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Indexed by W. A. Archer

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Calif. Willows (cop 2)

CALIFORNIA WILLOWS OF
SECTIONS PENTANDRAE, BONPLANDIANAE, AND NIGRAE.

By Carleton R. Ball

*unpublished
W.C.B.*

INTRODUCTION

California has a very rich flora, resulting from geographic position and climatic and topographic variation. More than 30 species of Salix, and probably fully as many varieties occur within her borders. Few if any other States can equal this record. New Species and varieties of willows have been discovered within the State during the past three years, and new combinations have become necessary. A monographic treatment of the genus is much needed. This paper is such a treatment of the Tribe Pleiandrae (Many-stamened), comprising three sections containing four species, eight varieties, and one form in California. Two combinations and the one form are new.

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The designations of containing herbariums in connection with specimens cited are as follows: CAS, California Academy of Sciences; CRB, Carleton R. Ball; NMC, National Museum of Canada; PC, Pomona College; SU, Stanford University; UC, University of California; UO, University of Oregon; USN, U.S. National Herbarium; and WLJ, Willis L. Jepson.

GEOGRAPHIC DATA.

California extends from approximately 32° 30' to 42° north latitude and a distance of more than 660 miles north and south and of about 800 miles on the actual southeast-northwest axis. Elevations range from about 280 feet below sea level in the Death Valley of Inyo County in east-central California and 200 feet below in the Salton Sink of Imperial-Riverside Counties of southeastern California, to nearly 14,500 feet above on Mt. Whitney and more than 14,000 feet on other peaks in the Sierra Nevada. In the southern portion of the State the general trend of the mountain ranges and the separating valleys is east and west, and the same is true in the extreme northern part of the State. They thus impose no barrier to, but actually facilitate, the ingress of plants from the Sonoran Zone to the south and east. The ranges and valleys of the central portion of the State trend south-north and there is enough continuity to permit northern species to progress southward into the State. A desirable discussion of ecologic factors and their effect is omitted here because of limitations imposed by depression economies.

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LIFE ZONES

In California, all the life zones from the Lower Sonoran to the Boreal are represented. The Lower and the Upper Sonoran and the Transition occupy large areas. The only available map¹ is that prepared by the Museum of Vertebrate Zoology of the University of California and published as plate 15 by Grinnell (1). While Dr. Grinnell states personally that much revision of the map has been accomplished, though not yet published, the changes are in detail rather than in the broad outlines.

(1) Grinnell, Joseph. A distributional list of the mammals of California. Proc. Calif. Acad. Sci. 3: 265-390, pls. 15-16, 1913.

The Lower Sonoran occupies nearly half of the State. It covers all of southern California except the mountains and occupies a wide strip on all of the central portion of the Great Valley to a point between the Tehama and Red Bluff. The Upper Sonoran occupies most of the mountains in the great southern area, and those of the Coast Range system north to Lake County, as well as a broad strip on both sides of the central valley as far north as Redding, a large diagonal patch in Lassen and Modoc Counties, and small spots farther north and west. The total area is probably one-sixth of the State. The Transition Zone, Arid and Humid, occupies the very highest parts of the southern mountains, a broad strip on both flanks of the Sierras, a gradually broadening coastal strip from about Piedras Blancas below Point Sur northward to Mendocino County, and most of the northern one-sixth of the State. In total it probably represents one-fifth of the State area.

The Boreal Zones, Canadian, Hudsonian, and Boreal combined, of Merriam, are restricted to the very highest peaks of the southern mountains, a broad band comprising the high Sierras, and smaller portion of the northern peaks and ranges, as Lassen, Shasta, Trinity, and Siskiyou, and the northern Coast Range.

KEYS TO TRIBES, SECTIONS, SPECIES, and VARIETIES

In making keys, it is customary to base the separations on a single character difference, such as "Stamens 3-9" vs "Stamens 2," "Capsules glabrous" vs. "Capsules pubescent," "Leaves serrate" vs. "Leaves entire," etc. Such a key cannot be used satisfactorily unless flowers of both sexes, as well as fruit and mature foliage, all are present. This complete assemblage of material seldom occurs. Pubescence is not developed and likewise is variably deciduous, making its use perplexing in some cases, especially as a primary character in key separations. For these reasons, in part, the genus Salix has been held difficult of determination.

Vegetative organs are present throughout most of the year, and therefore should be more widely used in constructing diagnostic keys. Keys also are most usable, and therefore most informative, when the characters are used in groups or combinations instead of singly. If any given character is not evident on the material in hand, some of the others surely will be. The use of such keys should tend to give a picture of the plant as a whole and, by helping to fix that picture in mind, gradually make the recognition of a species possible without the use of a key.

In the keys which follow, a serious attempt has been made to produce the result just mentioned. The species and varieties are arranged in their natural order of relationships. Closely related species or varieties are placed close together in the key. In the longer paragraphs the most strongly contrasting characters are italicized.

The characters given for the Sections cover the expression of the species occurring in California but are not necessarily complete for all the species of the Section occurring elsewhere. It is hoped that this method of treatment may lead to a better understanding of this interesting and useful but often neglected or avoided genus.

Trees or large shrubs; leafblades narrowly to broadly lanceolate at maturity, distinctly petioled, acuminate to long-acuminate, closely and evenly serrulate or serrate (very shallowly in No. 3); aments leafy-peduncled, coetaneous; flower scales pale yellow, deciduous; stamens 3 to 7 or more (never 2), filaments free; pubescent; capsules pedicelled, glabrous (except No.4), styles short, 0.1-0.3 mm. long Tribe PLEIANDRAE

Petioles glandular on the upper distal surface*; branchlets stoutish, shining, yellow to brown; stipules and leaf margins glandular; the stipules often glandular on the surfaces; aments stout, 12-18 mm. wide; flower scales mostly 3-5 mm. long, erose or 2-3-toothed; capsules stoutish, 6-8 mm. long, ovate-lanceolate; styles 0.2-0.4 mm. long, stigmas Sect. 1. PENTANDRAE *

----- ~~B~~* Another Section of Old World Willows, Albae or Fragiles, has more or less glandular petioles but the aments are exceedingly slender and the capsules small. The species, S. alba, the White Willow; S. fragilis, the Crack Willow, and S. Babylonica, the Weeping willow are cultivated commonly in the United States, the Weeping Willow being found commonly in California.

Blades green on both surfaces at maturity

Blades large, lanceolate, 1.5-4 cm. wide, petiolar glands strongly developed

Branchlets, bud scales, and petioles pubescent 1. S. caudata

Branchlets, bud scales, and petioles (usually) glabrous. 1a. S. caudata bryantiana

Blades ~~linear-lanceolate~~ lanceolate, smaller, 7-12 or rarely 15 mm. wide, glands

reduced. 1b. S. caudata parvifolia

Blades glaucous beneath at maturity.

Blades large, lanceolate to ovate-lanceolate, 1.5- cm. wide, petiolar glands strongly developed

Blades 4-5 times as long as wide

Branchlets, bud scales, and petioles (usually) glabrous. 2. S. lasiandra

Branchlets, bud scales, and petioles pubescent. . 2b. S. lasiandra lancifolia

Blades 2-3 times as long as wide

Branchlets, etc., glabrous. 2c. S. lasiandra macrophylla

Branchlets, etc., pubescent. 2ca. forma pubescens

Blades smaller, linear-lanceolate, 1-1.5 cm. wide, glands reduced. 2a. S. lasiandra abramsii

Petioles not glandular

Petioles not glandular on top at distal end, branchlets, of only midstoutness or slender, scarcely shining; staminate aments slender, 8-10 mm. wide, flexuous;

Leafblades lanceolate to broadly lanceolate, thick, firm, shallowly serrulate to subentire, glaucous to pruinose beneath; petioles short, stoutish;Sect.2. BONPLANDIANAE

Branchlets reddish or reddish-gray, finely striate when dried, blades rich yellowish green and shining above, the unfolding ones often narrowly obovate, apiculate, and hirsute at the apex beneath with copious yellowish hairs.

Aments lax; capsules ovate-conic, pedicels 1.5-2.5 mm. long.

Seasonal shoots and branchlets glabrous. . . .3. S. laevigata

Seasonal shoots and sometimes the 1-year and 2-year branchlets more or less densely pubescent3a. S. laevigata araquipa

Aments dense; capsules mostly ovoid, apex scarcely produced, pedicels about 1 mm. long.3b. S. laevigata congesta

Branchlets dark brown, blades dark green, not shining (S. longipes of the South, and S. harbisonii of the Southeast).

Leafblades linear to linear-lanceolate, not thickened, finely serrulate, green on both surfaces (dark-green except in our species); petioles short but slender; capsules ovoid-conical, glabrous (except in No.4), pedicel 1.5-2.5 mm. long, style 0.1-0.3 mm. long, stigmas slightly longerSect.5. NIGRAE

Branchlets yellowish, tenaceous, slender.

Capsules densely pubescent until nearly full sized, finally glabrate to glabrous; shoots and attached vegetative organs usually pubescent.4.S. gooddingii

^{to glabrous,}
Ovary ~~often~~ pubescent, capsule ~~glabrate or~~ glabrous; shoots glabrate.4a. S. gooddingii vallicola

Branchlets brown or dark brown, less tenaceous, slender (S. humboldtiana of Mexico southward, and S. nigra of the East).

SECTION 1. PENTANDRAE

Pentandrae Dumortier in Bijdr. Natuurk. Wetensch. 1: (58?), 1825; -Ball in Coulter and Nelson, New. Man. Rocky Mtn. Bot. 130, 1909; -Ball in Canad. Field-Nat. 40: 145, 1926.

Fragiles Andersson in Oefv. Svensk Vetensk. Akad. Forh. 15: 115, 1858, in part.

Lucidae or Pentandrae Andersson in Kon. Svensk. Vetensk. Akad. Handl. 6: 30, 1867 (Monog. Sal.); -in D.C. Prodr. 162: 205, 1868.

Pentandrae, subsection Lucidae, Schneider in Journ. Arnold Arb. 1: 13, 1919.

Description

Shrubs to trees, 3-15 m. high, with mostly shining yellowish or reddish branchlets; leaves stipulate, stipules glandular-serrulate, sometimes glandular on the surface also, blades narrowly lanceolate to ovate-lanceolate, acuminate to long-acuminate, 8-20 or, on vigorous shoots 30 cm. long, closely glandular-serrulate, petioles glandular on the distal upper surface; aments coetaneous on leafy peduncles, stout; flower scales pale yellow, 2.5-5 or 5 mm. long, erose or 2-3-toothed, thinly pilose to glabrate; ^{deciduous} stamens 5-9 or more, filaments free, crinkly-pubescent below; capsules stout, 6-10 mm. long, brown, glabrous; pedicels 1-2 mm. long, styles 0.2-0.4 or rarely 0.6 mm. long, stigmas slightly longer, notched; gland ventral

This Section, Pentandrae, and Sections Bomplandianae and Nigrae, comprise the so-called Tribe Pleiandrae (many-stamened), as distinct from the Diandrae (two-stamened) and Monandrae (one-stamened).

Section Pentandrae comprises four native and one introduced species in North America. Salix caudata and S. lasiandra with their varieties, occupy the western mountainous half of the country, ranging from New Mexico and Baja California north to upper Canada, lasandra lancifolia reaching into the Yukon Valley of Alaska and Yukon Territory. Two other species, S. lucida and S. serissima occur in the central and east-central portions of North America. S. lucida with its varieties angustifolia and intensa, occurs from Delaware to Iowa and north to Newfoundland, Manitoba, and North Dakota. S. serissima, distinguished by late summer fruiting, ranges from New England and Newfoundland westward across the northern States to northwestern Montana and northward, with sporadic occurrences in the Black Hills of South Dakota and on Pike's Peak in Colorado. Salix pentandrae of Europe and Asia is cultivated in North America.

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1. SALIX CAUDATA (NUTTALL) HELLER

Salix caudata (Nuttall) Heller in Muhlenbergia 2:186, 1906;-- Ball in Abrams, Illus. Fl. Pacific States 489, fig. 1191, 1923; ^{Ball} in Tidestrom (Fl. Utah & Nev.), in Contráb. U.S. Nat. Herb. 25:135, 1925; ^{Ball} in Canad. Field-Nat. 40:148, 1926. Ball in Standley (Fl. Glacier Nat. Park) in Contrib. U.S. Nat. Herb. 22:320, 1921;--

at least in part,

S. fendleriana Andersson as understood by many American authors, not Andersson (except as to Geyer No. 287, teste Schneider), Howell, Fl. NW. Am. 617, 1903;-- Rydberg, Fl. Colo. 94, 1906 (Colo. Agr. Exp. Stat. Bul. 100);-- Ball in Coulter & Nelson, New. Man. Rocky Mtn. Bot. 130, 1909; in Bot. Gaz. (Will. Black Hills) 60:397, 1915;-- Rydberg, Fl. Rocky Mts. 191, 1917; Wootton & Standley (Fl. N. Mex.), in Contrib. U.S. Nat. Herb. 19:213, 1915;--

S. lasiandra Benthams, as understood by some American authors, at least in part, but not Benthams; as Britton & Shafer, No. Am. Trees 148, 1908;--

Rydberg (Fl. Mont.) in Mem. N.Y. Bot. Gard. 1:110, 1900;--

S. lasiandra caudata (Nuttall) Sudworth in Bull. Torr. Bot. Club 20:43, 1893; in (Nomencl. Arb. Fl. U.S.) U.S. Dept. Agr. Div. For. Bul. 14:121, 1897;-- Bebb in Gard. & For. 8:372, 1895;-- in ibid. 17:43, 1898 Sargent, Silva No. Am. 9:116, pl. 470, 1896;-- Ball (Notes West. Will.) in Trans. Acad. Sci. St. Louis 9:74, 1899;-- Sargent, Man. Trees No. Am. 174, 1905;-- Piper (Fl. Washn.) (doubtfully) Eastwood, Fl. So. Fork Kings River 17, 1902;-- in Contrib. U.S. Sudworth, For. Trees Pac. Slope (U.S. Dept. Agr.) 219, 1908;-- Nat. Herb. 11:213, 1906;-- Piper & Beattie, Fl. SE. Washn. & Adj. Ida. 75, 1914;-- Henry, Fl. So. B.C. & Vanc. Id. 96, 1915;-- Schneider, in Jour. Arnold Arb. 1: 19-20, 1919 (bibliography, discussion); in ibid. 3:63, 86, 99, 109, 1921;-- EHX Kirkwood, No. Rocky Mtn. Trees and Shrubs 64, 1930.

S. lasiandra fendleriana (Andersson) Bebb, in Watson, Bot. Calif. 2:84, 1880 (preprinted with same pagination on July 10, 1887);-- Sargent (Rept. For. No. Am.) in 10th. Census U.S. 9:167, 1884;-- Bebb in Coulter, Man. Rocky Mtn. Bot. 334, 1885 (in part).

S. pentandra caudata Nuttall, Sylva 1:61, pl. 18, 1842.

Description

Shrub or small tree, with yellowish to brown, shining, more or less pubescent branchlets, pubescent bud scales; large lanceolate, acuminate, serrulate, stipulate leaves, green on both sides; glandular pubescent petioles; short stout leafy-peduncled cespitose aments with yellow scales; 4-9 stamens; glabrous capsules 6-8 mm. long, with pedicels 1-2 mm. long, styles about 0.3 mm. long, and short notched stigmas.

Usually a caespitose mountain shrub or occasionally a small tree, 2-5 m. high; branchlets long, substoutish; the older yellowish-gray, the seasonal shoots and 1-year and 2-year twigs orange-yellow or orange to chestnut, reddish, brown, and dark brown, according to age and exposure, mostly shining, seasonal shoots densely to thinly pubescent or subpilose with gray hairs; 1-year branchlets densely to thinly pubescent or subpilose to glabrate; 2-year branchlets thinly pubescent to glabrate; bud scales 5-6 mm. long, broadly lanceolate, acute, colored and clothed as the branchlets.

Leaves stipulate, petiolate, large; stipules normally present, reniform to sublunate, closely and prominently glandular-denticulate, sometimes thinly pubescent; petioles stoutish, 5-8 or, on vigorous shoots, 10-12 mm. long, colored and clothed as the branchlets, with 2-5 or more, usually sessile but sometimes stalked, or rarely foliaceous, (glands) clustered on the upper surface at base of the blade; blades narrowly lanceolate to lanceolate, or the younger sometimes oblanceolate, 5-12 cm. long, 1-2.5 cm. wide, or on vigorous shoots 13-15 or 18 cm. long and 2-4.5 cm. wide, common sizes being 5-6 by 1-1.5 or 2, 7-8 by 1.5-2.5, 9-10 by 1.5-2.5, 11-12 by 2-3, and 13-15 by 2-4.5 cm., respectively, acuminate to long-acuminate at apex, acutish to obtuse at base, closely glandular-serrate, dark green on both sides, often somewhat shining above, sometimes paler but never even subglaucous beneath, glabrous, ~~throughout~~, the veins stouter and less elevated than in lasianandra, the basal portion of the midvein often pubescent on both surfaces.

rachis densely pubescent;

Aments short, stoutish, coetaneous, leafy-peduncled; staminate peduncles 1-2 or 2.5 cm. long, bearing 5-6 or 7 small leaves; pistillate peduncles 1.5-2 cm. long in flower, becoming 2-3 or 3.5 cm. long in fruit, and bearing 5-6 or 7 small leaves.

Staminate aments 2-3.5 or 4 cm. long, 1-1.2 cm. wide, oblong, dense; scales narrowly to broadly elliptical or elliptic-oblancoelate, acute to obtuse, entire or somewhat erose at apex, 3-4 mm. long, glabrate on both surfaces or thinly pilose on the lower half or less, yellow, more or less deciduous; stamens 3-5 or up to 7, filaments free, about 6 mm. long, glabrate to thinly pilose with crinkly hairs on the lower one-third.

Pistillate aments stout, oblong, 4-4.5 or 5 cm. long in flower, becoming 4.5-6 cm. long in fruit, 1.5-1.7 cm. wide, dense; flower scales elliptical-oblancoelate to obovate, 3-3.5 mm. long, obtusish, entire or occasionally somewhat erose at apex, crinkly-pilose on the lower portion and glabrate to glabrous on the upper portion; ovary 3-5 mm. long, glabrous; capsule 6-7.5 or 8 mm. long, lanceolate, brown, glabrous; pedicel stoutish, 1.3-2 mm. long, glabrous; style very short, 0.2-0.4 or ^{rarely} 0.6 mm. long; stigmas very short, about 0.3 mm. long, notched.

