

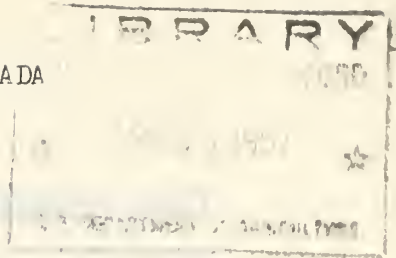
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CONTRIBUTIONS TOWARD A FLORA OF NEVADA

NO. 40



PINACEAE, RUTACEAE,
MELIACEAE, ANACARDIACEAE, TAMARICACEAE, CORNACEAE,
OLEACEAE, BIGNONIACEAE OF NEVADA

by

ELBERT L. LITTLE, JR.

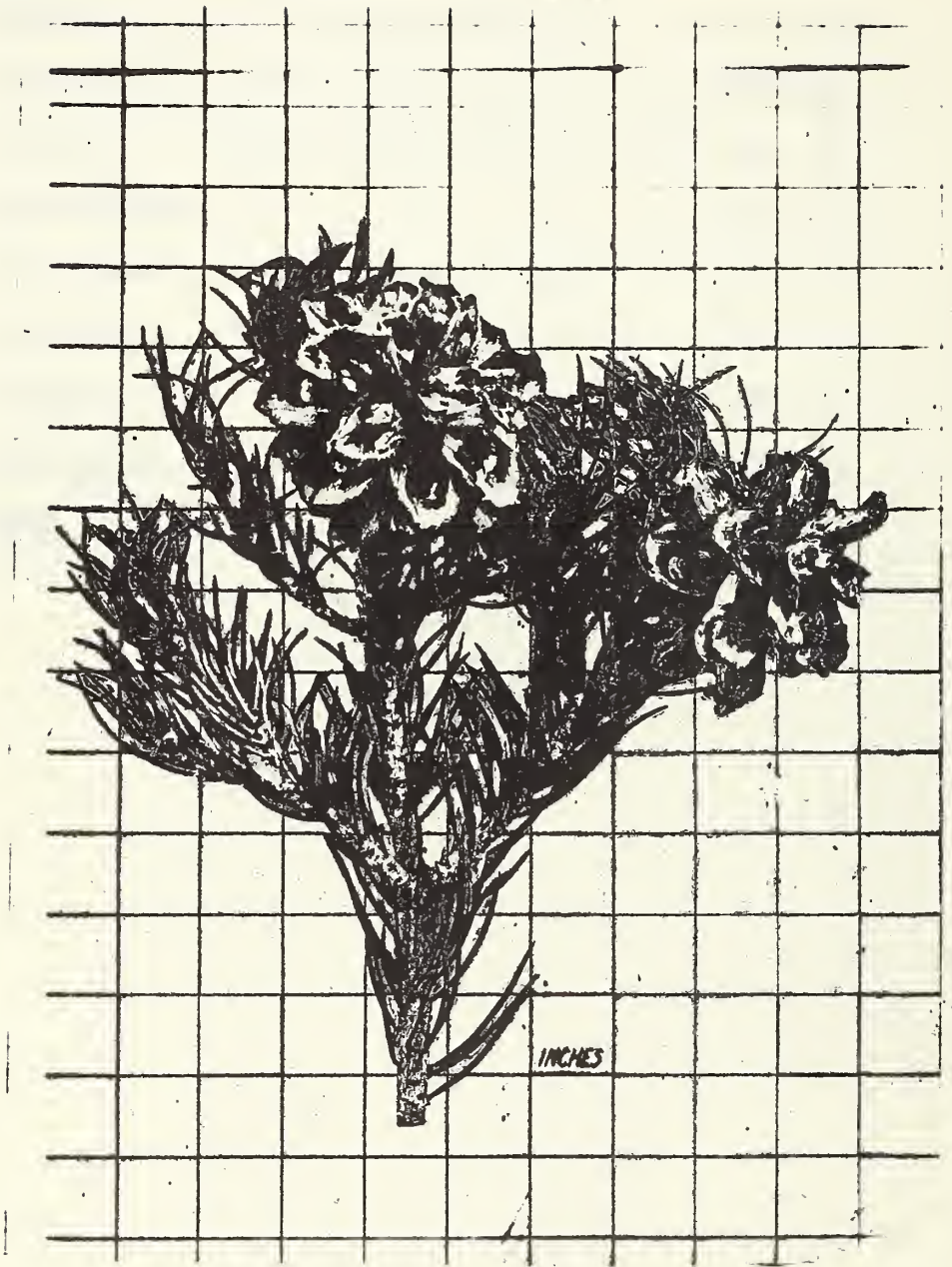
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TABLE OF CONTENTS

	<u>Page</u>
<u>Pinus monophylla</u>Frontispiece
Pinaceae.1 - 40
Rutaceae.	41 - 43
Meliaceae.	44 - 46
Anacardiaceae.	47 - 52
Tamaricaceae.	53 - 56
Cornaceae.	57 - 63
Oleaceae.	64 - 74
Bignoniaceae.	75 - 77
INDEX.	78 - 81



Singleleaf pinyon (*Pinus monophylla* Torr. & Frém.), the State tree of Nevada. Photograph by Elbert L. Little, Jr.

PINACEAE OF NEVADA¹

(Pine Family)

By Elbert L. Little, Jr.²

Resinous trees (rarely shrubs), mostly with a continuous unbranched axis, the secondary wood without vessels, with scaly buds (sometimes naked), evergreen (in all Nevada species) or sometimes deciduous. Leaves alternate, opposite, or whorled, linear, often needlelike, or scalelike, rarely lanceolate, sometimes of 2 forms, estipulate. Without true flowers or fruits, the pollen and naked seeds borne in unisexual cones or strobili; monoecious (mostly dioecious in Juniperus); male strobili small and herbaceous, with many scales or microsporo-

Nevada specimens in the following herbaria have been examined: United States National Museum, National Arboretum, United States Forest Service, University of Nevada, and Nevada Agricultural Experiment Station.

¹ Taxus brevifolia Nutt. (Pacific yew), of the Taxaceae (yew family), is native in the Sierra Nevada of central California but apparently not also in Nevada. This species was recorded from Nevada by C. L. Anderson (Rpt. Mineral. Nev. 1869 and 1870: 116-128. 1871) in an early list containing a few other species not recorded from the State by later authors. One specimen in the herbarium of the Nevada Agricultural Experiment Station is labeled as follows: "A.A.Heller, May 2, 1910, Morrills Lake, above Verdi, Washoe Co." That lake has not been located on maps and may be in California, since Verdi is less than 1 mile from the State line. These doubtful records are the only ones of this species for Nevada. Billings (Nev. Trees, ed. 2, 48. 1954) noted that Taxus baccata L. (English yew) is planted in western Nevada.

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phylls bearing on lower or abaxial side 2-6 sporangia mostly in early spring; female or ovulate strobili with numerous or sometimes few scales, mostly subtended by a bract, typically bearing 2 (sometimes several) naked ovules on upper or adaxial side. Mature female strobilus generally a woody cone, ovoid or globose (in Juniperus fleshy and berrylike); seeds naked, with or without wings, with endosperm, embryo with 2-several cotyledons.

Widely distributed in temperate and subtropical regions, best represented in the north temperate zone, by some authors divided into three families, Pinaceae, Taxodiaceae, and Cupressaceae. About 33 genera and about 350 species, with 13 native genera in the United States. Of great economic importance, this family is perhaps first in world production of softwood timber and lumber, pulpwood, and naval stores. Besides forest plantations, numerous species and improved horticultural varieties are grown for shade and ornament.

Seven genera and 21 species are native in Nevada. According to Billings, 7 additional genera are represented by the following 11 introduced species, planted chiefly in Reno and southern Nevada: Cedrus atlantica Manetti (Atlas cedar), Cedrus deodara (Roxb.) Loud. (Deodar cedar), Sequoia gigantea (Lindl.) Decne. (giant sequoia), Sequoia sempervirens (D. Don) Endl. (redwood), Metasequoia glyptostroboides Hu & Cheng (dawn-redwood), Cryptomeria japonica (L. f.) D. Don (cryptomeria), Thuja occidentalis L. (northern white-cedar), Cupressus arizonica Greene (Arizona cypress), Cupressus macnabiana A. Murr. (MacNab cypress), Cupressus sempervirens L. (Italian cypress), and Chamaecyparis lawsoniana (A. Murr.) Parl. (Port-Orford-cedar). Other

introduced species are mentioned below under their respective native genera.

References -- Billings, W. D. Nevada trees. Univ. Nev. Agr. Ext. Service Bul. 94, ed. 2, 125 p., illus. 1954. (Includes cultivated species with keys for this family and other trees.)

Little, Elbert L., Jr. Check list of native and naturalized trees of the United States (including Alaska). U.S. Dept. Agr., Agr. Handb. 41, 472 p. 1953. (Contains additional synonymy with citations of synonyms and also ranges outside Nevada in greater detail for this family and other trees.)

KEY TO GENERA

- A. Leaves needlelike, more than 15 mm. long, alternate or in fascicles; cone of many scales.
 - B. Leaves in fascicles of 2-5 (1 in Pinus monophylla), with sheath at base (at least when young). 1. PINUS
 - BB. Leaves single, without sheath at base.
 - C. Older twigs roughened by peglike bases of fallen leaves; leaves 4-angled or semicircular in cross-section, shed in dried specimens.
 - D. Leaves 4-angled, acute at apex, sessile. 2. PICEA
 - DD. Leaves flattened above and rounded or keeled below, rounded at apex, with minute petiole. 3. TSUGA
 - CC. Older twigs smoothish or only slightly rough; leaves flat (4-angled in Abies magnifica), remaining attached in dried specimens.

- E. Leaves with short petiole; leaf scars oval, broader than long, slightly raised; cones pendulous, with 3-pointed bracts, the scales persistent. 4. PSEUDOTSUGA
- EE. Leaves sessile; leaf scars round, not raised; cones erect, mostly on topmost branches, the bracts not 3-pointed, the scales deciduous. 5. ABIES
- AA. Leaves mostly scalelike, less than 15 mm. long (awl-like or needle-like in *Juniperus communis*, a low subalpine shrub), opposite or ternate; cone of few scales or fleshy and berrylike.
- F. Twigs flattened with decussate decurrent scalelike leaves; cone of few scales. 6. HEYDERIA
- FF. Twigs not flattened; cone fleshy and berrylike. . . .7. JUNIPERUS

1. PINUS L., Sp. Pl. 1000. 1753; Gen. Pl. Ed. 5, 434. 1754.

Apinus Neck., Strobus (Sweet) Opiz, Caryopitys Small. "pine"

Large or small trees, with bark mostly furrowed or sometimes scaly, the spreading branches in whorls, evergreen. Leaves of 2 kinds, the primary or juvenile leaves alternate, long, and green on seedlings, usually reduced to scales bearing in axils spur shoots with bud scales and secondary leaves; the secondary leaves needlelike, in a fascicle of 2-5 (sometimes 1) with basal sheath formed from the bud scales and mostly persistent. Male strobili lateral, clustered at base of current year's growth on twigs mostly in lower part of tree, mostly yellow, from scaly buds, with many scales bearing 2 sporangia; female strobili subterminal or lateral, the many scales each subtended by a small bract and 2-ovuled. Woody cone maturing at end of second year

(rarely third), the cone scales often becoming thickened at apex and often bearing a protuberance or spine; seeds mostly paired at base of a scale, mostly with long wing, sometimes wingless, embryo with 4-15 cotyledons. Derivation.--The classical Latin name. Type species.--P. sylvestris L. About 90 species widely distributed in northern hemisphere, including a few tropical.

With 10 native species, Pinus is the most important genus of trees in Nevada for lumber and the largest in number of species except for the mostly shrubby genus Salix. Seven additional species have been introduced for shade or ornament, according to Billings: Pinus griffithii McClelland (Himalayan pine), from Himalaya to Afghanistan; Pinus halepensis Mill. (Aleppo pine), from the Mediterranean region, planted in Boulder City; Pinus mugo Turra (Swiss mountain pine), from Europe; Pinus nigra Arnold (Austrian pine), from Europe; Pinus parviflora Sieb. & Zucc. (Japanese white pine), from Japan, planted in Reno; Pinus strobus L. (eastern white pine), from eastern United States and adjacent Canada; and Pinus sylvestris L. (Scotch pine), from Eurasia.

KEY TO SPECIES

- A. Leaves 5 or 1 in a fascicle, sheaths deciduous (except No. 5; soft pines).
- B. Leaves 5 in a fascicle; seed winged (except No. 1), body 12 mm. or less in length.
- C. Leaves 4-10 cm. long, spreading; cones without prickles.
- D. Leaves 4-6 cm. long, entire; cones not opening at maturity;

seed wingless. 1. P. ALBICAULIS

DD. Leaves mostly longer; cones opening at maturity; seed winged.

E. Leaves entire; cones short-stalked, mostly 8-13 cm. long,
with thick rounded scales; seed wing only 1-2 mm. long.

2. P. FLEXILIS

EE. Leaves serrulate at least toward apex; cones long-stalked,
elongated, mostly more than 13 cm. long, with thin scales;
seed wing 20-28 mm. long.

F. Cones mostly more than 25 cm. long, hanging from long
horizontal branches. 3. P. LAMBERTIANA

FF. Cones less than 25 cm. long, not on conspicuous horizon-
tal branches. 4. P. MONTICOLA

CC. Leaves 2.5-4 cm. long, curved and pressed against twig, form-
ing brushlike or "foxtail" mass; cones with prickles.

5. P. ARISTATA

BB. Leaves 1 in a fascicle; seed 15-20 mm. long, wingless.

6. P. MONOPHYLLA

AA. Leaves 2 or 3 in a fascicle, sheaths persistent (pitch or hard
pines).

G. Leaves 3 (sometimes 2) in a fascicle, more than 8 cm. long; cones
more than 5 cm. long, symmetrical, opening at maturity and soon
shedding.

H. Twig with piney odor; bark with yellowish layers; cone with
relatively few scales, the prickles turned outward.

7. P. PONDEROSA

HH. Twig with citrus odor; bark without yellowish layers; cone with

many scales, the prickles recurved.

I. Leaves 13-25 cm. long; cones 13-30 cm. long; Sierra Nevada from southern Washoe County to Mineral County. 8. P. JEFFREYI

II. Leaves 10-15 cm. long; cones 5-8 cm. long; rare and local on east side of Mount Rose, Washoe County. . . .9. P. WASHOENSIS

GG. Leaves 2 in a fascicle, 3-7 cm. long; cones 2-5 cm. long, asymmetrical or oblique at base, remaining closed on tree many years.

10. P. CONTORTA

1. PINUS ALBICAULIS Engelm., Acad. Sci. St. Louis Trans. 2: 209. 1863.

Pinus albicaulis (Engelm.) Rydb. "whitebark pine"

Small tree to 10 m. in height and 60 cm. in trunk diameter, sometimes larger, with open irregular or broom-topped crown, or shrubby at timber line. Bark grayish white, scaly, thin. Wood light brown, soft, light-weight. Twigs orange brown and often puberulous when young, becoming dark brown. Leaves clustered at ends of twigs, 5 in a fascicle with deciduous sheath, needlelike, 4-6 cm. long, stout and rigid, entire, dark green, marked on all sides by rows of stomata. Cones short-stalked, ellipsoidal, 4-7 cm. long, dark purple, with thick acute scales, not opening at maturity; seeds 10-12 mm. long, wingless, dark or reddish brown, thick-shelled, edible. Pollen shedding in July; cones maturing in August of next year but remaining closed. Derivation.--White-stemmed.

High mountains to timber line often with Pinus monticola, 2600 to 3200 m. elevation in western Nevada, principally in northern Sierra Nevada south to southern Washoe County and in Humboldt County (Pine

Forest Range), Storey County (Cedarhill Canyon near Virginia City), and Mineral County (Wassuk Range). Also northeastern Nevada in Elko County (Jarbidge, Pine Mt., and Ruby Mts.). High mountains of southwestern Alberta to central British Columbia, south to Washington, Oregon, and in Sierra Nevada to central California and western Nevada and east to western Wyoming and central Montana.

2. *PINUS FLEXILIS* James, Exped. Rocky Mts. 2: 27, 35. 1823.

Pinus flexilis (James) Rydb.

"limber pine"

Other common name--white pine.

