marks of one variable species; no essential differences can be found in the wood of the different trees. *Cercocarpus parvifolius betuloides* (Nuttall) Sargent, the California coast and Sierra foothill form, has wider leaves, smooth above, and larger fruit than are produced elsewhere. *Cercocarpus parvifolius breviflorus*^b (Gray) Jones is distinguished by very small flowers and small, narrow leaves with entire slightly curved or very finely toothed borders. This form occurs in the Southwest. *Cercocarpus parvifolius paucidentatus*, a form of the same region, is characterized by leaves with few or no marginal teeth.



FIG. 159.—*Cercocarpus parvifolius*.

RANGE.

From western Nebraska to Oregon (Siakiyou Mountains), south to western Texas and northern Mexico; California (west of Sierra Nevada and south to San Jacinto Mountains; Santa Cruz Islands); Lower California (mountains).

OCCURRENCE.

Habitat and silvical characteristics similar to those of mountain mahogany.

Quercus douglasii Hooker and Arnott.

DISTINGUISHING CHARACTERISTICS.

Appropriately called blue oak on account of the blue-green color of its foliage, but known locally also as "white oak," from its light, ashy-gray bark. Trunks exposed to the sun are especially light colored, sometimes even whitish, but are considerably darker gray in sheltered situations.

Usually small or medium sized, from 30 to 40 feet high and from 10 to 15 inches in diameter; exceptionally, from 60 to 75 feet in height and 2 feet in diameter; larger trees occur, but very rarely. The rather thin, narrowly ridged bark flakes off easily. The smooth-looking trunks are short and clear of branches for about 10 to 20 feet; they are invariably leaning or bent, and give off short, thick, horizontal, contorted limbs, which form a compact, flattish, dome-like crown. Year-old twigs are exceedingly brittle, dull gray to reddish brown, and

more or less minutely hairy. Mature leaves (figs. 127, 128), extremely variable in size and form; their upper sides conspicuously tinged light blue, with minute, sparse, star-shaped hairs; beneath pale bluish or yellowish green, with very fine soft hairs; midveins and their branches also with very fine soft hairs. They are shed gradually late in autumn. Acorns (fig. 128), deep chestnut brown when ripe and exceedingly variable in form, are matured in one season.

Wood, dark mottled brown, very dense, heavy, stiff, and brittle, very cross-grained and difficult to split; sapwood, uncommonly thick. Large trunks are often unsound. It is unfit for any ordinary commercial use, but is good for fuel, for which it is extensively used.

LONGEVITY.—Very little is known of the age attained. Believed to be long-lived. Trees from 14 to 20 inches in diameter are from 175 to 280 years old. Owing to the decayed heart of large trees it is exceedingly difficult to determine their age.

RANGE.

CALIFORNIA.—Foothills of coast ranges and west slope of Sierras from Mendocino County and mountains south of Mount Shasta southward to Santa Ynez and Tehachapi mountains and to borders of Mohave Desert. In coast ranges, common on lower foothills of inner mountains and rare in valleys; extends westward and northward to east slopes of seaward range at Ukiah on Russian River, becoming very abundant south of San Francisco Bay. Common in Trinity and Shasta National Forests at 500 to 2,000 feet elevation, on foothills south of Yolt River, on lower Sacramento, McCloud, and Trinity rivers, extending eastward in Trinity National Forest from beyond Shasta (town) to point just west of Redding, occurring also at point 18 miles northeast of Redding. Abundant in Stony Creek National Forest in coast ranges on lowest hills of east slope. In Santa Lucia Mountains, mainly on east slopes in Carmelo, Arroyo Seco, San Antonio, and Nuchemulo river basins at 250 to 3,000 feet. San Luis Obispo National Forest, generally distributed in Carrizo, Salinas, Santa Margarita, San Luis, Arroyo Grande, and Tuasna river watersheds at 1,000 to 2,500 feet. Santa Barbara National Forest, only in northwestern part; in Santa Maria and Santa Ynez river basins, where it grows at elevations of 550 to 4,000 feet. Elsewhere in southern coast ranges, limited to borders of Mohave desert on north slopes of northern Sierra Liebre Mountains and in San Fernando Valley at Encino (southern part of San Gabriel National Forest), the southern limit. On west slope of Sierras it occurs very generally and abundantly in foothills at 500 to 3,000 feet, southward throughout that side into valleys of Tehachapi Mountains; common, at north, in Lassen Peak and Yumas National Forests up to 2,000 feet. Abundant in Stanislaus National Forest on lowest hills between 300 and 1,500 feet, as it is also, up to about 1,000 feet, in the Sierra National Forest.

OCCURRENCE.

On low foothills and their valleys; in dry, lony, gravelly, and rocky soils. Forms extensive, peculiarly open, pure stands, and grows with *Waltzenus oak*, California white and live oaks, and Sabine pine.

CLIMATIC CONDITIONS.—Similar to those of Sabine pine.

TOLERANCE.—Very intolerant of shade.

REPRODUCTION.—Trotitic peridotic seeder. Seedlings scarce in ground usually grazed or cultivated, where much seed is destroyed or has little chance of germination; rather abundant elsewhere.

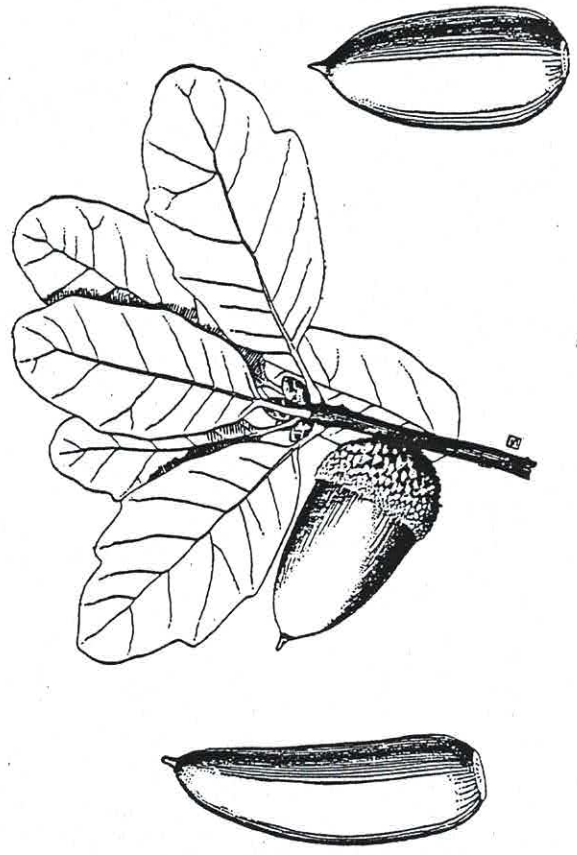
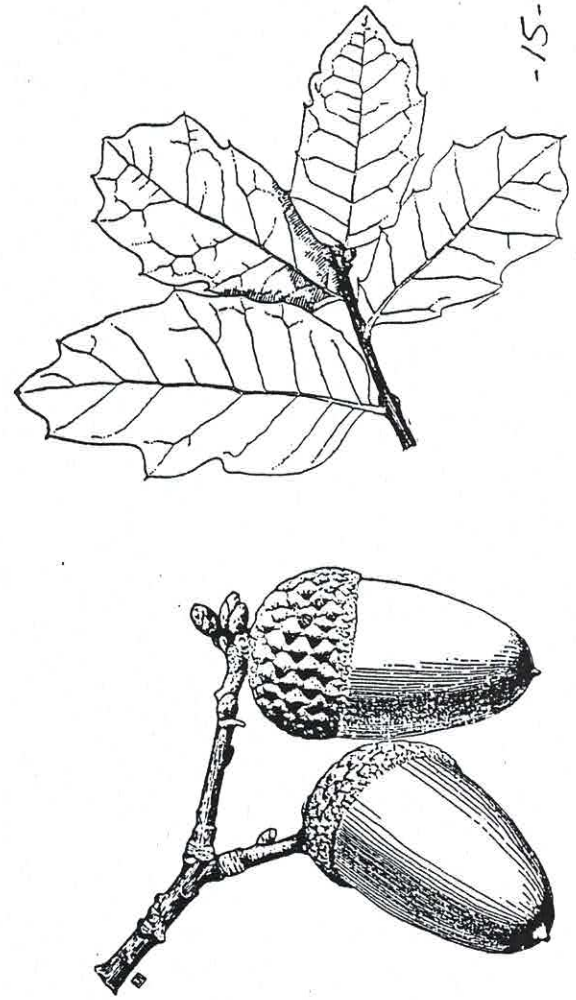


FIG. 128.—*Quercus douglasii*.



Valley Oak.

Quercus lobata Née.

DISTINGUISHING CHARACTERISTICS.

Valley oak, so called because it grows chiefly in open valleys, is the largest of western oaks. A striking characteristic is its scattered occurrence. Massive, short-trunked individuals, with enormously broad, often symmetrical, rounded crowns, grow naturally far apart, forming picturesque vistas through their open ranks. The huge trunk, with grayish, deeply furrowed bark, gives off very large, rough-barked, arching limbs at from 8 to 25 feet from the ground, the drooping lower branches sometimes reaching the ground. Occasional trees have tall, undivided trunks, with small spreading or drooping short branches in a narrow, dome-like crown; generally, however, there is not more than a single length of clear saw timber in the trunks. Height, from 60 to 75 feet, sometimes 80 or 100 feet, with a diameter of from 30 to 40 inches or more. As it straggles up narrow valleys into the foothills it becomes small, often under 30 feet in height and 1 foot through. Mature leaves (fig. 123), shed in autumn, are variable in size and form on the same tree; deep green and minutely hairy (star-shaped hairs) on their top sides, lighter and minutely hairy beneath; leaf stems also hairy. Acorns (fig. 123), matured in one season and sometimes produced in very large quantities,^a are also variable in size; bright chestnut brown when ripe. Wood, pale dull brown, very brittle, firm, often cross-grained and difficult to split or work. On account of its poor timber form the trees are rarely if ever cut for anything but fuel, for which, however, they are much used.

LONGEVITY.—Nothing is known of the extreme age attained, but it is believed to reach at least from 300 to 400 years. One tree 21½ inches in diameter showed an age of 57 years.

RANGE.

WESTERN CALIFORNIA.—Interior plains and valleys of coast ranges and western foothills of Sierras from below mouth of Pitt River on upper Sacramento River, at the north, where it grows from sea level to 2,000 feet, southward to Tejon Pass, Tehachapi Valley, Antelope Valley (west end of Mojave Desert), and across southern coast mountains; here growing at elevation of 100 to 4,500 feet, and reaching its southernmost limits in Santa Monica and Laramie Park (within the city of Los Angeles). Abundant in Sacramento Valley, extending northward to Anderson on the river and Shasta (town) in western foothills (Shasta County), reaching also valleys of lower Sierra foothills. Both sides Sacramento River and tributaries in Tehama, Glenn, and Butte counties. Northern coast ranges noted in Honey Creek National Forest northward to Gravelly Valley and other streams; in Mendocino County northward to Round Valley, Cahto, and Laytonsville (headwaters of Eel River, Mendocino County); westward to Cahto, Russian River Valley at Willits and Ukiah (Mendocino County), and down river into Sonoma County, where west limits are Forestville (west edge of redwood belt), and farther south, Green Valley and Camp Meeker; southward to Ignacio, San Geronimo Valley, and north base of Mount Tamalpais (Marin County) to Shellville (Sonoma County, Sonoma County). **Lake County:** In south at Middletown, Coyote, and Wrenok Lake valleys and Putah Creek; about Clear Lake, and Cache Creek from Lower Lake to Sacramento Valley; east side of Clear Lake northward on shore to east of Lower Lake; north side of Sulphur Bank