Flowering occurs from middle ^{or} ~~late~~ May, throughout June, and fruiting from late May throughout June and July.

Salix caudata presents a glabrous and a pubescent or hirsute form, so far as the branchlets, seasonal shoots, bud scales and petioles are concerned, just as in the cases of lasiandra, laevigata, and gooddingii. It seems desirable to recognize both forms as taxonomic entities, as has been done in these other cases. In the case of caudata, this name must go with the hairy portion of the species. Nuttall, in his original description, says: "Salix pentandra, β caudata. Foliis longissime acuminatis attenuatis; ramulis junioribus hirsutis;" In his descriptive discussion he further states that "the buds and last developed branches are hirsute." These two unmodified statements show conclusively that he had in hand and in mind only the pubescent plant, which is more common than the glabrous in most of the area he traversed. Attention has been called to this by Schneider (Journ. Arnold Arb. 1: 20, 1919) but it has been overlooked by American botanists, including the senior author. It is significant also that ^{Nuttall} ~~he~~ makes no mention of similar hairiness in the case of his speciosa. (lasiandra).

Distribution

Salix caudata is a shrub of mountain streams and meadows in the Arid Transition and Canadian Zones at elevations of 4,500 to 8,500 or 9000 feet in the southern and central parts of its range and correspondingly lower elevations northward. It occurs from northern Utah, northern Nevada, and northeastern California, northward across Wyoming, western Montana, Idaho, and Oregon and Washington east of the Cascades, to southern Alberta. It probably will be found in southern British Columbia also. In California it is confined to the mountains of Modoc County, in the extreme northeastern corner of the State, *except for a somewhat doubtful spec. from Inyo Co.* Doubtless further collecting will disclose both the species and its varieties at many other points in eastern California.

The type locality, as given by Nuttall, is "by streams in the valleys of the Rocky Mountains, towards their western slope, in Oregon, and also in the Blue Mountains of the same territory".

From an examination of available material, S. caudata seems to be absent from the more southern portion of the range of its more widely distributed glabrous variety, Bryantiana, namely northern New Mexico and the southern parts of Colorado, Utah, Nevada, and California. In short, the pubescent species is more abundant than the glabrous variety in the northern and western portions of the combined range. In this it agrees with its close relative, S. lasiandra, in which the pubescent variety lanceifolia is much more abundant in the western and northern portions of the combined range than is the glabrous S. lasiandra. The reverse is true, however, in the case of S. laevigata and S. gooddingii, two rather closely related species. Pubescent laevigata araquipa is much more common, as well as more strongly pubescent, in the southern and hotter portion of the combined range than is the glabrous S. laevigata. Similarly, the more pubescent S. gooddingii is common in the hotter districts of the southern portion of the combined range of the species and the more glabrate variety vallicola.

In any consideration of these differences it must be remembered that S. laevigata and S. gooddingii are anstral species, representing sections chiefly of anstral origin and distribution, and themselves confined to the Sonoran Zone. In their cases, the pubescence is a response to, and protection from, excessive heat. S. caudata and S. lasiandra, on the other hand, are components of a section distributed chiefly in the Transition and Canadian Zones. The pubescence in their cases may be more for protection from too rapid chilling than from excessive heat, although S. lasiandra lancifolia is common in some of the hot and arid districts of southern California.

Because of the new limitation placed on the species it is necessary to cite available herbarium specimens, in order that it may be readily recognized. The herbariums consulted, and their abbreviation in the citations are: CAS, California Academy of Sciences; CRB, Carleton R. Ball; PC, Pomona College; SU, Stanford University; UC, University of California; ^{and} [^]UO, University of Oregon.

CALIFORNIA: Sierra Co., Webber Lake to Sierraville, Sawmill Canon, W. R. Dudley 5476, June 21, 1908 (SU). Modoc Co., Davis Creek, Mts. (PC).

R. M. Austin 505, May, 1895 (PC). (Warner Mountain Expedition, 1910), along Parker Creek, Warner Mts., elevation 5,500 feet, W. P. Taylor and H. C. of Griffiths and Hunter 302, July 30, 1902 (CRB).
Bryant, June 26, 1910 (UC). Parker Creek, Warner Mts., Clumps 2-3 m. high, with S. lasioplepis Benth., along streams and ditches on north slope, alt. 1560 m., Frances D. Payne 135, June 10, 1931 (CRB, UC, 2 sheets). Warner Mts., Griffiths and Hunter 382, July 30, 1902 (CRB). Cottonwood Creek, Co. east side of Goose Lake, E. I. Applegate 5899, June 25, 1929 (SU). Siskiyou Co., Sisson, W. R. Dudley, June 19, 1893 (SU). 1901 (CRB). Elko Co.

NEVADA: Ormsby Co., Carson City, Marchs E. Jones 4079, May 23, 1892 (CAS, SU, UC). King's Canon, 1700-2000 m., C. F. Baker 919, June 1912 (CAS, SU, UC). Washoe Co., Truckee Valley, P. B. Kennedy 1665, May 21, 1907 (CAS, SU). Humboldt Co., 15 to 20 feet high, 35 miles west of Quinn River Crossing, which is 75 miles north of Winnemucca, Griffiths and Morris 322, July 28, 1901 (CRB). Elko Co., Star Canyon southeast of Deeth, elev. 5,700 ft., A. A. Heller 10581, July 10, 1912 (CAS, SU). Washoe Co., Hunter Creek Canyon, elev. 6100 ft., A. A. Heller 10470, June 18, 1912 (SU).

5. Lasiandra

OREGON: Lake Co.; By pond near Base of Crane Creek Mtn., alt. 6500-7000 ft., Ferris and Duthie 284, June 17, 1919 (SU); Along stream 4 miles from Lakeview, L. Constance 9870, June 23, 1928 (UO); Along and irrigation ditch, Constance 9871, June 19, 1928 (UO); Banks of streams between Paisley and Lakeview, Constance 9874, June 21, 1928 (UO); Chequamegon River, 7 miles above Paisley, E. I. Applegate 7386, June 30, 1932. (SU). Klamath Co.: Brookside Ranch, Swan Lake Valley, transplanted from Lost River, E.I. Applegate 908, May 18, 1897 (SU, as S. lasiandra); Along Link River above Klamath Falls, Applegate 3086, May 13, 1902 (SU, as S. lasiandra); Along U.S.R.S. Canal east of Klamath Falls, Applegate 3540, June 10, 1923 (SU, as S. lasiandra); Banks of Sprague River, Anna Evans 36, May 22, 1931 (UO).

SALIX CAUDATA BRYANTIANA Ball and Bracelin

Salix caudata Bryantiana Ball and Bracelin, Jour. Washn. Acad. Sci.

Variety Bryantiana differs from the species in having those vegetative organs glabrous or glabrate which are pubescent or pubescent-pilose in ~~Salix~~ ^{S.} caudata. These organs include seasonal shoots, 1-year and 2-year branchlets, bud scales, stipules petioles, and midveins. The seasonal shoots and petioles may be puberulent when first developed but soon become glabrate. In other than these vegetative characters the variety does not differ consistently from the species.

Variety Bryantiana bears the same relation to S. caudata that variety vallicola bears to S. Gooddingii, namely, that of a more widely distributed and glabrous or glabrate variety in comparison with a pubescent and less widely distributed species. It is just the reverse of the relationship which pubescent variety lancifolia bears to its glabrate species lasianдра, and which pubescent variety araquipa bears to its glabrate species laevigata, so relative far as pubescence is concerned. These relationships have been discussed more fully under S. caudata. ~~Examine~~

It has the same season of flowering and fruiting, and the same habitats, as the species where they occur together. At the higher elevations, flowering may be somewhat later. The type specimens are C.F. Baker's No. 1151, containing both staminate and pistillate material, in the herbarium of the University of California. They were collected on June 24, 1902, in Snow Valley, Ormsby County, Nevada, at an elevation of 2460-2615 feet meters.

From Cedar Willows

It is a pleasure to name this widely distributed *sp* variety in honor of DR. Harold C. Bryant, a graduate and former member of the faculty of the University of California, long interested in the natural history and natural resources of the State, and now Assistant Director of the National Park Service of the Federal Department of the Interior. The eleven States in which variety Bryantiana is known to occur contain some fourteen of the National Parks, and eventually it probably will be found in most of them.

Distribution.

Salix caudata Bryantiana occurs along mountain streams and in meadows of the Arid Transition and Canadian Zones of the western half of the United States. It is found at elevations of 4,500 to 8,500 feet (1350-2550 m.) or more in the southern part of its range and at correspondingly lower elevations northward. Its range extends from north-central New Mexico northward to the Black Hills of South Dakota and the mountains of southern Alberta. Westward it extends across the Wahsatch System and the ranges of the Great Basin to San Bernardino County, California, and northward in and east of the Sierra-Cascade System to southern British Columbia. Apparently it does not cross, and seldom enters, the Cascade range in Oregon and Washington. It is a plant of higher altitudes than the closely related S. lasiandra and therefore does not range as far south, west, or north, as that species.

In order that this variety may be promptly distinguished in herbariums, and thereafter recognized in the field, it is desirable to cite herbarium specimens which have been examined. In the following list the designations of the containing herbariums are: CAS, California Academy of Sciences; CRE, Carleton R. Ball; NMC, National Museum of Canada; PC, Pomona College; SU, Stanford University; and UC, University of California.

CALIFORNIA: San Bernardino Co., 6 ft. high, Bear Valley, San Bernardino Mts. and their eastern base, elev. 6500 ft., S. B. Parish 3003, June 23, 1894 (SU). Tulare Co., Soda Creek Canon near Soda Springs, Head of Kern River, elev. 6500-7500 ft., W. R. Dudley 1492a, July 17, 1897 (SU). Placer Co., Tahoe National Forest, French Meadows, along Middle Fork of American River, on Sec. 16, Twp. 15 N, R. 14 E, elev. 6000 ft., L.S. Smith 1, May 22, 1931 (CRB, UC); 2 (CRB); 2626 (in part) Aug. 27, 1931, probably from same plant as No. 2 (CRB). Nevada Co., Lower end of Donner Lake, A. A. Heller 6879, July 8, 1903 (PC). Sierra Co., By bridge over Little Truckee River, Sierraville-Truckee Stage Road, W. R. Dudley 5524, June 12, 1900 (SU). Modoc Co., by Parker Creek near Modoc Natl. Forest Boundary, Roxana S. Ferris and Rena Dithie 188, June 14, 1919 (SU). Plumas Co., Few shrubs, all male, east end of Bear Lake, Canadian Zone, alt. 6500 or 7000 ft., Mrs. C. M. Wilder 9331, July 10, 1912 (CRB). Siskiyou Co., Jackson Lake, alt. 5900 ft., Annie M. Alexander and L. Kellogg 186, June 24, 1911 (UC, very immature).

The identifications of the Dudley collections from Sierra County, and of the Alexander-Kellogg specimen from Siskiyou County, are somewhat doubtful, owing to their juvenile condition. Possibly they may represent S. lasiandra Benth.

NEVADA: Ormsby Co., Snow Valley, 2460-2615 m., C. F. Baker 1151, June 24, 1902, distributed as S. arguta var. lasiandra (Bentham) Anderss. (PC, UC) 2 sheets, each bearing staminate and pistillate types). Washoe Co., Franktown, K. Brandegee, May, 1913 (UC).

OREGON: DesChutes Co., vicinity of Redmond, Kirk Whited 444, 444a, June 3, 1921 (CRB); 506-66, April, May, Sept., 1922 (CRB); 8, May, June, 1923 (CRB); 28, June, 1923 (CRB). Grant Co. Along bottoms of Long Creek, near Long Creek, W. E. Lawrence 844, July 27, 1917 (CRB). Canyon City, Griffiths and Hunter 174, July 13, 1902 (CRB).

1b. SALIX CAUDATA PARVIFOLIA Ball

Salix caudata var. parvifolia Ball, Bot. Gaz. 72: 225-226,

fig. 1, Oct., 1921; - Ball in Abrams, Illus. Fl. Pacific States

1: 489, 1923; - Ball in Tidestrom, (Flora Utah and Nev.) in Contrib. U.S. Natl. Herb. 25: 135, 1925.

Description

This variety differs from the species in more or less pubescent branchlets and petioles, and in smaller, narrower leaves, and from variety Bryantii in the leaf characters named.

Seasonal shoots and petioles always, 1 - year branchlets, bud scales, and base of midrib often, and 2 - year branchlets occasionally puberulent to more or less densely pubescent, or the new shoots sometimes subvillous; leaf blades linear - lanceolate, acuminate to long - acuminate at the apex, subrounded to somewhat tapering at base, 5 - 12 cm. long, 7 - 15 or rarely 20 mm. wide, common sizes being 6 x 0.8, 7 x 0.9 - 1.2, 8 x 1.1 - 1.3, 9 - 10 x 1.4 - 1.8, and 11 - 12 x 1.3 - 1.8 cm.

With much more abundant material available the range of expression of the variety is better known than when it was described in 1921. The principal changes in the description are the noting of the pubescence of branchlets, petioles and adjacent organs, and the increased size allowed the leaf blades. In the original description the pubescence was not mentioned, although shown distinctly by the type specimen and by all collection except some made late in the autumn. The hairiness of these parts shows variety parvifolia to be a segregate from the hairy variety Bryantii rather than from the glabrous species. The separation of a variety on the relative size of the foliar organs must always be a matter of arbitrary judgment. The type specimen represents rather an extreme, as so often is the case. In general the leaves of parvifolia are less than one-half the average width of those of the species. The aments also tend to be reduced in size, ranging from 1.5 - 3 or rarely 4 cm. long.

Distribution

When described, variety parvifolia was known only from a narrow area extending northward from Ogden, Utah, to Banff, Alberta, Canada, with a westward extension from West - central Idaho across northern Oregon to but not into the Cascade Mountains. The known range ^{has been} greatly extended. ~~to now~~ The variety occurs from extreme northeastern California northward, east of the Cascades, to southeastern British Columbia, and from east - central Utah (near Provo) north to southwestern Alberta. This more than doubles the area previously recognized.

For convenience of students the subjoined list of specimens includes the 15 specimens cited in 1921, as well as those recognized since.

CALIFORNIA. Modoc Co., a small tree, 4 - 5 meters high,
on a stream, Warner's Range, alt. 5200 - 6000 ft., P. Monnet 9302,
July, 1913 (CAS.). (Lake Co., Along streams, Silver Lake, E.I. Applegate
7364, June 29, 1932 (SU).

OREGON. Deschutes Co., near Quakenbush home, Redmond, Kirk
Whited 506 - 9, Nov. 1, 1921, July 14, 1922 (CRB); east line of
Landes place, 3 miles southwest of Redmond, Whited 506 - 29,
Nov. 4, 1921 (CRB); wet land near Columbia Southern Tumalo ditch,
2.5 miles below headgate, southwest of Redmond, elev. 4600 ft.,
Whited 604, June 14, 1922 (CRB). Wasco Co., along streams in
yellow pines, near head of Warm Springs River, alt. 3000 ft.,
E.I. Applegate 2777, Sept. 7, 1898 (N). Grant Co., Prairie City,
alt. 1040m., W.W. Eggleston 13700, Sept. 5, 1916 (N); Union Co.,
a small tree, bank of Catherine Creek, alt. 3500 ft., W.C. Cusick
2385, May 30, June 28, 1900 (N).
WASHINGTON. Spokane Co., ^{PC, US} or 6 mi. southeast of
Spangle, W.N. Suksdorf 8526, Apr. 26, May 15, and Sept. 29, 1916
(CRB). Okanogan Co., open slopes along Salmon Creek near Con-
conully, J.Wm. Thompson 7070, June 28, 1931 (CRB, UC).

IDAHO. Washington Co., Weiser, alt. 2200 feet, Marcus
E. Jones 6548, July 5, 1899 (CAS. 2 sheets; (the sheet in U.C.
is S. caudata Bryantii); Nat.). Latah Co., Thatuna Hills,
Epling and Hauck 9201, July 6, 1926 (CRB); Bovill, Carl Epling,
July, 1929 (CRB). ^{Sandpoint, ME. Jones 9152, Sept. 18, 1908 (PC);} Bonner Co., near head of lower lake, Priest
Lake, C.V. Piper 6641, 6654, Aug. 8, 1923 (CRB). Fremont Co.,
along irrigating ditch near St. Anthony, Merrill and Wilcox 889,
July 6, 1901 (CRB, Nat.)

Dixie Creek, near Prairie
City, L.F. Henderson 5475, June 15, 1925 (StU). Baker Co., 1 mi. north
of Sumpter, Blue Mts., Roxana S. Ferris and Rena Duthie 1053, July 1, 1919 (StU).

UTAH. Utah Co., sparse, along Diamond Fork, Spanish Fork Canon, $5\frac{1}{2}$ mi. from D. & R.G. RR., alt. 5000 ft., K.E. Weight 98, 100a (from same plant), July 10, 1927. (CRB). Weber Co., mountains near Ogden, Hayden's Expedition, 1872 ^{US} (N, sheet 26198 in part, with S. lutea Nutt.).

WYOMING. Yellowstone National Park, Upper Fire Hole Basin, Yellowstone Lake, J.M. Coulter, Hayden Survey, July 1872 (N ~~26198, 26199~~). Along Lamar Creek, J.N. Rose 406, ~~Aug. 20, 1893~~ ^{US} (N).

MONTANA. Deer Lodge or Powell counties, Deer Lodge Valley, mountain streams, ^{elev} 5000 ft., ~~elevation~~ J.W. Blankinship 788, ~~Aug. 27, 1906~~ ^{US} (N). Flathead Co., Kalispell, west slope of Continental Divide, Susan D. McKelvey, Sept. 19, 1921 (CAS); Glacier National Park, 6 - 8 ft. high, boggy meadow, along Swiftcurrent

Creek, below Lake McDermott, alt. about 1350 m., P.C. Standley 16865 ^{CRB, US} (type) Aug. 1, 1919 (N); thicket along lake, abundant, very slender, 6 - 12 ft. high, vicinity of Glacier Hotel ("Lewis's"), at head of Lake McDonald, alt. 900 - 1050 M., Standley 17906, Aug. 22, 1919 ^{US} (N).