Small to medium-sized tree 8-15 m. tall and 50 cm. in trunk diameter (larger in a southern variety) with broad rounded crown, sometimes a low shrub at high elevations. Bark on small trunks smooth and whitish gray, on larger trunks becoming deeply furrowed and dark brown or gray. Wood pale yellow, soft, light-weight. Twigs orange green and often puberulous when young, becoming darker, smoothish. Leaves clustered near ends of twigs, 5 in a fascicle with deciduous sheath, needlelike, 4-9 cm. long, slender, entire, blue green, marked on all sides by rows of stomata. Cones short-stalked, cylindric, mostly 8-15 cm. long, yellow brown, with thick rounded scales; seeds 10-12 mm. long including minute wing 1-2 mm. long, mottled brown, thick-shelled. Pollen shedding in June-July, the cones and seeds maturing and opening in autumn of the second year. Derivation.--Flexible, or limber.

High mountains at elevations of 2,000 to 3,300 m. through most of Nevada except extreme western part. This is the common 5-needle pine of eastern and central Nevada for which White Pine County was

named. Collected in the following counties; Clark, Elko, Esmeralda, Humboldt, Lander, Mineral, Nye, Pershing and White Pine. Rocky Mountain region, chiefly, from southwestern North Dakota, Montana, southern Alberta, and southeastern British Columbia, south in mountains to southern California and Trans-Pecos Texas. Also in northern Mexico.

The wood is sometimes used for lumber (mostly for rough construction and boxes), poles, and fuel. The seeds are edible.

3. *PINUS LAMBERTIANA* Dougl., Linn. Soc. London Trans. 15: 500. 1827.

"sugar pine"

Large to very large tree to 45 m. tall (rarely to 60 m., or only 12-15 m. on poor sites) and 1-1.5 m. or more in trunk diameter, with narrow crown becoming flat-topped, and with long horizontal branches bearing giant cones. Bark smooth and greenish gray on small trunks, becoming reddish brown and furrowed into irregular scaly ridges. Wood reddish brown, soft, light-weight. Twigs brownish, pubescent when young, becoming glabrous and gray. Leaves 5 in a fascicle with deciduous sheath, needlelike, 5-10 cm. long, rigid, often slightly twisted, serrulate at least toward apex, bluish green or gray green, with rows of stomata on all surfaces. Cones long-stalked, much elongated, cylindrical, 20-45 cm. long, pendulous, yellow brown, with thin rounded resinous scales usually with sweetish resin; seeds about 40 mm. in length including body 12-15 mm. and long broad wing, dark brown or blackish. Cones opening in October of second year. Derivation.-- In honor of Aylmer Bourke Lambert (1761-1842), of England, author of a classic illustrated work on the genus Pinus and also a patron of

botany.

Sierra Nevada at elevations of 1,500 to 2,100 m. in western Nevada (Washoe and Douglas Counties) around Lake Tahoe, in mountains west of Washoe Valley, and Truckee watershed west of Reno. Mountains from western Oregon south to southern California and in Sierra Nevada to western Nevada. Also in northern Lower California, Mexico.

The largest of the pines, important for lumber and also planted for ornament. Indians used the big seeds as food. A sugary resinous exudate on the bark, pinitol, also eaten by the Indians, is the origin of the common name.

4. PINUS MONTICOLA Dougl. ex D. Don in Lamb., Descr. Genus Pinus. Ed. 3 (8^o), v. 2, unnumbered page between p. 144 and p. 145. 1832.

Strobus monticola (Dougl.) Rydb. "western white pine"

Other common names.--Idaho white pine (lumber), white pine.

Large tree to 25 m. or more in height and 80 cm. in trunk diameter, with narrow pyramidal crown. Bark on small trunks smooth, light gray, becoming checkered or furrowed into squarish scaly plates. Wood light brown, soft, light-weight. Twigs orange brown and puberulous when young, becoming dark purple and glabrous. Leaves 5 in a fascicle with deciduous sheath, needlelike, 4-8 cm. long, stout and rigid, serrulate toward apex, blue green, glaucous, with rows of ventral stomata and often also 1 or 2 rows of dorsal stomata. Cones long-stalked, elongated, cylindric, 13-25 cm. long, yellow brown, scales thin, acute; seeds about 30-35 mm. in length, including body 6-8 mm. long, and long wing, mottled brown. Cones maturing and opening in

autumn of second year. Derivation.--Inhabiting mountains.

Mountains at moderately high elevations of 1,600 to 2,800 m. in Sierra Nevada (southern Washoe County), Storey County, Virginia Mountains (Washoe County), and Pinenut Range (Douglas County). Western Montana and northern Idaho to southern British Columbia and Washington and south to Oregon and in Sierra Nevada to central California and western Nevada.

The State tree of Idaho and an important timber tree for lumber for building construction, matches (the leading match wood), boxes, and millwork.

5. PINUS ARISTATA Engelm. in Parry & Engelm., Amer. Journ. Sci. and Arts, Ser. 2, 34: 331. 1862. "bristlecone pine"

Other common names.--foxtail pine, cattail pine, hickory pine.

Small to medium-sized tree 5-18 m. or more in height, with short tapering trunk to 90 cm. in diameter, and irregular broad bushy crown of erect to drooping branches. Bark on small trunks and branches smooth and whitish gray, on larger trunks becoming irregularly fissured, scaly, and reddish brown. Wood brownish red, soft, moderately heavy. Twigs stout, puberulent, orange brown, becoming dark brown or blackish, covered with crowded needles. Leaves 5 in a fascicle with more or less persistent sheath, needlelike, 2.5-4 cm. long, stout, entire, dark green, with rows of stomata on ventral surfaces but none on dorsal, curved and pressed against twig and not spreading, remaining attached 10 to 15 years and forming a brushlike or "foxtail" mass. Cones short-stalked, narrowly ovoid, 7-10 cm. long, dark purplish

brown, each scale with a slender prickle 2-5 mm. long; seeds about 15 mm. long including body 6 mm. long and large wing, mottled brown. Pollen shedding June-August, the cones and seeds maturing and opening in early autumn of the second year. Derivation.--Awned, in reference to the long slender prickles on the cones.

High mountain peaks, often with Pinus flexilis and Abies concolor, near timber line at elevations from 2,300 to 3,300 m., eastern, central, and southern Nevada, recorded from the following localities: Elko County (Indian Creek, Spruce Mt.), Pershing Co. (East Humboldt Mts.), White Pine County (Mt. Moriah, Snake Range, Sherman Mt. at S. end of Ruby Range), Eureka County (Monitor Range), Nye County (Grant Range), Esmeralda County (Boundary Peak in White Mts. and Silver Peak Mts.), and Clark County (Charleston Peak and Sheep Mts.). Very local and widely scattered on high mountains of Colorado, Utah, Nevada, and eastern California, south to northern Arizona and northern New Mexico.

As the trees are small, uncommon, and not accessible, the wood is seldom used except locally for mine timbers.

6. PINUS MONOPHYLLA Torr. & Frém. in Frém., Rpt. Explor. Exped. Rocky Mts. 319, pl. 4. 1845; as "monophyllus." "singleleaf pinyon"
Caryopitys monophylla (Torr. & Frém.) Rydb., Pinus cembroides var. monophylla (Torr. & Frém.) Voss.

Other common name.--nut pine. (Frontispiece)

Small bushy tree mostly 3-8 m. tall, sometimes 12-15 m., the short trunk 30-50 cm. in diameter, with broadly conical to rounded spreading crown of gray green foliage commonly extending nearly to ground. Bark

on small trunks smooth and gray, becoming furrowed into narrow scaly ridges and dark brown. Wood yellowish brown, moderately soft, heavy, resinous. Twigs orange brown, becoming brown. Leaves 1 (rarely 2) in a fascicle with deciduous sheath, needlelike, 3-6 cm. long and about 2 mm. in diameter, terete, stout and stiff, sharp-pointed, usually slightly curved toward twig, gray green, marked by whitish rows or lines of stomata. Cones almost stalkless, ovoid, 5-8 cm. long and broader than long when open, light brown, with resin; cone scales relatively few, thickened, unarmed, only the middle scales seed-bearing; seeds several to many in a cone, large, brown or mottled with yellow, narrowly ovoid and blunt-pointed, 15-20 mm. long and 7-10 mm. broad, wingless, thin-shelled, edible and with mealy taste. Pollen shedding in June-July, cones and seeds maturing and opening in autumn of second year. Derivation.--One-leaf, alluding to the solitary needles in a sheath.

A dominant species of the pinyon-juniper woodland with Juniperus osteosperma on desert mountain ranges at elevation of 1,300 to 2,700 m., throughout Nevada except northern border and in northwest, extending northwest of Reno but not recorded from Pershing and Humboldt Cos. Chiefly in Great Basin region, from southern Idaho and northern and western Utah to Nevada, central and southern California, and northwestern Arizona. Also in northern Lower California, Mexico.

The State tree of Nevada. The edible seeds, known as pine nuts or pinyon nuts, harvested annually by the Indians for food, are also marketed locally. However, the pinyon nuts or Indian nuts of commerce are from Pinus edulis Engelm. (pinyon), of New Mexico and Arizona.

7. PINUS PONDEROSA Laws., Agr. Man. 354. 1836.

P. brachyptera Engelm., P. ponderosa var. scopulorum Engelm., P. scopulorum (Engelm.) Lemm. "ponderosa pine"

Other common names.--western yellow pine, Rocky Mountain yellow pine, blackjack pine.

Large to very large tree 10-45 m. tall and 1 m. or more in trunk diameter, or a small tree on poor sites, with mostly narrow cylindrical open crown of spreading branches. Bark on small trunks less than 30 cm. in diameter (known as "blackjacks") blackish and furrowed into ridges, on larger trunks becoming yellow brown and irregularly fissured into large, flat, scaly plates. Wood yellowish with whitish sapwood, hard, moderately heavy. Twigs stout, glabrous, orange becoming brown, with piney odor, bud with resin droplets. Leaves 3 or 2 (5 in a southern variety) in a fascicle with persistent sheath, needlelike, 8-25 cm. long, stout, serrulate, green, with rows of stomata on each surface. Cones short-stalked, ovoid, 7-13 cm. long, reddish brown, the scales with slender prickles turned outward, leaving several basal scales on twig when shedding; seeds 30-35 mm. long including body 6-8 mm. and large wing, mottled brown. Pollen shedding in May-June, cones maturing and opening in autumn of second year and soon shedding above basal scales. Derivation.--Ponderous, or heavy, referring to the heavy wood.

Mountains of eastern part (White Pine and Lincoln Cos.) at 2,300 to 2,700 m., Charleston Mountains (Clark County) as low as 1,200 m., and in Sierra Nevada (Washoe and Storey Counties) at 1,500 to 2,300 m. Widely distributed, chiefly in Rocky Mountains and mountains of Pacific Coast region from southwestern North Dakota and Montana to

southern British Columbia and Washington south to southern California and Trans-Pecos Texas. Also in northern Mexico.

This species has one of the greatest ranges of all the trees in the western mountains and includes minor geographic variations that intergrade. Trees of eastern Nevada (Snake Range south to Charleston Peak) have short needles 8-15 cm. long and largely 2 in a fascicle and are referred by some authors to a separate variety, var. scopulorum Engelm., while trees of the typical variety in Sierra Nevada of the western border have longer needles 15-25 cm. long.

The most important western pine and second to Douglas-fir in total stand in the United States, producing lumber for many uses. Also planted for ornament and in shelter belts. State tree of Montana.

8. PINUS JEFFREYI Grev. & Balf. in A. Murr., Bot. Exped. Ore. (Rpt. No. 8) 2, pl. 1853.

P. ponderosa var. jeffreyi Balf. "Jeffrey pine"

Other common name.--western yellow pine.

Large to very large tree 10-45 m. or more in height with tall massive trunk 1-1.5 m. or more in diameter. Bark dark reddish brown, often tinged with purple, becoming fissured into large plates. Twigs stout, rough, brown, with citrus odor when broken, buds without resin droplets. Leaves 3 in a fascicle with persistent sheath, needlelike, 13-25 cm. long, stout, serrulate, dark bluish green, with rows of stomata on each surface, usually with citrus odor when crushed. Cones short-stalked, ovoid, pineapple-shaped when open, 13-30 cm. long, light brown, the many scales with stout or slender recurved prickles, leaving several basal scales on twig when shedding; seeds 30-35 mm.

long, long-winged, the body 10-12 mm. in length, mottled dark brown. Pollen shedding in June, cones maturing and opening in autumn of second year and soon shedding above basal scales. Derivation.--Named for its discoverer, John Jeffrey (died 1853?), Scotch botanical explorer who collected seeds from British Columbia to California for introduction to Scotland.

Mountains of western Nevada at elevations of 1,400 to 2,400 m. from southern Washoe County to Lyon, Ormsby, and Mineral (Bodie Creek and Alum Creek Canyons) Counties. Here this species is more abundant than Pinus ponderosa and often in almost pure stands. Mountains from southwestern Oregon south in California through Sierra Nevada to western Nevada and to southern California. Also in northern Lower California, Mexico.

Closely related to Pinus ponderosa and by some authors regarded as a variety of that species. The lumber is sold as ponderosa pine and has similar uses.

9. PINUS WASHOENSIS Mason & Stockwell, Madrono 8: 62. 1945.

"Washoe pine"

Tree 15 m. or more in height in cutover forest, perhaps becoming somewhat taller at maturity, with strongly tapered trunk to 1 m. in diameter and with pyramidal crown. Bark thin, becoming rough fissured or occasionally plated, without yellowish layers. Twigs stout, rough, brown, with citrus odor when broken, buds without resin droplets. Leaves 3 (occasionally 2) in a fascicle with persistent sheath, needle-like, 10-15 cm. long, stout, gray green, finely serrulate, dorsal sto-

mata in about 12 rows and ventral stomata in about 6 rows. Cones short-stalked, ovoid, 5-8 cm. long, brown, with many scales, each with slender slightly recurved prickle; seeds about 25 mm. long, with body 8 mm. long and wing 15-20 mm. long. Pollen shedding in June; the cones maturing and opening in autumn of the second year. Derivation.--The name commemorates the Washoe Indians who hunted in this forest.

Rare and local, known only from moraine 7 miles long on south side of Galena Creek canyon, elevation 2,100 to 2,400 m., on east side of Mount Rose, Carson Range of Sierra Nevada, in southern Washoe County, Nevada. Associated tree species of the cutover forest here are Abies magnifica, Pinus monticola, and Pinus contorta.

Closely related to Pinus jeffreyi and also to Pinus ponderosa and possibly of hybrid origin from those species. The large trees were cut many years ago for mine timbers.

10. PINUS CONTORTA Dougl. ex Loud., Arb. Frut. Brit. 4: 2292, figs.

2210-2211. 1838.

"lodgepole pine"

P. contorta var. latifolia Engelm., P. contorta var. murrayana (Grev. & Balf.) Engelm., P. murrayana Grev. & Balf.

Other common names.--"tamarack," shore pine.

Medium-sized tree 8-20 m. tall and 60 cm. in trunk diameter, or larger (or a small tree in the coastal form), with narrow pointed pyramidal crown. Bark brown, thin, with many loose scales. Wood light yellow, soft, light-weight. Twigs orange when young, becoming reddish brown. Leaves 2 in a fascicle with persistent sheath, needlelike, 3-7 cm. long, stout, often twisted, serrulate toward apex, yellow green,

with rows of stomata on each surface. Cones often clustered, almost stalkless, ovoid, 2-5 cm. long, asymmetrical or oblique at base, light yellow brown, the thin scales with long slender recurved prickles, not opening at maturity; seeds about 15 mm. long including body 4 mm. long and wing, mottled brown. Pollen shedding in June-July, cones maturing in autumn of second year but remaining closed on the tree many years. Derivation.--Contorted or twisted, alluding to the irregular crown of the typical, scrubby shore pine of the coast.

High mountains, often with Pinus ponderosa and P. monticola, western Nevada at elevations from 1,700 to 2,700 m. Common in Carson Range and sparingly in westernmost Basin Ranges from Virginia Mountains of southern Washoe County southeast through Ormsby and Douglas Counties to Brawley Peaks west of Aurora in Mineral County. Possibly also in northern Elko County, according to Billings (Nevada Trees, ed. 2, 33. 1954), but not yet collected there. Rocky Mountain and Pacific coast regions from southwestern Saskatchewan and Alberta to Yukon and southeastern Alaska, south to southern California and western Nevada, Idaho, northern Utah, and Colorado. Also in northern Lower California, Mexico.

2. PICEA A. Dietr., Fl. Berlin 794. 1824.

"spruce"

Large trees with thin scaly bark, whorled branches, and pyramidal crown, evergreen. Twigs with peglike stalks (sterigmata) bearing leaves. Leaves alternate, sessile, linear, entire, 4-angled or flattened, stiff, sharp-pointed at apex, shedding from twig upon drying. Male strobili lateral, mostly long-stalked, with many scales bearing

2 sporangia; female strobili terminal, the many scales subtended by a small bract and 2-ovuled. Cones mostly in upper part of tree, pendulous, ovoid to cylindrical, with persistent scales; seeds mostly paired at base of a scale, with long wing, embryo with 4-15 cotyledons.