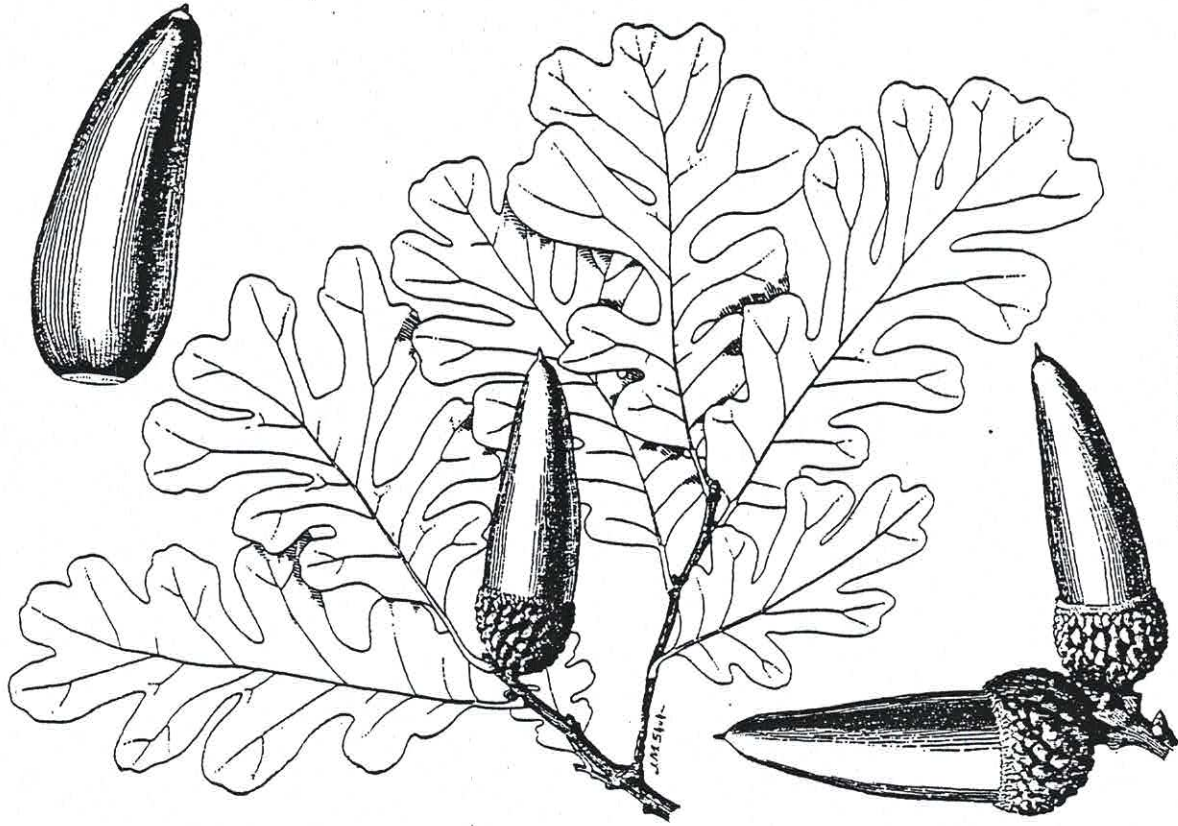


FIG. 123.—*Quercus lobata*.

^a In some parts of the tree's range the sweet acorns are gathered and fed to swine in lieu of grain.

Morehus Oak.

Quercus morehus Kellogg.

DISTINGUISHING CHARACTERISTICS.

Morehus oak is a rare and little known California tree of the black oak group. It was first found about 1863, and since then many new stations for it have been and are still being discovered. It is held by some authors to be a hybrid from *Quercus wislizeni* and *Q. californica*. Its acorns bear a strong resemblance to those of the first oak, while its leaves (fig. 144) are similar in texture to those of the latter oak. The remarkably uniform shape (within reasonable limits) of the leaves borne by widely separated individuals, and the fact that the parents suggested are by no means always within the same locality—one or the other, sometimes both, often very far distant from the supposed offspring—has led the writer to treat this oak as a species. Generally from 10 to 35 feet high and 3 to 8 inches in diameter, with smooth, dark ashy-gray bark. The branches of small, shrubby trees often trend upward, while those of the larger trees stand out horizontally from the trunk, which is free of limbs for about one-third of its length. The leaves, which are shed from midwinter to spring, are dark yellow-green and smooth on the upper sides and light yellow-green and smooth or more or less covered with fine star-shaped hairs beneath. The acorns, maturing in the autumn of the second year, are usually from 1 1/2 to 1 3/4 inches long. The light reddish-brown cups inclose from about one-third to two-thirds of the nut, which is somewhat thicker than that of *Q. wislizeni*. Wood similar in general appearance to that of *Q. californica*, but the thicker, whitish sapwood is considerably tougher; not fully investigated. Of no economic importance and of slight interest to the forester, because of the tree's rare occurrence.

LONGEVITY.—Not fully determined. Believed to be rather long-lived. A single tree, 12 1/2 inches in diameter, showed an age of 64 years.

RANGE.

CALIFORNIA.—Occurs as scattered individuals and detached thickets in northern coast ranges and Sierra foothills. *Coast ranges:* A single tree at Clear Lake, and several at Sulphur Bluff (Lake County); group at north base of Mount Tamalpais (Marin County); thicket on crest of Coast Range back of Berkeley, and a single tree farther north in Berkeley Hills near upper San Pablo Creek; canyon of Big Sulphur Creek between Geysers and Cloverdale (Sonoma County) at point about 3 miles below bridge; also at point 2 miles south of Ridgewood Summit (north of Ukiah, Mendocino County). Reported in Santa Lucia Mountains in Sur, Carmelo, and Arroyo Seco river basins. *Sierra foothills:* In a belt north of Yuba River (Yuba County), running northwest from Red Bluff and lower part of Dry Creek into Butte County; west foot of Stannfield Hill grade (about 21 miles northeast of Marysville); near Newcastle (Placer County); Eldorado County, on a head branch of Canyon Creek (tributary Middle Fork American River) 2 miles northeast of Georgetown; North Fork of Cosumnes River (near Nashville), Middle Fork of Cosumnes (between Piesann Valley and Oleta) ridge between North and Middle Forks Cosumnes (about 6 miles east of Nashville, elevation about 2,000 feet); Sacramento County; near Folsom; Amador County, near Plymouth, on head of Indian Creek (branch Cosumnes River), near Oleta (Sutter Creek road), and at several points on Raucheria near—lowest station about 3 miles from Sutter Creek, 3 miles north of Ione on low hill near Clay pit (leaves much toothed), with blue oaks, Mokelumne River west of West Point; Calaveras County, several thickets in Bear Creek Canyon (branch Calaveras River) 2 miles north of Mountain Ranch, on San Domingo Creek (tributary Calaveras River) 2 to 3 miles north of Murphy, road between Mountain ranch and Railroad Flat (elevation 2,450 feet) at two points on South Fork of Mokelumne River between Railroad Flat and West Point; Tuolumne County,

between Sonora and Tuolumne River, at two points (little north of Tuolumne Canyon) on road from Carfers to Big Oak Flat, near head of Deer Creek—south side of Tuolumne on same road. At several places in gulch few miles north of Coulterville (Mariposa County) on road between Coulterville and Priest, with Kellogg oak and bigland live oak; frequent from Cold Springs Station (Mariposa County) to Fresno Flats and North Fork (Madera County), especially in Crane Valley. Abundant also near Badger (Tulare County); very abundant on road from Raymond to Yosemite, especially within 6 or 7 miles of Raymond and eastward in edge of western yellow pine belt beyond Wasama; 2 miles west of latter is large tree at Potts's house, also one few rods north of Ahwahnee road house, and many others in vicinity among Kellogg oaks. At point 2 miles west of Eshom Valley, near east end of Burrough Valley (Fresno County). Range still imperfectly known.

OCCURRENCE.

Foothill slopes and ridges, in dry gravelly soils.

In groups and patches of pure growth interspersed with California black oak, *Wislizenus* oak, Fremontia, and occasional blue and valley oaks. Nowhere abundant.

CLIMATIC CONDITIONS.—Similar to those of gray pine.

TOLERANCE.—Evidently very tolerant, its evergreen leaves being retained in dense shade. **ITEROPRODUCTION.**—Imperfectly known. Appears to seed at irregular intervals at rather early age, and but sparingly. Owing to the tree's supposed hybrid origin, the fertility of acorns requires testing.

Also known as Oracle Oak



FIG. 144.—*Quercus morehus*.

California Scrub Oak.

Quercus dumosa Nuttall.

DISTINGUISHING CHARACTERISTICS.

With the possible exception of the polymorphous *Quercus undulata*, of Rocky Mountain range, California scrub oak unquestionably varies more than all other oaks in the form and size of its leaves and acorns. No sort of satisfactory harmony can be established between the perplexing phases of its development, and one is likely to be hopelessly confused without a most comprehensive field study of the bushes and small trees belonging to this species. At least 3 species and as many varieties have been singled out, but the distinctions between them are hopelessly confused by the occasional occurrence of their various types of leaf and fruit on the branches of a single individual. Unless the observer has a comprehensive view of all the points that seem to compel the unling of these diverging forms into one variable species, and one fairly constant subspecies, this reduction may seem hardly proper.

It is known as "scrub oak," for it occurs in the main, singly or massed in low thickets, with the fine, exceedingly stiff twigs and branches closely mingled. The California coast island representatives grown in sheltered places are from 20 to 25 feet high and from 8 to 12 or more inches in diameter, with scaly brown bark; while the bark of the scrub forms is scaly and light ashy-gray. The twigs, so rigid as to seem thorny to one penetrating a thicket, are branched at very abrupt angles. No adequate statement can be made of the size or form characters of the leaves and acorns, types of which are figured as fully as possible in fig. 131.

The best marked variety is *Quercus dumosa revoluta* Sargent, to be looked for especially in the northern and southern range of the species. It is distinguished by its strongly rolled or curled leaves, more or less coated with whitish hairs, and with prickly borders; the curled edges are turned toward the under surface of the leaf. Leaves of a season's growth adhere to the branches until the succeeding spring, and begin to fall as the new leaves are formed. Acorns are matured in one season.

Wood light brown, hard, brittle; of no commercial use. The species useful only in assisting, with other desert hill shrubs and small trees, in forming a protective cover on the too scantily clothed dry slopes. Its strong roots go deep into rocky crevices and send up sprouts year after year, provided that the thin stems are not too severely burned.

LONGEVITY.—Not fully determined. A single stem 4½ inches through shows an age of 20 years.

RANGE.

Central California to Lower California. Chaparral belt of foothills from central Sierras and of coast ranges in Mendocino County and Trinity Mountains, southward to northern Lower California; also on islands off southern California, here, only, becoming a tree of any considerable size.

CALIFORNIA.—Common scrub oak of southern coast ranges, the type definitely known northward on seaward mountains only to San Mateo County, and on Mount Hamilton range to southern Alameda County; eastward in southern California to desert slopes of San Gabriel, San Bernardino, San Jacinto, and Cuyamaca mountains. Common in Santa Lucia and San Luis Obispo mountains between 1,000 and 4,000 feet elevation, in San Carmelo, Arroyo Seco, San Antonio, Naclamiento, Carriso, Salinas, Santa Margarita, San Juis, Arroyo Grande, and Huasna river basins. In central Sierras the species is often more common than its variety *revoluta*. Locally noted in Butte County on foothills along Chico-Sterling Road; foothills on Sweetwater Creek (Eldorado County); in Stanislaus National Forest, forming small thickets near bottoms of canyons at 2,500

to 3,000 feet, on headwaters of Esperanza Creek (tributary North Fork of the River), and on San Antonio and Indian Creek (tributaries of South Fork of the River); also at Sherlock and West Point. In Sierra National Forest, reported on canyon sides of East Fork of Tule River, below Nelson's ranch, at about 5,500 feet elevation and on Greenhorn Mountains up to 5,000 feet. Very abundant in southern mountains. Its lowest altitude in Santa Barbara National Forest is 1,400 feet, while it goes up to 5,000 and sometimes 7,000 feet; in watersheds of Santa Maria, Santa Ynez, Santa Barbara, Matilija, Piru-Seape, Newhall, and Elizabeth rivers. In San Gabriel Mountains, on south and north slopes facing desert, growing on foothills south of Antelope Valley (western extremity of Mojave Desert), and on Liebro ranch; abundant on both sides of Cajon Pass, and farther west, at west end of Antelope Valley, common on hillsides facing desert; thence southward through Cañada de las Uvas. In San Bernardino Mountains eastward to canyons facing desert. Abundant in chaparral belt of San Jacinto National Forest up to 5,000 feet on mountain sides, and often among pines at higher elevations on south side. On Santa Ana Mountains, near coast, in scrub growth on tops of ranges at 1,000 feet. Occurs in San Diego County on mountains from near sea (Pomeroy Canyon, near San Diego, and near mouth of La Juana River, on Mexican boundary) eastward to Coast Range; here, in Palomar, Balkan, and Cuyamaca mountains, reaching east slopes; on Mexican boundary, down to about 2,513 feet on east slope, at Wagon Pass, going to about 4,000 feet, and at Jucumbá Hot Springs down to 2,822 feet elevation.