ALBERTA. Calgary, sandy flat along Bow River, alt. 3400 ft., Malte and Watson (1201) 116851 ^{US} (CRB). Rocky Mountains Park, probably near Banff, N.B. Sanson 164, ^{US} June 17, 1911 (B); 265, July 5, 1911 ^{CR} (B); 413, 414, Aug. 21, 1911 ^{CR} (B); 2056, June 22, 1912 ^{CR} (B). Banff, Rocky Mts., M.O. Malte 122187, July 9, 1918 (U.C.).

BRITISH COLUMBIA. Kootenay Dist., Fernie, J.K. Henry, June 21, 1914 (CAS, subnomen S. lasiandra).

S. arguta lasiandra Andersson, (Monog. Sal.), in Svensk. Vetensk. Akad. Handl. 6:33, 1867; in De Candolle, Prodr. 16(2):205, 1868.

S. fendleriana Andersson, in Oefv. Svensk. Vetensk. Akad. Förh. 15:115, 1858;

~~S. fendleriana~~ of Rydberg, Fl. Rocky Mtns. 191, 1922 (in part, on Pacific Coast);-- in Proc. Am. Acad. Arts & Sci. 4:54, 1858; Sal. Bor.-Am. (repr. of the last), p. 8, 1858;--

S. lasiandra caudata (Nutt.) Sudw. of Eastwood, Fl. So. Fork Kings R. 17, 1902. (in part, or entirely).

S. lasiandra lancifolia (Anderss.) Bebb, of Parish, Distrib. So. Calif. Trees 347, 1894 (at least in part).

~~S. lasiandra lyallii Sargent, in Gard. & Forest 8:463, 1895; Silva No. Am. 8: 115, pl. 470, 1896;-- Sudworth (Nomencl. Arb. Fl.), in U.S. Dept. Agr. Div. For. Bul. 14:123, 1897; (Checklist), ibid. 17:43, 1898;-- Sargent, Trees Man. No. Am. 174, 1905;-- Sudworth, For. Trees Pacific Slope 219, fig. 90, 1908;-- Ball in Piper and Beattie, Fl. NW. Coast 114, 1910;-- Henry, Fl. So. Cal. 96, 1915;-- Kirkwood, No. Rocky Mtn. Trees & Shrubs 84, 1930.~~

S. lasiandra typica Bebb, in Watson, Bot. Calif. 2:84, 1880 (preprinted as "Willows of California", with same pagination, 1879).

S. lucida Muhl., of Hooker, Fl. Bor.-Am. 2:148, 1839 (in part).

S. lucida angustifolia lasiandra Andersson, in Oefv. Svensk. Vetensk. Akad. Förh. 15:115, 1858; in Proc. Amer. Acad. Arts. & Sci. 4:54, 1858.

~~S. lucida macrophylla Andersson in Svensk. Vetensk. Akad. Handl. 6:32, 1867 (Monog. Sal.); in De Candolle Prodr. 16 (2):205, 1868.~~

~~S. lyallii (Sargent) Heller, in Bull. Terr. Bot. Club 25:580, 1899;-- Britton and Shafer, No. Am. Trees 191, fig. 149, 1908;-- Rydberg, Fl. Rocky Mtns. 191, 1922.~~

S. speciosa Nuttall, No. Am. Sylva 1:58, pl. 17, 1843; not Host, or Hooker and Arnott.

Description

Small to large tree, 4-15 m (13-50 ft.) high, glabrous or glabrate throughout, trunks solitary or in twos or threes, with brown fissured bark; seasonal shoots orange yellow, 1-year and two-year branchlets yellowish to brown, or bases of vigorous sprouts nearly black; budscales ovoid and obtuse to elliptic-lanceolate and acutish, 5-10 mm. long, colored as the branchlets, glabrous or puberulent, base enclosed in clasping stipules.

Leaves large, petiolate, stipulate; stipules abundant and conspicuous, reniform to broadly reniform to semi-lunate, ^{or} ~~to~~ sub-orbiculate, 2-10 or 12 mm. long, glandular-denticulate, glandular-serrate, or glandular-spinulose-denticulate, often glandular on the inner surface, colored as the blades; petioles 6-10 mm. long on fruiting branches to 1.5-3 cm. long on vigorous sprouts, bearing 1 to several glands clustered on the distal upper surface, the glands on vigorous shoots often stalked and 1-2 mm. long, ~~or~~ sometimes foliaceous, colored as the branchlets; blades more or less oblanceolate while developing, narrowly to broadly lanceolate when mature, acute to rounded at base, acute to acuminate or long-acuminate at apex when mature, 6-20 ^{or 28} cm. long, 1.5- 3.5 ^{or 6} cm. wide, common sizes being 6-8 by 1.5-2, 10-15 by 2-2.5, 15-20 by 3-3.5, and 19-28 by 3-6.6 cm. on vigorous shoots, glandular-serrate or glandular-serrulate, the serrulations averaging 10 per cm. of central margin on small leaves and 6-8 per cm. on larger leaves, dark green and shining above, glaucous to densely glaucous beneath (when fully expanded), midrib and primary veins yellowish white, the latter impressed in younger leaves but becoming finely elevated at maturity, glabrous, or the petiole and basal portion of midrib and blade puberulent when young, becoming glabrous.

Aments coetaneous, leafy-pedunculate, large, stout, solitary, ascending or spreading; peduncles 1-3 cm. long in flower, bearing 3-6 or rarely 7 small stipulate leaves, the pistillate peduncles lengthening to 2-5 cm. long in fruit, all pubescent, orange to brown, the paired stipules conspicuous even if part of the leaves become deciduous.

Pistillate aments cylindrical, 4-8 or occasionally ¹¹ cm. long and 1.5 cm. in Elmer 2429, Olympic Mts. long (to 11 cm. in Dudley, Klamath River), mostly 5-6 cm. and 1.5-1.8 cm.

wide; flower scales lanceolate, elliptical, or oblanceolate, 2-3 or the basal 4 mm. long, erose to 2-3-toothed at apex, glabrate or thinly pubescent-pilose on the outside, yellow, more or less promptly deciduous; capsules lanceolate from an ovate base, 5-6.5 or 7 mm. long, 2-2.5 or 3 mm. wide, acutish to rounded at base, glabrous, brown; pedicels 1.5-2 ^{or} 2.5 mm. long, glabrous; styles 0.2- 0.4 ^{or rarely 0.6} mm. long, stigmas equalling the styles, divided; seeds linear-oblong, 1 mm. long;

Gland 1, ventral, 0.5 mm. long, capitate.

Staminate aments cylindric-oblong to cylindrical, 4-7 or occasionally 9 cm. long, 1.5-1.7 cm. wide; stamens 4-7 or 9, filaments free, pubescent-pilose on the lower one-fourth to one-third; flower scales as in the pistillate ament, but up to 5 mm. long and 3-5-toothed.

The ~~is~~ ^{is} Willos flowers from early March to early May and fruits from early April to early June in different parts of the State and at different elevations. Speaking approximately, flowering in the Southern third of the State will occur from about March 10 to April 10, in the central third of the State at about the same time, and in the northern third in late March and the first half of April. In general, the higher the elevation the later the flowering, with reference to flowering at low elevations in the same section of the State. Fruiting follows flowering by about a month. Old fruits may be found still attached to the branchlets, however, throughout June and part of July in many localities.

Salix lasiandra is a noteworthy willow in several ways. It is a striking feature of river landscapes in early spring when the leafless orange-yellow twigs give a distinct color to the woods of meadow and valley. It also is one of the largest tree species native to America. No exact records are available but some very large specimens occur in the valleys of central California. Sudworth, in 1908, states that "Ordinarily it is 25 or 30 feet high and from 14 to 20 inches in diameter; sometimes from 40 to 50 feet high and from 24 to 30 inches through; . . . "

This species, with its variety lancifolia, probably produces on its vigorous sprouts the longest leaves of any American species and perhaps of any species in the world. Other species have wider blades. The longest leaves yet recorded for the species itself (excluding variety lancifolia) are on a specimen from Shasta County, California, collected by Mrs. H.P. Bracelin (No. 503) and now in the herbarium of the University of California. Three leaf-blades vary from 26 to 28.6 cm. in length and from 5.3 to 6.6 cm. in width. The longest blade (28.6 cm.) is 11.25 inches long. The specimen holding second rank is Bracelin 640 from San Mateo County, on which three blades vary from 24 to 25.3 cm. in length and from 6.5 to 6.8 cm. in width. Still larger leaf-blades are recorded, however, on variety lancifolia, in the discussion of the variety which follows.

This species often is called "Western Black Willow" in manuals and check lists. This name comes from the black bark of the larger, older trunks, and is a forester's and lumberman's term. Our plant is not closely related to the Black Willow (S. nigra Marshall) of the Eastern United States, of which the Valley Willow (S. gooddingii Ball) is the western representative. The name Nectar Willow would be more appropriate for this than for almost any other willow species. The name Yellow Willow, which otherwise might be appropriate, is properly applied to S. lutea Nuttall, because of its lemon-yellow twigs.

Still another striking characteristic is the abundant exudation of nectar from the large and numerous glands on the petioles and stipules. Practically all willows produce some nectar from the floral glands at time of flowering and the steady hum of the many nectar- and pollen-gathering insects is familiar to all vernal botanists. But these foliar glands of this and related species are at their best in late spring and midsummer when lush new foliage shoots are developing. Not only are insects attracted in numbers, but preparation of herbarium specimens is made more difficult. So adhesive is the nectar that bits of newspaper or loosely-woven felt driers remain attached to the glanduliferous organs as the plants come out of press and make any future study of these organs almost impossible. Furthermore, if the specimens become heated in press the odor of the caramelized sugar from the glands becomes quite overpowering.

Distribution

Salix lasiandra is a plant of stream banks and valleys in the Upper Sonoran and Transition Zones. It occurs from North-central New Mexico and Southwestern Colorado across Northern Arizona and Southwestern Nevada to California and thence north through Oregon and Washington to the Stikine River in Northwestern British Columbia and east in the Columbia and Snake River Valleys to Blaine County, South-central Idaho, thence north in the mountains of Alberta at least as far as Jasper ~~Lake~~ Park, and across the interior basin to the Lesser Slave Lake District of Alberta, at about latitude 55° N.

To the southeastward of California, it apparently is only sparsely distributed. In New Mexico it is known from Santa Fe County; in Colorado from Archuleta, Montezuma, and Montrose Counties; in Arizona from the districts represented by Lakeside, the Black Mesa, and the Tonto Basin, and in Nevada from Nye, Ormsby, and Washoe Counties, the two latter adjacent to East-central California.

It occupies all of California except perhaps the extreme southern part. It occurs from San Bernardino County north to Modoc and Siskiyou Counties, and from Los Angeles County north to Trinity and Del Norte Counties. In all, it has been found in 37 out of the 58 counties of the State. It apparently has not been collected in three important groups of counties. In the first are Imperial, Riverside, San Diego, and Orange Counties in Southern California. It may occur there sparingly but in general is replaced by S. laevigata Bebb and S. gooddingii Ball. In the second group are these counties forming much of the two large, arid southern basins, namely Kern, Kings, and Inyo. In the third group are most of the counties of the great interior San Joaquin-Sacramento Valley, namely, Merced, Stanislaus, San Joaquin, Solano, Colusa, Glenn, and Yuba. Other scattering counties are Ventura, ^{and} Santa Barbara, and Contra Costa, on the West Coast, and ^{Amador, and Colusa} Madera, Calaveras, and Lassen in the Sierras. Lack of specimens from these Coast and Sierran Counties probably is due to lack of collectors rather than to absence of the species. The State distribution is shown on the chart of counties (p.). The type locality is "ad flumen Sacramento", California.

Its range varies in altitude from sea-level to elevations of 6,000 feet in the California mountains, both north and south, and reported elevations of 8,000 to 8,500 feet in Tulare, Fresno, and Alpine Counties, in the southern Sierra-Nevada. In Nevada, Colorado, and New Mexico also it is found at 6,000 to 7,500 feet. elevations of

2a *S. LASIANDRA ABRAMSI* Ball

Salix lasiandra abramsi Ball, in Bot. Gaz. 72: 224, 1921;--
Schneider in Jour. Arnold Arb. 3: 63 (footnote), 1921;--Ball in Abrams,
Illus. Fl. Pacific States 1: 489, 1923:

S. lasiandra lancifolia (Anderss.) Bebb, as understood by
Jepson, Man. Fl. Calif. 263, 1923 (in so far as the synonym, Var.
abramsi Ball, and all the description except that of the pubescent
branchlets ^{are} concerned.)

Description

Low to large shrub, 1-4.5 m. high, differing from the species
chiefly by leaves relatively small and narrowly lanceolate, 5-11 cm.
long, 1-1.7 cm. wide, common sizes being 6-7 by 1, 7-8 by 1-1.5, and
9-11 by 1.5 cm., acute to subacuminate, firm, margins shallowly ser-
rulate to subentire, the glands on the serrations very small or wanting;
petioles short, 4-8-10 mm. long, thinly pubescent or puberulent to gla-
brous, the glands of the distal upper surface small and inconspicuous,
or wanting; stipules wanting or very small, semi-ovate, acute, 2-5 mm.
long, shallowly denticulate and scarcely glandular to subentire; aments
short, usually 2-3, or sometimes 4, cm. long; capsules 5.5-7 mm. long;
pedicels 1-1.5 mm. long.

Variety abramsi bears the same morphological relationship to
S. lasiandra that variety parvifolia bears to S. caudata and variety
angustifolia to the related S. lucida of the Eastern United States.
Flowers are found during May and Early June, and fruits during June and
early July, dates later than for the species, owing to greater elevations.

has been found once in the San Bernardino Mountains, and
Distribution

Variety abramsi is the most montane form of S. lasiandra. It occurs commonly in the southern and central Sierras at elevations between 4000 and 7500 feet in the Canadian and Transition Zones. It is found sparingly farther north in the Siskiyou Range of northern California, the Cascade Mts. of southern British Columbia, and the Rocky Mountains of central Alberta. The single specimen from Vancouver Island is doubtfully referred here and more material is needed. A similar but even smaller-leaved sterile specimen has been received more recently from an island in Puget Sound. Some specimens from northern Idaho approximate variety abramsi in leaf size.

Because specimens of variety abramsi have not been widely distributed until recently and the variety is not known personally in the field to many botanists, all known specimens are cited below. The list includes all that were cited when the variety was described and all that have come to hand since. The herbariums indicated as sources for the material are California Academy of Science (CAS), the writer *S. Willis L. Jepson (W.L.J.)*, (CRB), Stanford University (SU), University of California (UC), and U.S. National Museum (USN). Many of the Dudley specimens from Nevada and Sierra Counties are too immature for absolutely certain determination. The Jepson specimen from Howell Mountain, the most southern collection from the Coast Ranges, has the very small leaves characteristic of the species, but the margins are sharply serrulate.

CALIFORNIA

San Bernardino Co., San Bernardino Mts., banks of Bluff Lake Creek, alt. 7200 ft., P.A.Munz 10472, June 24, 1926 (PC).

Tulare Co., Lloyd Meadows, Kern River, W.R.Dudley 823, July 20, 1895 (SU);- River bed of the Kern, alt. 6700 ft., W.L.Jepson 1103, Aug. 1-12, 1900 (WLJ);- By river, Lower Funston Meadow, Little Kern River near Funston's, W.R.Dudley 2079, July 20, 1897 (SU);- near Big Arroyo, Region of Kaweah Peaks, Arroyo-Kern Divide, W.R.Dudley 2329, July 25, 1897 (SU);- Buck Canon Crossing, Sequoia National Park, W.R.Dudley 2941, July, 1900 (SU);- Board Camp Creek Crossing, W.R.Dudley, June 29, 1902 (SU);- Sequoia National Park, Mrs. Charles Derby, July 3, 1928 (CAS).

Fresno Co., in marshy creek bottoms, 3-8 ft. high, Pine Ridge, Sierra Nevada Mts., elev. 5200 ft., H.M.Hall and H.P.Chandler 323, June 15-25, 1900 (SU,UC);- Region of Dickey Creek, elev. 5300 ft., Hall and Chandler 360, June 25-July 15, 1900 (UC); Dickey Meadow, Sierra National Forest, Sec. 20, T.10 S, R.26 E, E.G.Dudley 18, Sept. 9, 1912 (SU);- King Canyon (with no further data, UC);- Bubb's Creek, Kings River Canon and Kearsarge Pass, alt. 8,500 ft., W.L.Jepson 787, July 5-15, 1900 (WLJ);- Waltham (Wartham) Creek, on trip to Priest Valley, W.L.Jepson 2665, May 10, 1907 (WLJ).

Mariposa Co., Yosemite National Park, Yosemite Valley near Sentinel Hotel, elev. 4000-4500 ft., L.R.Abrams 4493, June 2-3, 1912 (CRB, PC, SU, pistillate type, UC);- Yosemite National Park, Mirror Lake, W.R.Dudley, June 12, 1894 (SU);- Merced Canyon, near Cascade Creek, elev. 3500 ft., Abrams 4684, July 12, 1911 (SU);- Yosemite National Park, abundant shrub, 10 ft. tall, on banks and sand bars of Merced River, opposite Yosemite Falls, Annie M. Hurd-Karrer 1, July 19, 1929 (CRB);- shrub 1 m. high (teratological), on margin of stream, Crane Flat, on Big Oak Flat Road, alt. 1860 m., C.R.Ball, Mrs. H.P.Bracelin, and Beryl Kautz 508, Aug. 4, 1931 (CRB, UC 2 sheets).

Kennedy's Meadow alt 6300 ft. Adelph.
Forest 12, 15, Aug 11, 1915 (1028)
Tuolumne Co., Yosemite National Park, shrub .6-1 m.

high, in rocky or gravelly soil, Tioga Road, on Middle Fork of Tuolumne River, 9 km. west of White Wolf, alt. 2100-2250 m., C.R. Ball, Mrs. H.P. Bracelin, and Beryl Kautz 514, Aug. 4, 1931 (CRB, UC).

El Dorado Co., Camp Agassiz, Glen Alpine Region, Alice Eastwood 965, July 23, 1906 (CAS); Glen Alpine Springs, W.R. Dudley 5660, June, 1900 (SU); between Glen Alpine Spring and Camp Agassiz, Dudley 5664, June 27, 1900 (SU); Tallac House, Lake Tahoe shore, Dudley 5725, June 28, 1900 (SU); Glen Alpine, elev. 6800 ft., E.A. McGregor 204, Aug. 26, 1909 (SU); shrub 12-18 inches high, bank of the American River, elev. 6750 ft., Morris Halperin 859, Aug. 14, 1932 (CRB, UC); Eldorado National Forest, Barrett Camp, elev. 6350 ft., P.B. Kennedy 100, Aug. 16, 1920 (CRB).