Derivation.--The ancient Latin name (from pix, piceis, pitch) of a pitchy pine, probably Scotch pine, Pinus sylvestris L. Type species.--P. abies (L.) Karst. About 35 species in cooler north temperate regions.

Besides the single native species, the five following are planted in Nevada for ornament, according to Billings: Picea abies (L.) Karst. (Norway spruce), from Europe; Picea glauca (Moench) Voss (white spruce), of northeastern United States, Canada, and Alaska; Picea polita (Sieb. & Zucc.) Carr. (tigertail spruce), from Japan; Picea pungens Engelm. (blue spruce), of the Rocky Mountain region; and Picea sitchensis (Bong.) Carr. (Sitka spruce), of the Pacific coast region from Alaska to California.

1. PICEA ENGELMANNII Parry ex Engelm., Acad. Sci. St. Louis Trans.

2: 212. 1863; as "engelmanni."

"Engelmann spruce"

Large tree 10-25 m. or more in height, with straight trunk to 1 m. in diameter, and with narrow pointed pyramidal or conical crown and whorled horizontal or slightly drooping branches extending nearly to ground, or reduced to a stunted shrub at timber line. Bark grayish or purplish brown, with loosely attached scales or flakes, thin. Wood light yellow to reddish brown, soft, light-weight. Twigs roughened by peglike bases after leaves fall, orange brown, usually puberulent.

Leaves linear, 4-angled, 15-30 mm. long, acute but not sharp to touch, slender and flexible, straight or slightly curved, with 3-5 rows of stomata on each surface, dark or pale blue green, with disagreeable odor when crushed. Cones pendulous, sessile or nearly so, cylindrical to ellipsoid, 4-6.5 cm. long, light brown, with thin or papery flexible scales more or less rounded and erose at apex; seeds blackish, about 10 mm. in length with body 3 mm. long and long wing. Cones maturing and opening in autumn and mostly soon falling. Derivation.-- In honor of George Engelmann (1809-84), German-born physician and botanist of St. Louis, an authority on conifers who first recognized this species as undescribed.

Subalpine forest at high elevations from 2,500 m. to timber line in White Pine County (Shell Creek and Snake Ranges) and perhaps other high mountains in eastern Nevada. Reported from Charleston Peak region of Clark County by Billings (Nevada Trees, ed. 2, 35. 1954) but not recorded by Clokey (Flora Charleston Mountains, Nevada. Calif. Univ. Pubs. Bot. 24, 274 p., map. 1952). Rocky Mountain region, chiefly, from Montana to southwestern Alberta and central British Columbia, and south in high mountains of western United States to northern California, eastern and southeastern Nevada, southeastern Arizona, and southern New Mexico.

The wood is suitable for lumber, such as construction and boxes, for mine timbers, railroad ties and poles, but the supply is limited in area and accessibility. The trees are planted for ornament also.

3. TSUGA (Endl.) Carr., *Traité Gén. Conif.* 185. 1855.

Hesperopeuce (Engelm.) Lemm.

"hemlock"

Large trees with deeply furrowed cinnamon-red bark, nodding leading shoot, irregular horizontal to pendulous branches, evergreen. Twigs with peglike stalks bearing leaves. Leaves mostly 2-ranked or in the Nevada species radially arranged, alternate, with a minute petiole, linear, usually flat and with stomata below or in the Nevada species flattened above and rounded or keeled below and with stomata on both sides, shedding from twig upon drying. Male strobili solitary, lateral, with many scales bearing 2 sporangia; female strobili solitary, terminal on lateral twigs with many scales subtended by a bract and 2-ovuled. Cones nearly sessile, pendulous, ovoid to cylindrical, small, with sub-orbicular, thin, entire, persistent scales; seeds mostly paired at base of a scale, with long wing, embryo with 3-6 cotyledons. Derivation.--The Japanese name for the native hemlocks of Japan. Type species.--T. sieboldii Carr. About 10 species in temperate North America and Asia.

One native species in Nevada. Tsuga canadensis (L.) Carr. (eastern hemlock), of eastern United States and adjacent Canada, is occasionally planted as an ornamental in Reno.

1. TSUGA MERTENSIANA (Bong.) Carr., *Traité Gén. Conif.* Ed. 2, 250.

1867; as to name but not description.

"mountain hemlock"

Hesperopeuce mertensiana (Bong.) Rydb., Tsuga crassifolia Flous.

Medium-sized tree 10-25 m. in height and 1-1.5 m. in trunk diameter; crown narrowly pyramidal or in age spreading, with leading shoot

nodding away from wind direction, and with slender pendulous branches. Bark on small trunks grayish, becoming dark brown, thick, and deeply furrowed into scaly ridges. Wood pale reddish brown, moderately hard, moderately heavy. Twigs mostly short, slender, roughened by peglike bases after leaves fall, light reddish brown, puberulent. Leaves radially arranged but appearing crowded on upper side, with minute petiole, linear, 12-25 mm. long, flattened above and rounded or keeled below (semicircular in cross-section), rounded at apex, flexible, often more or less curved, with about 8 rows of stomata on each surface, blue green. Cones usually pendulous when mature, sessile, cylindric, 2.5-7.5 cm. long, purplish but turning brown when open, with thin papery scales rounded and erose at apex and puberulous outside; seeds light brown, about 12-15 mm. long including body 4 mm. long and large wing. Pollen shedding in June-July; cones maturing and opening in autumn. Derivation.---Named for Karl Heinrich Mertens (1796-1830), German naturalist and physician, who discovered it at Sitka, Alaska.

With Pinus albicaulis, Pinus contorta, and Pinus monticola at high elevations mainly 2,400 to 2,900 m. in Sierra Nevada at western edge of Nevada, abundant between Slide Mountain and Mount Rose in southern Washoe County. Also Snow Valley in Ormsby County. Pacific coast region from southern Alaska (Cook Inlet) and British Columbia south to northern California and in Sierra Nevada to central California and western Nevada. Also east in mountains to northern Idaho, and western Montana.

A handsome tree planted elsewhere as an ornamental.

4. PSEUDOTSUGA Carr., Traité Gén. Conif. Ed. 2, 256. 1867.

"Douglas-fir"

Medium-sized to large trees with pyramidal crown, evergreen.

Twigs slightly rough, with raised oval leaf scars broader than long, the buds not resinous. Leaves radially arranged or somewhat 2-ranked, alternate, with short petiole, linear, flattened, grooved above, with prominent midrib and 2 whitish stomatal bands below. Male strobili solitary and scattered, lateral, cylindric, with many scales bearing 2 sporangia; female strobili solitary, terminal or axillary, the many scales 2-ovuled and shorter than the bract. Cones short-stalked, pendulous, narrowly ovoid, with rounded concave, rigid, persistent scales; bracts distinctive, exserted, 3-lobed, the middle lobe longest and awn-like; seeds mostly paired at base of a scale, with long wing, embryo with 6-12 cotyledons. Derivation.--False hemlock; from Greek pseudo-, false, and Japanese tsuga, hemlock, referring to the relationship to Tsuga (Engl.) Carr. Type species.--P. Menziesii (Mirb.) Franco (P. douglasii (Sabine) Carr.). About 5 species, 2 in temperate western North America, and 3 in Japan, Formosa, and China. One species with 2 varieties in Nevada.

Reference.--Little, Elbert L., Jr. The genus Pseudotsuga (Douglas-fir) in North America. Leaflets West. Bot. 5: 181-198. 1952.

1. PSEUDOTSUGA MENZIESII (Mirb.) Franco, Soc. Broteriana (Coimbra)

Bol., Sér. 2, 24: 74. 1950.

"Douglas-fir"

P. taxifolia (Poir.) Britton, P. mucronata (Raf.) Sudw., P. douglasii (Sabine) Carr.

Medium-sized to large trees 10-30 m. in height and 1 m. or more

in trunk diameter with pyramidal crown or becoming flat-topped in age, and with many horizontal to drooping branches. Bark reddish brown or gray, very thick, rough and deeply furrowed into broad ridges, sometimes corky. Wood yellowish with whitish sapwood, soft, light-weight. Twigs slightly roughened by bases where leaves were attached, with raised oval leaf scars broader than long. Leaves radially arranged or somewhat 2-ranked, alternate, with short petiole, linear, 1.5-3.5 cm. long, flattened, grooved above, straight, usually rounded and obtuse at apex but sometimes acute, with prominent midrib and 2 whitish stomatal bands below, dark yellow green or blue green. Cones short-stalked, pendulous, cylindric, 4.5-9 cm. long, reddish brown, with conspicuously exserted 3-lobed or 3-toothed bracts, the middle lobe longest and awnlike, spreading or reflexed; seeds mottled brown, 15-20 mm. long including body about 5 mm. long, and longer wing. Cones maturing and opening in autumn. Derivation.--Named for Archibald Menzies (1754-1842), Scotch physician and naturalist, who discovered it in 1791 at Nootka Sound on Vancouver Island, British Columbia.

Mountains at elevations of 1,900 to 2,900 m. in eastern Nevada in northern Elko County (near Mountain City; also reported as introduced in Ruby Mts.), White Pine County (Shell Creek and Snake Ranges), and Lincoln County (Mt. Wilson) and in Sierra Nevada at western border of State in Douglas County (east shore of Lake Tahoe near Glenbrook). Widely distributed in Rocky Mountain and Pacific coast regions from Montana, southwestern Alberta and central British Columbia, south to California, New Mexico, and Trans-Pecos Texas. Also south in mountains of northern and central Mexico.

Two geographical varieties both occurring in Nevada are distinguished. The typical variety (var. menziesii) or coast Douglas-fir of the Pacific coast region to western Nevada is characterized by: twigs pubescent; leaves thin, dark yellow green, with odor of pineapple; cones 6-10 cm. long, with straight erect 3-lobed bracts. The inland variety (var. glauca (Beissn.) Franco, Soc. Broteriana (Coimbra) Bol., Sér. 2, 24: 77. 1950) or Rocky Mountain Douglas-fir of the Rocky Mountain region including eastern Nevada is characterized by: twigs pubescent or glabrous; leaves blue green, thickened, with odor of turpentine; cones 4-7 cm. long with erect or reflexed 3-lobed bracts.

First in total stand, lumber production, and production of veneer for plywood among the native tree species of the United States, used principally for building production as lumber, timbers, piling, and plywood, and for many other purposes. Also planted for shade and ornament. The State tree of Oregon.

5. ABIES Mill., Gard. Dict. Abridged. Ed. 4, V. 1. 1954. "fir"

Large trees with pyramidal sharp-pointed crown of whorled horizontal branches, evergreen. Twigs smooth, with round leaf scars and buds usually resinous. Leaves radially arranged or often 2-ranked, alternate, sessile but contracted above base, linear, mostly flattened and grooved above or sometimes 4-angled, rounded and usually emarginate at apex, on upper branches often thickened, curved, and acute, with stomata on lower surfaces or sometimes (as in the 3 Nevada species) also on upper surface. Male strobili numerous, pendulous, lateral, cylindrical, with many scales bearing 2 sporangia; female strobili

erect mostly on topmost branches, ovoid to cylindrical, the many scales each 2-ovuled and subtended by a longer pointed bract. Cones sessile, erect, ovoid to cylindrical, with many closely imbricated thin scales rounded at apex, the bracts exerted in some species; at maturity the scales deciduous and falling from the persistent axis; seeds mostly paired at base of a scale, ovoid or oblong, with long wing, embryo with 4-10 cotyledons. Derivation.--The classic Latin name of the silver fir, Abies alba Mill., of Europe, the type species. About 40 species in northern hemisphere in temperate zone and mountains southward.

Besides the 3 native species, Abies pinapso Boiss. (Spanish fir), of Spain, is planted in Nevada.

KEY TO SPECIES

Leaves flattened; cones 6-12 cm. long.

Leaves of lower branches 2-4 cm. long, dark blue green, with 2 medial resin ducts in cross-section. 1. A. LASTOCARPA

Leaves of lower branches 3-6 cm. long, pale blue green, with 2 external (margin) resin ducts in cross-section. . . . 2. A. CONCOLOR

Leaves 4-angled; cones large, 10-20 cm. long. . . . 3. A. MAGNIFICA

1. ABIES LASTOCARPA (Hook.) Nutt., No. Amer. Sylva 3: 138. 1849.

"subalpine fir"

Other common names.--alpine fir, white fir (lumber).

Large tree to 27 m. tall and 1 m. in trunk diameter or dwarfed and shrubby at timber line; crown long, narrow, and sharp-pointed, with branches extending nearly to base of tree. Bark gray, becoming fissured and scaly (creamy white, soft, and corky in a southern variety).

Wood light brown, soft, light-weight. Twigs gray, puberulent to glabrous. Leaves radially arranged, crowded and pointing upward and forward, alternate, sessile, linear, 2-4 cm. long, flattened, grooved above, rounded at apex, with rows of stomata on both surfaces, dark blue green; on upper branches the leaves as short as 1.5 cm., thickened, acute. Cones cylindric, 6-10 cm. long, dark purple, puberulent, the scales rounded or truncate at apex, bracts not exposed; seeds light brown, about 20 mm. long including body 7 mm. long and broad wing. Pollen shedding in July; cones maturing in autumn, scales soon falling from axis. Derivation.--Hairy-fruited.

Spruce-fir subalpine forest up to timber line at elevations of 2,100 to 3,000 m., common in Jarbidge Mountains of northern Elko Co. and reported from other high mountains of northeastern Nevada. Western Northwest Territories, Yukon, and southeastern Alaska south in mountains of Oregon, northeastern Nevada, southeastern Arizona, and western New Mexico.

Suitable for lumber. Also an ornamental and shade tree.

2. *ABIES CONCOLOR* (Gord. & Glend.) Lindl. "white fir"

Large tree to 30 m. in height and 60 cm. or more in trunk diameter, with narrow sharp-pointed conical crown becoming irregular in age.

Bark on small trunks smoothish, gray, resin-blistered, becoming very thick, hard, and deeply furrowed into scaly ridges. Wood whitish or light brown, soft, very light-weight. Twigs yellowish green, puberulent to glabrous. Leaves spreading and pointing upward and forward,

alternate, sessile, linear, 3-6 cm. long, flattened, rounded or acute at apex, with rows of stomata on both surfaces, pale blue green, glaucous; on upper branches the leaves as short as 2 cm., curved, thickened, acute. Cones cylindric, 7-12 cm. long, grayish green, brownish, or purplish, puberulent, the scales rounded at apex, bracts not exposed; seeds light brown, about 25 mm. long, including body 10 mm. long and broad wing. Pollen shedding in May-July; cones maturing in autumn, scales soon falling from axis. Derivation.--Of uniform color, referring to the leaves, which are pale green on both sides.

Mountain forests, often common, at elevations from 1,700 to 3,300 m. in eastern Nevada in Elko, White Pine, Lincoln, Nye, and Clark (Charleston Mts.) Counties and in Sierra Nevada and adjacent ranges (Washoe, Storey, Douglas, and Lyon Counties) and Virginia Mts. (Washoe Co.) of western part. Mountains from western Wyoming and southern Idaho to southern Oregon, and south to southern California, southern Arizona, and southern New Mexico. Also in northern Mexico (Lower California and Sonora).

Suitable for lumber and a popular ornamental elsewhere. Browsed by sheep when small.

3. *ABIES MAGNIFICA* A. Murr., Roy. Hort. Soc. Proc. 3: 318, figs. 25-33. 1863. "California red fir"

Other common names.--red fir, Shasta red fir (var.), silvertip fir.

Large tree becoming 45 m. or more in height, with massive trunk 1 m. or more in diameter, and with narrow irregular crown. Bark dark reddish brown, thick, deeply furrowed into narrow ridges. Wood light

reddish brown, soft, light-weight. Twigs yellowish green, puberulent. Leaves spreading flat on lower side of twig, crowded, alternate, sessile, linear, 2-4 cm. long, 4-angled, curved, rounded at apex, with rows of stomata on all 4 sides, blue green, glaucous; on upper branches as short as 1.5 cm., curved, thickened, and acute. Cones cylindric, large and heavy, 10-20 cm. long, purplish brown, puberulent, the rounded scales 3-3.5 cm. broad; bracts not exposed except in var. shastensis Lemm., which has exserted reflexed bright yellow bracts, spatulate and pointed, about 8 mm. longer than scale, covering nearly half the exposed portion of scale; seeds dark reddish brown, about 35 mm. long including body 15 mm. and broad wing. Cones maturing in autumn, scales soon falling from axis. Derivation.--Magnificent, referring to the cone.