The form in Santa Cruz and Santa Rosa islands, off the southern mainland coast, usually with rather large lobed leaves, is exceptional in representing the principal tree growth of this species. Its size and larger foliage are believed, however, to result from its protected habitat in these island canyons.

LOWER CALIFORNIA.—Southward on foothills of Mount San Pedro Martir to Telmo, about latitude 31°. The range of *Quercus dumosa revoluta*, which is within that of the species, is imperfectly known. Foothills of central Sierras and of coast ranges chiefly north of San Francisco Bay. In Sierras recorded only from Stanislaus National Forest, where it forms occasional dense thickets; locally noted near Volcanoville and Georgetown. Occurs rarely in Coast Mountains southward to Santa Lucia Mountains, but replaces species apparently only north of San Francisco Bay; abundant to Mendocino County and Napa Valley, and probably with species in Stony Creek National Forest, north of Clear Lake, and in Trinity Mountains (Shasta National Forest); locally noted in Lake County, and Knoxvile Grade, Napa River basin, and in Upper Conn Valley.

OCCURRENCE.

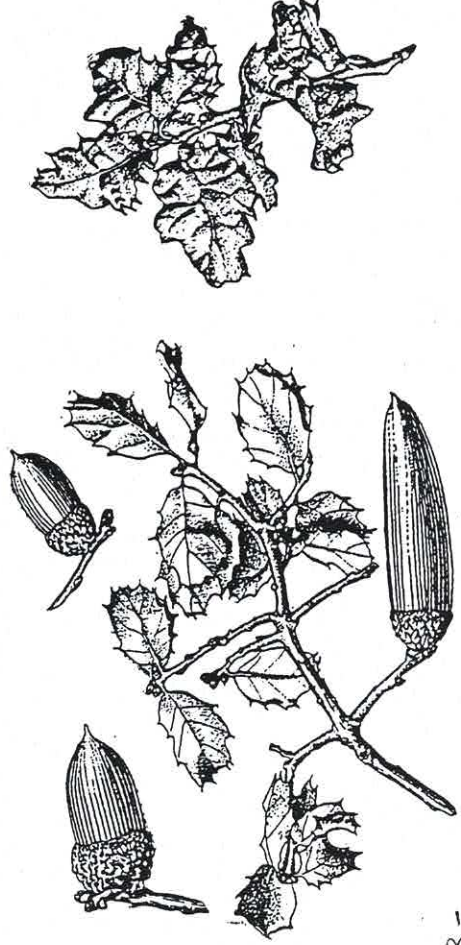
Low mountain and foothill slopes and sides of desert hill canyons, in the poorest and driest gravelly soils, often so sterile as to support little else.

In scattered, thick clumps and patches of pure growth, more or less interspersed with Christmas berry, mountain mahogany, ceanothus brush, manzanitas and other chaparral of which it is essentially a part.

CLIMATIC CONDITIONS.—Similar to those of gray pine.

TOLERANCE.—Appears to be tolerant of but little shade.

REPRODUCTION.—Abundant seeder; apparently seeds nearly every year. Seedlings moderately abundant in exposed mineral soil of pockets where seed is well covered by washing or other accidents.



BLACK OAK

9. *Quercus Kelloggii* Newb. Black Oak.
Quercus californica Coop.

Leaves oblong or obovate, truncate, cuneate or rounded at the narrow base, 7 or rarely 5-lobed by wide and deep or shallow and oblique sinuses rounded in the bottom, the terminal lobe ovate, 3-toothed at the acute apex, the lateral lobes tapering gradually from the base or broad and obovate, coarsely repand-dentate with acute pointed teeth, or rarely entire, when they unfold dark red or purple and pilose above and coated below and on the petioles with thick silvery white tomentum, at maturity thick and firm, and on the petioles dark yellow-green and glabrous or rarely pubescent above, light yellow-green or lustrous, dark yellow-green and glabrous or rarely pubescent or occasionally hoary-tomentose below, 3'-6' long, 2'-4' brownish and glabrous or pubescent, or occasionally hoary-tomentose below, 3'-6' long, 2'-4' wide; turning yellow or brown in the autumn before falling; petioles slender, yellow, 1'-2' in length. **Flowers:** staminate in hairy aments 4'-5' long; calyx pubescent, divided into 4 or 5 ovate acute segments shorter than the stamens; anthers bright red; pistillate on short tomentose peduncles, their involucre scales ovate, coated like the acute calyx-lobes with pale tomentum; stigmas dark red. **Fruit** short-stalked, solitary or clustered; nut oblong, ellipsoidal or obovoid, broad and rounded at base, full and rounded or gradually narrowed and acute at the puberulous apex, 1'-1½' long, about ¾' broad, light chestnut-brown, often striate, inclosed for one fourth to two thirds of its length in the deep cup-shaped cup light brown on the inner surface, and covered by thin ovate-lanceolate lustrous light chestnut brown scales, sometimes rounded and thickened on the back toward the base of the cup, their tips elongated, thin and crose on the margins, often forming a narrow fringe-like border to the rim of the cup.

A tree, occasionally 100' high, with a trunk 3'-4' in diameter, stout spreading branches forming an open round-topped head, and branchlets coated at first with thick hoary castaneous tomentum, bright red or brown tinged with red, and usually glabrous or pubescent or puberulous during their first winter, becoming dark red-brown in their second year; frequently much smaller and at high elevations a small shrub (*f. ciliata* Jeps.). Winter-buds ovoid, gradually narrowed and acute at apex, about ¼' long, with closely imbricated pale chestnut-brown scales ciliate on the thin scarious margins and pubescent toward the point of the bud. **Bark** of young stems and branches smooth, light brown, becoming on old trunks 1'-1½' thick, dark brown slightly tinged with red or nearly black, divided into broad ridges at the base of old trees and broken above into thick irregular oblong plates covered by minute closely appressed scales. **Wood** heavy, hard, strong, very brittle, bright red, with thin lighter colored sapwood; occasionally used as fuel.

Distribution. Valleys and mountain slopes; occasionally in the Mackenzie River in western Oregon, southward over the California coast ranges, and along the western slopes of the Sierra Nevada up to altitudes of 6500' to the Cuyamaca Mountains near the southern boundary of California; extending across the Sierra Nevada to the foothills of Owens valley (*Jepson*) in eastern California; rare in the immediate neighborhood of the coast; the largest and most abundant Oak-tree of the valleys of southwestern Oregon and of the Sierra Nevada, sometimes forming groves of considerable extent in coniferous forests; of its largest size at altitudes of about 6000' above the sea.



Fig. 231

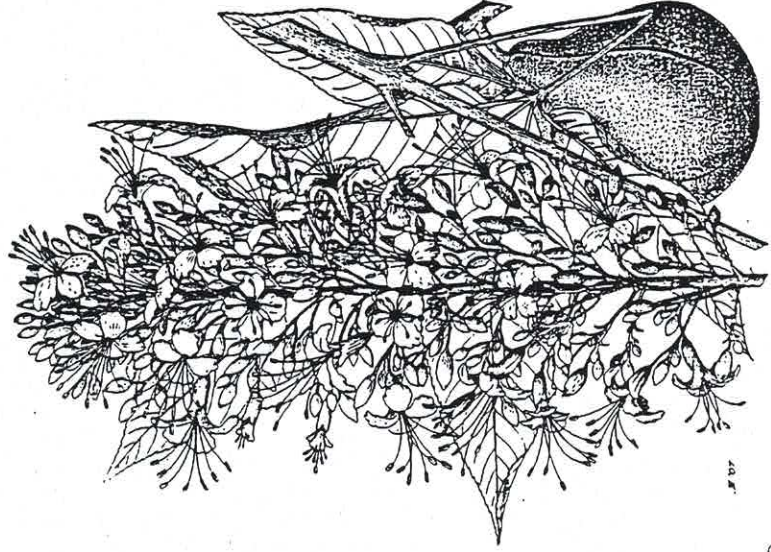
California Buckeye.

- Ascutus californica* Nuttall.

DISTINGUISHING CHARACTERISTICS.

California buckeye is shrub-like; it has several stems from 10 to 20 feet high and from 3 to 6 inches through, growing together from a common root. Sometimes it is from 25 to 30 feet high and from 8 to 20 inches in diameter, with a short, smooth, gray—often whitish—trunk and a flat-topped, open crown of wide spreading limbs. Leaf-stems from 4 to 5 inches long and commonly with 5 (sometimes 4 to 7) leaflets (fig. 189), which are from 3 to 7 inches long, smooth throughout when mature, except for minute hairs in the angles of the veins on the paler green lower sides. They fall in early autumn, leaving the large pear-shaped fruits (fig. 189), 2½ to 3 inches long, hanging down conspicuously from the tips of the branches. The fruit capsule usually contains one seed, about 2 inches thick. Wood, fine-grained, white to very pale yellow, the heart and sapwood scarcely distinct from each other; of no commercial use.

The chief usefulness is in forming considerable open but helpful cover on exposed dry, rocky foothill slopes, in gulches, and along hill streams where few other trees grow.

FIG. 189.—*Ascutus californica*.

CALIFORNIA.—Foothills, lower mountain slopes, and high valleys (at north) of coast ranges and Sierras.

Coast Ranges.—From upper Sacramento and Trinity rivers and Hoopa Valley (on Klamath River, Humboldt County) to southern cross ranges; generally at elevations of 500 to 4,000 feet—occasionally to 5,000 feet. *Shasta County*: North limits, delta in Sacramento River Canyon, above mouth of Pitt River, at 1,150 feet, and at point 15 miles up McCloud River; eastern limits, isolated bodies in northeastern corner of county on hills west and south of Fall River, and on Hat Creek (near Cassel), main body ending 2 miles east of Montgomery Creek (tributary Pitt River); west limit, immediately on Sacramento Valley on ridge west of French Gulch at 2,400 feet; south limit, immediately on Sacramento River at Anderson (11 miles south of Redding). *Trinity County*: North limits, Trinity River and Weaver Creek considerably above Weaverville at 2,100 feet, Canyon Creek (10 miles above Junction) at 2,400 feet; western limit, east side Mad River Valley on bottom slopes of South Fork Mountain. *Humboldt County*: Only in Trinity River bottoms, mainly in Hoopa Valley (north limit), Supply Creek Canyon and Redwood Creek (west of Hoopa Valley near Bair ranch), west limit. *Tehama County*: Eastward on west side of Sacramento Valley to point 8 miles west of Red Bluff (700 feet), and 2 miles southwest of Paskenta; on coast range (6 miles west of Bearum post-office) at 3,000 to 3,400 feet. *Mendocino County*: Westward to west slopes of Eel River, at 1,900 feet, and northward on Russian River to Hopland. *Sonoma County*: Westward to west side of Russian River; southward to Alexander Valley (Russian River, south limit in coast ranges). *Napa County*: South and southwest slopes of Mount St. Helena at 400 to 2,800 feet, southward on ridge east of Napa Valley nearly to Rutherford (south limit in coast range). *Yolo County*: Eastward to east ends of ranges on both sides of Capay Valley (south limit in hills about Sites, ridge west of Antelope Valley, hills bordering Cortena Creek, to point within about 10 miles of Williams, and to one between Arbuckle and Dunnigan (Southern Pacific Railroad). *Lake County*: General between 2,500 and 3,000 feet, but on north slope of Mount St. Helena only up to 1,500 feet. South of San Francisco, on north slopes of Monte Diablo (Contra Costa County) at 800 to 3,000 feet, and on east slope near headwaters of Marsh Creek. Mount Hamilton Range (Santa Clara County), west side at 2,000 to over 4,000 feet; also farther south about Gilroy Hot Springs. Not in Santa Cruz Mountains west of Santa Clara Valley nor about Monterey Bay (Monterey County). Common in Santa Lucia Mountains, east of summit, at 400 to 2,500 feet; and also on west slopes in vicinity of Los Burros. Abundant in Reverse Canyon south of Arroyo Seco and east of Santa Lucia Peak; also on nearly all slopes on south side of divide, except on Santa Lucia Peak; south of Santa Lucia Peak about 1 mile below Milpitas schoolhouse; on San Antonio Creek to Jolon and vicinity upper San Antonio Creek slopes and tributaries to 2,000 or 2,500 feet, here meeting lower border of Coulter pine; southeast border of Monterey County on hills about Priest Valley, and eastward into west border of Fresno County. *San Benito County*: Common on Gabalan and San Benito ranges; Chelone Creek Canyon and neighboring hills; higher hills west side of Bear Valley and northward on higher parts of Gabalan Range to point opposite Tres Pinos; second ridge east of San Benito Valley (south of San Benito post-office), and farther south on hills most of the way to Hernandez and New Idria; hills about Bitter Water Valley. In San Luis Obispo National Forest, at 1,000 to 3,000 feet. Noted a few miles south of Templeton on east side San Luis Obispo Divide, but very rare on west side of San Joaquin Valley from south border of San Benito County southward to end of valley. Below 4,000 feet in San Rafael and San Emigdio mountains, and on north slopes of Mount Pinos; Santa Ynez Range, at 500 to 5,000 feet; slopes of Sierra Llebra and extending nearly down to Antelope Valley. *Sierras*: General on west side, in upper foothills, from mouth of Pitt River to Walker Basin. In northern part, chiefly at 500 to 2,500 feet—sometimes to 3,000 feet, or in canyon of South Fork of Yuba River, to 4,200 feet; in central part, range mostly 800 to 3,000 feet, but occasionally reaching 4,000 feet. *Tehama County*: West limit on Sierra foothills, 7 miles east of Red Bluff (on Sacramento River); east limit, 1 mile east of Payne post-office, at 3,000 feet, and Lyonsville. *Butte County*: Westward to point 2 miles