Placer Co., Monte Vista, Dutch Flat, W.R.Dudley, August, 1909, (CRB,StU);
French Meadows, along Middle Fork of American River, below chalk bluff
crossing, Sec.16, T.15 N, R.14 E, L.S.Smith 2630, Aug.28, 1931 (CRB,UC);
Lake Tahoe, James Moffitt, Aug.22, 1926 (CAS). Nevada Co., Soda Springs
alt. 7000 ft., M.E.Jones 2450, July 22, 1881 (CAS); ^{PC}lower end of Donner
Lake, A.A.Heller 6879, July 8, and 6943, July 16, 1903 (StU, UC, USN); ^{PC}
vicinity of Donner Lake, W.R.Dudley 5007, 5008, June 12, and 5018, 5021,
5026, 5027, 5049, June 14, 1900 (StU); Soda Springs Station, Dudley 5138,
June 15, 1900 (StU); flat land of the Yuba River opposite Cascade, Dud-
ley 5149, 5150, June 15, 1900 (StU); by Truckee River, 1.5 miles be-
low Truckee, Dudley 5155, June 17, 1900 (StU); Independence Lake, by
outlet bridge, Dudley 5276, 5277, June 19, 1900 (StU); Glenbrook, near
Truckee, W.R.Dudley 5783, June 28, 1900 (StU); near Glenbrook, vicinity
of Truckee, W.R.Dudley 5787, June 28, 1900 (StU); Glenbrook near Truck-
ee, W.R.Dudley, June 28, 1900 (StU); Truckee River, below Tahoe City,
W.R.Dudley 5804, June 29, 1900 (StU). Sierra Co., Salmon Lakes, Mrs.
Salmon Lake, Mrs. G. Earle Kelley, 1919 (CAS);
E.C.Sutcliffe, July, 1918 (CAS); vicinity of Gold Lake, elev. 1940 m.,
W.W.Eggleston 6263, 6265, August 28,29, 1910 (USN). Plumas Co., near
Marston Station, elev. 3500 ft., A.A.Heller 10849, June 13, 1913 (StU);
^aFether River Region, Lake Center Camp, alt. 6300 ft., Anna Head, June
30, 1920 (CAS); no locality, Anna Head, 1920 (CAS). Napa Co., Howell
Mtn., Napa River Basin, W.L.Jepson ²⁹⁵May 7, 1893 (UC); ^{W.L.J.}Humboldt Co.,
large shrub 10-15 ft. tall, along stream in wet meadow at Corral Prairie,
Trinity Summit, alt. 5000 ft., Joseph P.Tracy 10497, July 13, 1932(CRB,UC).
~~Siskiyou Co., along creek near Yreka, Geo. D.Butler 1084, Sept. 20, 1909~~
~~(UC).~~
Chester, elev. 4230 Ft., M.B. Kildale 2799, Sept. 11-20, 1926 (SU).

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Beyond
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(Lander Co. Birch Creek Toiyabe Reserve, P.B. Kennedy 4569, July 31, 1913 (SU). alt. 7000 ft.,

NEVADA. Washoe Co., Riverside Park, Reno, elev. 4500 ft.,

A.A.Heller 9699, May 26, 1909 (CAS).

OREGON. Jackson Co., in swampy ground, Mt. Pitt, elev. 7000

ft., Univ. of Oregon 7240, Aug. 25, 1916 (CRB). N.E. Oregon, a small tree, bank of Catherine Creek, alt. 3500 ft., W.C. Cusick 2385, May 30, June 28, 1900 (UC). ^{W.C.}

IDAHO. Blaine Co., on creek bank, Corral, alt. 5700 ft.,

Macbride and Payson 2932, June 28, 1916, dist. sub nomen S. laevigata ^{PC} Bebb (UC). Nez Perce Co., about Lake Waha, alt. 2000-3500 ft., A.A. and E.G. Heller 3334, June 29, 1896 (UC).

BRITISH COLUMBIA. Vicinity of Victoria, Vancouver Island,

J. Macoun 76803, June 18, 1908 (CRB); Pacific Great Eastern Railway, ⁷⁷⁷⁰ Mons, J.M. Macoun 97785, June 19, 1916 (CRB, UC).

ALBERTA. ~~Jasper~~ Rocky Mtns. Park, (vicinity of Banff),

N.E. Sanson 402, Aug. 18, 1901 (CRB); Jasper Park, slender stem 6-7 ft. high, leaves and twigs purplish-red, Mt. Cavell RR. Station, near Yellowhead Pass, J.G. Jack 2747, Sept. 5, 1922 (CRB).

Huckleberry Mountain, Coville and Applegate 377, Aug. 3, 1897 (SU);

24. S. lasiandra lancifolia (Andersson) Bebb

Salix lasiandra lancifolia (Anderss.) Bebb in Watson, Bot. Calif. 2:84, 1880 (preprinted on July 10, 1879, as "The Willows of California", with same pagination);
 ;-- Macoun, Cat. Canad. Pl. 1(3):460, 1886 ; 2 (5):358, 1890;-- Sudworth (Nomencl. Arb. Fl. U.S.), in U.S. Dept. Agr. Div. For. Bul. 14:120, 1897;-- Schneider in Journ. Arnold Arb. 1:16-18, 1919 (discussion, synonymy, and citation of numerous specimens);
 JEM in Jour. Arnold Arb. 3:63, 86, 1921;-- Ball in Abrams, Illus. Fl. Pacific States 1:489, 1923;-- Jepson, Man. Fl. Pl. Calif. 263, fig. 296, 1923 (excl. synonym and all of description except that relating to pubescent branchlets);-- Ball in Canad. Field-Nat. 40:147, 1926.

S. lancifolia Andersson, in Svensk. Vetensk.-Akad. Handl. 6:34, pl. 2, fig. 23, 1867 (Monog. Sal); in De Candolle, Prodr. 16 (2):206, 1868.

S. lasiandra Benth, of Sargent, Man. Trees of No. Am. 173, fig. 145, 1905 (in part covered by the sometimes pubescent or tomentose branchlets);--^{of} Kirkwood, Nor. Rocky Mtn. Trees and Shrubs 64, 1930 (as to part relating to branchlets sometimes densely pubescent).

Description

S. lasiandra lancifolia differs from the species in having the seasonal shoots and 1-year branchlets, and sometimes the 2-year branchlets, more or less densely pubescent-pilose. The pubescence often extends to the budscales and petioles, and sometimes to the midrib below. The name lancifolia does not denote a leaf-shape different from that of typical lasiandra. The type of the latter species was not mature and the leaves did not show the characteristic lanceolate form, and the practical identity of the two was not recognized for many years. In California, at any given latitude or elevation, the species and this variety flower and fruit at the same time.

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Description

Salix lasiandra lancifolia differs from ^{the} ~~the~~ species in ^X more or less dense pubescence of the younger vegetative organs. The seasonal shoots always, the 1-year branchlets usually, and the 2-year branchlets sometimes, more or less densely pubescent or subpilose; bud scales more or less densely pubescent; petioles and basal portion of the midrib usually densely pubescent; stipules sometimes pubescent.

By these characters, variety lancifolia is seen to bear the same relationship to S. lasiandra that variety Bryantii ^{and} bears to S. caudata, and variety araguipa bears to S. laevigata.

The name lancifolia does not denote a leaf-shape different from that of typical lasiandra. The ^{specimen} type ^{of} the species was not mature, the leaves did not show the characteristic lanceolate form, and the practical identity of the two was not recognized for many years. In California, at any given latitude or elevation, the species and this variety flower and fruit at the same time.

Jepson (Man. Flow. Pl. Calif. 263) describes this variety as having "branches more or less pubescent", which is correct. He further adds "leaves smaller, narrower, less serrulate; petioles less glandular"-- and cites "(var. abramsi Ball)" as a synonym. In this he is incorrect. Variety lancifolia has the same ^{of expression} range in length and width of leaf, and in size and abundance of petiolar glands, as is shown by S. lasiandra. On the other hand, variety abramsi differs from both lasiandra and variety lancifolia by having exactly the characters of leaves and glands described in the words quoted from Jepson and taken from the original description. It differs further from lancifolia by having the branchlets normally glabrous, or only thinly puberulent at most.

The largest leaves found on any member of this species, S. lasiandra, and perhaps on any willow species anywhere, occur on vigorous sprouts of variety lancifolia from Oregon and Washington. A leaf from Bradshaw 2009 from Eugene, Oregon (herb. CRB) measures 28.8 by 5.6 cm. Two leaves on Sukédorf 10447 from Bingen, Klickitat County, Washington (herb. CRB) measure 30 by 6.5 and 30.3 by 7 cm. respectively. The larger leaf, therefore, is almost exactly 12 inches (30.48 cm.) long.

Four recent collections, made primarily for the purpose, serve to show the size attained by the leaves of vigorous sprouts in California. On Setchell 14, from Sonoma County, three leaves range from 23.2 to 25.2 cm. in length and from 3.9 to 4.5 cm. in width, the longest being only 4.2 cm. wide. On Bracelin 504, from Shasta County, eight leaves measured from 25.5 to 27.3 cm. in length (two being 27.2 cm. long) and from 5.9 to 6.7 cm. in width. In this case the longest *blade* was only 6.1 cm. wide, and the widest was only 26 cm. long.

Most of the items in the discussion of S. lasiandra apply equally well to this variety.

California

Alameda Co. Copeland (1931) UC; Jepson (1891) StU.

Butte Co. Copeland (1931) UC; Heller 11594 (1914) CAS.

Calaveras Co. Blaisdell (before 1919) CAS.

Del Norte Co. Ball and Parks

Fresno (or Tulare) Co. (Gen. Grant Nat. Park) Dudley 3095 (1900) StU.

Humboldt Co. Kildale 3000 (1927) StU; Tracy 4218 (1913) UC.

Los Angeles Co. Abrams 1449 (1901) StU; Ewan, (as *laevigata* 4017,)
(1931) UC; Grant 1160 (1904) UC; Jones 3042 (1882) CAS; McClatchie (189-) StU.

Mendocino Co. Bracelin and Payne 490 (1931) UC; Goldsmith 24 (1911) UC.

Mono (or Tuolumne) Co. Paine (1905) StU (from Tuolumne Meadows
to Mono Lake)

Placer Co. Dudley 5798 (1900) StU.

Plumas Co. Eastwood 14645 (1927) CAS

Sacramento Co. Baker 5 (♂), 6 (1930) UC (5 ♂ = *laevis*)

San Bernardino Co. Abrams and McGregor 739 (1908) StU; Billings
(1923) StU; Hall 2510 (1901) UC; Munz 10472 (1926) UC; Parish 546 (1882) StU;
4587, as *S. laevigata* (1889) UC; 4635 (1901) StU; 4996 (1901) StU; 11670
(1919) StU; Jones (1928) PC.

San Luis Obispo Co. Dudley (1902, 1903) UC.

Santa Barbara Co. Hoffman (1930) CAS; Santa Cruz Id., Jones (1927) PC.

Shasta Co. Bracelin 504 (1931) UC; Campbell (1921) CAS.

Sierra Co. Dudley 5518 (1900) StU.

Siskiyou Co. Butler 1443 (1910) ^{PC,} UC; Dudley (1899) 2 spec. UC;
Eastwood 10828 (1921) CAS.

Sonoma Co. Setchell 14, 15, 16 (1931) UC.

Tulare Co. Dudley 2028 (1897) StU; 3058 (1900) StU.

Inyo Co. ^{Near} Bishop, Jones (1927) PC.

Mexico

Baja California. Ensenada, M.E. Jones, July 10, 1882 (PC).

2c. SALIS LASIANDRA MACROPHYLLA (Andersson) Bail n. comb.

Salix lasiandra Benth, in part, as understood by Schneider, in Jour. Arnold Arb. 1: 14-17, 1919; and most authors treating of Pacific Coast Willows.

S. lasiandra lyallii Sargent, in Gar. & Forest 8: 463, 1895; Silva No. Am. 9: 115, pl. 470, 1896;--Sudworth (Nomencl. Arb. Fl.), in U.S. Dept. Agr. Div. For. Bul. 14: 120, 1897; (Checklist), ibid. 17: 43, 1898;--Sargent, Man. Trees No. Am. 174, 1905;--Sudworth, For. Trees Pacific Slope 219, fig. 90, 1908;--Bail in Piper and Beattie, Fl. NW. Coast 114, 1915;--Henry, Fl. So. B.C. 96, 1915;--Kirkwood, No. Rocky Mtn. Trees and Shrubs 64, 1930.

S. lucida macrophylla Andersson in Svensk. Vetensk. Akad. Handl. 6: 32, 1867 (Monog. Sal., as subspecies): in De Candolle Prodr. 16 (2): 205, 1868 (as variety).

S. lyallii (Sargent) Heller, in Bull. Torr. Bot. Club 25: 580, 1898;--Britton and Shafer, No. Am. Trees 191, fig. 149, 1908;--Rydberg, Fl. Rocky Mtns. 191, 1922.

from Calif W.

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Description

Differs from the species chiefly in oval, oval-lanceolate, or broadly lanceolate leaf-blades, broad to rounded at the base. Large shrub to midsize tree; branchlets brownish or yellowish-brown, glabrous or the young yellowish seasonal shoots pubescent to sparsely pubescent at the beginning, with evanescent hairs; leaf-blades narrowly to broadly oval or oboval, 4-10 or 12 cm. long, 1.5-3.3 or 4 cm. wide, ^{common} sizes being 2.5 by 0.8-0.9, 3.5-4 by 1.2-1.8, 4.5-5 by 1.5-2, 5.5-6 by 1.8-2.2, 7-7.5 by 2.2-2.6, 8-9 by 2.5-3.1, 9.5-11 by 3-3.8, and 12-13 by 3.5-4.7 cm., respectively, acute to short-acuminate, or, on the vigorous seasonal shoots and sprouts, broadly lanceolate and long-acuminate at apex, up to 15, 20, or 25 cm. long, 4-4.5 or 5.3 cm. wide, common sizes being 17-20 by 4-5, and 21-25 by 4.5-5.3 cm. respectively, rounded to rarely subcordate at base, or the lowermost obovate and acute at base.

From the measurements given it is seen that the blades of this variety average about one-third as wide as long. In S. lasiandra and variety lancifolia the width is about one-fourth or one-fifth of the length.

Andersson's quasi subspecies of lucida (designated by an asterisk and the use of bold face type) is certainly identifiable only because he cites Lyall's collection of 1859, from the "lower Fraser River, lat. 49° 30' N." This locality is in British Columbia near the international boundary and the coast. The significant part of his description is the phrase: "foliis. . . . e basi subcordato-rotundata late lanceolatis." Large leaves, with large lunate, sharply serrate stipules, long-acuminate apices, and sharply crenulate-serrate margins are common to S. lasiandra, S. lasiandra lancifolia, and S. lasiandra macrophylla. Broadly lanceolate leaves (on fruiting branchlets) with subcordate to rounded bases are found only in the variety macrophylla.

Collectors will need to be on their guard against the temptation to assign vigorous shoots or sprouts of lasiandra and variety lancifolia to the present variety macrophylla, because of large lanceolate leaves with rounded bases. The smaller leaves from ^{their} fruiting branches still will show the characteristic narrow-lanceolate shape and narrowed bases. The measurements given for sprout leaves of lasiandra and variety lancifolia show that width is always definitely less than one-fourth of the length. In variety macrophylla the width may range to as much as one-third of the length, as noted by Andersson in DeCandolle's Prodrromus (16(2): 205), where he gives his quasi subspecies undoubted varietal rank. Here he describes the leaf-size as follows: "Foliis. . . . 5-6 pollices longis infra medium fere 2 poll. latis." This width-length ratio holds true of the leaves on fruiting branches, and even of immature leaves. In fact, juvenile specimens of macrophylla, with leaves only half expanded, or less (2-4 cm. long) usually may be readily recognized by the "fat", broad-based leaves. The leaves at various stages of development often bear a strong resemblance in shape to leaves of the cultivated apple.

Sargent, in establishing his new variety, Lyallii, honored Dr. Lyall, the original collector, but disregarded Andersson's much earlier name, as pointed out by Schneider (p.16) who, however, regards this form as not separable from S. lasiandra. Heller, in raising Sargent's variety to specific rank, fell into the common error of studying descriptions rather than plants. The only character which he quotes from Sargent that in any way separates this from the others comprising lasiandra is the "rounded or subcordate base" of the leaves. ~~This, with~~ ^{However} the relatively wider blade, must serve to distinguish the variety.

Distribution

Variety macrophylla is a plant of the Humid Transition and Canadian Zones of the Central Pacific Coast. It occurs, so far as now known, from Mendocino County, California, northward through Oregon and Washington, west of the Cascades, to the Strait-of-Georgia area in southwestern British Columbia, Canada, including the Vancouver Island and New Westminster Districts. The type locality is "ad 'lower Fraser river', 49° lat. boreal." where it was collected by Dr. Lyall in 1859. Apparently it does not occur commonly in the mountains, except in the forma pubescens, the variety being confined mostly to the Coast and to coastal and nearby inland river valleys up to a few hundred feet above sea level. The herbarium specimens examined are listed below. The abbreviations are the same as given under variety Abramsi. Forma pubescens occurs with the variety but also farther from the Coast and at higher elevations.

The abbreviations designating herbariums where the cited specimens are located are: CAS, California Academy of Sciences; CRE, Carleton R. Ball; NMC, National Museum of Canada; PC, Pomona College; SU, Stanford University; and UC, University of California.