Dominant or with Pinus ponderosa or P. monticola, P. contorta, and Tsuga mertensiana at elevations from 1,800 to 2,900 m. on high mountains of Sierra Nevada of western Nevada (Washoe, Ormsby, and Douglas Counties). Southwestern Oregon (Cascade Mountains) south to north Coast Ranges of California and through Sierra Nevada to central California and western Nevada.

Var. shastensis Lemm. (Calif. State Bd. Forestry Bienn. Rpt. 3: 145. 1890), Shasta red fir, differs from the typical variety only in the conspicuously exserted cone bracts and has the same range. However, no specimens from western Nevada were found.

The largest native true fir of the United States. Used for lumber, ornament, and Christmas trees.

6. HEYDERIA K. Koch, Dendrol. 2 (2): 177. 1873.

Libocedrus auth. in part.

"incense-cedar"

Large aromatic trees with scaly bark, evergreen. Twigs flattened in horizontal plane; buds naked. Leaves in 4 ranks, decussate, small and scalelike, decurrent at base, much compressed, the lateral keeled; on seedlings linear-lanceolate and spreading. Strobili solitary, terminal; male strobili oblong, with 6-16 decussate scales bearing usually 4 sporangia; female strobili oblong, with several pairs of leaflike scales at base, of 6 imbricate acuminate scales, the 2 middle scales each with 2 ovules at base. Cones oblong, of 6 flat woody scales mucronulate at apex, the 2 middle scales each with 2 seeds and the 2 upper sterile scales united; seeds with 2 unequal lateral wings, embryo with 2 cotyledons. Derivation.--Honoring Ed. Heyder, German horticulturist and councilor of the ministry of agriculture. Type species.--H. decurrens (Torr.) K. Koch. Three species, 1 in western North America, 1 in Formosa, and 1 in China and Burma.

According to Li, the 3 species from the northern hemisphere commonly referred to Libocedrus are more closely related to Thuja and should be segregated as the genus Heyderia.

Reference.--Li, Hui-lin. A reclassification of Libocedrus and Cupressaceae. Arnold Arboretum Jour. 34: 17-36, illus. 1953.

1. HEYDERIA DECURRENS (Torr.) K. Koch, Dendrol. 2 (2): 179. 1873.

Libocedrus decurrens Torr.

"incense-cedar"

Other common name.--California incense-cedar.

Medium-sized to large tree to 20 m. or more in height, with rela-

tively thick trunk to 1.5 m. in diameter, enlarged and lobed at base, and long narrow open crown of erect and spreading branches, irregular in age. Bark orange brown or reddish brown, thick and fibrous, deeply furrowed into scaly and shreddy ridges. Wood light reddish brown with thin whitish sapwood, soft, light-weight. Twigs much branched in horizontal plane, mostly shedding the second or third year. Leaves decussate, scalelike, decurrent at base, oblong-ovate, 3-12 mm. long, yellow green, adnate to twig except at apex. Cone pendulous, oblong, 2-3 cm. long, light brown, the 6 scales mucronulate, the upper sterile pair united; seeds 4 or fewer, oblong, light brown, 16-20 mm. long including body about 8-12 mm. long and 2 unequal wings appearing as 1. Pollen shedding in January-February; cones maturing and opening in autumn. Derivation.--Decurrent, the scale leaves running down the twig.

Characteristic of mixed coniferous mountain forests with Pinus jeffreyi, Pinus ponderosa, and Abies concolor at elevations between 1,500 and 2,100 m. on eastern slopes of Sierra Nevada at western border of Nevada (Washoe and Douglas Counties); common around Lake Tahoe. Mountains from western Oregon south in higher Coast Ranges and Sierra Nevada to southern California and to western Nevada. Also in Lower California, Mexico.

The leading wood for pencils. Also for Venetian blinds, lumber for rough construction, and railroad ties. Preferred for fence posts because of its durability. Also an ornamental.

7. JUNIPERUS L., Sp. Pl. 1038. 1753; Gen. Pl. Ed. 5, 461. 1754.

Sabina Mill.

"juniper"

Aromatic trees or sometimes shrubs, with usually shreddy bark, scaly or naked buds, evergreen. Leaves opposite or whorled in 3's, scalelike or linear and sharp-pointed, often of 2 kinds, primary leaves or juvenile leaves in 3's, linear and awllike or needlelike, and secondary leaves scalelike, ovate, closely imbricated and appressed, often glandular. Male and female strobili mostly on different plants (dioecious), lateral or terminal on short twigs, small; male strobili solitary, oblong or ovoid, yellow, the many decussate or ternate scales bearing 2-6 sporangia; female strobili ovoid, subtended by persistent scaly bracts, of 3-8 pointed scales some or all bearing 1 or 2 ovules. Strobili or cones (popularly "fruits" or "berries") maturing at end of first or second year (rarely third), mostly globose, berrylike, fleshy from the enlarged fused scales, indehiscent, closed or sometimes open at apex, blue, blue black, brownish, or reddish, glaucous. Seeds 1-12, ovoid, often angled and grooved, brown; embryo with 2 or 4-6 cotyledons. Derivation.--The classical Latin name. Type species.--J. communis L. About 50 species widely distributed in northern hemisphere south to tropical mountains.

In addition to the 4 native species in Nevada, Juniperus virginiana L. (eastern redcedar), of eastern United States, has been planted for ornament.

KEY TO SPECIES

- A. Leaves all spreading from twig, awllike or needlelike, mostly 10-15 mm. long; low creeping subalpine shrub. 1. J. COMMUNIS
- AA. Leaves mostly closely appressed, scalelike, mostly 1-3 mm. long; erect tree or large shrub.
 - B. Leafy twigs relatively stout, 2 mm. or less in diameter; older twigs scaly or shreddy, gray or brown; scalelike leaves denticulate.
 - C. Mature strobili dark blue or bluish black, juicy; scalelike leaves mostly with gland on back; seeds about 4 mm. long; cotyledons 2.
 - D. Scalelike leaves mostly in 3's; seeds 2 or 3; western Nevada.
 - 2. J. OCCIDENTALIS
 - DD. Scalelike leaves mostly in 2's; seed 1; possibly in southeastern Nevada. 2a. J. MONOSPERMA
 - CC. Mature strobili brownish or whitish, dry and mealy; scalelike leaves mostly without gland on back; seed 1 (sometimes 2), 5-8 mm. long; cotyledons 4-6. 3. J. OSTEOSPERMA
- BB. Leafy twigs slender, about 1 mm. in diameter, often drooping at end; older twigs becoming smoothish and reddish brown to dark red; scalelike leaves entire. 4. J. SCOPULORUM

1. JUNIPERUS COMMUNIS L., Sp. Pl. 1040. 1753.

Juniperus sibirica Burgsd. "common juniper"

Other common name.--dwarf juniper, mountain juniper.

Low shrub 0.3-1 m. high, usually low and mat-forming, the typical

variety elsewhere and especially in Europe and in cultivation becoming a small tree to 8 m. or more in height. Bark dark reddish brown, thin, papery and shreddy. Twigs 3-angled and yellowish when young, becoming brown, with scaly winter buds. Leaves in 3's, spreading nearly at right angles to twig, linear, awllike or needlelike, mostly 10-15 mm. long (only 4-8 mm. in a variation), 1-2 mm. broad, stiff and spiny-pointed, slightly curved and twisted at base so that the yellow green lower surface is commonly uppermost, the upper surface with broad whitish stomatal band. Dioecious or sometimes monoecious; mature female strobili or cones short-stalked, berrylike, globose, 5-8 mm. in diameter, bluish or blackish, slightly glaucous, with mealy resinous sweetish flesh and 1-3 light brown seeds 4-5 mm. long. Pollen shedding in July; the berrylike strobili maturing the third year and persistent a year or more. Derivation.--Common; that is, common to Linnaeus in Sweden.

Subalpine forest with Pinus aristata and Pinus flexilis to timber line and above or sometimes lower down to pinyon-juniper zone, mostly at 2,100 to 2,700 m. elevation, also to 3,300 m., high mountains of northern and eastern Nevada in Elko, Pershing, Eureka, White Pine, and Clark (Charleston Mts. and Sheep Range) Counties. Also reported from Sierra Nevada by Tidestrom (Fl. Utah Nevada 55. 1925), but perhaps not in this State. A variable species with intergrading forms widely distributed from Greenland, Newfoundland, and Labrador, across Canada to northwestern Alaska, south in United States, chiefly in mountains, to central California, northern New Mexico, North Dakota, Illinois, and Georgia. Also in Europe and Asia.

Reported to be the most widely distributed tree species in the northern hemisphere though seldom a tree in North America. The variation in Nevada is referred by some authors to var. saxatilis Pall. (Fl. Ross. 1, 2: 12, pl. 4, fig. A. 1788; var. montana Ait.), mountain common juniper, of high mountains and Arctic regions, characterized by spreading prostrate habit and shorter, more crowded leaves. The typical, erect tree form (var. communis; var. erecta Pursh) as well as shrubby and horticultural forms are grown as ornamentals. Elsewhere the resinous strobili have been utilized to flavor gin and in medicine.

2. JUNIPERUS OCCIDENTALIS Hook., Fl.-Bor. Amer. 2: 166. 1839.

Sabina occidentalis (Hook.) Ant.

"western juniper"

Other common name.--Sierra juniper.

Small to medium-sized tree 6-20 m. in height with short massive trunk to 1-2 m. in diameter, with low broad crown of large spreading branches. Bark reddish brown, fissured into broad flat scaly ridges. Wood reddish or brown, with thick whitish sapwood, soft, light-weight. Leafy twigs relatively stout, 2 mm. or less in diameter, old twigs reddish brown, scaly. Leaves mostly in 3's or partly in 2's, closely appressed, scalelike, rhombic-ovate, about 3 mm. long, acute or acuminate, with gland on back, denticulate, gray green or blue green, on vigorous shoots awllike and sharp-pointed, to 6 mm. Mature female strobili or cones berrylike, subglobose to ellipsoid, 6-8 mm. long, bluish black, glaucous, with thin dry resinous flesh; seeds 2 or 3, 4 mm. long, brown, cotyledons 2. Derivation.--Western.

Sierra Nevada and other mountains at elevations of 1,700 to 2,600

m. from northern Washoe County to Douglas and Lyon Counties in western Nevada. Mountains of Pacific coast region of western Montana, Idaho, and Washington, south to Oregon and southern California and to western Nevada.

The "berries" were eaten by the Indians.

2a. JUNIPERUS MONOSPERMA (Engelm.) Sarg., Silva No. Amer. 10: 89, pl. 522. 1896. "one-seed juniper"

Sabina monosperma (Engelm.) Rydb., Juniperus gymnocarpa (Lemm.)

Cory.

Other common name.--cherry-stone juniper.

Much-branched, spreading, often scraggy shrub or small tree 3-8 m. tall, with several curved branches from the ground, usually without a single upright trunk but sometimes with trunk to 40 cm. in diameter. Bark gray, fibrous and shreddy. Wood light reddish brown with whitish sapwood, soft, light-weight. Leafy twigs crowded at ends of branches, relatively stout, 2 mm. or less in diameter. Leaves opposite or partly in 3's, closely appressed, scalelike, rhombic-ovate, about 2 mm. long, usually acute, mostly with gland on back, denticulate, yellow green, on vigorous shoots in 3's, awllike and sharp-pointed, to 5 mm. long. Dioecious; male strobili 3-4 mm. long, pale light yellow brown; mature female strobili or cones berrylike, subglobose, 4-7 mm. in diameter, dark blue, glaucous, juicy, with reddish bitter pulp, maturing the first year; seed 1, about 4 mm. long, dark brown, cotyledons 2. Derivation.--One-seeded.

Pinyon-juniper woodlands, apparently not Nevada. Colorado and Utah, south to southeastern Arizona, southern New Mexico, Trans-Pecos,

central, and northwestern Texas, and extreme northwestern Oklahoma. Also in northern Mexico.

Juniperus monosperma is not known to be native in Nevada but may eventually be discovered in the southeastern part. It is sometimes confused with J. osteosperma or other species. Apparently first recorded from Nevada in Charleston Mountains by Coville (Bot. Death Valley Exped. 225. 1893: Merriam, No. Amer. Fauna 7: 343. 1893), according to Sargent (Silva No. Amer. 10: 90. 1896). Sudworth (The cypress and juniper trees of the Rocky Mountain region. U. S. Dept. Agr. Bul. 207, map 6. 1915) included eastern Nevada in the range. However, it is significant that Clokey (Flora Charleston Mts., Nevada. Calif. Univ. Pubs. Bot. 24: 29. 1951) in his extraordinarily large collections in the Charleston Mountains did not find J. monosperma. He listed this species as reported there at an elevation of 2,800 m. in the Death Valley Expedition. Upon examination this old Nevada specimen (Coville and Funston 322) proves to be J. scopulorum with compact foliage; the high elevation also agrees with that species. Billings (Nevada Trees, ed. 2, 48. 1954) restricted the Nevada range of J. monosperma to the eastern and perhaps the southern counties, but specimens from those areas are referred here to J. osteosperma. Moreover, Nevada is outside the range of J. monosperma as mapped by Whiting (Plateau 15: 23-32, illus. 1942).

In order that further search may be made for it in Nevada, Juniperous monosperma is tentatively retained here. If not collected within the State, this species should be excluded from the final publication of this flora.

Juniperus monosperma may be distinguished from J. osteosperma by the following characters: smaller size, habit usually a spreading shrub with several curved branches from ground and usually without a single upright trunk; leafy twigs crowded at ends of branches; dioecious; smaller, dark blue, juicy strobili; smaller seed; and 2 cotyledons.

3. JUNIPERUS OSTEOSPERMA (Torr.) Little, Leaflets West. Bot. 5: 125. 1938. "Utah juniper"

J. californica var. utahensis Engelm., J. utahensis (Engelm.) Lemm., Sabina osteosperma (Torr.) Ant., S. utahensis (Engelm.) Rydb.

Small tree 3-12 m. tall, usually with definite upright trunk (elsewhere to 90 cm. in diameter), branching at height of a few feet to form a broad, rounded or conical, open crown with spreading branches nearly to ground. Bark gray, fibrous and shreddy in long strips. Wood light brown with thick whitish sapwood, soft, light-weight. Leafy twigs relatively stout, 2 mm. or less in diameter. Leaves mostly opposite or also in 3's, closely appressed, scalelike, rhombic-ovate, about 2 mm. long, mostly acute, mostly without gland or sometimes with inconspicuous gland on back, denticulate, yellow green, on vigorous shoots in 3's, awllike and sharp-pointed, to 5 mm. long. Monoecious; male strobili 3 mm. long, brown; mature female strobili or cones berrylike, subglobose, 7-13 (17) mm. in diameter, brownish or whitish, glaucous, dry and mealy, the sweetish pulp greenish brown; seeds 1 or sometimes 2, 5-8 mm. long, brown toward apex and light brown toward base, cotyledons 4-6. The berrylike strobili mature the second year. Deri-

vation.--Bone-seeded.

Common and characteristic desert mountain tree of the pinyon-juniper woodland usually with Pinus monophylla or sagebrush or alone, at elevations from 800 to 2,400 m. on Great Basin mountain ranges almost throughout Nevada. Specimens seen from all 17 counties. Great Basin region, chiefly, from southwestern Wyoming to southern Idaho and Nevada, south to eastern and southeastern California, central Arizona, and western New Mexico. Also local in southern Montana.

The durable wood is used for fence posts and also for fuel, while the "berries" were eaten by the Indians. The trees have been grown for ornament.

4. JUNIPERUS SCOPULORUM Sarg., Silva No. Amer. 14: 93, pl. 739. 1902.

J. virginiana var. scopulorum Lemm., Sabina scopulorum (Sarg.) Rydb.

"Rocky mountain juniper"

Other common names.--western juniper (lumber), Rocky Mountain redcedar.

Small to medium-sized tree to 12 m. tall, with straight trunk to 50 cm. in diameter, with narrow, pointed, open, conical crown, and with slender branches often drooping at ends, or sometimes shrubby. Bark dark reddish brown or gray, thin, fibrous and shreddy. Wood deep red or purplish red with thick whitish sapwood, soft, light-weight. Leafy twigs slender, about 1 mm. in diameter, often drooping at end, older twigs becoming smoothish and reddish brown to dark red. Leaves mostly opposite, closely appressed, scalelike, rhombic-ovate, about 2 mm. long, acute or acuminate, mostly with gland on back, entire, gray green or blue green; vigorous shoots in 3's, awllike and sharp-pointed,

to 6 mm. long. Dioecious (?); male strobili 2-3 mm. long, brown; mature female strobili or cones berrylike, subglobose, 5-8 mm. in diameter, bright or dark blue, glaucous, juicy, resinous; seeds 1-3, usually 2, 4-5 mm. long, light brown. Pollen shedding in May; the berrylike strobili maturing the second year. Derivation.--Of rocky cliffs, or crags, referring to the habitat.