Gray Pine;

Pinus subiniana Douglas.

DISTINGUISHING CHARACTERISTICS.

Gray or Digger pine owes its common names to the pale blue-green color of its foliage and to the fact that the large seeds furnish an important food to the California Digger Indians. Its gray, thin-foliated crown of one or two long upright forks with lower drooping small branches distinguishes it at long distances from associated trees. The meager foliage permits the big, dark cones to be seen half a mile away. Young trees form a rounded or pyramidal crown of upright branches from a short, thick stem. In middle age two or more of the upper branches grow very large and long, forming conspicuous U-shaped forks. Old trees are from 50 to 75 feet high, with a bent or rarely straight trunk from 20 to 30 feet long and from 18 to 30 inches in diameter. Larger trees are sometimes found. The bark of young trees and of branches is a dull gray; that of mature trunks is about 2 inches thick and very roughly furrowed and ridged. The ridges are scaly, wide, irregularly connected, and of a dark gray-brown, tinged with purple-red in unweathered parts. The thin, drooping clusters of leaves, a light blue or gray-green, occur two in a bundle (fig. 17, a), and are from 8½ to about 12 inches long. Those of a year's growth remain on the tree for three or four years. When the tree is planted for ornament in a rich, irrigated soil, within its natural range, the foliage becomes very much stouter, giving the tree an entirely different aspect from one grown in its dry native habitat; the cones of such cultivated trees are usually smaller. With the exception of the Coulter pine, the gray pine produces the largest and heaviest cones of any American pine (fig. 17). They mature by September of the second season, remaining firmly attached to the branches for a number of years. The cone scales open very slowly, so that seeds continue to be shed for several months. Indians hasten the opening of the cones by placing them in a red fire. Cones are from 6½ to 10½ inches long. The tips of the scales are a red dish or chestnut brown, later weathered and grayish brown. The seeds (fig. 17) and short wings are very dark chocolate or blackish brown. Seed leaves commonly 15, but often 16. Wood, very coarse-grained (the result of scattered or open stands), dark yellowish brown, often tinged with red; locally used for fuel.

LONGEVITY.—Little is definitely known of the longevity of this pine. It appears to attain its average full growth in from 60 to 80 years; trees from 20 to 24 inches in diameter are from 40 to 50 years old. Recurring fires, to which it has been subjected, seem to prevent its longer survival. If permitted, it would probably not attain an age of over 150 years except in a broken and decrepit form.

Gray Pine.
Pinus sabiniana Douglas.

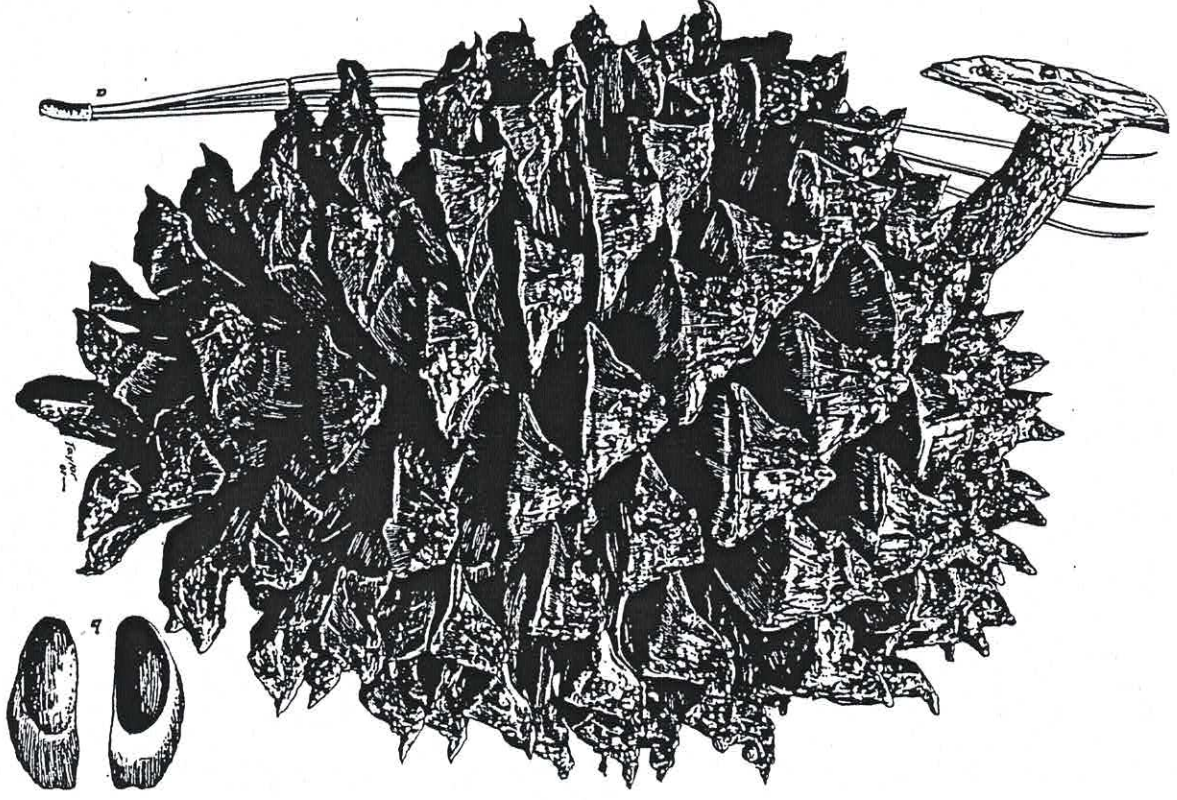


FIG. 17.—*Pinus sabiniana*; a, leaf; b, seed, both natural size. Cone slightly reduced; original 9 inches long.

east of Chico, 8 miles east of Nelson, and to Palermo; eastward to point 1 mile east of Magalla (2,300 feet), West Branch Feather River, Yankee Hill, Harris Mill (1,700 feet; 7 miles east of Bidwell Bar). *Yuba County*: Westward to point 12 miles east of Marysville; eastward to west base of Oregon Hills. *Nevada County*: Eastward nearly to Grass Valley and Nevada City. *Placer County*: Westward to Rocklin (22 miles north east of Sacramento); eastward to Colfax and considerably farther in canyon of North Fork of American River. *Sacramento County*: Westward to Natoma (American River) and Michigan Bar. *El Dorado County*: Eastward 3,000 feet to point 5 miles east of Elacerville, Pleasant Valley, canyons of North, Middle, and South Forks of Cosumnes River and Mount Orcum. *Amador County*: Westward to point 1 mile east of Carbondale; eastward to Oleta, Jackson Reservoir (1,900 feet), volcano basin (Sutter Creek), and between volcano and Oleta. *Calaveras County*: Westward to point few miles east of Wallace and some miles below Tuttle town and Angels; eastward to Rich Gold Gulch, Mountain Ranch, Mokelumne River at least to crossing between West Point and Defender, to point 5 miles east of Murphys (3,200 feet), and farther in canyon of Cooper town Stanislaus River. *Tuolumne County*: Westward to point 8 miles east of Cooper town (1,200 feet); eastward to Cherokee Mine (east of Soulsbyville), Hetch-Hetchy Valley (on main Tuolumne River), to 3,500 feet on Middle Fork of Tuolumne River. *Mariposa County*: Westward to point 3 miles east of Merced Falls; eastward to point 5 miles east of Coulterville (3,200 feet), to point 2 miles north of Cold Springs (Mariposa road), to point on Merced River about 5 miles east of Mariposa, some distance east of Chowchilla at 3,100 feet, ridge near South Fork of North Fork San Joaquin River. *Madera County*: Westward to point 2 miles west of Raymond (900 feet) and 10 miles east of Madera (1,000 feet); eastward to point 3 miles northeast of Wassama (3,100 feet), some miles east of Fresno Flat, at 3,000 feet, ridge east of North Fork, mouth of Mill Creek, on Kings River about 20 miles east of Sanger; eastward to Pine Ridge east of Fresno County; westward to point 4 miles east of Pollasky, to Letcher, mouth of Walker Toll House, Big Creek, and Trimmer Springs (on Kings River). Distribution interrupted in southern Sierras; occurs in valley of Kern River from point 1 mile west of Walker Pass to Kernville, at elevations of 2,500 to 5,000 feet; southward into Tule Indian Res. 3,100 feet, and northward on Greenhorn Mountains, continuously into Tule River reservation. Abundant from Kings River northward, but absent from parts of Tule River basin, from Kaweah basin, and from region between Kaweah and Kings rivers, but reported in Eschom Valley. *Kern County*: Kernville to Havilah, Walker Basin, and nearly to Callente; east of Callente on north slopes about 1½ miles up Callente Creek (1,400 feet), and to far beyond Plute post-office, going eastward to west edge of desert, here meeting upper border of tree yuccas; west of Callente, on slopes of Bear Mountain; south of Callente, common on slopes of Tehachapi Pass; encircles Tehachapi Basin; east of Tehachapi, on hills between Tehachapi Basin and Mohave Desert; west of Tehachapi Valley, on divides about Britte and Cummings valleys; westward from west end of Cummings Valley for about 12 miles to promontory overlooking Kern River plain. Reported northward in Coast Mountains to south slopes of Siskiyou, eastward to Owens Valley, and southward to San Bernardino Mountains.

OCCURRENCE.

In hot, dry valleys and on dry foothills. Grows thriftily on driest, shallow, coarse, gravelly soils—often bated and cracking throughout rainless summer. Unaffected even where brush is killed by drought. Nevertheless it grows rapidly and very thriftily when planted in moist, rich soils within its range, where it becomes a much heavier foliaged tree.

Does not form forests, but occurs mainly in open groups or widely scattered at lower elevations, mostly with chaparral and foothill oaks; higher up, less abundant and mingled with scattered western yellow pine, which often extends below its main belt. Best growth between 2,000 and 3,000 feet, where it is the only pine in chaparral.

CLIMATIC CONDITIONS.—Not fully determined. Climate most suitable, apparently, that of arid regions.

TOLERANCE.—In early life endures shade, but does not require it. Seedlings come up and grow rapidly under chaparral. In late life general appearance of tree indicates need of, or adaptation to, the fullest light.