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Salmon Creek, Jas. McMurphy 325,
June, 1902 (SU);
bank of Garcia River, 3.5 miles

CALIFORNIA. Mendocino Co., north of Point Arena, John Thomas Howell 8123, Sept. 27, 1931 (CAS, remarkably large, broad, and short-pointed leaves). Humboldt Co., vicinity of Eureka, alt. 0-500 ft., J.P. Tracy 1013, April 7, 1901 (UC); tree 6-12 m. high, abundant on banks of Eel River, Fortuna, alt. 10 m., H.E. Parks 0911, March 24, 1931 (CRB, UC); - on gravel bars, Eel River, Alton to Fortuna, alt. 50 ft., J.P. Tracy 9795, 9796, 9797 (small tree, common), April 17, 1932 (UC); low slender tree in marsh, the unfolding leaves broad at the base, Ferndale, about 16 km. south from mouth of Eel River, near sea level, H.E. and S.T. Parks 01099, April 16, 1932 (CRB, UC, 2 sheets); - tree 9 m. high, common in gravelly river bed, Blue Lake, Mad River, alt. 15 m., H.E. Parks 0991, May 20, 1931 (CRB, UC); tree 15 m. high, on banks of Willow Creek, ^{its} at mouth, Trinity River, alt. 150 m., Parks and Tracy 0966, May 17, 1931 (CRB, UC, 2 sheets each); - Del Norte Co., slender trees, 4.5-5 m. high, on creek bank, near Smith River below Gasquets, alt. about 90-120 m., Parks and Tracy 0933, May 10, 1931 (CRB, UC); Shasta Co., Costello, L.E. Smith 645, April 26, 1914 (CAS). Siskiyou Co., Sisson, L.E. Smith 720, June 24, 1914 (CAS).

OREGON. Curry Co., Cape Blanco, Abrams and Benson 10626, Agness, Rogue River, B.I. Applegate 7193, May 13, 1932 (SU). May 15, 1924 (CRB); Coos Co., Coquille River between Bridge and Myrtle Point, Abrams and Benson 10533, May 13, 1924 (CRB). Douglas Co., sandbars of Umpqua River, Roseburg, W.C. Cusick 4584, 4584a, April 26, 1915 (CRB). Marion Co., Santiam River, at Detroit, alt. 700 ft., W.C. Cusick 4582a, April 20, 1915 (CRB). Multnomah Co., tree 20 ft. tall, 8 in. diam., in slough east of Willamette River, below St. Johns, C.R. Ball 1988, June 23, 1915 (CRB, 2 sheets). Hood River Co., Hood River, L.H. Pammel 31, July 28, 1905 (CRB).

Dyerville, M. E. Jones, April 25, 1924 (SU):

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King Co., mud flats, University Crew House, Lake Washington, Seattle, Lyman Benson 1463, May 24, 1929 (SU).

WASHINGTON. Grays Harbor (Chehalis) Co., near Monte-

sano, alt. 200 ft., A.A. and E.G. Heller 3856, June 1, 1898 (UC). King (?) Co., Mercer Island, Seattle, Alice Eastwood 9958, June 29, 1920 (CAS). Island Co., damp ground, Camano Island, N.L. Gardner, May, 1895 (UC). Whatcom Co., Wickersham, W.C. Blasdale, July, 1902 (UC, with a shoot of S. coultteri).

BRITISH COLUMBIA. Vancouver Island: Victoria and

vicinity, John Macoun, 76794, 76795, June 1, 1908 (CRB); Point Comfort, Mayne Island, J.M. Macoun 90151, May 21, 1914 (NMC); Salt Spring Island, J.M. Macoun 90152, May 24, 1914 (NMC); Royal Oak, near Victoria, John Macoun, 97816, May 13, 1915 (NMC, UC). New Westminster District: Damp places, Vancouver, (J) Fowler 24555, June 25, 1887 (NMC, as lasianandra lancifolia); Vancouver City, J. Fowler (Flora Canadensis), July 1, 1903 (CRB); Vancouver City, J.K. Henry, May 14, 1912 (CAS); Lulu Island, near Vancouver, J.K. Henry, Oct. 4, 1912 (CAS, "leaves from 2 adjacent trees", the other being S. lasianandra); Overflowed low lands, Sumas Lake, J.M. Macoun 26897, Aug. 21, 1901 (NMC); Wet ground, Chilliwack, W. Spreadborough 26896, June 6, 1901 (NMC, as S. caudata); by a creek, east end of Chilliwack Lake, J.M. Macoun 26898, July 10, 1901 (NMC); Chilliwack Lake, W. Spreadborough 79554, June 23, 1906 (NMC); Hatzic, vigorous shoot, J.G. Jack 2875, Sept. 14, 1922 (CAS, CRB); tree 25 ft. high, 6 in. diam., Jack 2876, Sept. 14, 1922 (CRB).

2ca Forma pubescens new form

Seasonal shoots/ and 1-year branchlets, and sometimes the 2-year branchlets, more or less densely gray-pubescent; also the bud-scales, petioles, and the basal portion of the midvein on both surfaces, and sometimes but temporarily the under surface of the blade.

This form occurs with the variety but also farther from the Coast and at higher elevations. The available specimens are cited below.

CALIFORNIA. Humboldt Co. Abundant tree, 9-12 m. high, between Alton and Carlotta on Van Duzen River, H.E. Parks 0959, May 14, 1931 (CRB, UC, 2 sheets each). Del Norte Co., small tree, 20 ft. high, gravel bar, Smith River, 5 miles above the mouth, alt. 50 ft., J.P. Tracy 10060, May 15, (CRB, UC) and 10821 from same plant, Sept. 24, 1932 (UC). Modoc Co., small tree, 4-5 m. high, intergrown with S. lasiandra and S. lutea in meadow south of Payne Ranch, Mrs. H.P. Bracelin and Miss Frances D. Payne 498, June 30, 1931 (CRB, UC).

WASHINGTON. Klickitat Co., Columbia River, western part of County, W.N. Suksdorf, May 20, 1886 (CRB); Bingen, on bottom land, Suksdorf 10729, May 19, 1921 (CRB).

BRITISH COLUMBIA. New Westminster District. Hatzic, tree 30-40 ft. high, 2 ft. diam., J.G. Jack 2886, Sept. 15, 1922 (CRB).

SECTION 2. BONPLANDIANAEBonplandianae Schneider in Bot.Gaz.65:15, 1918; - Journ.

Arnold Arb. 1:22, 1919.

Description

Trees or stout shrubs; branchlets reddish or purplish; leaves stipulate, stipules small, never glandular on the surface, blades linear-lanceolate to lanceolate at maturity, thick, firm, leathery, petioles never glandular on the upper surface; aments coetaneous or (abnormally) serotinous, short-peduncled or the staminate rarely subsessile, slender, the staminate flexuous; stamens 3-7 or more, filaments free, crinkly-pubescent below; capsules ovoid-lanceolate, glabrous (except while young in S. longipes); pedicels 1-2.5 or 3 mm. long; style 0.1-0.2 mm. long, stigmas very short, notched; gland ventral, broad, short, sometimes appearing as if partly surrounding the pedicel.

Section Bonplandianae comprises 5 species, of which three are western and two are eastern. S. laevigata is the only one entering California. It ranges with its varieties araquipa and congesta from southern Utah and northern Arizona to Baja California in Mexico and to Siskiyou County in extreme northern California. S. bonplandiana is restricted to Arizona and Mexico. A. jaliscana, an obscure species, occurs only in Mexico. In the east, S. longipes and its varieties are found from the West Indies to District of Columbia, southern Indiana, western Texas, and northeastern Mexico. S. harbisonii is confined to the Atlantic Coast from Virginia southward.

Salix laevigata Bebb in Am. Nat. 8:202, 1874; in Watson, Bot. Calif. 2:85, 1880 (preprinted as "The Willows of California" on July 10, 1879);-- Sargent (Rept.) For. No. Am.) in 10th Census U.S. 9:167, 1884;-- Bebb (Review Will. Calif.) in Bot. Gaz. 16:103, 1891; in Coville (Bot. Death Valley Exped) in Contrib. U.S. Nat. Herb. 4:198, 237, 246, 275, 1892;-- Greene, Man. Bot. San. Fran. Bay Reg. 299, 1894;-- Parish, (Distrib. So. Calif. Trees) Zee 4:347, 1894;-- Sargent, Silva No. Am. 9:113, pl. 468, 1896;-- Sudworth (Nomencl. Arb. Flora U.S.) in U.S. Dept. Agr. ~~FORE~~ Div. For. Bul. 14:120, 1897; (Checklist For. Trees U.S.) ibid. 17:43, 1898;-- Ball in Trans. Acad. Sci. St. Louis 9:70, 1899;-- Jepson, Fl. West. Mid. Calif. 136, 1901;-- Abrams, Fl. Los. Angeles & Vic. 100, 1904;-- Eastwood, Handb. Trees Calif. 37, 1905;-- Sargent, Man. Trees No. AM. 171, fig. 143, 1905;-- Britton and Shafer, No. Am. Trees 187, fig. 144, 1908;-- Sudworth, For. Trees Pacific Slope 217, fig. 88, 1908;-- Jepson, Trees Calif. 134, figs. 75 a, b, 76c, 1909; Fl. Calif. 338, 1909; Silva Calif. 176, pl. 56, figs. 4-6, 1910; Fl. West. Midd. Calif., ed. 2, 117, 1911;-- Schneider, in Bot. Gaz. 66:21, 1918; in Jour. Arnold Arb. 1:23-24, 1919 (bibliography and discussion);-- Rydberg, Fl. Rocky Mtns. 191, 1922;-- Ball in Abrams, Illus. Fl. Pacific States 490, fig. 1194, 1923;-- Jepson, Man. Fl. Pl. Calif. 263, fig. 296, 1923;-- in Jour. Arnold Arb. 63, 86, 91, 99, 109 (footnote), 113, 1921 (keys and summary);-- Ball in Tidestrom (Fl. Utah & Nev.), in Contrib. U. S. Natl. Herb. 25:135, 1925;-- Pickwell and Smith, Trees Valley & Foothill 177, 195, 199, 205, figs. 67, 85(5), 90 (2), 1930.

S. laevigata angustifolia Bebb, in Watson, Bot. Calif. 2:84, 1880 (preprint as "The Willows of California", on July 10, 1879), with same pagination);-- Sudworth (Nomencl. Arb. Fl.), in U.S. Dept. Agr. Div. For. Bul. 14:120, 1897; ibid. 17:43, 1898; ~~///~~ Sargent, Man. Trees No. Am. 171, 1905

S. congesta Howell, Flora NW. Am. 617, 1903 (in part, at least).

Large shrub to small tree, 2-10 m. high and 1.5-2.5 dm. in diameter, occasionally up to ¹⁵ m. high, and 3- dm. in diameter, with broad, rather rounded crown; bark of trunk and larger branches dark brown or reddish brown, roughly furrowed with narrow ridges; the 1-year to 3-year branchlets dull brown or reddish brown, finely striate longitudinally, the epidermis peeling off each season between March and June and giving the branchlets a dirty grayish appearance, new seasonal shoots orange to yellow, especially at the tip; bud scales slender, 4-5 or 6 mm. long, ~~very~~ acute, brown to yellowish, glabrous or sometimes puberulent, as the branchlets.

Leaves petiolate, those on vigorous shoots stipulate; stipules minute or wanting, except on vigorous leafy shoots, where they are 2-6 mm. long, lanceolate to obliquely ovate, acute, finely denticulate to subentire, easily deciduous; petioles short, stoutish, 4-6 or 8 mm. long on fruiting shoots, up to 1.5 cm. long on vigorous sterile shoots, channeled on the upper surface, colored as the branchlets, glabrous or puberulent

to sometimes pubescent; blades thick, firm, those on flowering and fruiting peduncles ^{lanceolate or oblanceolate to} narrowly obovate ~~or~~ obovate, 1-5 or 6 cm. long, 1-2.5 cm. wide above the middle, common sizes being 1.2-1.5 x 2-3, 1.4-1.7 x 4, and 1.8- (rarely) 2.5 x 5-6 cm., obtuse to apiculate or mucronate at apex, white beneath and at first villous with long yellowish hairs, ^{glabrous} quickly ~~deciduous~~ or ~~those at~~ the apex persistent ^{very villous}, those on foliage shoots lanceolate or occasionally oblanceolate, 7-12 cm. long by 2.2-3 cm. wide, or on vigorous shoots 20 cm. long by 2.5-4 cm. wide, common sizes being 1.5-2.2 x 7-9, 2.5-3 x 10-12, 2.5-3.5 x 13-16, and 4 x 20 cm., acutish to rounded or subcordate at base, acute to acuminate at apex, the margins subcartilaginous, shallowly and rather closely serrulate, with 10-12 serrulations per cm. of margin in midsize leaves and 5-7 serrulations

per cm. on large leaves, midrib yellow, the primary veins numerous and noticeably parallel, at first impressed above, later somewhat raised on both surfaces, especially beneath, rich yellowish green above when young, becoming darker green and shining with age, densely glaucous beneath, glabrous throughout after full expansion, the immature often drying with black veins against the white or green background.

Aments costaneous, leafy-pedunculate, ascending or spreading, flexuous and rather lax; peduncles 1-2 cm. long in flower and bearing 3-5 small, mostly obovate, leaves, the pistillate usually becoming 2-4 cm. long in fruit and the more distal leaves developing into foliage leaves.

Pistillate aments 2.5-5 or 6 cm. long in flower, becoming 3-8 or rarely up to 11.5 cm. long in fruit (Madera County), 1.2-1.5 cm. wide, the shorter usually compact, the longer somewhat lax; ament scales elliptical-oblong or oblanceolate, 2-3 mm. long, irregularly erose or 2-3-toothed at apex, yellow, becoming pale straw-color, thinly pilose to glabrate on outside, pilose with short crinkly hairs within, tardily deciduous or subpersistent and becoming reflexed; capsules broadly lanceolate to broadly ovate (see var. congesta), 4-5 ^{to} 6, or rarely 6.5 (6 mm. Wolf Orange County) mm. long, acutish to rounded at base, short-acute at apex, ^{roughened} glabrous, brown; pedicels 1.5-2.5 or rarely 3 mm. long, yellow, glabrous; style and stigmas very short, the style 0.1-0.2 or 0.3 mm. long, stigmas notched; gland 1, ventral, stout, truncate, 0.5 mm. long.

Staminate aments slender, cylindrical, flexuous, lax, 4-8, usually about 6-7, but occasionally 9-10.5 (Los Angeles County) cm. long, 0.8-1 cm. wide, yellow; flower scales elliptical-oblanceolate to obovate, broader than the pistillate, 2-2.5 mm. long, 2-4-toothed at apex, yellowish, pilose as the pistillate; stamens 3-6, ^{filaments} usually about 5 mm. long, free, pilose with crinkly hairs on 1-2 mm. of the basal portion.

S. laevigata is not an early bloomer. In the southern portions of the State, flowering occurs from Early March to late May and fruiting from April to June, dependent on elevation, exposure, moisture, and similar factors. In the Bay district it flowers throughout March and most of April and fruits through April and early May. In the northern Coast Range and Sierras flowering occurs throughout April and fruiting throughout May and early June,

Its nearest and only close relative is S. bonplandiana and its varieties of Mexico and the mountains of Arizona, from which it differs in coetaneous production of foliage and flowers and in ^{Larger} ~~smaller~~ capsules.

Salix laevigata is one of the most pleasing willow species of the State in its natural setting. The bright and shining, yellowish-green leaves, white on the under surface, (and not discoloring in drying) give somewhat the same delightful color effect which makes S. amygdaloides, the peach-leaf willow, so charming a feature of landscapes in the Middle West. S. laevigata lacks, however, the graceful drooping branchlets of amygdaloides which make that species so readily recognized at a distance.

One of the striking morphological features of the Red Willow is the oblanceolate to obovate expanding leaves on the ament-bearing seasonal shoots. Not only is their general shape often in striking contrast to that of the lanceolate blades on the later seasonal foliage shoots, but their short-acute apiculate or mucronate apices are unusual. When the apically persistent brush of yellowish hairs projects from beneath this apex like the chin-whisker of a goat the effect is almost bizarre, especially in a willow named for its glabrousness. Frequently also the petioles and sometimes that portion of the branchlets directly behind the bud scales will be finely pubescent when all other parts are glabrous.

There is a superficial resemblance between this species and S. lasiandra, and specimens often are found under the latter name, especially those collected while immature. In general, the shining yellowish twigs of lasiandra, the darker green leaves with sharply glandular-denticulate margins and glandular petioles, and often darkening in drying, ^{and} the stouter aments with longer capsules and styles, form a sufficient contrast [^] to the characters of S. laevigata to prevent confusion.

No variety with small and narrow leaves comparable to S. caudata parvifolia or S. lasiandra abramsii, can be distinguished. This may be due in part to the limited altitudinal range of laevigata. Bebb described a variety ~~angustifolia~~ ^{angustifolia} but afterward ignored it, and recent writers are unable to separate such a variation with certainty. Narrow-leaved plants occur here and there throughout the State but in some cases normal leaves have been collected from the same plants. ↗

Ball 1714 from Citrus and 1716 from Bishop, both in Inyo County, have linear-lanceolate blades 9-12 cm. long, 1.2-1.8 cm. wide, with long petioles, acute bases, and acuminate apices. These come the nearest to representing ^{such} a distinct variation of any specimens seen. There are other specimens bearing only juvenile leaves which appear to belong in this same category but complete specimens, with full-grown leaves, might readily disprove this apparent identity.

Several specimens showing unusually broad, obovate or oval juvenile leaves have been examined but unfortunately mature foliage from the same plants is not known. Among these collections (with some juvenile blade measurements) are Fosberg 8007, a sprout from Matilija Canon, Ventura County (3.5 x 5.5, 4.6 x 7.5, 4.5 x 8, and 4 x 9 cm.); Bioletté, Coyote Hills, Alameda County (2.5 x 5 cm.); and Bracelin 272, Sylva Dale, Humboldt County (2 x 4.5 cm.). ↗ Baker 2814, Contra Costa County (2 x 4.5; 2.3 x 5.5);

A few hybrid plants, mostly resulting from probable crossing with lasiandra, have been found. They usually possess the leaf color and shape of laevigata, with some reduced petiolar glands, and more evident and partly glandular serrulation of the blade ~~///~~ margin. The aments are stouter and the capsules and styles are longer than in laevigata. Among specimens representing such hybrids are Hall 2278 from the San Jacinto Mountains (UC), Lee Bonar's collection from Putah Creek north of Middletown, Lake County, July 14, 1932 (UC, 3 sheets), and perhaps Ball's 2070, 2072, and 2073 from Chico Creek, near Chico, Butte County (CRB, 5 sheets.).