Canyons, streams, and ridges in pinyon-juniper and ponderosa pine zones in mountains at elevations of 1,700 to 2,800 m. in eastern and northern Nevada in Elko, Eureka, Lander, Pershing, White Pine, Nye, and Clark Counties. A variation called swamp cedar grows with greasewood and rabbitbrush in the wet, saline Spring Valley, northeast of Connor's Pass, White Pine County. Western North Dakota and Montana, northwest to southwestern Alberta, and eastern British Columbia, south to southern Nevada, Arizona, New Mexico, and Trans-Pecos Texas.

The wood is used for fence posts and lumber and is suitable for cedar chests.

RUTACEAE OF NEVADA

(Rue Family)

Shrubs (in Nevada) or trees (rarely herbs), glandular-punctate and often strongly bitter aromatic; leaves alternate or opposite, simple or palmately or pinnately compound (rarely reduced to spines), mostly gland-dotted, estipulate. Flowers mostly bisexual (sometimes unisexual and the plants dioecious), mostly actinomorphic, in lateral or terminal inflorescences. Calyx of 3-5 sepals or lobes; corolla hypogynous or slightly perigynous, of 3-5 usually distinct petals, rarely none; disk present; stamens as many or twice as many as petals, mostly distinct, anthers 2-celled, opening longitudinally; pistil 1 or sometimes of 2-5 nearly separate carpels, 2-12-carpellate, ovary superior, usually deeply lobed, typically 4-5 celled (or 2-12-celled) with axile placentation, ovules 1-2 or several in each cell, styles as many as carpels or connate and seemingly 1. Fruit a capsule, of nearly separate carpels, a berry, drupe, or samara; seeds 1-several in each cell, with or without endosperm.

About 140 genera and 1,300 species, widely distributed in tropical and temperate regions but mainly tropical, with 8 genera native in the United States. The citrus fruits (Citrus) are of great economic importance, and other representatives are ornamentals.

A single native species in Nevada. To be sought here is the genus Ptelea (hoptree), which is found in the bordering States of Utah, Arizona, and California.

1. THAMNOSMA Torr. & Frém. in Frém., Rpt. Explor. Exped. Rocky Mts.

313. 1845.

"desert-rue"

Small shrubs or half-shrubs, strong-scented, deciduous (in the Nevada species) or evergreen. Leaves alternate, simple, small or reduced to scales. Flowers bisexual, solitary. Calyx 4-lobed; petals 4; stamens 8, inserted on the cuplike disk; ovary stipitate, 2-celled, deeply 2-lobed, style filiform, ovules several in each cell. Capsule deeply 2-lobed, the segments subglobose; seeds reniform. Derivation.-- From Greek bush and odor, referring to the strong odor. Type species.-- T. montana Torr. & Frém. Three species in arid southwestern United States and northern Mexico.

1. THAMNOSMA MONTANA Torr. & Frém., Rpt. Explor. Exped. Rocky

Mts. 313. 1845.

"Mohave desert-rue"

Other common name.--turpentine-broom.

A low shrub 30-60 cm. or more in height, much-branched and broom-like, strongly odorous, soon deciduous and leafless most of year. Twigs stout, yellow green, with raised gland dots, the apices dying and often forming a spiny point. Leaves linear to oblanceolate, 2-12 mm. long, gland-dotted, shedding early. Flowers solitary, terminal and lateral, short-pedicellate, 8-12 mm. long, gland-dotted; calyx 2 mm. long, green, with 4 rounded lobes, persistent; corolla cylindric to funnellform, 8-12 mm. long, petals dark bluish purple, the slender style exserted. Capsule with stipe 2-4 mm. long, the 2 gland-dotted globose lobes 5-8 mm. in diameter; seeds 1-3 in each cell, 4 mm. long, dark brown, smooth or slightly wrinkled. Flowering March-May and

fruiting April-June. Derivation.--Of mountains.

Frequent on rocky and gravelly mesas, slopes, and washes in creosote-bush desert zone at elevations from less than 350 to 1,300 m., Lincoln and Clark Counties, southeastern Nevada. Southwestern Utah, southeastern Nevada, southeastern California, and Arizona. Also in northwestern Mexico (Lower California and Sonora).

The type of this species and genus was collected on Virgin River, southeastern Nevada, by Frémont.

Not browsed by livestock. Reported to have been used medicinally by the Indians.

MELIACEAE OF NEVADA

(Mahogany Family)

Trees or shrubs with wood often scented. Leaves alternate (rarely opposite), mostly pinnate (sometimes 2-3 pinnate, rarely simple), estipulate. Flowers mostly bisexual, actinomorphic, commonly in axillary panicles. Calyx usually small, of 4-5 sepals or lobes, persistent; corolla of 4-5 (rarely 3-8) petals, free or connate at base or adnate to staminal tube; stamens mostly 8-10 (rarely 5 or numerous), the filaments connate (rarely free) forming a staminal tube with anthers often sessile, anthers 2-celled, dehiscent longitudinally; disk usually present, various; pistil 1, ovary superior, usually 2-5 carpellate and 2-5-celled, placentation axile, ovules mostly 2 in each cell, rarely 1 or more, pendulous, anatropous, style 1 or none, stigma often capitate, discoid, or 5-lobed. Fruit a berry, capsule, or rarely a drupe; seeds often winged, with or without endosperm.

Tropical family of about 50 genera and 800 species, with 1 species of Swietenia (mahogany) north to the United States in southern Florida. Valuable tropical timbers, such as mahogany and Spanish-cedar (Cedrela), and ornamentals, including the following single introduced species in Nevada.

1. MELIA L., Sp. Pl. 384. 1753; Gen. Pl. Ed. 5, 182. 1754.

"chinaberry"

Deciduous or half-evergreen trees or shrubs. Leaves alternate,

large, 1-3-pinnate, the leaflets entire or serrate. Flowers numerous in lateral panicles; sepals 5-6; corolla of 5-6 petals, white or purple; staminal tube divided at top into 10-12 lobes, bearing 10-12 anthers between lobes on inside; disk annular; ovary 3-8-celled with 2 ovules in each cell, style long with 4-6-lobes capitate stigma. Fruit a small indehiscent drupe. Derivation.--A classical Greek name for the ash tree, and transferred by Linnaeus to this genus. Type species.--M. azedarach L. About 10 to 20 species from tropical Asia and Australia, 1 of which is naturalized in warmer parts of the United States.

1. MELIA AZEDARACH L., Sp. Pl. 384. 1753.

M. azedarach umbraculifera G. W. Knox "chinaberry"

Other common names.--umbrella chinaberry, chinatree, umbrella-tree.

Small to medium-sized deciduous tree becoming 6-10 m. tall and 30 cm. in trunk diameter, with crowded, abruptly spreading branches forming a hemispherical, flattened, or umbrellalike crown. Bark dark or reddish brown, becoming furrowed. Wood light brown to reddish brown with yellowish white sapwood, moderately soft. Twigs green, glabrous or nearly so. Leaves 20-40 cm. or more in length, mostly 2-3-pinnate; leaflets numerous, odd-pinnate, short-petiolulate, ovate to lanceolate, 2-5 cm. long, 1-2 cm. broad, acute to acuminate at apex, cuneate and mostly oblique at base, sharply serrate or lobed, thin, glabrous or nearly so, dark green above and paler beneath, with pungent odor when crushed. Panicles 10-25 cm. long, lateral, long-stalked; flowers numerous, on slender pedicels, 5-merous, about 1 cm. long and 1.5-2 cm. across, showy and fragrant; sepals 5, 2 mm. long, greenish; petals 5,

10 mm. long, spreading, pale purplish or lilac-colored; staminal tube 8 mm. long, violet, with usually 10 anthers; ovary 3-6-celled. Drupe subglobose, 1.5 cm. in diameter, yellow, slightly fleshy and becoming wrinkled, persistent on tree in winter, stone with 5 or fewer dark brown seeds 8 mm. long. Derivation.--From the Persian name (azad dirakht, literally "noble tree") for this species.

Escaped from cultivation in southern Nevada, where grown for ornament and shade, according to Tidestrom (Fl. Utah Nev. 340. 1925) and Billings (Nev. Trees, ed. 2, 87. 1940). However, probably not naturalized and to be excluded from the State flora, since no herbarium specimens from Nevada were found. Widely planted and escaped and naturalized in southeastern United States from Virginia to Oklahoma, Texas, and Florida. Sometimes escaping in California. Native of southern Asia, probably from Iran and Himalaya to China, but widely cultivated and naturalized in tropical and subtropical regions.

This species is poisonous and has insecticidal properties. Various parts of the tree including the poisonous fruits have been employed medicinally. A sacred tree in parts of Asia.

ANACARDIACEAE OF NEVADA

(Sumac or Cashew Family)

Trees or shrubs (rarely woody vines) usually with resinous juice in bark; leaves alternate (rarely opposite), simple, 3-foliolate, or pinnate, estipulate or with stipules obscure. Flowers bisexual or usually unisexual, usually actinomorphic, minute, mostly numerous, mostly in terminal or lateral panicles. Calyx of 5 (sometimes 4 or 3) sepals united at base; petals 5 (sometimes 4 or 3 or rarely none), usually hypogynous; a short hypanthium sometimes present; disk slightly 5-lobed; stamens mostly 5 and alternate with petals or 10, filaments filiform, anthers 2-celled, dehiscing longitudinally; pistil 1, ovary superior, usually 3-carpellate but 1-celled (sometimes to 5 carpels and 5 cells), usually 1 ovule with axile or parietal placentation, anatropous, style usually 1 (sometimes 3-5) with terminal stigma. Fruit usually a drupe with resinous mesocarp; seed 1, with scant or no endosperm.

Family mostly tropical and warm temperate, of about 70 genera and 600 species, with 5 genera, such as Rhus (sumac) and Toxicodendron (poison-sumac), north into subtropical and temperate United States. Members of the family produce fruits (mango, etc.), nuts (cashew, etc.), resins, oils, lacquers, and tannin. A few are commercial timbers or ornamentals.

One genus and 2 native species in Nevada. Pistacia chinensis

Bunge (Chinese pistache) from China, is recorded as grown in Clark County. The genus Toxicodendron (poison-ivy, poison-sumac, and poison-oak), with toxic juice irritating to the skin of most persons, fortunately is not yet known from Nevada, though represented by one or more native species in all the other 47 States.

1. RHUS L., Sp. Pl. 265. 1753; Gen. Pl. Ed. 5, 129. 1754. "sumac"

Schmatlzia Desv. ex Small, Schmatlzia Desv. emend. Barkley & Reed.

Shrubs or small trees, mostly deciduous. Leaves alternate, simple, 3-foliolate, or pinnate. Flowers numerous, unisexual and bisexual, polygamous or dioecious, in terminal panicles or compound spikes. Calyx of 5 sepals, mostly persistent; petals 5; stamens 5; ovary 1-celled, sessile on the disk, styles 3. Drupes red, about as broad as long, slightly flattened, with red glandular hairs, 1-seeded. Derivation.--The classical Greek and Latin name of Rhus coriaria L. (Sicilian sumac), which is the type species. About 100 species in North America, southern Europe, and Asia, 2 native in Nevada.

Rhus typhina L. (staghorn sumac), of eastern United States and adjacent Canada, is an ornamental shrubby tree planted in Nevada.

Reference.--Barkley, Fred Alexander. A monographic study of Rhus and its immediate allies in North and Central America, including the West Indies. Mo. Bot. Gard. Ann. 24: 265-498, illus. 1937.

Barkley, Fred A. Schmatlzia. Amer. Midland Nat. 24: 647-665. 1940.

KEY TO SPECIES

Leaves pinnate, with 11-21 or more lanceolate serrate leaflets; flow-

ers in dense terminal panicles, appearing after the leaves.

1. R. GLABRA

Leaves 3-foliolate (rarely simple), with ovate to obovate crenate leaflets; flowers in terminal compound spikes, appearing in early spring before or with the leaves.2. R. TRILOBATA

1. RHUS GLABRA L., Sp. Pl. 265. 1753.

"smooth sumac"

R. macrothyrsa Goodding, R. cismontana Greene.

Other common names.--Rocky Mountain sumac, scarlet sumac.

Deciduous shrub mostly 1-4 m. high (sometimes a small tree in southeastern United States), with relatively few branches, dioecious or polygamous. Twigs stout, brownish, often glaucous, generally glabrous, with large pith and milky juice, without terminal bud; lateral buds minute, brown hairy. Leaves alternate, imparipinnate, 14-40 cm. long; leaflets 11-21 or more, sessile or nearly so, lanceolate, 5-12 cm. long, 1.5-3 cm. broad, apex acuminate, base unequal and subcordate to subcuneate, subrevolute, serrate, glabrous, green above, lighter and glaucous beneath, turning red in autumn. Inflorescence a dense terminal panicle 10-30 cm. long, puberulent. Flowers numerous, short pedicellate; sepals 2 mm. long, greenish, hairy, persistent; petals lanceolate, about 2 mm. long, whitish. Fruiting panicles erect; drupes numerous and crowded, red or scarlet, about 4 mm. long and broad, slightly flattened, covered with short red hairs; seed 2.5-3 mm. long, brown. Flowering after the leaves, collected with fruit in May.

Derivation.--Glabrous, or hairless.

Uncommon and local, open areas in canyons and foothills, 1,400 to

2,100 m., southeastern Nevada (Lincoln County). Very widely distributed almost throughout the United States and apparently in every State. Also southern Quebec, southern British Columbia, and northern Mexico.

A variable species for which many names have been proposed. The type of R. macrothrysa Goodding (Goodding 988) was from Caliente, Lincoln County.

The acid outer fruit coats can be eaten or made into a drink like lemonade. Elsewhere planted as an ornamental for the red autumnal foliage and red fruits.

2. RHUS TRILOBATA Nutt. ex Torr. & Gray, Fl. No. Amer. 1: 219. 1838.

R. aromatica Ait. var. trilobata (Nutt.) A. Gray, R. utahensis Goodding, R. trilobata var. anisophylla (Greene) Jeps., R. trilobata var. quinata Jeps., R. trilobata var. simplicifolia (Greene) Barkley, Schmaltzia hederacea Greene, S. trilobata (Nutt.) Small, S. trilobata var. anisophylla (Greene) Barkley, S. trilobata var. quinata (Jeps.) Barkley, S. trilobata var. simplicifolia (Greene) Barkley. "lemonade sumac"

Other common names.--skunkbush, squawbush, squawberry, ill-scented sumac.

Deciduous shrub 0.3-2.5 m. high, spreading and much branched, dioecious or polygamous. Twigs slender, brown, puberulent, becoming glabrate, with characteristic aromatic or skunklike odor and taste. Leaves alternate, 3-foliolate or rarely simple, 2-7 cm. long; petiole 0.5-2 cm. long, often pink or reddish; leaflets sessile or nearly so, subrevolute, crenate to crenate-dentate, usually 3-lobed near rounded

or obtuse apex, base cuneate, puberulent or nearly glabrous, dark green above, paler beneath; terminal leaflet broadly ovate, 1-5 cm. long, 1-4 cm. broad; lateral leaflets ovate to obovate, 1-3 cm. long, 0.5-3 cm. broad. Inflorescence a terminal panicle or compound spike 0.5-2 cm. long, from reddish brown scaly buds 5-8 mm. long formed the preceding year, opening in early spring before or with the leaves. Flowers numerous, short pedicellate; sepals more than 1 mm. long, persistent; petals obovate, 2.5 mm. long, yellowish. Drupe red, 6 mm. long, 7 mm. broad, flattened, covered with short red hairs and longer transparent hairs; seed 5 mm. long, brown. Flowering April-May, fruit maturing June-August. Derivation.--Three-lobed, referring to the leaflets.

Plains, mountain sides, and canyons in creosotebush, sagebrush, and pinyon-juniper woodland zones, 1,200 to 2,100 m. elevation, eastern Nevada in Elko, White Pine, Lincoln, and Clark Counties. Central and western United States from Indiana and Iowa to Montana; Saskatchewan, Alberta, and Oregon, south to California and Texas and northern and central Mexico.