REPRODUCTION.—An annual seeder, but certain years cones are more abundant than others. Germination only moderate, and vitality of seeds (out of cones) transient. Large, heavy seeds scattered but little by wind, and falling mostly close to seed trees; hence reproduction mainly near seed trees. Seeds germinate late in winter during rainy season, usually under some shade and upon rough, bare mineral soil.

Knobcone Pine.

Pinus attenuata Lemmon.

DISTINGUISHING CHARACTERISTICS.

The form and size of knobcone pine varies considerably, according as it grows in exposed or in sheltered situations. It is commonly from 15 to 30 feet high and from 6 to 12 inches in diameter. Exceptionally large trees are from 60 to 80 feet high and from 18 to 20 inches in diameter. Except in very dense stands, trees of these sizes have broad, pyramidal crowns, the slender branches curving outward and upward toward the stem; the branches grow from the trunk in distant circles, giving an open aspect to the crown. Old trees are peculiar in having the trunk forked near its middle, thus forming a thin-folaged, open, narrow crown. The bark of old trunks is thin, dull brown, and shallowly furrowed and ridged, mainly near the ground; the ridges have large, loose scales. The bark of young trunks and of branches and upper stems of old trees is smooth and light brown. The foliage is nearly always light yellow-green. The leaves (fig. 22), 3 in a bundle, are slender, often with a twist, and from 3 to sometimes 7 inches long, but mainly from 3½ to 5 inches. Leaves persist for about four or five years. The cones (figs. 22, 23) mature by September of the second season. Clusters of them, rigidly attached and bent down, encircle the main stems of even small trees (from 5 to 8 feet high) and are the most striking character of this pine. They adhere to the branches and trunk indefinitely; many trees showing that they have retained their cones for nearly fifty years (embedded in the trunk). Moreover, the cones very rarely open until the tree is killed or they are cut from it; then they open only slowly. In collecting the seed it is necessary to force the cones open by moderate artificial heat. When ripe they are a light yellow or clay brown. The seed (fig. 23, b) is blackish. Seed leaves, 5 to 7, sometimes 8.

Wood rather light and soft, coarse-grained, brittle, pale yellowish brown, and usually with a thick layer of sapwood.

Longevity.—But little is known of the age limits of this tree. It is commonly killed by the recurring fires which run over the dry slopes it inhabits. Considering the unfavorable conditions (barren and dry soils) under which it grows, its diameter growth, as well as its height growth, is rather rapid during early life (from 15 to 25 years old). Trees from 10 to 12 inches in diameter are from 40 to 60 years old. Probably it does not attain an age of over 100 or 150 years. Further study of its longevity is needed.

RANGE.

Throughout Coast Mountains of southern Oregon, of California, and also in southern Cascades of Oregon and northern California Sierras.

Oregon.—Southwestern part south of McKenzie River, and eastward to western slopes of Cascades, where it occurs at 1,000 to 2,000 feet elevation.

California.—Klamath National Forest, at about 5,000 feet; Trinity National Forest, above 5,000 feet, extending eastward to Shasta and Whiskeytown (near Redding) and southward throughout the coast ranges. **Stakiyou County:** East slope of Scott Mountain, between Gaselle and Scott Valley, at about 4,000 feet, and thence to near summit; west slope of Marble Mountain Divide (west of Scott Valley), and thence into Russian Creek basin, scarce on North Fork of Salmon River, especially west of Sawyers Bar; extreme western Stakiyou County (between Salmon and Trinity summits, on trail from forks of Salmon River to Hoopa) up to about 5,400 feet. **Humboldt County:** West slope of Trinity Mountain (east of Hoopa Valley) between 3,700 and 4,100 feet. In Trinity County on Canyon Creek near Dedrick. **Shasta County:** Common on Sacramento River about Redding (westward also 10 or 12 miles, reaching Clear Creek), and sparingly up river to Gregory (Baird Switch); also along lower McCloud River near Baird, north-

ward up river valley for about 15 miles. **Lake County:** East slope of Bartlett Mountain from about 3,000 feet down to Bartlett Springs and Leesville); from Bartlett Springs Valley (about halfway between Bartlett Springs and Leesville); on road between Kelseyville southward to northern Long Valley (about 1,800 feet); on road between Kelseyville and Konokki Landing (west side of Clear Lake and south of Mount Konokki); Highland Springs, and about 5 miles west of it on road to Hopland; saddle of Cobb Mountain (near upper Big Sulphur Creek), on road from Middletown to Geysers, and westward on Big Sulphur Canyon to Socrates Basin, Little Geysers, also between Little Geysers and Geysers (Sonoma County). **Napa County:** Top of Mount St. Helena (at junction of Napa, Lake, and Sonoma counties); between Toll House and south summit. Occurs in vicinity of San Francisco Bay, in Moraga Valley, on Santa Cruz Mountains, Point Pinos (near Monterey); eastern slopes of Santa Lucia Mountains at head of Arroyo Seco, San Antonio and Nachuelito rivers at elevations of about 2,000 to 3,000 feet; but in southern Santa Lucia Mountains, at Cuesta Pass, and on south side of the San Bernardino Mountains, it occurs at 2,500 to 4,000 feet, or sometimes 5,500 feet; on East Twin Creek, at about 3,000 feet, and on City and Plunge creeks, at 2,700 to 4,600 feet. Reported from San Jacinto Mountains. Limited area on Mount Shasta at 4,000 to 5,600 feet, between Panther and Mud creeks; eastward to Fall River. West slopes of northern Sierras, at 1,500 to 3,000 feet—occasionally to 4,000 feet, and southward to Yosemite National Park (?). Forest Hill (between forks of American River), at 2,500 feet elevation; north slope of Merced River (T. 3 S., R. 18-19 E.) in Sierra National Forest (north); Lake Tahoe National Forest, only near Lynchburg, at 4,000 feet, and on ridge above Horse Shoe Bar (T. 13 N., R. 12 E.).

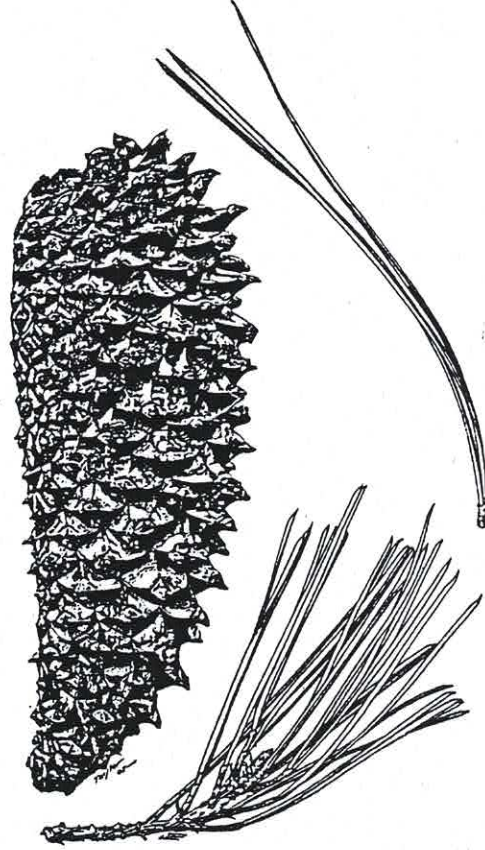
OCCURRENCE.

Usually on dry, exposed, steep southeastern slopes, but often in deep gulches and protected ravines. On poor, dry, rocky, or gravelly and sandy soils. Next to digger pine it is the least fastidious of its kind regarding soil moisture. Frequently forms extensive pure forests, especially in Oregon; in foothills, it grows mainly in groups or singly, while in San Bernardino Mountains it is sparingly scattered in western yellow pine forests, with bigcone spruce, sugar pine, white fir, incense cedar, Coulter pine, and oaks.

CLIMATIC CONDITIONS.—Endures seasonal temperature of from about zero to 95° F., with occasional heavy snows and an annual rainfall up to 45 inches.

TOLERANCE.—Next to digger pine, the least tolerant of Pacific coast pines.

REPRODUCTION.—Abundant annual seed, bearing cones at very early age. Seed with high rate of germination and with very persistent vitality in cones, no matter how old the cones are. Old trees often bear over 3.5 pounds of seed. Few cones open except by the aid of fire, which is nearly always followed by abundant reproduction. Seed germinates in the most barren soils, and seedlings are hardy from the start.



California Red-bud.

Cercis occidentalis Torrey.

DISTINGUISHING CHARACTERISTICS.

California red-bud is not generally regarded as a tree, but it occasionally grows to tree size in sheltered places, and then has a single, smooth, grayish trunk from 10 to 12 feet high and from 2 to 3 inches through. Much more frequently, however, it grows in dense clumps with slender stems from 2 to 4 feet high. The small, pea-shaped flowers (fig. 172) are a clear magenta color. Mature leaves (fig. 172), smooth throughout (as are the twigs and branches). In autumn the twigs and branches often bear many clusters of pointed, flat, very thin, russet-brown pods (fig. 172); in ripening, the pods are first purple. Wood, fine-grained, dark yellowish brown, with a rather thin layer of whitish sapwood. Of no economic or domestic use.

It is worthy of the forester's notice only for its aid, with other foothill brush, in forming a scanty cover along dry, rocky borders of streams.

LONGEVITY.—Undetermined.

RANGE.

CALIFORNIA.—Along streams from Mendocino County and the region about Mount Shasta southward to San Diego County.

OCCURRENCE.

Borders of foothill streams, low mountain slopes and canyons, in dry, or rather dry, gravelly and rocky soils. Grows singly and in shrubby clumps interspersed with California buckeye, ceanothus, manzanita, and other chaparral brush in gray pine belt; tree forms occur in sheltered situations.

CLIMATIC CONDITIONS.—Similar to those of gray pine.

TOLERANCE.—Endures a good deal of shade in early life and light shade when older; tolerance appears greater with increased soil moisture.

REPRODUCTION.—Plentiful seeder. Seed of high rate of germination (80 to 70 per cent), but tardy; vitality persistent. Young plants frequent in crevices, pockets, and little benches where seed has been well covered with mineral soil.

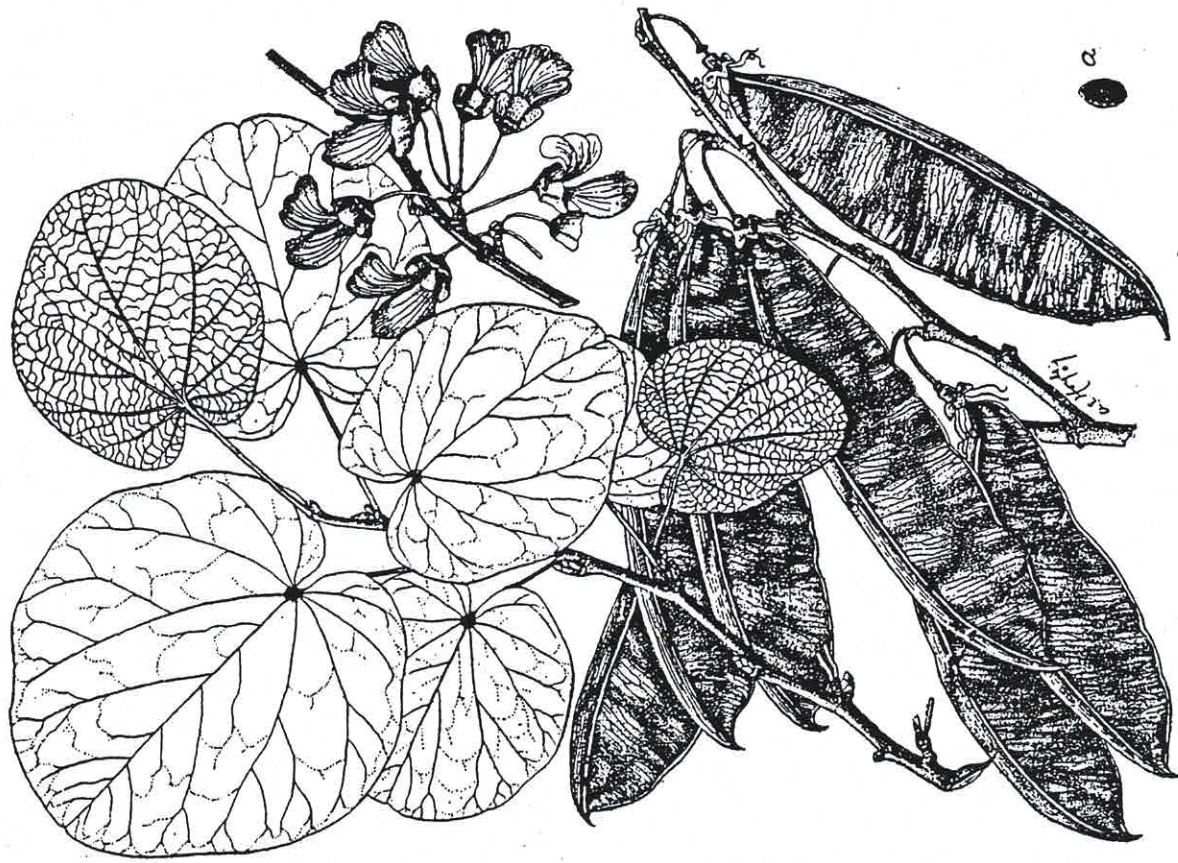


FIG. 172.—*Cercis occidentalis*: a, seed.