Distribution

Salix laevigata is a species of rather limited distribution. It occurs in the Lower and Upper Sonoran and the Transition Zones from Southern Utah and northern Arizona westward to northern Baja California to Washoe County in northwest Nevada, and and northward, ~~in the west of the Sierras to Butte, Siskiyou, and Humboldt Counties.~~ Within California it occurs practically throughout the State except east of the Sierra Nevada. Specimens from about two-thirds of the counties have been examined, as will be noted from the tabulated county distribution of all species (p.). Some authors credit it to Oregon but no specimens from that State have been seen by the writers. The anomalous Howell 1393, discussed under variety congesta, was collected at Hornbrook, which is only a few miles from the Oregon boundary. The type locality is Santa Cruz, Santa Cruz County, California. In altitude it ranges from sea level to about 5000 feet in the mountains of southern California. Variety araguipa ranges somewhat higher in Mariposa County. And to more than 6000 feet in Placer County, near Lake Tahoe.

Distribution

Salix laevigata is a species of relatively limited geographic distribution.

It occurs in the Lower and Upper Sonoran and the Transition Zones from southern Utah and northern Arizona westward to southern Nevada and northern Baja California and thence northward to northern California and northwestern Nevada. Within California it occurs practically throughout the State at lower and middle elevations. Specimens from about two-thirds of the counties have been examined, as will be noted from the tabulated county distributions of all species (p.).

In Utah, it has been noted from San Juan Co. (Cottam 2449, CRB); Iron Co. (Harris 29248, 28345, CRB); and Washington Co. (Harris 29326, CRB; Nelson 9999, UC; Olsen 284, 371, CRB; A.M.W. 39-Z-29, 92-Z-29, CRB). In Arizona it is known from the Navajo Indian Reservation (Vorhies 64, UC), in the northwestern corner of the State, and from Beaverdam in Mohave Co. (Goodding 2138, UC; Jones 5020, UC), in the northwestern corner. In southern Nevada it is known with certainty only from Lincoln Co. (Goodding 636, CRB, UC; Goodding 647, CRB; Jones, April 29, 1904, PC). In northwestern Nevada it occurs again in Washoe Co. (Kennedy 1745, CAS, SU; 1897, CAS, UC, annotated by Rowlee as "S. washoensis W.R."). It occurs in California east of the Sierra Nevada (Inyo Co., Bishop, PC; Death Valley, USN), with the variety arauqupa. In northern California it occurs in Shasta Co. as far as McCloud River near the fish hatchery (Heller 13025, SU); in Siskiyou Co. (at Yreka, Butler 151, WLJ, UC; near Yreka, Butler 1084 (possible hybrid with lasianдра), PC, UC); in Trinity Co. (at Betty May Mine, Kildale 10481, SU), and throughout the Eel River system in Humboldt Co. (numerous collections, CRB, SU, UC).

Some authors credit it to Oregon but no specimens from that State have been seen by the writers, although specimens of S. amygdaloides wrongly determined as S. laevigata have been noted. The anomalous Howell 1393, discussed under variety congesta, was collected at Hornbrook, which is only a few miles from the Oregon boundary. The type locality is Santa Cruz, Santa Cruz County, California. In altitude the species ranges sparingly from sea level to about 5000 feet in the mountains of southern California, and to more than 6000 feet in Placer Co., at Lake Tahoe. Variety arauqupa ranges to somewhat higher elevations in Mariposa Co.

3a. SALIX LAEVIGATA ARAQUIPA (Jepson) Ball

Salix laevigata araquipa (Jepson) Ball, in Bot. Gaz. 72:
234-235, 1921; Ball in Abrams, Illus. Fl. Pacific States 1: 491, 1923;
-- Jepson, Man. Flow. Pl. Calif. 263, 1923.

S. laevigata Bebb (in part) of Rydberg, Fl. Rocky Mts. 191, 1922
(portion described as having young twigs pubescent).

S. laevigata forma araquipa Jepson, Fl. Calif. 339, 1909; Silva
Calif. 177, 1910; -- Schneider in Jour. Arnold Arb. 1: 24, 1919; *ibid.* 3:
63, 1921.

S. ? occidentalis Koch, of Eastwood, Handb. Trees Calif. 36,
1905 (so far as the phrase: "The young branches are downy" is concerned).

Description

Differs from the species in having the seasonal shoots and the
1-year, and sometimes the 2-year, branchlets, and also the bud-scales,
stipules (when present), petioles, basal portion of the midrib, and
sometimes the basal portion of both surfaces of the blades, thinly to
densely pubescent-tomentulose. The seasonal shoots frequently become
glabrate in autumn while, at the same time, the 1-year and 2-year branch-
lets may be densely pubescent (as in Gardner's pistillate specimen from
Lake Merced, San Francisco, 1911).

The variety araquipa, like the species, produces flowers
throughout March and into mid-April, or even later, especially at
higher elevations, and the fruits ripen about 1 month later.

from Calif Willows

Variety araquipa, as a pubescent variation of laevigata, is exactly comparable to S. lasiandra lancifolia and S. caudata.

In 1921, the senior writer, in elevating Jepson's form to varietal rank, stated that:

"The vesture of the seasonal twigs, the buds, the petioles, and even the basal portion of the midrib, especially beneath, makes such a striking contrast with the glabrous and shining epidermis of the typical form that forma araquipa seems worthy of varietal rank. It should be noted, however, that the conspicuous tuft of brown hairs (used as a distinguishing character by Jepson) at the base of the seasonal shoots is found on many specimens of which the shoots themselves are glabrous" (l.c. 234-235).

Distribution

Specimens showing only a sparse puberulence or pubescence of the newest shoots should be regarded as representing the species rather than this variety, for they usually become entirely glabrate in a short time. In this class belong Fosberg 7427 from Los Angeles Co., distributed as variety araquipa but more properly regarded as the species. Pubescence from the 1-year and 2-year twigs is lost by the peeling off of the epidermis each spring, but is renewed later, at least to a partial extent. Similarly pubescence on the petioles, and on the branchlets behind the budscales (as on the human armpit), is a normal condition in the species, at least on young growth, and should not be regarded as indicating the variety.

Distribution

The variety has much the same range as the species but is not as commonly found. In fact it occurs rather sparingly except in southern California. In this area, from San Bernardino County westward to the Coast and from San Diego County northward to Santa Barbara County, it occurs perhaps more abundantly than the species. In central and northern California it is much less abundant. It occurs sparingly east of the Sierras from Death Valley in southern Inyo County, California, to Washoe County, in northwestern Nevada, contiguous to Sierra and Plumas Counties in California. The species itself also is known from this county of Nevada. In far northern California variety araquipa is known from Shasta, Siskiyou, and Humboldt Counties. The Siskiyou County specimen is from Gazelle, in the central part of the county. In Humboldt County it occupies only the Eel River Basin, so far as yet known. Like the species, variety araquipa is most common at low elevations, but it reaches an elevation of more than 6000 feet in Mariposa County.

The type locality is Chandler Canon, Araquipa Hills, Solano County, where the pistillate type (39s or 13817) was collected by Dr. W.L. Jepson in May, 1891. This collection, in Dr. Jepson's herbarium, shows dense pubescence on 1-year and 2-year twigs, as well as on seasonal shoots. Few specimens from the northern part of the State are so densely pubescent but many of those from southern California are of this character.

Specimens have been seen from 30 counties of California, or more than half the total number. The specimens, as in the case of S. lasiandra lancifolia, are cited in abbreviated form, with only the county, collector, collection number if any, year, and herbarium location of specimens cited. These are CAS, California Academy of Sciences; CRB, Carleton R. Ball; PC, Pomona College; SU, Stanford University; UC, University of California; USN, U.S. National Herbarium, and WLJ, Willis L. Jepson.

California

Alameda Co. Elmer 4367 (1903) PC, UC; Jepson (1891) SU.

Butte Co. Copeland (1923) UC.

Fresno Co. Eastwood 13977 (1926) CAS.

Humboldt Co. Chandler (1901) UC; Tracy 7301 (1925) UC; Tracy 9834 (1932) CRB, UC.

Imperial (?) Co. Coyote Canon, Colorado Desert, elev. about 1500 ft. Hall
2774 (1902) UC.

Inyo Co. Ferris 7422 (1922) SU.

Kern Co. Eastwood 13956 (1926) CAS, 2 sheets.

Lake Co. Agnes Bowman (1902) SU.

Los Angeles Co. (including Santa Catalina Island). Abrams 1449 (1901) SU, UC;

Abrams 3253 (1903) PC; Baker 5315 (1909) PC, SU, UC; Bracelin and Fosberg

568 (1931) CRB, UC; Elmer 3673 (1902) SU; Fosberg 4756, 4793 (1931) UC;

Grant (1902) SU; Grant 1153 (1904) UC; Johnston 1903, 1906 (1917) PC;

1998 (1918) PC; Jones (1882) PC; Moore (1912) CRB; Munz 2023 (1918) UC;

Peirson 9609 (1923) CRB, UC; Sharsmith 2, 11 (1932) CRB, UC; Trask (1896) UC.

Mariposa Co. Ball, Bracelin, and Kautz 506 (1931) CRB, UC.

Monterey Co. Ferris 1909 (1920) SU.

Napa Co. *Jepson 2341 (1903) W.L.J.*

Nevada Co. Ball 2301 (1925) CRB.

Orange Co. Helen Gibb 552 (1902) SU.

Placer Co. Heller 12747 (1917) CAS.

Riverside Co. Campbell 37 (1921) CAS; Fosberg 1560 (1930) UC; Hall 2278

San Jacinto Mts., elev. 5200 ft., (1901) UC; Jones (1927) PC, SU, UC;

Jones (1930) PC.

San Benito Co. (Mt. Pinos Region, above Ft. Tejon). Dudley and Lamb 4555

(1896) SU; Eastwood 7978 (1919) CAS.

- San Bernardino Co. Howell 2423 (1927) CAS; Johnston 1902, 1906 (1917) SU;
 Johnston 1991, (PC); Jones (1882) PC; Jones 26539 (1930) PC; Kennedy 1671
 (1907) CAS; Munz 2096 (1918) PC; Munz 2651 (1919) PC; Parish 4589 (1899)
 SU; Parish 11674 (1988) SU. *Parish (April, 1887), W.H.*
- San Diego Co. Abrams 3541 (1903) PC, SU; Abrams 3615 (1903) PC, SU; Abrams 4916
 (1912) SU; Brandegee (1904) SU; Chandler 5019, 5027 (1904) SU; Eastwood
 2589, 2590 (1913) CAS; Fosberg 8245 (1932) UC; Jones 2870 (1882) CAS. 2
 sheets, PC; Mearns 3874 (1894) SU; Wiggins 2030 (1926) SW.
- San Francisco Co. Gardner (1931) CRB, UC; Munz 7185 (1923) PC; Munz 9787 (1925) PC.
- San Mateo Co. Dudley (1894) SU.
- Santa Barbara Co., Santa Cruz Island, Brandegee (1888) UC.
- Santa Clara Co. Dudley (1893, 1895, 1908) SU; Newell (1914) CAS; Pendleton 1339
 (1909) UC; (or Stanislaus Co.) Pacheco Pass, Eastwood 14082, 14090 (1927) PC.
- Santa Cruz Co. Dudley (1908) SU.
- Shasta Co. Smith 584 (1914) CAS.
- Siskiyou Co. (Gazelle), Dudley, Aug. 25, 1899, SU.
Salas Co. Jepson 395, 1387 (Jepson), 1891 (W.H.)
- Sonoma Co. Baker 3946 (1930) SU; Heller 5348 (1902) SU.
Sonoma Co. Salt Creek, Jepson 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000
- Ventura Co. Fosberg 8011, 8013 (1932) UC. *Chico Hatch (1918) W.H.*
- Yolo Co. Ball 1956 (1915) CRB.

Nevada

- Lincoln Co., along creeks, Calientes, L.N. Goodding 608 (April 25, 1902) CRB, SU,
 UC; 949 (May 24, 1902) CRB, UC.
- Washoe Co., Hills north of Reno, elev. 4650 ft., Heller 9578 (1909) CAS, SU;
 near Pyramid Lake, Eastwood 14743 (1927) CAS.

Arizona

- Yavapai Co., Mayer, Gifford (June 12, 1932) CRB, UC.

Utah

- Washington Co., Veyo, Cottam 3370 (1928) CRB; Santa Clara Valley, M.E. Jones
 (April 9, 1880) PC.

Mexico

- Baja California. Northern part, M.E. Jones (April 5, 1882) PC; no locality,
 Jones (April 8, 1882) PC.

38

Salix laevigata congesta Bebb

Salix laevigata congesta Bebb, in Watson, Bot. Calif. 2:84, 1880 (Pre-printed, with same pagination, on July 10, 1879);-- Sudworth (Nomencl. Arb. Fl. U.S.), in U.S. Dept. Agr. Div. For. Bul. 14:120, 1897; in ibid. 17:43, 1898;-- Ball in Trans. Acad. Sci. St. Louis 9:71, 1899;-- Sargent, Man. Trees No. Am. 172, 1905;-- Schneider in Jour. Arnold Arb. 1:24 (discussion only), 1919.

S. congesta ~~Be~~ (Bebb) Howell, Fl. NW. Am. 617, 1903. (in part).

Description

As the species except aments short, 2-5 or rarely 7 cm. long, dense (due to shorter pedicels, or sometimes also to a greatly shortened rachis, possibly caused by parasitization) to middensity; capsules ovate or ovate-conic, or partly ovate-lanceolate, or short conic from an ovoid base, 3.5-4, or 4.5 mm. long, rounded or sometimes acute at base, blunt to acute or short-acute at apex; pedicels 1-1.5 or rarely 2 mm. long.

It is with some hesitation that Bebb's discarded variety is rehabilitated. The doubt is based not so much on lack of material as on the lack of uniformity in the specimens here tentatively assigned to the variety. Bebb's original description reads:

"Aments short, densely flowered, scarcely exceeding the simple leaves of the peduncle; capsule glabrous - conical, shortly pedicelled."

Here are three characters assigned to the new variety: short, dense aments; globose-conic capsules, and short pedicels. In the species he published at the same time, the aments are described as "elongated, flexuose, 2-4 inches long, rather densely flowered", the capsule as "conical from a thick base, acute", and the pedicel as "3 or 4 times the length of the nectary". From the brief descriptions given below with each specimen cited, it is seen that each of these specimens possesses at least two of the three characters assigned by the author of the variety. Several of the specimens, however, are aberrant in some way.

The aments, for instance, vary greatly in length and compactness or density. The very short ones appear as if parasitized, the rachis being much shortened, and the capsules thereby crowded, as in the Glenn and Siskiyou County specimens, and in some aments of the Humboldt County plant. Density of the ament is a result of a shortening of the rachis or the pedicels, or both. The pedicels of the species are 1.5-2.5 or rarely 3 mm. long, whereas in the variety they are from 1-1.5 or rarely 2 mm. long, a character noted by Bebb.

The capsules likewise are variable. In some specimens they are almost perfectly ovate or ovate-conic, while others are somewhat lanceolate from an ovate base. In the latter the apex is produced more or less distinctly above the bulbous base, and such capsules somewhat resemble a water carafe in shape.

Bebb cited no type collection, but, according to Schneider (p.24), he has annotated Bolander's No. 4632 from New Castle, Placer County, April 1865 (sheet 3515 in the Bebb Herbarium of the Field Museum) as his variety congesta. This collection is cited below from the herbarium of the University of California. Bebb did not mention this variety, nor his other variety, angustifolia, in reviewing his "Willows of California" in 1891.

Howell, in raising Bebb's variety to specific rank, made his No. 1393 from Hornbrook, Siskiyou County, the type specimen. A sheet of it is in the University of California, and the type has been made herbarium of the. The aments are short, dense, 1-1.5 cm. long, and somewhat scorpioid, and apparently have been parasitized by some insect. The capsules vary from 3 to 4.5 mm. long, with bases rounded to acute, and in some cases the apical portion well produced. The pedicels are about 1 mm. long.

Omitting the abnormally shortened aments, we have left the denser aments, the shorter, more ovate capsules, and the shorter pedicels. These seem to be sufficient characters on which to reestablish this variety.

available for study through the courtesy of Prof.
L. F. Henderson.

Distribution

The specimens here tantatively referred to variety congesta show a wide but scattered distribution in California. The counties represented range from Riverside, (or San Bernardino) and Inyo Counties to Santa Berbara County on the south coast and northward to Placer, Glenn, Siskiyou, and Humboldt Counties. It occurs also in Washington County, in southwestern Utah.

Because of the great variations in the individual specimens, and the doubtful validity of the variety, notes on the characters of each specimen are appended to the citation. The abbreviations of herbarium designations are the same as used with variety araguipa.

Riverside (or San Bernardino) Co. Keys Ranch near Quail Springs in Lost Horse Canon, Juniper Belt of Little San Bernardino Mts., Colorado Desert, Clary Herb. 923, May 12, 1932 (UC, capsules ovate, 3-4 mm. long, base acute or rounded; pedicel 1.5 mm. long) ^o
Along small stream, Keys Ranch, Little San Bernardino Mts., alt. 3500 ft., Munz and Johnston 5270, May 7, 1922 (UC as S. exigua, young leaves linear-lanceolate; young aments 2.5-4 cm. long; ovaries narrowly ovate to ovate, 2 mm. long, pedicel 1 mm. long).

Inyo Co., Sand hills west of Laws, Heller 8239, May 12, 1906 (CAS, UC, aments lax, capsules immature, ovate, apex not produced, 3-4 mm. long, pedicel 1.5-2 mm. long; stigmas sessile).

Tulare Co., near Grapevine Spring, 35 miles east of Visalia, P.S. Woolsey, (Flora of the Head of San Joaquin Valley), March, 1898 (UC, pistillate aments dense, 2-3 cm. long, capsules lanceolate to ovate, 3.5-4 mm. long, apex obsolete to produced, pedicel 1 or rarely 1.5 mm. long, staminate aments normal).

Los Angeles Co.(?), Tree, Eagle Nest, Geo. B. Grant 6136,
(SU, aments 4-5 cm. long, very dense; capsules narrowly ovoid to ovoid,
4-5 mm. long, apex well to only slightly produced; pedicel 0.5-1 mm. long).

Ventura Co., Foster Park, Alice Eastwood 5013, April 14,
1912 (CAS, aments 3-4 mm. long, dense, capsules 3-3.5 mm. long, ovate,
not produced; pedicel 1 mm. long; style wanting to 0.1 mm. long). ^A Along
stream, Sespe Creek, alt. 1500 ft., P.A. Munz 9370, April 18, 1925 (PC).