Many specific names and eight intergrading geographic varieties of doubtful value have been assigned to minor variations, mostly scarcely worthy of recognition, in this widespread species. Nevada specimens have been referred to the four following varieties, which are not accepted here: Rhus trilobata var. trilobata, with terminal leaflet much longer than broad, leaflets glabrate, and with small drupes about 6 mm. in diameter; var. anisophylla (Greene) Jeps., with terminal leaflets nearly as broad as long, not deeply lobed, lateral

leaflets small and unequal, leaflets glabrate; var. quinata Jeps., with terminal leaflets nearly as broad as long, deeply 3-lobed, leaflets large, somewhat pubescent, and appearing as if 5; and var. simplicifolia (Greene) Barkley, with mostly simple leaves. The type of S. hederacea Greene was from Mica Spring, Clark County (Jones 5064m).

As the common name lemonade sumac suggests, the sour fruits can be made into a beverage or also can be eaten. The slender pliable twigs have served the Indians in basketry. Generally of no or low palatability to livestock.

TAMARICACEAE OF NEVADA

(Tamarisk Family)

Shrubs or trees (mostly small, rarely herbs), with very slender branches, halophytic or xerophytic; leaves alternate, sessile, mostly scalelike to awl-shaped, appressed, entire, estipulate. Flowers bisexual, actinomorphic, minute, in dense spikelike racemes or solitary, 4-5-merous. Calyx of 4-5 sepals; petals 4-5, hypogynous, persistent; fleshy disk present; stamens as many or twice as many as petals, distinct or basally connate, anthers 2-celled, dehiscing longitudinally; pistil 1, ovary superior, 3-5 carpellate, 1-celled with parietal or basal placentation, ovules 2-many on each of the 3-5 placentas, anatropous, styles 3-5 or sometimes none, and 3-5 sessile stigmas. Fruit a capsule, 1-celled or sometimes falsely and incompletely 3-4-celled; seeds hairy (rarely winged), with or without endosperm.

Family of 4 genera and about 100 species, from Mediterranean region to eastern Asia. One introduced genus with 2 naturalized species in Nevada. A few species are ornamental.

1. TAMARIX L., Sp. Pl. 270. 1753; Gen. Pl. Ed. 5, 131. 1754. "tamarisk"

Shrubs or trees with very slender terete branches, twigs and leaves punctate with salt-secreting glands, deciduous, the small twigs shedding with leaves. Leaves alternate, sessile, mostly scalelike, often sheathing. Flowers minute, short-pedicelated or sessile, in dense spike-like racemes usually in terminal panicles. Calyx of 4-5 sepals; 4-5

petals; stamens 4-5, rarely 8-10; ovary 1-celled, on a deeply lobed disk, styles 3-5. Capsule 3-5 valved; seeds many, minute, with tuft of hairs at apex. Derivation.--The classical Latin name, perhaps from Tamaris, a river in Spain, according to some authors. Type species: T. gallica L. About 75 species from the Mediterranean region to eastern Asia.

Tamarix aphylla (L.) Karst. (athel tamarisk, athel; T. articulata Vahl), a tree from northeastern Africa and western Asia, is planted in Las Vegas.

Reference.--McClintock, Elizabeth. Studies in California Plants 3. The tamarisks. Calif. Hort. Soc. Jour. 12: 76-83, illus. 1951.

KEY TO SPECIES

Racemes lateral on twigs of last year; flowers 4-merous.

1. T. PARVIFLORA

Racemes mostly in large terminal panicles, on twigs of current year;

flowers 5-merous. 2. T. GALLICA

1. TAMARIX PARVIFLORA DC., Prodr. 3: 97. 1828. "smallflower tamarisk"

Shrub or small tree 2-6 m. high, much branched, deciduous. Twigs long, slender, dark purple, mostly arching. Leaves scalelike, ovate, 1.5-3 mm. long, acuminate, green, with minute salt particles secreted by dotlike glands. Inflorescences of numerous racemes 1.5-4 cm. long, densely flowered, lateral on twigs of last year. Flowers numerous, minute, almost sessile, 2-3 mm. long; sepals 4; petals 4, light pink or whitish; stamens 4, filaments inserted at angles of disk; styles 3-4, short. Capsule 3-4 mm. long, 3-4-valved, with sepals and petals

persistent. Flowering and fruiting in April-May, before the leaves.

Derivation.--Small-flowered.

Escaped from cultivation and naturalized, forming thickets along streams from less than 200 to 1,400 m. elevation, southeastern to western Nevada. Counties: Churchill (Humboldt Sink), Clark, Lyon, Mineral, and Washoe. Naturalized also in southern California. Native of southeastern Europe and western Asia.

Planted for ornament, being alkali-tolerant and hardy except in the coldest parts of the State.

2. TAMARIX GALLICA L., Sp. Pl. 270. 1753.

"French tamarisk"

T. pentandra Pall. (?)

Other common name.--salt-cedar.

Shrub or small tree commonly 2-5 m. high, reported to become 10 m. in height and 30 cm. in trunk diameter, with slender upright or spreading branches and narrow or rounded crown, glabrous, deciduous. Bark reddish brown, smoothish, becoming furrowed and ridged. Twigs long, slender, becoming purplish. Leaves scalelike, lanceolate to ovate, 1-3 mm. long, acute to acuminate, pale blue green, with minute salt particles secreted by dotlike glands. Inflorescences of numerous densely flowered racemes 1-8 cm. long, mostly in large terminal panicles, on twigs of current year. Flowers numerous, minute, almost sessile, 2-3 mm. long; sepals 5; petals 5, pink; stamens 5, filaments inserted between lobes of disk; styles 3, about half as long as ovary. Capsule 3 mm. long, 3-valved, reddish brown, with sepals and petals persistent at base. Flowering in spring and summer, after the leaves. Derivation.--Of Gaul, or France.

Escaped and naturalized along streams, forming thickets in desert zones, elevation from less than 200 to 1,500 m., from Clark County to Pershing and Elko Counties, southern to northern Nevada. Widely naturalized in southern and western United States from North Carolina to Missouri, Colorado, and southeastern Oregon, south to California, Texas, and Florida. Also escaped from cultivation northward to Massachusetts. Native of southeastern Europe and western Asia.

Planted as an ornamental shrub in southern and western parts of the State. Along several rivers in southwestern United States this alkali-tolerant species has become abundant, consuming ground water needed for irrigation and creating a problem of eradication.

A few authors have taken up the name Tamarix pentandra Pall. for this introduced plant of southwestern United States. Further study of the nomenclature is needed.

CORNACEAE OF NEVADA

(Dogwood Family)

Shrubs or trees (rarely herbs), deciduous or evergreen, with bisexual flowers or dioecious. Leaves opposite or alternate, mostly entire, usually estipulate. Inflorescence terminal or lateral, a cyme or head (catkinlike raceme in Garrya). Flowers small; calyx of usually 4 minute sepals; petals usually 4-5 (absent in Garrya); stamens 4-10; ovary inferior, usually 1-2-celled (rarely 3-10-celled), with usually 1 style arising from a fleshy disk (2 styles and no disk in Garrya). Fruit a drupe, 1-seeded (1-2-seeded berry in Garrya); seed with endosperm.

Heterogeneous and perhaps artificial family of about 15 genera and more than 100 species in temperate and subtropical regions mostly in northern hemisphere. Three native genera in the United States, each often placed in a separate family but retained together here pending further determination of their affinities: Cornus, Nyssa (Nyssaceae), and Garrya (Garryaceae). Ornamental shrubs and timber trees. Two genera and 3 species native in Nevada.

KEY TO GENERA

- Leaves thin, deciduous; flowers bisexual, in flat-topped cymes or heads. 1. CORNUS
- Leaves coriaceous, evergreen; dioecious; flowers in pendulous catkinlike racemes. 2. GARRYA

1. CORNUS L., Sp. Pl. 117. 1753; Gen. Pl. Ed. 5, 54. 1754. "dogwood"

Svida Opiz ex Small.

Shrubs or small trees (rarely herbs), deciduous. Twigs ringed at nodes; buds elongated, with 2 valvate scales. Leaves opposite (rarely alternate), clustered toward ends of twigs, elliptic to ovate or lanceolate, entire, usually with 2-forked appressed hairs; veins usually arising near base of blade and curving parallel with margin. Infructescence terminal, a flat-topped cyme or in a few species an involucre head with petaloid bracts. Flowers small, usually bisexual, 4-merous; calyx of 4 minute sepals; petals 4, valvate, mostly white or yellowish, spreading or revolute; stamens 4, alternate, exserted; ovary inferior, 2-celled, style 1, arising from a fleshy disk. Drupe usually 2-celled, with 2 or sometimes 1 seed. Derivation.--Latin name of the type species, Cornus mas L., Cornelian-cherry dogwood of Europe, from the word horn, referring to the hardness of the wood. About 40 species in the north temperate zone.

Cornus floricida L. (flowering dogwood), of eastern United States, is planted as an ornamental in Reno.

References.--Fosberg, F. R. *Cornus sericea* L. (*C. stolonifera* Michx.) Torrey Bot. Club Bul. 69: 583-589. 1942.

Rickett, H. W. *Cornus stolonifera* and *Cornus occidentalis*. Brittonia 5: 149-159, illus. 1942.

Rickett, Harold William. Cornaceae. North Amer. Fl. 28B: 299-311. 1945.

KEY TO SPECIES

Under surface of leaves mostly strigillose; petals mostly 2-3 mm. long; endocarp smooth; throughout Nevada.1. *C. STOLONIFERA*

Under surface of leaves densely hirsute with spreading hairs; petals 3-5 mm. long; endocarp ridged; Sierra Nevada and vicinity.

2. *C. OCCIDENTALIS*

1. *CORNUS STOLONIFERA* Michx., Fl. Bor.-Amer. 1: 92. 1803.

C. instolonea A. Nels., *C. interior* (Rydb.) N. Petersen, *C. sericea* L. (in part but not of most authors), *C. sericea* subsp. *interior* (Michx.) Fosberg, *C. sericea* f. *interior* (Rydb.) Fosberg, *C. sericea* subsp. *stolonifera* (Michx.) Fosberg, *C. sericea* f. *stolonifera* (Michx.) Fosberg, *C. stolonifera* f. *interior* (Rydb.) Rickett, *Svida instolonea* (A. Nels.) Rydb., *S. interior* Rydb., *S. stolonifera* (Michx.) Rydb. "red-osier dogwood"

Other common name.--basket dogwood.

Shrub 1-2 m. or sometimes a small tree to 5-6 m. tall, spreading, with branches often procumbent and rooting at tips, and with bitter foliage. Twigs dark red or purplish, strigillose, with large white pith half the diameter. Leaves 5-11 cm. long; petiole 0.5-2 cm. long; blade lanceolate, elliptic, or ovate, 4-9 cm. long, 2-5 cm. broad, acute or acuminate at apex, cuneate at base, veins commonly 5-7 on each side of midrib, usually 4 or 5 from basal half, above dark green and nearly glabrous, beneath paler, strigillose, villose-tufted in vein axils, and minutely papillose, turning crimson in autumn. Flowers in flat cymes 3-6 cm. across; pedicel 1-5 mm. long; hypanthium 1.5 mm. long, gray strigillose; sepals 0.5 mm. long; petals mostly 2-3

mm. long, white; style 2 mm. long. Drupe globose, 6-9 mm. in diameter, white (sometimes blue); stone 4-5 mm. broad, usually oblique and longer than broad, smooth on the faces, furrowed laterally. Flowering May-July; fruiting July-September. Derivation.--Bearing stolons; that is, the branches often touching the ground and rooting at the tips.

Frequent on moist shaded soil along mountain streams often with willows, poplars, and aspens, elevation 1,600 to 2,500 m., throughout Nevada. Collected in the following counties: Clark, Douglas, Elko, Eureka, Humboldt, Lander, Mineral, Nye, Ormsby, Storey, Washoe, and White Pine. Very widely distributed from Newfoundland across Canada to central Alaska, south in western United States to California and New Mexico and in northeastern United States to Wisconsin, Indiana, and New York. Also in northern Mexico.

The Indians make baskets of bark peeled from long shoots. The foliage generally is not browsed by livestock.

2. *CORNUS OCCIDENTALIS* (Torr. & Gray) Coville, U. S. Dept. Agr. Contrib. U. S. Natl. Herbarium 4: 117. 1893. "western dogwood"

C. sericea L. var. *occidentalis* Torr. & Gray, *C. pubescens* Nutt., not Willd., *C. sericea* subsp. *occidentalis* (Torr. & Gray) Fosberg, *C. sericea* F. *occidentalis* (Torr. & Gray) Fosberg.

Shrub 2 m. high or sometimes a small tree to 5 m. tall. Twigs usually dark red and hirsute, with large white pith half the diameter. Leaves 5-10 cm. long; petiole 0.5-2 cm. long; blade elliptic, ovate or lanceolate, 4-9 cm. long, 2.5-5 cm. broad, short acuminate at apex, cuneate, rounded, or subcordate at base, veins commonly 5-6 on each

side of midrib, usually 4 from basal half, above sparsely strigillose, beneath paler, tomentose, and minutely papillose. Flowers in flat cymes 4-6 cm. across; pedicel 4-7 mm. long, villose; hypanthium 2 mm. long, gray strigillose; sepals less than 1 mm. long; petals 3-5 mm. long, white; style 2.5-3 mm. long. Drupe globose, about 8 mm. in diameter, white; stone 4-5 mm. long, broader than long, often oblique, with 3 ridges on each face and furrowed laterally. Flowering June-July; fruiting July-August. Derivation.--Western.

Moist soil along streams at 1,400 to 2,200 m. elevation, Sierra Nevada and vicinity in southern Washoe, Ormsby, and Douglas Counties, western Nevada. Southern British Columbia, Washington, and northern Idaho, south to southern California and western Nevada.

Cornus occidentalis is closely related to C. stolonifera, with which it intergrades and also has been united. Intermediate variations occurring in the range of C. occidentalis and reported from western Nevada are designated as a hybrid, Cornus x californica C. A. Meyer (Acad. Imp. Sci. St. Pétersb. Bul., Phys.-Math. 3: 373. 1845; C. occidentalis x stolonifera).

2. GARRYA Dougl. ex Lindl., Edwards' Bot. Reg. 20: No. 1686, pl. 1686.

1834

"silktassel"

Shrubs or sometimes small trees, evergreen, dioecious. Young twigs 4-angled; older twigs ringed at nodes. Leaves opposite, elliptic to lanceolate, coriaceous, mostly entire, bitter, estipulate, with petioles slightly connate at base. Inflorescence lateral and terminal, of pendulous catkinlike racemes with connate bracts; flowers small,

apetalous. Staminate flowers in 3's, with 4 sepals and 4 alternate stamens. Pistillate flowers solitary, sometimes with 2 small sepals; ovary inferior, 1-celled, 2-ovuled, with 2 filiform persistent styles. Fruit a dry globose or ovoid blackish berry, breaking open irregularly, 1-2 seeded, with bitter pulp. Derivation--Named in compliment to Nicholas Garry, secretary of the Hudson Bay Company, for assistance to David Douglas during his travels in northwestern America. Type species.--G. elliptica Dougl. About 15 species in western United States and Mexico, with 1 in West Indies, often placed in a separate family Garryaceae of uncertain position.

1. GARRYA FLAVESCENS S. Wats., Amer. Nat. 7: 301. 1873.

Other common name.--quinine bush. "yellowleaf silktassel"

Shrub 1-2.5 m. or more in height, with gray to whitish sericeous young twigs, lower leaf surfaces, inflorescences, and berries. Twigs becoming glabrate and brownish. Leaves 2.5-8 cm. long; petiole 0.5-1 cm. long; blade elliptic to ovate, 3-7 cm. long, 1.5-4 cm. broad, acute and mucronate at apex, acute at base, stiff and coriaceous, margin slightly revolute, yellow green (dull gray in a California variety) and usually sparsely appressed pubescent above. Racemes 3-7 cm. long, with ovate connate bracts 4-7 mm. long; staminate flowers with hairy sepals 4 mm. long; pistillate flowers with hirsute ovary 4 mm. long. Berry ovoid, 7-10 mm. long, with broken styles at apex, blackish, densely sericeous; seeds 1-2, subglobose, 3 mm. long, black. Flowering in early spring from elongate buds formed the pervious summer; fruiting May-August. Derivation.--Yellowish, referring to the foliage.

Rocky mountain slopes and canyons in pinyon-juniper and ponderosa pine zones at elevations of 1,300 to 2,200 m., Clark County (Charleston Mountains and Bunkerville), southeastern Nevada. Southern Utah, southeastern Nevada, California, and Arizona.

This species was described originally from southern Nevada and Utah to Arizona and New Mexico. The bitter foliage is seldom browsed by livestock.