California Sycamore.

Platanus racemosa Nuttall.

DISTINGUISHING CHARACTERISTICS.

California sycamore, also called "buttonwood" and "buttonball," is small or medium sized; from 40 to 60 feet high and from 18 to 30 inches in diameter. Trunks are often very short, giving off several trunk-like branches. The branches are conspicuously irregular in the directions they take. One or more of them may reach out low to the ground, while others wind and twist in prorate or upright positions. Thick, long, crooked, and awkwardly bent, they form an exceedingly open crown. Such trees grow mainly in the open. Crowded in the bottoms of deep canyons California sycamore occasionally reaches a height of 75 or 80 feet (rarely more) and a diameter of from 3 to 6 feet. The dull brownish bark is ridged and furrowed at the base of the trunk. At the bases of old trunks it is from 2 to 3 inches thick; a short distance above, and on all of the limbs, it is very thin, smooth, and ashy white, with greenish-gray areas. Thin layers peel off annually; broken by diameter growth, keeping the upper parts of the trees smooth and conspicuously white.

The thick leaves (fig. 150), from 5 to 11 inches long and wide, are light yellow-green, much lighter beneath; they are minutely and densely hairy, especially on the midveins and their branches, though the amount of hair is variable. From 4 to 5 male flower heads are borne on a thread-like stem which grows from a leaf cluster on branches of the previous year; and from 2 to 7 (commonly 4 to 6) female flower heads grow on a similar stem which usually terminates a new branch of the season. The latter develop into bristly fruit heads (fig. 150), three-fourths inch to nearly an inch in diameter, with a single stem 5 to about 10 inches long. The slender, bristly seeds (akemes) are from three-eighths to seven-sixteenths of an inch long (fig. 150, e). Wood (described under *Platanus*) is not specifically distinct from that of the other sycamores.

LONGEVITY.—Age limits not fully determined. Believed to be long-lived. A single tree 20½ inches in diameter showed an age of 80 years. Exceedingly tenacious of life, requiring repeated damage to its crown and trunk by vigorous sprouts and growth of wood.

RANGE.

California (from the lower Sacramento River through interior valleys and coast ranges) to Lower California (San Pedro Martir Mountain). In the north up to 2,000 feet and in the south to 4,000 feet. Plumas and Lassen National Forests in foothill type up to 2,500 feet. Farther south in Sierra noted at White Deer Creek (northwest tributary King's River), on King's River from Trimmer Springs up to near mouth Big Creek and thence south, in Big Creek Canyon and on Northeast Branch Mill Creek, along lower Kanweb and in Tehachapi Mountains. On Lytle Creek, Caliente Creek, lower end Cananda de las Uvas, lower part Tejon Canyon and along Poso Creek, but not down desert streams to the east. On coast ranges noted on Carmel River up from mouth and along all streams beds of Santa Lucia Mountains from sea level to 2,000 feet; San Luis Obispo National Forest up to 2,500 feet on watersheds of Carriso, Salinas, Santa Margarita, San Luis, Arroyo Grande, Huasna, and Santa Maria. Santa Barbara National Forest in watersheds of Santa Ynez, Santa Barbara, Matilija, Piru-Sespe, Elizabeth, and Newhall rivers, at 100 to 4,200 feet. San Gabriel National Forest up to above 5,000 feet; noted near Pasadena on Oak Knoll, Arroyo Seco, and canyons of San Gabriel Mountains. Santa Ana range in canyons. San Bernardino Mountains, western and southern slopes, 1,000 up to 3,000 feet. San Jacinto Mountains, western slope, below 4,800 feet. On Palomar (Smith), Balcon, and Cuyamaca Mountains, from western side nearly to summit, and west nearly to ocean.

OCCURRENCE.

Confined to or near borders of perpetual and intermittent streams and moist gulches; in poor, rocky soil. Forms sparse lines and small groups of pure growth, or is mixed with white alder, broadleaf maple, California walnut, and occasional willows.

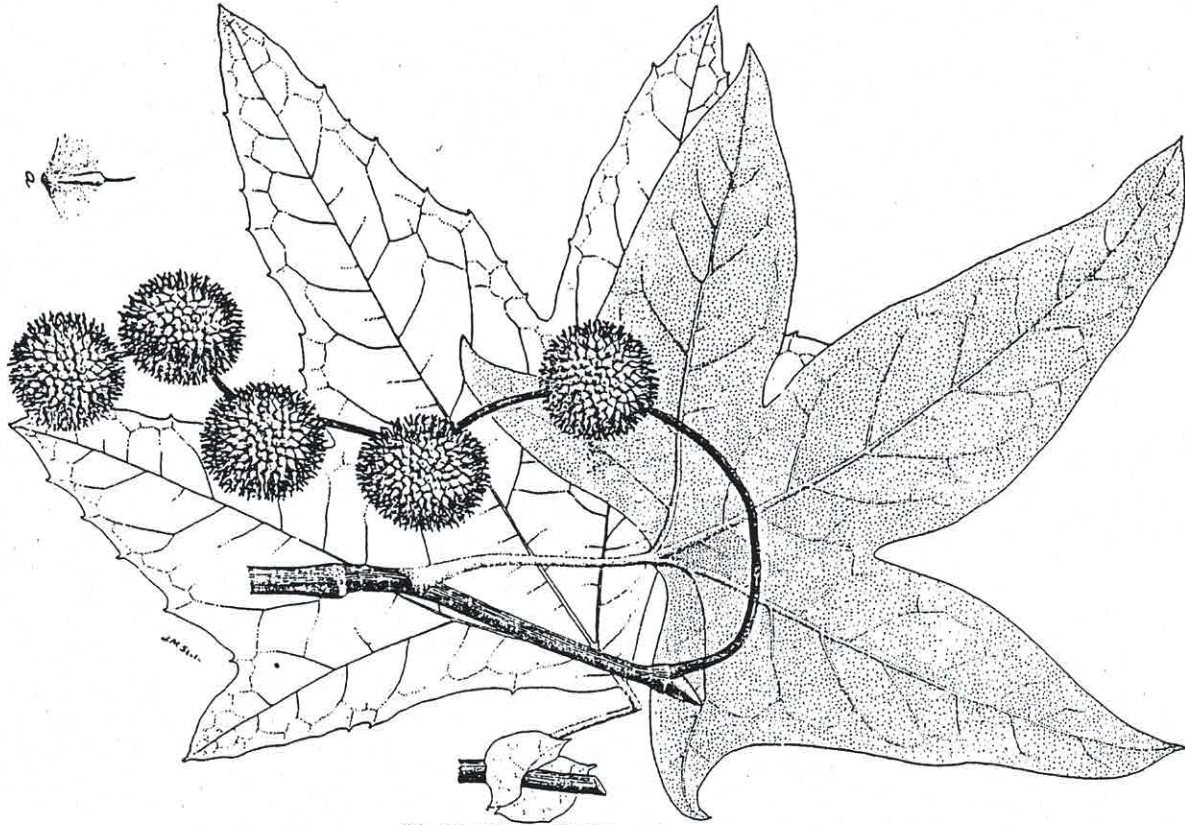


FIG. 150.—*Platanus racemosa*: a, seed.

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California Walnut.
Juglans californica Watson.

DISTINGUISHING CHARACTERISTICS.

Though it ranges in size from a shrub to a tree 50 feet high and from 8 to 15 inches in diameter, California walnut is usually a low, wide-crowned tree from 12 to 20 feet high. The clear trunk is short, giving off big branches which curve upward, then down, often drooping nearly to the ground and forming a handsome dome-like crown. The bark of young trees and portions of the large branches is smooth and ashy white, while that of older trunks is blackish brown and rather deeply and sharply furrowed and ridged. The California species resembles the eastern black walnut sufficiently to suggest that tree to one familiar with it. The leaves (fig. 82), with from 9 to 17 leaflets, are light yellow-green and are smooth throughout when full grown; occasionally, however, the leaflets may have minute clusters of tawny hairs underneath in the angles formed by the veins. The spherical fruit (fig. 82) is a thinly covered nut, with a very finely but perceptibly velvety surface. Divested of its thin husk, the hard-shelled nut, its two ends appearing to be pressed together, is indistinctly and irregularly grooved (fig. 82, a).

Wood, rather heavy, dark brown, somewhat lighter-colored than that of the eastern tree, but similarly rich in color and grain. It is usually moderately coarse-grained, owing to the fact that it is mainly grown in the open. The tree is too poorly formed and usually too small to furnish wood of much commercial value except for local needs. When large enough for lumber it is useful as a cabinet wood on account of its handsome color and good working qualities.

As a forest tree it can be of only secondary importance, serving with a number of other riparian species in maintaining needful protective tree growth along streams.

LONGEVITY.—Few records of its age are available. It is a very rapid-growing tree in youth and gives evidence of being short-lived, probably not exceeding 150 years. Trees from 12 to 15 inches in diameter are 13 to 17 years old, while one tree 15½ inches through showed an age of 15 years.

RANGE.

CALIFORNIA.—River courses of foothills and valleys of coast region usually 20 or 30 miles from the sea, from Lower Sacramento River (noted 2 miles north of Shingle Springs, Eldorado County, at about 1,500 feet), Mount St. Helena (southern Lake County), vicinity of San Francisco and Monte Diablo (northwest base), south in coast ranges to south side of the Santa Ana (Orange County) and San Bernardino Mountains. Santa Barbara National Forest common at 800 to 4,000 feet; in watersheds of Santa Maria, Santa Ynez, Santa Barbara, Matilija, Viru-Seape, and Newhall rivers. Santa Monica Mountains and Puente Hills, near Los Angeles; frequent in foothills below 3,000 feet; less so on south slopes of San Gabriel and Santa Ana Mountains; noted locally near Arroyo Seco west of Pasadena. San Bernardino Mountains south and west slopes up to 3,000 feet and occasionally at some distance from foot of mountains; locally noted in Waterman Canyon at 2,000 feet.

OCCURRENCE.

On margins of perpetual and intermittent streams and bottoms, usually in rather moist gravelly or sandy soil; sometimes in dry situations. Much scattered or in small straggling groups.

CLIMATIC CONDITIONS.—Similar to those of California sycamore.

TOLERANCE.—Intolerant of shade.

REPRODUCTION.—Seedling habits undetermined. Seedlings scarce. Much of seed eaten by rodents, and carried by flood waters to places unfavorable for germination.