Placer Co., New Castle, State Survey 4632, ⁱⁿ 1861 (UC, pis-
tillate aments rather dense, 3-4 cm. long; capsules lanceolate to ovate,
3.5-4 mm. long, base rounded to acute, apex semi-produced, style evident,
pedicels 1-1.5 mm. long; staminate aments rather dense also).

Contra Costa Co., levee banks, Jersey Island, Ira. L. Wiggins 4601, April 18, 1930 (UC, aments 4-5 cm. long, semi-dense, capsules 3.5-4 mm. long, ovate-lanceolate, unfertilized, pedicels 1-2 mm. long).

Solano Co., near Cordelia, A.A.Heller 5599, May 23, 1902 (UC, aments lax to semidense, 4-7 cm. long; capsules nearly mature, ovate, 3.5-4 mm. long, apex scarcely produced, style obsolete to very short, pedicels 1.5-2 mm. long).

Napa Co., Bed of Putah Creek, below the Bluffs, W.L.Jepson, May 26, 1891 (UC, aments dense, 2.5-4 cm. long; capsules ovate-lanceolate, 3.5-4.5 or 5 mm. long, apex moderately produced, pedicels 1-1.5 mm. long).

Glenn Co. Plentiful on creek bank, 8 miles south of Newville, A.A.Heller 11438, May 26, 1914 (CAS, UC, aments dense, abnormal, probably parasitized, 1.5-2.5 cm. long; capsules ovate-lanceolate, mostly infertile, 3-3.5 or 4 mm. long; pedicels about 1 mm. long).

Humboldt Co., Bush 15 ft. tall, South Fork of ~~El~~ Eel River, between Miranda and Redway, alt. 300 ft., J.P.Tracy 10122, May 22, 1932 (UC, aments dense to somewhat lax, variable, some perhaps parasitized; capsules variable, ovate to lanceolate, 3-4 mm. long; base acute to rounded; style evident; pedicels 1-2 mm. long).

Siskiyou Co. Hornbrook, Thos. Howell 1393, dist. as "S. laevigatus var. angustifolia Bebb" April 14, 1889^{UC} (UC, see notes elsewhere).

Contra Costa (?) Co. State Survey 6338 (another sheet bearing label with this same number on a specimen of S. laevigata ^{as} from Contra Costa Co., Mt. Diablo), (UC, aments dense, elongated, 3-6.5 cm.; capsules ovate, 2-2.5 mm. wide, 3.5-4 mm. long, base mostly rounded, apex acute or shortly produced; style almost obsolete; pedicels 1-1.5 mm. long.)

Utah
Washington Co. Zion Canon, M.E. Jones, May 7, 1923 (PC).

SECTION 3. NIGRAE Loudon

Nigrae Loudon, Arb. Frut. Brit. 3: 1529, 1838; -Schneider in Bot. Gaz. 65: 5, 1918; -Schneider in Journ. Arnold Arb. 1: 2, 5, 1919; -Ball in Canad. Field-Nat. 40: 150, 1926.

Amygdalineae Koch. as interpreted by Ball in Coulter and Nelson, New Man. Rocky Mtn. Bot. 129, 1909.

Triandrae Dumortier in Bijdr. Natuurk. Wetensch. 1: 58, 1825; -as interpreted by Schneider (in part) in Bot. Gaz. 65: 13, 1918; -and Schneider in Journ. Arnold Arb. 1: 9, 1919.

Trees or large shrubs; trunks 1-3 or rarely more; bark black to dark brown, furrowed; branchlets slender, tough, sometimes somewhat drooping, brown to yellowish, glabrous or the younger shoots more or less pubescent to glabrous; stipules small, often glandular on the upper and sometimes on both surfaces, often deciduous; leaves short-petioled, linear to linear-lanceolate, acuminate to long-acuminate, often falcate, 5-10 or, on vigorous shoots, 12-16 cm. long, closely serrulate, green on both surfaces; aments coetaneous, on short leafy peduncles, those of both sexes 3-6 or 8 cm. long, slender, often flexuous; often flower scales pale yellow; ob lanceolate-oblong to narrowly obovate, entire to 2-3-toothed; capsules glabrous or sometimes pubescent (No. 4), pedicelled, 5-7 or rarely 9 mm. long; ovate-lanceolate to lanceolate; style very short, 0.1-0.3 mm. long; stigmas short.

Section Nigrae comprises 3 species. S. nigra occupies the Eastern half of the United States as far west as Minnesota and west Texas, with variety lindeheimeri extending from Texas to northeastern Mexico. Its western counterpart, S. gooddingii, or its variety vallicola, treated herein, ranges from western Texas to northern California, and south to northern Mexico. Salix humboldtiana, with still narrower leaves, ranges from northeastern Mexico to Argentina and Chile. The other two species are placed by Schneider in Section Triandrae Dumortier, of Europe. One, S. amygdaloides, occurs from New York west to Nevada and north to eastern Washington and southern Saskatchewan. The other, S. wrightii, is local to western Texas, New Mexico, and extreme southern Colorado. It is impossible to follow Schneider in his arrangement, as both species show extremely close relationships with S. nigra and S. gooddingii vallicola, the juvenile stages being almost impossible of separation from those last named. The species of this section are very closely related to those of Section 2, Bonplandianae, and often have been combined in the same section by different authors.

4. SALIX GOODDINGII Ball

Salix Gooddingii Ball in Bot. Gaz. 40: 376, pl. 12, figs. 1-2, 1905. η Also the plant of the following authors and publications as far as they include distribution in the Southwest and Far Wouthwest and so far as they cover the typical, but not most widely distributed, form of the plant with capsules rather permanently pubescent, and the younger vegetative organs more or less puberulent-pubescent, as described below.

S. Gooddingii Ball: of Schneider in Bot. Gaz. 65: 12-13 1918 (Mexican specimens cited); in Jour. Arnold Arb. 1: 9, 1919; in ibid. 3: 62, 86, 92, 98, 110 (keys), 1921;--Ball in Bot. Gaz. 72: 227-234, figs. 2-4 (tree and trunk photographs of true S. Gooddingii), 1921 (redescription, with citation of abundant herbarium specimens from Texas, N. Mex., Ariz., Mexico, Nev., and Calif.); Ball in Abrams, Illus. Fl. Pacific States 490, fig. 1192, 1923; in Tidestrom (Fl. Utah and Nev.), in Contrib. U.S. Natl. Herb. 25: 135, 1925.

S. nigra Marshall (in only that part covered by distribution in the Far Southwest) of Bebb in Watson, Bot. Calif. 2: 83, 1880; in Bot. Gaz. 16: 102, 1891;--Greene, Man. Bot. Reg. San. Fran. Bay 299, 1894;--Parish, Distr. So. Calif. Trees 347, 1894;--Sudworth (Nomencl. Arb. Fl. U.S.), in U.S. Dept. Agr. Div. For. Bul. 14: 118, 1897; in ibid. 17: 42, 1898;--Jepson, Fl. West. Midd. Calif. 136, 1901;--Howell, Fl. N.W. Am. 617, 1903;--Sargent, Man. Trees No. Am. 168, fig. 140, 1905;--Eastwood, Handb. Trees Calif. 35, 1905;--Hough, Handb. Trees No. States & Can. 78, figs. 91-92, 1907;--Sudworth, For. Trees Pac. Slope (U.S. Dept. Agr.) 213, figs. 85-86, 1908;--Jepson, Trees Calif. 136, fig. 76a, 1909; Fl. Calif. 339, 1909;--Ball in Coulter and Nelson, New Man. Ricky Mtn. Bot. 129, 1909;--Jepson (Silva Calif.) in Mem. Univ. Calif. 2: 177, pl. 56(7), 1910;--Jepson, Fl. West. Midd. Calif. (Ed. 2) 118, 1911;--Hall and Hall, Yosemite Fl. 66, 1912;--Parish, Cat. Pl. Salton Sink 3, 1913 (reprinted from Carnegie Inst. Washn. Publ. 93);--Wootton and Stnadley (Fl. N. Mex.), in Contrib. U.S. Nat. Herb. 19: 161, 1915.

S. nigra vallicola Dudley (as per type specimen but excluding most of the description) in Abrams, Fl. Los Angeles and Vic. 100, 1904;-- in Suppl. Ed. 100, 1911;--Eastwood, Handb. Trees Calif. 36, 1905;--Jepson (Silva Calif.) in Mem. Univ. Calif. 2: 178, 1910;--Man. Fl. Pl. Calif. 263, 1923;--Pickwell and Smith, Trees Vall. & Foothill 199, 206, fig. 90(1), 1930.

Description

Small to large tree with long, slender branchlets, mid-sized lanceolate leaves, green on both sides, without petiolar glands, and slender, leafy-peduncled catkins with deciduous yellow scales, 4-9 stamens, and densely pubescent to finally glabrate-glabrous, long-pedicelled capsules with very short styles and stigmas.

Shrub 3 m. high to tree at least 15 m. high and 3-4 dm. in diameter; bark furrowed, gray in hotter drier areas, to yellowish-brown in cooler and more humid areas; branchlets straight, very slender, elongated, yellowish, glabrous to puberulent to pubescent, more or less shining, the 1-year usually bright lemon yellow in spring but becoming grayish as the epidermis weathers, the seasonal shoots yellow but sometimes turning brown rapidly in sunshine, usually pubescent or subpilose; bud scales small, 2-4 mm. long, the color and pubescence as in the branchlets bearing them.

Leaves numerous, petiolate, sometimes stipulate; stipules usually wanting on flowering shoots, present on vigorous shoots, 5-8 or 10 mm. long, or small, 1-3 mm. long, semicordate to subreniform or subulate, the larger glandular-denticulate to dentate on the margin and often densely glandular on the upper (inner) surface also with fragrant odorous glands (see Ball Nos. 1820, 1821, 2068; Chase 5517); petioles 2-4 or 6 mm. long, or up to 15 mm. on sprout leaves, yellowish green, pubescent or puberulent, becoming glabrate; blades midsize, linear-lanceolate, usually somewhat falcate (often oblanceolate while expanding), 6-10 or 16 cm. long, 6-12 or (on sprouts) 1.5 to 2.5 cm. wide, common sizes being 6-7 by 0.6-0.8, 7-8 by 1, 9-10 by 1-1.5, and, on sprouts, 12-16 by 1.5-2.5 cm., respectively, acute at base, acute to short-acuminate, or the distal long-acuminate, at apex, finely and shallowly glandular-serrulate or occasionally subspinulose, yellowish-green on both surfaces in hot dry climates, darker green in cooler and more humid climates, usually more or less puberulent to pubescent when

young, usually glabrous before maturity; veins spreading, then curving upward to unite and form a continuous marginal vein, prominent above, the vein islets in the parenchyma very small, 0.3-0.5 mm. in diameter.

Aments costaneous, numerous, solitary, terminating short lateral leafy peduncles; staminate peduncles 1-4 cm. long, pistillate peduncles 2-5 cm. long, those of both sexes bearing 3-6 or 7 small leaves; ament rachis densely pubescent to pilose.

Staminate aments slender, cylindrical, somewhat flexuous, 4-6 or occasionally 8 cm. long, 9-10 or rarely 12 mm. wide; flower scales oblanceolate-oblong or nearly obovate, 2.5-3 or rarely 4 mm. long, entire to 2-5-toothed or even lacerate at the apex, pale yellow, more or less deciduous, more or less pubescent-pilose, becoming somewhat glabrate on the outer apical portion; stamens 4-7 or 9, anthers yellow, filaments about 5 mm. long, crinkly-pilose on the lower one-third to one-half, free; gland 1, ventral, short, stout, cylindrical.

Pistillate aments oblong to linear-oblong, 3-6 or rarely 7 or 8 cm. long, 8-10 mm. wide in anthesis, increasing to 12-18 or 20 mm. wide in fruit, often somewhat flexuous; flower scales much as in the staminate ament but never subobovate, occasionally longer, up to 4-5 mm. long at apex of ament (Heller 5419); ovary 2-3 mm. long, ovate-lanceolate, densely pubescent; capsules narrowly ovate-conic to lanceolate, (4.5)-5-7, or rarely 9 mm. long, densely pubescent, finally becoming thinly pubescent or glabrous in age, roughened or minutely papillate; pedicels slender, 1.5-2.5 or rarely 3 mm. long, pubescent or becoming glabrate; styles 0.1 to 0.3 or 0.4 mm. long, entire; stigmas 0.3-0.4 or 0.5 mm. long, divided; gland as in the staminate ament.

middle of
Salix gooddingii flowers from late March to early May, according to elevation and exposure. Fruits ripen from very late April throughout May and into early June, and old fruits may be found as late as *early* July.

In general, the species differs from variety vallicola in having the ovary densely villous-pubescent; capsules more lanceolate, densely pubescent while developing, and moderately to thinly pubescent when full-grown, some remaining pubescent until past full maturity; the seasonal shoots, the bud scales, petioles, midveins, the young blades, and often the 1-year branchlets, puberulent or thinly to densely pubescent, usually becoming glabrate with age. The abundance of the pubescence depends much on stage of development and the time of year.

While typical gooddingii, with its densely pubescent ovaries, pubescent capsules, and more puberulent or pubescent young vegetative organs, apparently is confined to the central part of the combined range of the species and variety, thinly and evanescently pubescent capsules occur throughout most of this range, even to northern California (Colusa and Butte Counties). The type specimen is Goodding's No. 689 from Lincoln County, Nevada, in the herbarium of C. R. Ball.

This is one of the largest of the tree willows of California, at least in trunk diameter though probably not in height. The slender yellowish branchlets, sometimes subpendulous, make it of striking and pleasing aspect, especially in the deserts. With lasiandra it shares the presence of odorous glands on the upper (inner) surface of the stipules, as noted by Dudley, though stipules are never so numerous or well developed in S. gooddingii. Specimens collected at Yuma, Arizona, by Agnes Chase (No. 5517) are very aromatic and ~~fragrant~~, from the exudation of the floral glands and perhaps from stipular glands also. S. gooddingii has no true petiolar glands such as are found in the Section Lucidae (caudata, lasiandra, lucida, etc.) or Section Fragiles (alba, fragiles, etc.), where the glands occur on the top of the petiole near the base of the blade. S. vallicola has glandular serrulations on the blade margins and sometimes one or two ~~pairs~~ pairs of these glands are found on the adjacent sides of the petiole, as if the base of the blade had been reduced in size and one or two pairs of basal primary veins had been reduced to mere gland-tipped points.

Discussion

Members of the Section Nigrae, and of related sections of the genus, normally have glabrous capsules and not much permanent pubescence of other parts. Increased hairiness, and not increased glabrousness, is the variation. It would have been most fitting, therefore, if vallicola could have been recognized as the specific name, especially as the plant finds its most congenial habitat in valleys, and as variety vallicola has the more extensive geographic range. Such action also would have been more in accord with the botanical facts. However, Dudley's S. nigra vallicola, while published in 1904, was raised to specific rank by Britton only in 1908. Salix gooddingii was published in 1905. Regretfully, therefore, gooddingii is maintained as the specific name.

The original description (Bot. Gaz.40: 376, pl.12, figs.2,1905) ^{1/-} ~~was~~ based on a single collection of immature and somewhat parasitized pistillate specimens and applies strictly to the ultra-pubescent form. The later and fuller description and discussion by Ball (Bot. Gaz.72: 227-234, figs. (plates)2-4, 1921) includes both S. gooddingii and what is recognized below as variety vallicola, with its more normally glabrate or glabrous parts. This applies also to the very extensive series of specimens cited, most of which represent the variety. The 3 figures(plates) just mentioned show the habit of the typical gooddingii under different conditions in the Colorado Valley.

When the type specimen (Abrams 3256) of Dudley's variety vallicola was studied in the herbarium of Stanford University and the cotype in that of the University of California, a new difficulty arose. The capsules of the type specimen, while pubescent, are less so than in typical gooddingii and are variably so on different sheets and in different aments. Those of the cotype specimen are distinctly less pubescent, though younger, than those of the type specimen. Evidently, also, the description was based largely on specimens differing from the type.

Dudley's original description of his new variety vallicola in 1904 shows quite conclusively that it was intended to include the commonly-occurring glabrous or glabrate plant as well as the one with more permanently pubescent parts, especially capsules. In the first place, there is no mention of pubescent branchlets although the leaves are described as glabrate and the petioles as "quite puberulent, or nearly glabrous at maturity". In the second place, the capsules, instead of being recorded as pubescent, which they obviously are on the type specimen, are set down as "glabrous or more or less pubescent, mostly 4-5 mm. long". The size assigned to the capsules indicates also that the specimens consulted were immature, a stage at which they are most hairy. If, ~~then~~^{seems}, when immature they are described as sometimes glabrous, it ~~is~~^{is} certain that this variety rather than the more pubescent species was principally in mind.

As the publication was concerned only with the flora of Los Angeles and vicinity it is not surprising that only the local distribution was given therein.

Britton, in raising variety vallicola to specific rank in 1908, says only that apparently it was deserving of such rank. Evidently he was quite unacquainted with the plant itself because he merely rephrases Dudley's description and repeats that "it inhabits river banks in southern California". He also makes no mention of any pubescence of the branchlets, although noting the puberulent to pubescent petioles ("stalks"). More significantly, he records the capsules as "smooth, 4-5 mm. long". So far as pubescence is concerned, this statement is much more restrictive even than Dudley's "glabrous or more or less pubescent" (italics ours).

From a consideration of all these facts, the type specimen of variety vallicola is regarded as essentially representing the species gooddingii, whereas the description given by Dudley, as also that by Britton, are held to represent essentially the variety vallicola. It is deemed proper, therefore, to disregard the cited type and to abide by the published descriptions in recognizing vallicola, not as a synonym of gooddingii but as a valid variety of that species, a conclusion in which Dr. W. A. Setchell concurs.

Distribution

Salix gooddingii is typically a plant of the Lower and Upper Sonoran Zones in the southern part of the Colorado River basin and westward. In geographic range it occurs from the Apache Trail in Gila or Mariposa County, Arizona, westward in Lincoln County, Nevada, and across southern California to San Diego and Orange Counties and northern Los Angeles County, and very sparingly north of the Tehachapi Mountains to near Hanford in Kings County (Tulare Co. on label) in the Tulare Basin, and near Merced in Merced County at a low elevation in the upper San Joaquin Valley of California. The type locality is a ditch bank near Muddy Creek (River) near Virgin River, Lincoln County, Nevada, not far from the Utah-Arizona junction-line. Its occurrence might well be expected in those portions of Sonora and Baja California lying directly along the Colorado and Salton Rivers below Yuma, Arizona, and the Imperial Valley in California. The few specimens available from that district, however, all seem referable to variety vallicola.