OLEACEAE OF NEVADA

(Olive Family)

Trees, shrubs, or woody vines (halfshrubs in Menodora). Leaves opposite (rarely alternate, as in Menodora), simple or pinnate, estipulate. Flowers bisexual, sometimes unisexual, (as in Fraxinus), actinomorphic, in axillary or terminal racemose or paniculate inflorescences. Calyx mostly 4-lobed or 4-toothed (rarely absent); corolla gamopetalous, mostly 4-lobed or 4-toothed, sometimes of separate petals or absent (as in Fraxinus); stamens 2 (rarely 4), often adnate to the corolla, anthers 2-celled, cells back to back, dehiscing longitudinally; pistil 1, ovary superior, 2-carpellate, 2-celled, placentation axile, ovules usually 2 (4 or 2 in Menodora) in each cell, anatropous, style 1 or none, stigmas 1-2. Fruit a drupe, berry, capsule, or samara; seeds with large straight embryo, usually with endosperm.

This family of temperate and tropical regions has about 20 genera and 500 species and 5 genera, such as Fraxinus (ash) and Forestiera (forestiera) in the United States. The olive, ornamentals such as lilac and privet, and hardwood timbers are included.

Three genera and 5 species are native in Nevada. Olea europaea L. (olive), of the Mediterranean region, has been planted in Las Vegas. Three species of Fraxinus, listed below, have been introduced for shade.

KEY TO GENERA

Trees or shrubs; leaves opposite; flowers mostly unisexual, corolla none or rudimentary (present in Fraxinus cuspidata); fruit 1-seeded. Leaves pinnate (except in Fraxinus anomala, which has broadly ovate to orbicular leaves); fruit a samara with long terminal wing.

1. FRAXINUS

Leaves simple; fruit a black 1-seeded drupe. 2. FORESTIERA

Low shrubs or halfshrubs 0.2 to 1 m. high; leaves alternate and opposite; flowers perfect, corolla large; fruit a capsule of 2 subglobose cells, each 4- or 2-seeded. 3. MENODORA

1. FRAXINUS L., Sp. Pl. 1057. 1753; Gen. Pl. Ed. 5, 477. 1754. "ash"

Trees or shrubs, mostly with furrowed bark, mostly deciduous, dioecious or polygamous. Twigs with rounded winter buds and relatively large nearly semicircular leaf scars. Leaves opposite, unequally pinnate (rarely simple), the leaflets usually serrate. Flowers in terminal or lateral panicles in early spring; calyx minute, campanulate, deciduous or persistent, or none; corolla 2-4-parted or none; stamens usually 2, rarely 3-4, inserted on base of corolla or hypogynous; ovary 2-celled, style with 2-lobed stigma, ovules 2 in each cell. Samara with elongate wing, usually 1-celled, 1-seeded. Derivation.--

The classical Latin name of ash. Type species.--F. excelsior L.

About 40 species in the north temperate zone with a few species southward to Guatemala, Cuba, and Philippines.

Three additional species have been introduced as shade trees:

Fraxinus americana L. (white ash), of eastern United States; F. mand-

shurica Rupr. (Manchurian ash), of northeastern Asia, planted as a street tree in Reno; and F. syriaca Boiss. (Syrian ash), of western and central Asia, grown in warmer areas of southern and western Nevada.

Fraxinus pennsylvanica Marsh. (green ash) widely distributed in eastern and central United States, is recorded by Billings (Nev. Trees, ed. 2, 97-99, fig. 1954; as var. lanceolata (Borkh.) Sarg.) as an excellent shade and ornamental tree and also seemingly native in the side canyons of Meadow Valley Wash, Lincoln County. However, a specimen from that locality is here referred to F. velutina Torr. The two species are related, and the latter recently has been considered as a subspecies, F. pennsylvanica subsp. velutina (Torr.) G. N. Miller (Cornell Univ. Agr. Expt. Sta. Mem. 335: 40. 1955).

Fraxinus cuspidata Torr. var. macropetala (Eastw.) Rehd. (fragrant ash) is cited from Warm Springs, Clark County, by Billings (Nev. Trees 81. 1945; Ed. 2, 97. 1954). A sterile specimen with 3-5 leaflets from that locality (Train 1853) is identified here as F. anomala Torr.

Fraxinus dipetala Hook. & Arn. (two-petal ash) is indicated from southeastern Nevada in a distribution map by G. N. Miller (Cornell Univ. Agr. Expt. Sta. Mem. 335: 34. 1955). No Nevada specimens of that species were found in the collections examined.

Reference.--Little, Elbert L., Jr. Notes on Fraxinus (ash) in the United States. Wash. Acad. Sci. Journ. 42: 369-380. 1952.

KEY TO SPECIES

Twigs 4-angled when young; leaves simple (sometimes with 2-5 leaflets), broadly ovate to orbicular, rounded or acute at apex; samara obovate

with wing extending to base. 1. F. ANOMALA
 Twigs terete; leaves pinnate with 3-9 lanceolate to ovate leaflets
 acuminate or acute at apex; samara oblong or oblanceolate, the wing
 not extending to base. 2. F. VELUTINA

1. FRAXINUS ANOMALA Torr. ex S. Wats. in King, Rpt. Geol. Expl. 40th
 Par. 5: 283. 1871. "singleleaf ash"

Shrub or small tree 3-6 m. tall and 15 cm. in trunk diameter,
 with rounded crown, deciduous. Bark furrowed into narrow ridges, cork
 brown, reddish tinged. Wood light brown, hard, heavy. Young twigs 4-
 angled, often slightly winged, glabrous. Leaves simple or occasionally
 with 2-5 leaflets (3-7 leaflets in a southern variety), 4-7 cm. long
 including petiole 1-3 cm. long; blade or leaflets broadly ovate to orb-
 icular, 2.5-5 cm. long, 2.5-5 cm. broad, rounded or acute at apex, cu-
 neate to cordate at base, entire or inconspicuously crenate-serrate a-
 bove middle, coriaceous with lateral veins obscure, glabrous and dark
 green above, beneath paler and pubescent when young, often with minute
 gland dots. Flowers appearing with the leaves, in compact pubescent
 lateral panicles, bisexual or unisexual, less than 5 mm. long; calyx
 cup-shaped, minutely toothed; corolla none; filaments slender. Samaras
 few, obovate and flattened, 12-25 mm. long, 7-10 mm. broad, light brown,
 the wing extending to base. Flowering in April, fruiting June-July.
 Derivation.--Anomalous, referring to the simple leaves in this genus
 characterized by compound leaves.

Canyons and hillsides, often on very dry rocky slopes, in creosotebush upper desert and pinyon-juniper woodland zones, 600 to 1,800 m. elevation, southeastern Nevada (Clark and southern Lincoln Counties).

Western Colorado, southern Utah, and southeastern Nevada, south to southeastern California, northern and central Arizona, and extreme northwestern New Mexico.

Almost unique among the genus because of the simple leaves, which are rare in other species. A variety in Arizona (var. lowellii (Sarg.) Little) has 3-7 leaflets.

2. FRAXINUS VELUTINA Torr. in Emory, Notes Mil. Recon. Ft. Leav. Calif. 149. 1848. "velvet ash"

F. coriacea S. Wats., F. toumeyii Britton, F. velutina var. coriacea (S. Wats.) Rehd., F. velutina var. toumeyii (Britton) Rehd., F. pennsylvanica subsp. velutina (Torr.) G. N. Miller.

Other common names.--Arizona ash, desert ash, leatherleaf ash, smooth ash, Toumey ash, fresno.

Small to medium-sized deciduous tree 8-15 m. tall and 30 cm. or more in trunk diameter, with spreading branches and rounded crown; dioecious. Bark gray, deeply furrowed into broad ridges. Wood light brown, soft, heavy. Twigs terete, brown, glabrous or pubescent to velvety. Leaves pinnate, 8-15 cm. long. Leaflets 3-9, varying greatly, lanceolate to elliptic or ovate, 3-9 cm. long, 2-5 cm. broad, almost sessile to long-petiolulate, acute to acuminate at apex, rounded or cuneate at base, serrate to crenate-serrulate or entire, thin to coriaceous, beneath often glandular punctate and glabrous or pubescent. Flowers appearing with the leaves, numerous in lateral panicles, on slender pedicels, small, 3-4 mm. long, staminate yellowish in dense clusters, with 2 or 3 stamens; pistillate greenish; calyx cup-shaped, less than 2 mm. long, minutely toothed; corolla none. Samaras many

in dense clusters, narrowly oblong, or oblanceolate, 15-25 mm. long, 4-6 mm. broad, the long wing terminal and decurrent about to middle of body. Flowering in April; fruiting in July. Derivation.--Velvety, referring to the hairy leaflets and twigs of the typical variety.

Springs, streams, and drainages with permanent ground water in the desert and woodland at 500 to 1,300 m. elevation, southeastern Nevada (Lincoln, Clark, and Nye Counties). Trans-Pecos Texas, southern New Mexico, Arizona, southwestern Utah, southeastern Nevada, and southern California. Also in northern Mexico.

A variable species with 2 or more varieties distinguished by some authors, who refer the Nevada plant to var. coriacea (S. Wats.) Rehd. (F. coriacea S. Wats.), characterized by 3-5 coriaceous, slender petiolulate, often coarsely serrate leaflets. The type specimen was from Ash Meadows, Nye County (G. M. Wheeler in 1871).

This species is planted as a shade tree in dry areas, such as warmer parts of Nevada, southern Arizona, and California.

2. FORESTIERA Poir. in Lam., Encycl. Méth. Bot. Sup. 1: 132. 1810;
2:664. 1812. "forestiera"

Adelia P. Br., not L.

Shrubs or small trees, much branched, with slender twigs and small scaly buds, deciduous or rarely evergreen, dioecious or polygamous. Leaves opposite, short-petioled, simple, entire or serrulate. Flowers minute on slender pedicels in lateral clusters or racemes in early spring from scaly buds in axils of leaves of previous year; staminate flowers sessile; pistillate flowers short pedicellate; calyx of 3-6 unequal minute scales or none; corolla usually none; stamens 2-4; o-

vary 2-celled with 2 ovules in each cell, style slender, with capitate or 2-lobed stigma. Drupe small, usually black, 1-celled, ovoid or ellipsoid, with thin flesh, 1-seeded (rarely 2-seeded). Derivation.-- Dedicated to Charles Le Forestier (died about 1820), French physician and naturalist. Type species.--F. acuminata (Michx.) Poir. (Adelia acuminata Michx.). About 20 species from southern United States and West Indies to South America, 1 in Nevada.

1. FORESTIERA NEOMEXICANA A. Gray, Amer. Acad. Arts and Sci. Proc. 12: 63. 1876; as "Neo-Mexicana." "New Mexican forestiera"
F. acuminata Poir. var. parvifolia A. Gray, F. neomexicana var. arizonica A. Gray, F. arizonica (A. Gray) Rydb.

Other common name.--desert-olive.

Deciduous shrub 1-3 m. tall, perhaps rarely a tree to 5 m., with smooth light gray bark, much branched, mostly dioecious. Twigs and leaves usually glabrous or pilose. Leaves 2-6 cm. long, petiole 0.3-1 cm., blade variable, ovate, obovate, elliptic, or oblanceolate, 1.5-5 cm. long, 0.5-1.5 cm. broad, acute or obtuse at apex, base gradually narrowed to petiole, slightly crenulate-serrate, grayish green on both sides, minutely punctate beneath. Flowers with or before the leaves, mostly unisexual, minute, greenish, in lateral clusters, corolla none; staminate flower sessile, of 4 stamens 3 mm. long; pistillate flower with pedicel 3-5 mm. long, calyx of 3-5 minute scales, pistil 2 mm. long, sometimes with 2-4 usually sterile stamens. Drupe 4-8 mm. long, dark bluish black, glaucous. Fruiting in May. Derivation.--Of New Mexico.

Streams, springs and canyon slopes in desert (Atriplex-Ephedra)

and pinyon-juniper zones, elevation 1,200 to 2,100 m.. southern Nevada, collected in Nye County (Buck Springs, 10 mi. SW. of Beatty) and Clark County (Charleston Mts. and Dead Man Canyon, Desert Game Range). Southwestern Colorado, southern Utah, southern Nevada, and southern California to Arizona, New Mexico, and western Texas. Also in northern Mexico.

Merging from the typical glabrous form through a pubescent form into Forestiera pubescens Nutt. (downy forestiera). Perhaps only a variety of that species, which ranges from Arizona and New Mexico east to Oklahoma and eastern Texas.

3. MENODORA Humb. & Bonpl., Pl. Aequin. 2: 98, pl. 110. 1809.

"menodora"

Low shrubs or halfshrubs woody toward base, 0.2-1 m. high, deciduous. Leaves alternate and opposite, simple. Flowers showy, mostly in cymes; calyx with short tube and 5-15 mostly linear lobes, persistent; corolla subrotate to funnelform, large, with 5 (sometimes 6) lobes, yellow or white; stamens 2, inserted on the corolla tube; ovary 2-lobes, 2-celled with 4 or 2 ovules in each cell, style filiform. Capsule of 2 globose or ovoid membranaceous parts or cocci, circumscissile or indehiscent, each cell 4- or 2-seeded. Derivation.--From Greek force or courage and gift, in reference to the force or strength it gave to animals. Type species.--M. helianthemoides Humb. & Bonpl. About 15 species, mostly in North America and South America but 2 in southern Africa; 2 in Nevada.

Reference.--Steyermark, Julian A. A revision of the genus Menodora. Mo. Bot. Gard. Ann. 19: 87-176 p., illus. 1932.

KEY TO SPECIES

Stems woody throughout, spiny; larger leaves 6-12 mm. long; corolla white (or brownish tinged) with lobes shorter than the tube; capsule not circumscissile, with 2 seeds in each cell. . . .1. M. SPINESCENS

Stems woody toward base, not spiny; larger leaves 15-30 m. long; corolla yellow with lobes longer than the tube; capsule circumscissile, with usually 4 seeds in each cell.2. M. SCABRA

1. MENODORA SPINESCENS A. Gray, Amer. Acad. Arts and Sci. Proc. 7: 388. 1868. "spiny menodora"

M. spinescens var. mohavensis Steyerem.

Other common names.--ground-thorn, greenfire.

Deciduous low spreading shrub 20 cm. to 1 m. high, irregularly branching with numerous puberulent light green rigid stems, many stems 5-20 mm. long transformed as stout spines. Leaves mostly alternate or fascicled, oblanceolate to linear or reduced to obovate scales, 2-12 mm. long, 1-2 mm. broad, narrowed at base, entire, fleshy, puberulent. Flowers numerous, solitary or clustered in short axillary cymes, short pedicellate; calyx 4-8 mm. long, puberulent, with short tube and 5 linear lobes; corolla funnelform, 8-14 mm. long and 7-8 mm. across, white or brownish tinged, the 5 obovate lobes shorter than the tube; stamens slightly exserted; ovary with 2 ovules in each cell. Capsule 5-7 mm. long, the 2 ovoid or subglobose parts about 6 mm. long and almost separate, not circumscissile but afterwards breaking irregularly; seeds 2 or 1 in each cell, 5-6 mm. long, 3-4 mm. broad, brown, finely reticulate. Flowering March-June; fruiting June-Aug. Derivation.--Becoming spiny.

Frequent or rocky plains, mesas, and mountain sides in creosote-

bush desert zone, elevation 800 to 2,200 m., southern to west-central Nevada in southern Lincoln, Clark, Nye, Esmeralda, and southern Mineral Counties. Also in southeastern California (Mohave Desert) and northwestern Arizona (Detrital Valley, Mohave County).

The type specimen was from southeastern Nevada (C. L. Anderson in 1865).

2. MENODORA SCABRA A. Gray, Amer. Jour. Sci. Ser. 2, 14: 44. 1852.

"rough menodora"

M. scabra var. glabrescens A. Gray, M. scoparia Engelm. ex A. Gray.

Other common names.--broom menodora, twinberry, twinfruit.

Deciduous halfshrub woody toward base, 10-80 cm. high, with many erect, slender, slightly striate stems puberulous or scaberulent to glabrous. Leaves opposite or alternate, sessile, linear to linear-lanceolate (or obovate if very small), 1-30 mm. long, 1-4 mm. broad, puberulent or scaberulent to glabrous, the upper leaves often much reduced. Flowers few to many, in cymes, pedicels slender, erect; calyx 3-9 mm. long, puberulent to glabrous, with short tube and 5-12 equal or unequal linear lobes; corolla subrotate, 9-14 mm. long and 11-15 mm. across, yellow, the 5 lobes longer than the tube; stamens exerted; ovary with 4 ovules in each cell. Capsule about 6 mm. long, of 2 globose parts, each about 6 mm. in diameter, circumscissile; seeds 4 or fewer in each cell, angled, reticulate or smooth, 4-6 mm. long, 3-4 mm. broad. Flowering in June. Derivation.--Scabrous, from the rough stems and leaves of the typical variation.