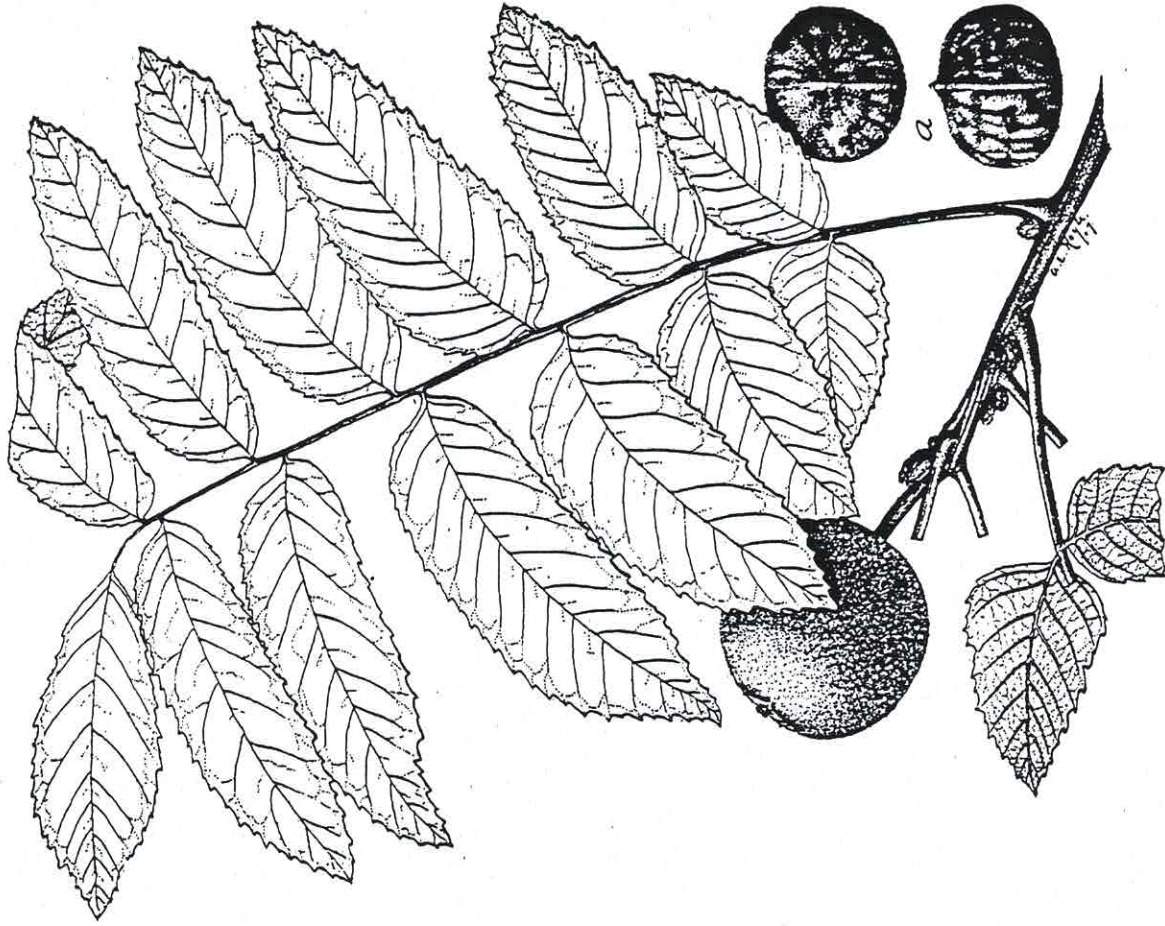


FIG. 82.—*Juglans californica*: a, nut without hull.

OCCURRENCE.

Borders of lowland streams and adjacent bottoms (as a tree), and lower mountain slopes in springy places and on streams (shrubby), in moist sandy and gravelly soil. Scattered and in small groups with California sycamore and white alder.
CLIMATIC CONDITIONS.—Similar to those of white alder.

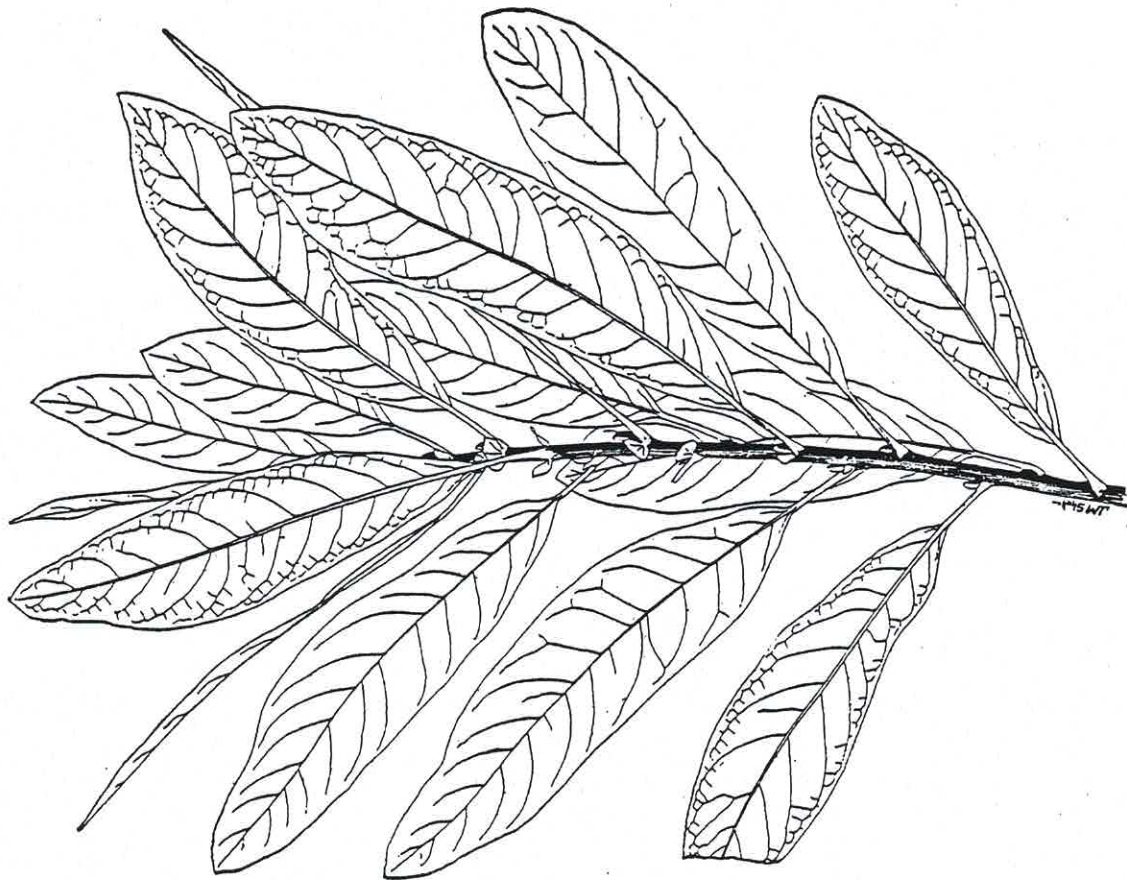


FIG. 94.—*Salix lasiolepis*.

White Willow.

Salix lasiolepis ^a Bentham.

DISTINGUISHING CHARACTERISTICS.

The white willow, so called on account of the smooth ashy gray bark (with brownish tinge) of young trunks and limbs of older trees, varies in size from a cluster of low shoots (at high elevations) to a tree from 15 to 25 feet in height (at low elevations) with a diameter of from 6 to 10 inches. Very exceptionally it is from 30 to 40 feet high and a foot or more in diameter. The slim branches trend upward strongly in a rather narrow, irregular open crown. Bark of larger trunks is less than one-half an inch thick, shallowly seamed, the wide ridges connected here and there by smaller lateral ridges; indistinctly dark brown or blackish with occasional grayish areas on the flat ridges. Mature twigs of the season, rather thick, bear numerous leaves and are deep red-brown, tinged with yellow toward their extremities, where they are very minutely downy, but smooth lower down. Mature leaves (fig. 94), from 2½ to about 5½ inches long, are somewhat thick and leathery, with yellow stems and midveins, dark yellow-green and smooth on their top sides, conspicuously silver-white beneath, where the midveins and terminal leaves are minutely hairy. Wood: Very little of the pale brown heartwood is formed, the main bulk of the trunk being sapwood. Not used commercially, but in the southern range at a low altitude, where fuel timber is scarce, it is locally used for fuel.

LONGEVITY.—Not fully determined. Stems from 5 to 9 inches in diameter are from 12 to 22 years old.

RANGE.

Northern California (Klamath River) and southward through the western part of the State to Lower California and southern Arizona (Tanners Canyon on Huachuca Mountains, and White River Canyon on Chiricahua Mountains).

^a There is doubt, which can not be cleared up at present, as to whether this name is older than *Salix bigelovii* Torrey, supposed to have been published in 1856 or January, 1857, while *S. lasiolepis* Bentham appeared in February, 1857. Torrey, however, cites other species of *Salix* described and published by Bentham with his *S. lasiolepis*, and this seems to show conclusively that the latter's name was actually published before Torrey's *S. bigelovii*, notwithstanding the printed earlier date of the document containing Torrey's name of this willow.

Wood of *Salix lasiandra* and its varieties is pale brown and usually brittle. It is probable that the annual shoots of this willow, particularly *lyallii*, would, with training, prove to be good basket rods. They are worthy of trial in moist, sandy river bottoms.

Western Black Willow.

Salix lasiandra Benth.

DISTINGUISHING CHARACTERISTICS.

Western black willow, like the preceding species, is known throughout its range simply as "black willow," on account of the color of its bark. The bark is distinctly cut by cross-seams into flat plates longer than they are wide. The form of its leaves and twigs affords the principal means of distinction. Ordinarily it is 25 or 30 feet high and from 14 to 20 inches in diameter; sometimes from 40 to 50 feet high and from 24 to 30 inches through; in some parts of its range, often a bushy tree under 10 feet high. The clear trunk, rarely straight, is short, and the long, straight limbs grow upright, producing an open, unsymmetrical crown. The mature twigs are rather large, and clear reddish yellow to brown. The leaves (fig. 80), deep yellow green at maturity and about 4 to 5 inches long, are shiny on their upper surface, whitish beneath, the large mid-veins reddish yellow and the leaf stems, with two or more blackish spots (glands) at their juncture with the leaf blade, smooth or slightly and minutely hairy. As a rule the largest leaves are produced at the ends of the branches, apparently on account of the more vigorous growth there.

RANGE.

California (west of the Sierra Nevada); western Oregon, Washington, and southern British Columbia (Selkirk Mountains) at middle elevations.

OCCURRENCE.

Borders of streams, water-holes, and lakes, in damp, gravelly, and sandy soil. Scattered in small groups and singly; sometimes with red and white alders, black and Fremont cottonwoods, and California sycamore. Climatic and other requirements undetermined.

A well-marked variety of this willow is the Lyall willow (*Salix lasiandra lyallii* Sargent), often from 20 to 30 inches in diameter; common on streams of western Oregon and Washington. Its leaves (fig. 90) are sometimes 10 or 12 inches long, and distinctly white beneath, while the leaf stems have more glands than those of the Western black willow. Another less distinct form is *Salix lasiandra caudata* (Nutt.) Sudworth, which has smaller, more leathery leaves than the species; they are also often scythe-shaped, tapering at the base, and green throughout.

Salix lasiandra lyallii occurs in western Oregon, Washington, and southern British Columbia at middle elevations. It grows on borders and bottoms of lowland streams and of those on lower mountain slopes, in moist, loamy sand and gravel or humous, rocky, and gravelly soils of higher sites. Forms clusters in open pure stretches and patches, or is scattered singly at higher levels among other inhabitants of stream banks. Appears indifferent to altitude, but abundant soil moisture is a requisite.

CLIMATIC CONDITIONS similar to those of red alder.

TOLERANCE.—Endures considerable shade—probably one of the most tolerant of willows.

REPRODUCTION.—Abundant seeder; seedlings rather scattered, but frequent.

* Described in 1842 by Nuttall as *Salix speciosa*, from its large handsome leaves; a name which, unknown to that author, was unfortunately already assigned to another willow.



FIG. 89.—*Salix lasiandra*.

LONGEVITY.—Probably reaches maturity within about 50 years. Trees from 12 to 18 inches in diameter are from 30 to 47 years old.

11. *Acer saccharinum* L. Silver Maple. Soft Maple.