Apparently rare in southeastern-Nevada, collected in Lincoln County (5 mi. E. of Deer Lodge, Pinyon Mt., 2,100 m. elevation).

Central Colorado, southern Utah, and southeastern Nevada, and southeastern California to Arizona, New Mexico, western Texas, and northern Mexico.

A variation distinguished by some authors as var. glabrescens A. Gray (in S. Wats., Wheeler Rept. U. S. Surv. W. 100th Mered. Cat. Pl. 15. 1874) and by others as a distinct species (M. scoparia Engelm.) is glabrous or nearly so, with upper leaves much reduced and scalelike, and with calyx lobes usually 5-6 or sometimes with smaller lobes to 7-10 but intergrades with the typical form. The Lincoln County specimen (Desma Hall, June 28, 1935) is intermediate, being glabrous but with normal leaves above and 7-10 calyx lobes. Another specimen (Wheeler in 1872, Nevada; at US) represents this variation and perhaps is the source of the southern Nevada record of M. scoparia Engelm. by Tidestrom (Fl. Utah Nev. 413. 1925). This specimen was originally labeled M. scabra var. glabrescens A. Gray and possibly is the type collection which, however, was from Arizona according to the published description.

Highly palatable to livestock and heavily browsed.

BIGNONIACEAE OF NEVADA

(Bignonia Family)

Trees, shrubs, or woody vines (rarely herbs); leaves opposite or in a few species whorled or alternate, compound or simple, estipulate. Flowers bisexual, zygomorphic, large and showy, in terminal or lateral racemes or panicles. Calyx tubular with usually 5 teeth or lobes; corolla campanulate or funnelform, with usually 5 lobes, somewhat zygomorphic and often bilabiate, the lowest lobe largest; disk present; stamens epipetalous, typically 4, didynamous, with 1 staminode, anthers 2-celled, the cells usually widely divergent and seemingly one above the other, dehiscing longitudinally; pistil 1, ovary superior, 2-carpellate, typically 2-celled with axile placentation (sometimes 1-celled with 2 parietal placentas), ovules numerous, anatropous, style 1, long and filiform, stigma 2-lobed. Fruit usually a 2-valved septicidal or loculicidal capsule (sometimes a berry); seeds numerous, flat, usually winged, lacking endosperm.

Chiefly a tropical family of about 110 genera and 750 species, mostly woody vines and trees, some with commercial timbers, and a few genera, such as Campsis (trumpet-creeper), Catalpa (catalpa), Chilopsis (desert-willow), northward into the United States.

Nevada has one native genus, which contains a single species. Two additional tree species native in eastern United States are planted, Catalpa speciosa Warder (northern catalpa) and C. bignonioides

Walt. (southern catalpa).

1. CHILOPSIS D. Don, Edinb. Phil. Jour. 9: 261. 1823. "desertwillow"

The only species is described below. Derivation.--With the appearance of a lip, the corolla having a distinct lip. Type species.--

C. linearis (Cav.) Sweet (C. saligna D. Don).

Reference.--Fosberg, F. Raymond. Varieties of the desert willow, *Chilopsis linearis*. Madroño 3: 362-366. 1936.

1. CHILOPSIS LINEARIS (Cav.) Sweet, Hort. Brit. 283. 1827.

C. linearis var. arcuata Fosberg. "desertwillow"

Large deciduous shrub or small tree 2-8 m. tall and becoming 10 cm. or more in trunk diameter, with spreading crown and willowlike twigs and leaves. Bark ridged and scaly, dark brown. Wood soft, brown streaked with yellow. Twigs slender, glabrous (elsewhere also puberulent or sticky), without terminal bud; the minute puberulent winter buds with several overlapping scales. Leaves mostly alternate, sometimes opposite or in 3's, simple, sessile or short-petioled, linear to narrowly lanceolate, 7-15 cm. long, 3-10 mm. broad, narrowed at base and apex, slightly curved or straight, entire, glabrous, punctate, light green. Inflorescence a terminal raceme 4-10 cm. long, usually coarsely woolly, several-flowered. Flowers large and showy, fragrant, short-stalked; calyx about 1 cm. long, 2-lipped, mostly woolly; corolla 2.5-3 cm. long, funnelform-campanulate, slightly 2-lipped; the upper lip 2-lobed and the lower 3-lobed, whitish and tinged with purple, pink, or yellow, or dark purplish; stamens 4, included, and 1 staminode; pistil including filiform style about 2.5

cm. long. Fruit a linear terete brown capsule 10-25 cm. or more in length and 6 mm. or less in diameter, splitting into 2 walls and partition; seeds numerous, flat, thin, brown, about 8 mm. long, with long whitish hairs at both ends. Flowering from April to July; capsules remaining attached in winter. Derivation.--Linear, referring to the very narrow leaves.

Common long washes and drainages, forming thickets along bottoms and banks, in plains, mesas, and foothills of creosotebush desert, from about 200 to 1,500 m. elevation, Lincoln and Clark Counties, in southeastern Nevada. Central and southern Texas west to central New Mexico, northwestern Arizona, southwestern Utah, southeastern Nevada, and southeastern California, and south into northern Mexico.

A handsome ornamental with showy fragrant flowers and planted along washes for erosion control. The durable wood is suitable for fence posts. Generally unpalatable to livestock and not browsed except in heavily stocked ranges.

As many as three varieties based on minor differences in leaves and twigs have been distinguished. If varieties are recognized, the Nevada plants would be referred to var. arcuata Fosberg, characterized by very narrow curved leaves and foliage and twigs glabrous or nearly so and not sticky.

INDEX

- Abies - 4, 25.
 alba - 26.
 concolor - 12, 26, 27, 31.
 lasiocarpa - 26.
 magnifica - 3, 17, 26, 28.
 shastensis - 29.
 pinsapo - 26.
 (Adelia) - 69.
 (acuminata) - 70.
 Aleppo pine - 5.
 Alpine fir - 26.
 Anacardiaceae - 47.
 (Apinus) - 4.
 (albicaulis) - 7.
 (flexilis) - 8.
 Arizona ash - 68.
 cypress - 2.
 Ash - 64, 65.
 Athel tamarisk - 54.
 Atlas cedar - 2.
 Austrian pine - 5.
 Basket dogwood - 59.
 Bignonia family - 75.
 Bignoniaceae - 75.
 Blackjack pine - 14.
 Blue spruce - 19.
 Bristlecone pine - 11.
 Broom menodora - 73.
 California incense cedar - 30.
 red fir - 28.
 (Caryopitys) - 4.
 (monophylla) - 12.
 Cashew family - 47.
 Catalpa
 bignonioides - 75.
 speciosa - 75.
 Cattail pine - 11.
 Cedrus
 atlantica - 2.
 deodara - 2.
 Chamaecyparis
 lawsoniana - 2.
 Cherrystone juniper - 36.
 Chilopsis - 76.
 linearis - 76.
 (arcuata) - 76, 77.
 (saligna) - 76.
 Chinaberry - 44, 45.
 Chinese pistache - 48.
 Common juniper - 33.
 Cornaceae - 57.
 Cornus - 57, 58.
 x californica - 61.
 florida - 58.
 (instolonea) - 59.
 (interior) - 59.
 mas - 58.
 occidentalis - 59, 60, 61.
 x stolonifera - 61.
 (pubescens) - 60.
 (sericea) - 59.
 (interior) - 59.
 (occidentalis) - 60.
 (stolonifera) - 59.
 stolonifera - 59, 61.
 (interior) - 59.
 Cryptomeria - 2.
 japonica - 2.
 Cupressaceae - 2.
 Cupressus
 arizonica - 2.
 macnabiana - 2.
 sempervirens - 2.
 Dawn-redwood - 2.
 Deodar cedar - 2.
 Desert ash - 68.
 olive - 70.
 rue - 42.
 willow - 76.
 Dogwood - 58.
 family - 57.
 Douglas-fir - 15, 23.
 Downy forestiera - 71.
 Dwarf juniper - 33.
 Eastern hemlock - 21.
 red cedar - 32.
 white pine - 5.
 Engelmann spruce - 19.
 English yew - 1.
 Fir - 25.
 Flowering dogwood - 58.
 Forestiera - 64, 65, 69.
 acuminata - 70.
 (parvifolia) - 70.
 (arizonica) - 70.
 neomexicana - 70.
 (arizonica) - 70.
 pubescens - 71.
 Foxtail pine - 11.
 Fragrant ash - 66.
 Fraxinus - 64, 65.
 americana - 65.

virginiana - 32.
 (scopulorum) - 39.
 Leatherleaf ash - 68.
 Lemnade sumac - 50.
 Libocedrus - 30.
 (Libocedrus) - 30.
 (decurrens) - 30.
 Limber pine - 8.
 Lodgepole pine - 17.
 Macnab cypress - 2.
 Mahogany family - 44.
 Manchurian ash - 66.
 Melia - 44.
 azedarach - 45.
 (umbraculifera) - 45.
 Meliaceae - 44.
 Menodora - 64, 65, 71.
 helianthemoides - 71.
 scabra - 72, 73.
 (glabrescens) - 73, 74.
 (scoparia) - 73, 74.
 spinescens - 72.
 (mohavensis) - 72.
 Metasequoia
 glyptostroboides - 2.
 Mohave desert yew - 42.
 Mountain hemlock - 21.
 juniper - 33.
 New Mexican forestiera - 70.
 Northern catalpa - 75.
 white-cedar - 2.
 Norway spruce - 19.
 Nut pine - 12.
 Olea
 europaea - 64.
 Oleaceae - 64.
 Olive family - 64.
 One-seed juniper - 36.
 Pacific yew - 1.
 Picea - 3, 18.
 abies - 19.
 engelmannii - 19.
 glauca - 19.
 polita - 19.
 pungens - 19.
 sitchensis - 19.
 Pinaceae - 1, 2.
 Pine - 4.
 Family - 1.
 nuts - 13.
 Pinus - 3, 4, 5.
 albicaulis - 6, 7, 22.

anomala - 65, 66, 67.
 lowellii - 68.
 (coriacea) - 68, 69.
 cuspidata - 65.
 macropetala - 66.
 dipetala - 66.
 excelsior - 65.
 mandshurica - 65.
 pennsylvanica - 66.
 lanceolata - 66.
 sylvatica - 66.
 (tumei) - 68.
 velutina - 66, 67, 68.
 (coriacea) - 68, 69.
 (tumei) - 68.
 French tamarisk - 55.
 Fresno - 68.
 Garrya - 57, 61.
 elliptica - 62.
 flavescens - 62.
 Giant sequoia - 2.
 Green ash - 66.
 Greenfire - 72.
 Ground-thorn - 72.
 Hemlock - 21.
 Heyderia - 4, 30.
 decurrens - 30.
 (Hesperopence) - 21.
 (meritensiana) - 21.
 Himalayan pine - 5.
 Hoptree - 41.
 Idaho white pine - 10.
 Ill-scented sumac - 50.
 Incense cedar - 30.
 Italian cypress - 2.
 Japanese white pine - 5.
 Jeffrey pine - 15.
 Juniper - 32.
 Juniperus 1, 2, 4, 32.
 californica
 (utahensis) - 38.
 communis - 32, 33.
 erecta - 35.
 montana - 35.
 saxatilis - 35.
 (gymnocarpa) - 36.
 monosperma - 33, 36, 37, 38.
 occidentalis - 33, 35.
 osteosperma - 13, 33, 37, 38.
 (sibirica) - 33.
 scopulorum - 33, 37, 39.
 (utahensis) - 38.

(cismontana) - 49.
 coriaria - 48.
 glabra - 49.
 (macrothyrsa) - 49, 50.
 trilobata - 49, 50, 51.
 (anisophylla) - 50, 51.
 (quinata) - 50, 52.
 (simplicifolia) - 50, 52.
 typhina - 48.
 (utahensis) - 50.
 Rocky Mountain juniper - 39.
 redcedar - 39.
 sumac - 49.
 yellow pine - 14.
 Rough menodora - 73.
 Rue family - 41.
 Rutaceae - 41.
 (Sabina) - 32.
 (monosperma) - 36.
 (occidentalis) - 35.
 (osteosperma) - 38.
 (scopulorum) - 39.
 (utahensis) - 38.
 Salix - 5.
 Salt cedar - 55.
 Scarlet sumac - 49.
 (Schmaltzia) - 48.
 (hederacea) - 50, 52.
 (trilobata) - 50.
 (anisophylla) - 50.
 (quinata) - 50.
 (simplicifolia) - 50.
 Scotch pine - 5, 19.
 Sequoia
 gigantea - 2.
 sempervirens - 2.
 Shasta red fir - 28, 29.
 Shore pine - 17.
 Stilian sumac - 48.
 Sierra juniper - 35.
 Silktassel - 61.
 Silver fir - 26.
 Silvertip fir - 28.
 Singleleaf ash - 67.
 Pinyon - 12.
 Sitka spruce - 19.
 Skunkbush - 50.
 Smallflower tamarisk - 54.
 Smooth ash - 68.
 sumac - 49.
 Southern catalpa - 77.

aristata - 6, 11, 34.
 (brachyptera) - 14.
 cembroides
 (monophylla) - 12.
 contorta - 7, 17, 22, 29.
 (latifolia) - 17.
 (murrayana) - 17.
 edulis - 13.
 flexilis - 6, 8, 12, 34.
 halapensis - 5.
 griffithii - 5.
 Jeffreyi - 7, 15, 17, 31.
 Lambertiana - 6, 9.
 monophylla - Frontispiece,
 3, 6, 12, 39.
 monticola - 6, 7, 10, 17, 18,
 22, 29.
 mugo - 5.
 (murrayana) - 17.
 nigra - 5.
 parviflora - 5.
 ponderosa - 6, 14, 16, 17, 18,
 29, 31.
 (Jeffreyi) - 15.
 (scopulorum) - 14, 15.
 (scopulorum) - 14.
 sylvestris - 5, 19.
 strobilus - 5.
 washoensis - 7, 16.
 Pinyon - 13.
 Pistachia
 chinensis - 47.
 Poison-ivy - 48.
 oak - 48.
 sumac - 47, 48.
 Ponderosa pine - 14.
 Port-Orford-cedar - 2.
 Pseudotsuga - 4, 23.
 (Douglasii) - 23.
 menziesii - 23, 25.
 glauca - 25.
 (macronata) - 23.
 (taxifolia) - 23.
 Ptelea - 41.
 Quinine bush - 62.
 Red fir - 28.
 Red-osier dogwood - 59.
 Redwood - 2.
 Rhus - 47, 48.
 aromatica
 (trilobata) - 50.

- Spanish fir - 26.
- Spiny menodora - 72.
- Spruce - 18.
- Squawberry - 50.
- Squawbush - 50.
- Staghorn sumac - 48.
- (Strobilus) - 4.
 - (monticola) - 10.
- Subalpine fir - 26.
- Sugar pine - 9.
- Sumac - 47, 48.
 - family - 47.
- (Svida) - 58.
 - (instolonea) - 59.
 - (interior) - 59.
 - (stolonifera) - 59.
- Swiss mountain pine - 5.
- Syrian ash - 66.
- Tamarack - 17.
- Tamaricaceae - 53.
- Tamarix - 53.
 - aphylla - 54.
 - (articulata) - 54.
 - gallica - 54, 55.
 - parviflora - 54.
 - (pentandra ?) - 55.
 - (pentandra) - 56.
- Tamarisk - 53.
 - family - 53.
- Taxaceae - 1.
- Taxodiaceae - 2.
- Taxus
 - baccata - 1.
 - brevifolia - 1.
- Thamnosma
 - montana - 42.
- Thuja - 30.
 - occidentalis - 2.
- Tigertail spruce - 19.
- Toumey ash - 68.
- Toxicodendron - 47, 48.
- Tsuga - 3, 21.
 - canadensis - 21.
 - (crassifolia) - 21.
 - mertensiana - 21, 29.
 - sieboldii - 21.
- Turpentine-broom - 42.
- Twinberry - 73.
- Twinfruit - 73.
- Two-petal ash - 66.
- Umbrella chinaberry - 45.
 - tree - 45.
- Utah juniper - 38.
- Velvet ash - 68.
- Washoe pine - 16.
- Western dogwood - 60.
 - juniper - 35, 39.
 - white pine - 10.
 - yellow pine - 14, 15.
- White ash - 65.
 - fir - 26, 27.
 - pine - 8, 10.
 - spruce - 19.
- Whitebark pine - 7.
- Yellowleaf silktassel - 62.
- Yew family - 1.