Leaves truncate or somewhat cordate at base, deeply 5-lobed by narrow sinuses, with acute irregularly and remotely dentate lobes, the middle lobe often 3-lobed, rarely laciniately divided (var. *Wieri* Schverin), 6-7' long and nearly as broad, thin, bright pale green above, silvery white and at first slightly hairy below, especially in the axils of the primary veins; turning pale yellow in the autumn before falling; petioles slender, drooping, bright red, 4'-5' in length. Flowers greenish yellow, opening during the first warm days of the late winter or early spring long before the appearance of the leaves, on short pedicels, in sessile axillary fascicles on shoots of the preceding year, or on short spur-like branchlets developed the year before from wood of the preceding season, the staminate and pistillate in separate clusters, on the same or on different trees, and produced from clustered obtuse buds covered with thick ovate pubescent red and green scales ciliate on the margins with a thick fringe of long rufous hairs; calyx slightly 5-lobed, more or less pubescent on the outer surface, long and narrow in the staminate and short and broad in the pistillate flower; corolla 0; stamens 3-7, with slender filaments, three times as long as the calyx of the staminate flower, with about as long as the calyx of the pistillate flower; ovary covered, like the young fruit, with a thick coat of pubescence, rudimentary in the sterile flower; styles united at base only with long exerted stigmatic lobes. Fruit ripening in April and May when the leaves are nearly grown, on slender drooping pedicels, 1½-2' long, glabrous, 1½' to nearly 3' long, with thin almost straight conspicuously falcate divergent wings sometimes ½' broad, prominently reticulate-veined and pale chestnut-brown or rarely bright red; seeds ½' long, with a pale reddish brown wrinkled coat, germinating as soon as they fall to the ground, and producing plants with several pairs of leaves before the end of the summer.

A tree, 90°-120° high, with a trunk 3°-4° in diameter, generally dividing 10°-15° from the ground into 3 or 4 stout upright secondary stems destitute of branches for a considerable length, brittle pendulous branchlets light green and covered with lenticels when they first appear, soon becoming darker, bright chestnut-brown, smooth and lustrous in the autumn and winter of their first year, and in their second season pale rose color or gray faintly tinged with red. Winter-buds ¼' long, with thick ovate bright red outer scales rounded on the back, minutely apiculate, and ciliate on the margins, and acute inner scales pubescent on the inner surface, becoming pale green or yellow and about 1' long. Bark of young stems and large branches smooth and gray faintly tinged with red, becoming on old trunks ½-¾' thick, reddish brown and more or less furrowed, the surface separating into large thin scales. Wood hard, strong, close-grained, easily worked, rather brittle,



Fig. 627

pale brown, with thick sapwood of 40-50 layers of annual growth; now sometimes used for flooring and in the manufacture of furniture. Sugar is occasionally made from the sap. Distribution. Sandy banks of streams, rarely in deep often submerged swamps; valley of the St. John's River (near Fredericton), New Brunswick, to that of the St. Lawrence in Quebec, and southward through western Vermont and central Massachusetts to western Florida (valley of the Apalachicola River), Alabama, and south central Mississippi, and westward through Ontario, New York, Ohio, the southern peninsula of Michigan and southern Indiana to Minnesota, southeastern South Dakota, and eastern Nebraska, and through Kentucky, Tennessee, Missouri, eastern Kansas, northwestern Arkansas, and eastern Oklahoma; in western Louisiana (swamp near Alexandria, Rapides Parish); rare in the immediate neighborhood of the Atlantic coast and on the high Appalachian Mountains; probably of its largest size in the valley of the lower Ohio River.

Often cultivated with several forms differing in habit and in the lobing of the leaves; fast-growing, and largely planted in the eastern states as a park and street tree.

19. *Prunus caroliniana* Ait. Wild Orange. Mock Orange.

Leaves oblong-lanceolate, acuminate, mucronate, with entire thickened slightly revolute margins, or rarely remotely spinulose-serrate, glabrous, coriaceous, dark green and lustrous on the upper surface, paler on the lower surface, $2\frac{1}{2}$ - $4\frac{1}{2}$ ' long and $\frac{1}{2}$ - $1\frac{1}{2}$ ' wide, and obscurely veined, with a narrow pale midrib; persistent until their second year; petioles stout, broad, orange-colored; stipules foliaceous, lanceolate, acuminate. Flowers appearing from February to April, on slender pedicels about $\frac{1}{2}$ ' long, from the axils of long-acuminate scarious red-tipped bracts, in dense racemes shorter than leaves; calyx-tube narrow-obovoid, lobes small, thin, rounded, undulate on the margins, reflexed after the flowers open, deciduous; petals boat-shaped, minute, cream-colored; stamens exserted, orange-colored, with glabrous filaments and large pale anthers; ovary gradually narrowed into a slender erect style enlarged above into a club-shaped stigma. Fruit ripening in the autumn, remaining on the branches until after the flowering period of the following year, oblong, short-pointed, black and lustrous, $\frac{1}{2}$ ' long, with a thick skin, and thin dry flesh; stone short-ovoid, pointed, ridged on the ventral suture and deeply grooved on the dorsal suture.

A tree, 30°-40° high, with a straight or inclining trunk sometimes 10' in diameter, slender horizontal branches forming a narrow oblong or sometimes a broad head, and glabrous branchlets marked by occasional pale lenticels, slightly angled, at first light green, becoming bright red, and in the second season light brown or gray. Winter-buds acuminate, $\frac{1}{4}$ '



Fig. 532

long, covered with narrow pointed dark chestnut-brown scales rounded on the back. Bark about $\frac{1}{4}$ ' thick, gray, smooth or slightly roughened by longitudinal fissures, and marked by large irregular dark blotches. Wood heavy, hard, strong, close-grained, light red-brown or sometimes rich dark brown, with thick lighter colored sapwood. The partially withered leaves and young branches are often fatal to animals browsing upon them, owing to the considerable quantities of hydrocyanic acid which they contain.

Distribution. Deep rich moist bottom-lands; valley of the Cape Fear River, North Carolina, to the shores of Bay Discayne and the valley of the Kissimee River, Florida, and through southern Alabama, Mississippi, and Louisiana to the valley of the Guadalupe River, Texas; in Bermuda; in the Atlantic and eastern Gulf states usually only in the immediate neighborhood of the sea, rarely ranging inland more than fifteen or twenty miles; common along the borders of hummocks in the center of the Florida peninsula and a characteristic tree on those in the region of Lake Apopka, Orange County; in Alabama ranging inland to Dallas County (Pleasant Hill, *T. G. Harbison*); most abundant and of its largest size in the valleys of eastern Texas, and here often forming great impenetrable thickets. Often cultivated in the southern states as an ornamental plant and to form hedges; and when cultivated occasionally 50°-60° high, with a trunk 3° in diameter.

1. PISTACIA L.

Balsamic trees or shrubs. Leaves 3-foliate or equally or unequally pinnate, petiolate, deciduous or persistent. Flowers small, dioecious, subtended by a bract and 2 branchlets, short pedicellate in panicles or racemes; calyx 1 or 2-lobed or in the pistillate flower 3-5-lobed, or 0; petals 0; stamens 3-5, 0 in the pistillate flower; filaments short, their base connate with the disk; anthers large; ovary subglobose or short-ovoid, rudimentary or 0 in the staminate flower; style 3-lobed, shorter than the 3 obovate-oblong or oblong stigmas. Drupe ovoid, oblique, compressed; exocarp thin; the stone bony, 1-seeded; seed compressed; cotyledons thick plano-convex.

Pistacia with eight or nine species is confined to the valley of the lower Rio Grande, southern Mexico; the Canary Islands, the countries adjacent to the Mediterranean, and northern and central China, with one species growing on the northern banks of the Rio Grande in Texas.

The Pistacio-nuts of commerce, the green or yellow seeds of *P. vera* L. are largely used in confectionery, and some of the species are valued for the decoration of parks and gardens.

Pistacia from *vera* and *dekouat*, in reference to the healing properties of its resinous exudations.

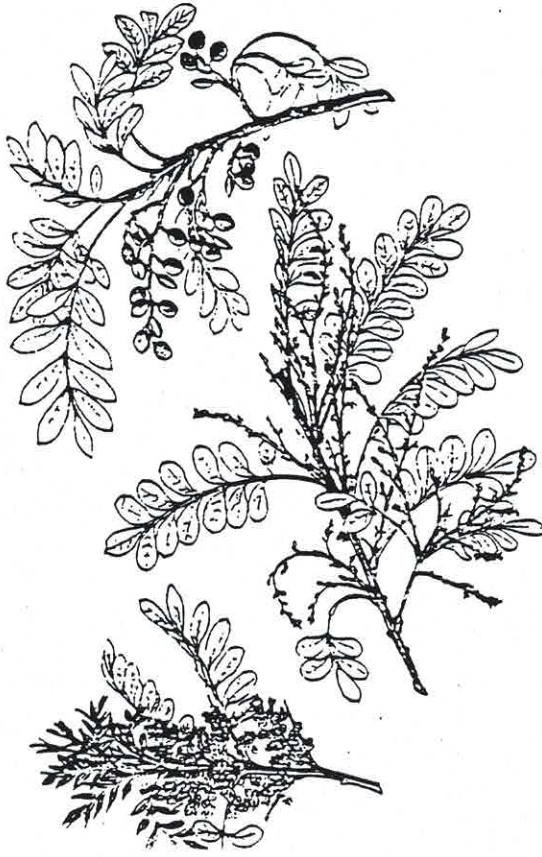
1. Pistacia texana Swing.

Leaves persistent or tardily deciduous, 9-19-foliate, with a slightly winged rachis pubescent above and a flattened narrow-winged petiole $\frac{1}{2}$ - $\frac{3}{4}$ ' in length; leaflets spatulate, rounded and often mucronate at apex, gradually narrowed below into a deltoid or sub-cuneiform base, entire, more or less curved and unequalateral, wine-red when they unfold, and at maturity thin, dark green and sparingly pubescent along the midrib above, pale and glabrous below, nearly sessile or the terminal leaflet raised on a short petiole, $\frac{1}{2}$ - $\frac{3}{4}$ ' long and about $\frac{1}{4}$ ' wide, with a slender midrib often near one side of the leaflet and reticulate veinlets. Flowers small, without a calyx, appearing just before or with the new leaves, in simple nearly glabrous panicles, their bracts and bractlets ciliate on the margins and wine-red at apex; staminate flowers more crowded than the pistillate, in compact panicles $\frac{1}{2}$ - $\frac{1}{3}$ ' long; anthers reddish yellow or wine color; pistillate flowers in loose panicles $\frac{1}{4}$ - $\frac{2}{3}$ ' in length; ovary ovoid or subglobose, two of the three styles with 2-lobed stigmas, the third with a 3-lobed stigma. Fruit oval, dark reddish brown and slightly glaucescent, about $\frac{1}{4}$ ' long and $\frac{1}{2}$ ' broad, usually atriolate.

A small tree, occasionally 30' high with a short trunk 1 1/2-1 3/4' in diameter, with stout erect and spreading branches forming a head sometimes 30°-35° across, and slender slightly pubescent reddish branchlets becoming grayish brown by the end of their first year; more often a large shrub with numerous stout stems.

Distribution. Texas, limestone cliffs and the rocky bottoms of cañons periodically swept by floods, and in deep narrow ravines, along the lower Pecos River and in the neighborhood of its mouth, Valverde County; and in northeastern Mexico.

1. *Pistacia texana* Swing.



Silverleaf Willow.

Salix sessilifolia Nuttall.

DISTINGUISHING CHARACTERISTICS.

Silverleaf willow is generally known only by the name of "willow." In general appearance, and in the form of its leaves, it closely resembles longleaf willow, particularly the variety *argyrophylla*. It is sometimes 20 or 25 feet high and from 8 to 10 inches through, but usually it is a slender shrub from 6 to 10 feet high. The grayish-brown bark of larger trunks is from one-third to one-half an inch thick, with irregular shallow seams. Mature leaves (fig. 92), about 2 to 4½ inches long by about one-fourth to one-third of an inch wide, sometimes narrower, are light pea-green, smooth or minutely hairy on the upper side, and with white, silky hairs beneath. Midveins of the leaves, lemon yellow, and the short thick stems minutely hairy.

The distinctive characters of this willow are not fully worked out. Many forms of it so closely resemble *S. fluviatilis argyrophylla*, with which it may occur, that they can be distinguished only with great difficulty. Further careful field study is required for both.

Wood, pale reddish brown. Not used commercially.

LONGEVITY.—Not fully determined. Stems from 6 to 9 inches in diameter are 24 to 37 years old.



FIG. 92.—*Salix sessilifolia*: a, seed-bearing branch.

RANGE.

From mouth of Columbia River, Washington, to southwestern California, ranging through western Oregon and western slopes of Sierras and coast ranges.

OCCURRENCE.

Borders of streams and moist depressions.