Its favorite habitat is on the floodplains or banks of streams in the hot and otherwise dry valleys at relatively low elevations. The altitudinal range is from below sea level in the Salton Sink (and in Death Valley ?) to elevations of 100-500 feet in the major valleys, with occasional occurrence at 1000 feet (near San Bernardino) and 1200 feet (in Riverside County), to some 2100 feet near Barstow in the Mohave Desert of San Bernardino County. The altitudinal, as also the geographic range of variety vallicola is much greater.

All herbarium specimens available at the present time are listed below. The abbreviations used are CAS for California Academy of Sciences; ^{PC for Pomona College;} CRB for Carleton R. Ball; SU for Stanford University; and UC for University of California; and ^{W.J.} ~~W.J.~~ for Willis L. Jepson.

Nevada

Lincoln Co., ditch bank, Muddy Creek, Leslie N. Goodding 689,
May 2, 1902 (CRB, pistillate type specimen); - River banks, Riverville,
Colorado River, Goodding 719, May 6, 1902 (CRB, UC, as S. nigra); -
Along ditches, Bunkerville, Ivar Tidestrom 9202, April 27, 1919 (CRB).

Arizona

Gila (or Maricopa) Co., Apache Trail, Alice Eastwood 6262,
April 19, 1917 (CAS); Fish Creek, Apache Trail, Eastwood 8768, May 18,
1919 (CAS). *Chamehuic Valley, Japson 5198, Oct. 22 -
Nov. 7, 1912 (WIG).*

Mohave Co. ^ Springs north of Beale, Selma Braem, May 10, 1928
(SU); Topock, Alice Eastwood 8879, May 24, 1919 (CAS).

Yuma Co., Bottoms of Colorado River, near Yuma, W.R. Dudley,
Jany. 1, 1895 (SU); Ehrenberg, on bank of Colorado River among arrow-
weed, Joseph Grinnell, March 26, 1910 (UC, 2 sheets). Large tree on
levee, Arizona Experiment Substation, Yuma, C.R. Ball 1740, June 15, 1911
(CRB); from same plant, C.R. Ball 1901, May 26, 1915 (CRB, SU); see figs.
2 and 4, Bot. Gaz. 72: 228, 232, 1921).

California

Imperial Co.: Yuma Indian Reservation, forming dense growth along both sides of Colorado River (aromatic - fragrant), Agnes Chase 5517, *Colo. R., alt. 100 ft. Jackson 11737, Apr. 15, 1927 (CRB);* April 7, 1910 (CRB, 2 sheets). Fort Yuma, (opposite Yuma, Arizona); large tree on Colorado River bank at pump house, end of ferry, C.R. Ball 1741, June 15, 1911 (CRB, 4 sheets). Yuma (Imperial Co.), Ethel H. Campbell 5, May, 1921 (CAS). Colorado River Bridge, H.E. McMinn 1471, June 29, 1925 (SU, as S. exigua). Colorado River across from Yuma, Ariz., river bed, small tree, F.R. Fosberg 7817, 7820, March 31, 1932 (UC); large tree, same data, Fosberg 7818, 7819, (UC). Bard, H.L. Westover 1,2, May 9, 1913 (CRB). Calexico (then San Diego County), Jos. Burtt Davy 7966, March 28, 1902 (UC). Calexico, a tall rough-barked tree, LeRoy Abrams 4092, June, 1904 (SU). Near Calexico, Imperial Valley, G.D. Abrams, ~~4092~~, April, 1910 (PC, SU). Calexico, near bridge over New River, alt. 7.5 m. below sea level, tree about 3.5 m. high, Mrs. H.P. Bracelin 611, 612 (capsules densely pubescent), April 14, 1932 (CRB, UC, 2 sheets of each). Along highway, 6.5 km. west of Calexico, alt. 6 m. below sea level, tree 4.5 m. high, trunks 5-7.5 cm. in diameter, with very light gray bark, growing beside irrigation ditch, Bracelin 613, April 14, 1932 (CRB, UC, 2 sheets). Along ditches, Meloland, Salton Sink, Imperial Valley, E.W. Paecord No. A, Oct., 1913 (SU). Brawley, a fine large tree, almost evergreen in the Imperial Valley, along irrigating canal, Elmer I. Applegate 3320, April 8, 1910 (SU). Loose, sandy bank of a large irrigation ditch, 22.5 km. north of Brawley, alt. 35 m. below sea level, the only tree, 3.5 m. high, very heavily fruited; growing at water's edge, Mrs. H.P. Bracelin 609, April 13, 1932 ^{CRB,} (UC, 2 sheets). Holtville, tree 25 ft. tall, 10" diam. ^{CRB,} In public park, S.B. Parish 8079, July 1, 1912 (SU). Agua Dulce Springs, Salton Sink, E.A. McGregor 781, March 17, 1917 (SU).

Riverside County. Blythe, M.E.Jones 26030, April 2, 1930 (PC). About 800 m. from State Inspection Station, on way to Blythe Bridge, alt. 90 m., Lower Sonoran Life Zone, tree, 9 m. high, 7.5 m. spread, trunk 3 dm. in diameter, in sandy alkali loam of overflow land back of Colorado River, Carl B.Wolf 3085, April 28, 1932 (CRB, UC 3 sheets). Salton Basin (possibly Imperial Co.) elev. 50 ft. below sea level, S.B.Parish 8092a (mixed with S. exigua), June 30, 1912 (CRB). Tree by dry creek bed, hills south of Arlington, alt. 1200 ft., ^{m.} I. Johnston 1235, June 5, 1917 (PC, 2 sheets; SU). Cameron Lake, Colorado Desert (Riverside (?) Co.) T.S.Brandegee, March 28, 1901 (CRB, UC). Elsinore, C.F.Baker 4146, April 4, 1903 (PC, SU). Lake Elsinore: Mrs. J.D.Abrams, May 20, 1901 (SU); common tree along shore of lake, alt. 1200 ft., I.M.Johnston 2016, May 30, 1918 (PC). Lee Lake, Temescal Canon, a tree on lake bank, alt. 1100 ft., I.M.Johnston 2018, May 30, 1918 (PC, SU). Thousand Palms, shrub 6-8 ft. and more, survey bottom, Carl Epling, March 27, 1927 (CRB).

San Bernardino Co. Ft. Mohave, Colorado River bottom, J.G.

Cooper, March 25, 1861 (CRB, UC, 2 sheets). Ft. Mojave, April, 1884 (UC).

29. *Palms, Mohave River, Jepson 5975, May 12, 1914 (W.L.J.)*
Needles, M.E. Jones, May 3, 1882 (PC). [^] About 300 m. from bridge, 1.5 km.

north of Barstow, Mojave Desert, alt. 630 m., [^] An individual trees, about 6 m.

high, trunk 2.5 dm. in diameter, with gray bark, growing on sand bar, beside

Mojave River, Bracelin 587, 588, April 10, 1932 (CRB, UC, 2 sheets each).

San Bern. Parish, May, 1894 (W.L.J.)
Colton, M.E. Jones 3195, April 28, 1882 (PC, SU, UC). [^] Vicinity of San Bern-

ardino, alt. 1000-2500 ft., S.E. Parish, May, 1899 (SU, as *laevigata*). San

Bernardino Valley, ~~Lytle Creek~~, alt. circ. 300 m., damp-land, ~~S.E. Parish 11131,~~

~~May 2, 1917 (UC).~~ meadows, S.E. Parish 8152, June 8, 1912 (SU, UC). San Bernard-

ino Valley, Lytle Creek, alt. circ. 300 m., damp land, S.E. Parish 11131, May

2, 1917 (UC). A common tree along stream, Chino Creek, south of Ontario,

I. M. Johnston 1990, May 26, 1918 (PC).

San Diego Co. San Dieguito river, Berardo, LeRoy Abrams 3371,

May 2, 1903 (SU, 2 sheets, UC).

Orange Co. Santa Ana river, near Orange, LeRoy Abrams 3256,

April 16, 1903, ([♂] and [♀] types of S. ~~SE~~ nigra vallicola Dudley n.var.) (CAS,

PC, SU, UC, 2 sheets in all). Santa Ana River, west of Santa Ana, LR. Abrams

1763, June, 1901 (SU). Santa Ana, Helen D. Geis 533, Spring, 1902 (SU);

Near Santa Ana, Miss H.D. Geis, May (?) 1902 (SU). Santa Ana River Bridge near

Orange (Type Station) LR. Abrams 5005, July 14, 1913 (PC? SU); Santa Ana

River between Orange and Anaheim (Type Station), LR. Abrams (fol.) July 14,

1913 (SU). Santa Ana Canon, Santa Ana River bottom, bark rough. alt. 500 ft.,

John Thomas Howell 2439, June 6, 1927 (CAS); 2772 (fol.), July 14, 1927 (CAS).

Rancho Santa Ana, near Santa Ana River, Santa Ana Canyon, Upper Sonoran Life

Zone, alt. 120 m., tree, 7.5 m. high, with 6 trunks, each 2 dm. in diameter, in

sandy loam of floodplain, at southeast corner of pear orchard, Cuttings growing

in Botanic Garden under Garden No. 1441, Carl B. Wolf 2950, April 8, 1932 (CRB, UC);

same locality and habitat, tree 6.5 m. high and 2 dm. in diameter, Garden No. 1468,

Wolf 2955, April 15, 1932, (CRB, UC).

Los Angeles Co. Gorman (Gorman's Station, extreme north-western corner of county), Antelope Valley, L.R.Abrams and E.A.McGregor 314, June 17, 1908 (SU).

Kings (?) Co. (Tulare Co. on label). Hanford, Alice Eastwood 3851, March 24, 1914 (CAS).

Merced Co. Canal bank, four miles north of Merced on "6-Mile Road", alt. 170 ft., John Thomas Howell 4205, April 26, 1929 (CAS).

4 a. S. GOODDINGII variety VALLICOLA (Dudley) Ball, Gomb. nov.

Salix nigra vallicola Dudley (as per description for the most part, but excluding the type specimen) in Abrams, Fl. Los Angeles and Vic., 100.
100, 1904;--in Suppl. Ed., Fl. 1911.

Also the plants discussed under S. Gooddingii Ball, S. nigra Marshall, and S. nigra vallicola Dudley by the several authors cited above relate in the treatment of S. Gooddingii in so far as they ~~relate~~ to the South-western plant of western Texas to California and Mexico with capsules glabrous, or thinly pubescent and soon glabrous.

S. nigra venulosa Anderss. of Bebb in Coville (Bot. Death Valley Exped.), in Contrib. U.S. Nat. Herb. 4: 199, 1893.

S. vallicola (Dudley) Britton in Britton and Shafer, No. Am. Trees 184, fig. 141, 1908.

S. wrightii Anderss. (in part) of Wootton and Standley (Fl. N. Mex.) in Contrib. U.S. Nat. Herb. 19: 160; 1915;--of Rydberg, Fl. Rocky Mts. 191, 1923.

Description

Differs from the species in being more glabrate in all its parts; branchlets glabrous, seasonal shoots puberulent to pubescent but usually soon glabrate; bud scales, stipules, and leaf-blades glabrous, or puberulent and soon glabrate or glabrous; petioles often pubescent but becoming less so in age; ovaries often pubescent; capsules glabrous, or thinly pubescent and becoming glabrate or glabrous very early in their development; flower scales less pubescent, the apical portion often becoming only thinly pubescent or glabrate.

In the southern part of its range, variety vallicola flowers from the last third of March to early May, according to elevation and exposure. In north-central and northern California it flowers throughout April. Fruits ripen from very late April throughout May and into June, although old fruits may be found still attached until early July.

So far as size and height of plant is concerned, as well as size of the different organs, variety vallicola is in every way similar to the species. It is probable that the plants of Gooddingii in the Colorado River Valley, where it is most abundant, will have an average greater height than those of variety vallicola if averaged throughout their greater geographical and altitudinal range.

The extensive discussion of both the species and this variety, given under S. Gooddingii, need not be repeated here. It is a great pleasure to be able to re-establish Dudley's appropriate varietal name Vallicola for this beautiful and widely distributed Californian willow. As he was the first to distinguish this variety as a plant distinct from the eastern S. nigra, it is especially fitting that his name shall remain attached to it.

Distribution

Salix Gooddingii vallicola is a plant of the Lower and Upper Sonoran ~~Zones~~ and Arid Transition Zones. Its favorite habitat is on the alluvial floodplains of streams, although it occurs in mountain canyons in the southern part of its range. In geographic range it occurs from western Texas southeastern New Mexico, and northern Chihuahua in Mexico, westward to southern Nevada and northern Baja California, and thence northward over all of southern California and on through the central basins as far as the upper Sacramento Valley in Tehama and Shasta Counties. It occurs also in the northern Coast Range of Lake Co. and likewise east of the Sierra Nevada through Inyo County, California, to Washoe County, in northwestern Nevada. The type locality is the Santa Ana River near Orange, Orange Co., California, but as previously noted, the type specimen probably belongs to S. Gooddingii. On the basis of the accepted description by Dudley the type locality would be Orange and San Diego Counties.

TEXAS: Brewster Co.(SU). El Paso Co.(SU, USN). Jeff Davis Co.(USN). Lubbock Co.(SU, UC). Tom Green Co.(USN).

NEW MEXICO: Chaves Co.(CRB). Dona Ana Co.(UC, USN). Grant Co.(CAS, SU, UC, USN).

ARIZONA: Cochise Co.(CRB). Gila Co.(CAS, CRB, UC). Graham Co.(CRB, USN). Maricopa Co.(UC). Mohave Co.(CRB, PC). Pima Co.(CAS, CRB, PC, SU, UC, USN). Pinal Co.(CRB, USN). Santa Cruz Co.(CRB, USN). Yuma Co.(CRB).

NEVADA: Nye Co.(UC). Washoe Co.(UC).

MEXICO: Baja California (CAS, SU, UC, USN). Chihuahua (CAS, PC). Sonora (CAS, SU, UC).

CALIFORNIA: Amador Co.(SU, 1500 ft.). Butte Co.(CAS, CRB, SU, UC). Calaveras Co.(CAS). Colusa Co.(CAS, SU). Contra Costa Co.(SU, UC). Fresno Co.(CRB, SU, UC). Imperial Co.(PC, SU). Inyo Co.(CAS, UC, USN, WLJ). Kern Co.(CRB, SU, UC). Kings Co.(CAS). Lake Co.(CRB, UC). Madera Co.(CRB). Mariposa Co.(CAS, SU). Merced Co.(CAS). Nevada Co.(CAS). Orange Co.(PC). Placer(?) Co.(CAS). Riverside Co.(CRB, PC, SU, UC). Sacramento Co.(UC). San Bernardino Co.(CAS, CRB, PC, SU, UC, WLJ). San Diego Co.(CAS, PC, SU, UC). San Joaquin Co.(CRB, UC). San Mateo Co.(SU). Shasta Co.(CAS, CRB, UC).utter Co.(UC). Tehama Co.(CAS, WLJ). Tulare Co.(CRB, PC, SU, UC). Yolo Co.(CAS, CRB, PC, SU, UC).

DISTRIBUTION BY CALIFORNIAN AND ADJACENT COUNTIES

The chart of county distribution which follows has been constructed for greater convenience in visualizing the local distribution of the different species and varieties treated herein. All counties of California are included, in alphabetical order. The few counties of Arizona, Nevada, and Oregon, which lie against the California border are arranged in order from south to north, or east to west, as the case may be. It would have given a better picture of distribution if the California counties also had been arranged in order from south to north. As there are at least 3 south-north belts, the two mountain systems and the great valley, and as some valley counties extend across the mountains also, the difficulties of a satisfactory arrangement on that basis will be apparent.

The absence of a given species or variety from a given county may mean simply the absence of collections from that county. This is especially true of some of the counties in the central valley. Additions to the known range can be indicated easily by a cross in the appropriate square.

(CALIFORNIA COUNTIES

Alameda				U	U		U	U			
Alpine				S							
Amador							A			S	
Butte				U	U		U	U		U	
Calaveras				P	C		A			C	
Colusa							S			C	
Contra Costa				P			U		U	U	
Del Norte				U		U	U				
Eldorado				SB	SU						
Fresno				U	U	U	U	C		U	
Glenn							U		U		
Humboldt				U	U	U	U	U	U		
Imperial								U?		U	S
Inyo					P		U	S	U	U	
Kern							U	C		U	
Kings										C	C
Lake							U	S		U	
Lassen											
Los Angeles				U	U		U	U	S?	S	
Madera							B				B
Marin				CJ							
Mariposa				U	U		A	U		C	
Mendocino				U		CS	U				
Merced							A			C	C
Modoc	U	U	C	U	U	U					
Mono				S	S		S				
Monterey				U			A	S			
Napa				U	U		U	J	U		
Nevada	P	P		S	JCS		J	B		C	
Orange							U	S		U	P
Placer	U	U		U	B	S	U	C	U		C?
Plumas				U	C	S	C				
Riverside							U	U	U?	U	U
Sacramento				U	U		A?			U	
San Benito				U			U	C			
San Bernardino	S	S		U	P	U	U	S	U	U	U
San Diego							U	U		U	U
San Francisco				U			U				
San Joaquin											U
San Luis Obispo				U	S		U				
San Mateo				U			S	S		S	
Santa Barbara					C		U	U			
Santa Clara				U			U	U			
Santa Cruz				U			A	S			
Shasta				U		U	C	A	C		U
Sierra	S	S		S	C	S					
Siskiyou	S	S		U	U	U	C	U	S	U	
Sloano							U	J	U		
Snoma				U	U		U	S			
Stanislaus							U				
Sutter				S			U			U	
Tehama				SU			A	J		C?	
Trinity				U			S				
Tulare		S		U	S	S	U		U	U	
Tuolumne				SU	U		A	U	C		
Ventura							U	U	C		
Yolo				B			B	B		U	
Yuba											

caudata
 bryanti
 parvifol
 lasianus
 abrams
 lancif.
 macro
 back
 laevigat
 nraque
 congest
 Gooding
 velle

Br. Calif.
MEXICO

Baja California

Sonora

ARIZONA

Yuma Co.

Mohave Co.

NEVADA

Clarke Co.

Lincoln Co.

Nye Co.

Esmeralda Co.

Mineral Co.

Douglas Co.

Ormsby Co.

Washoe Co.

OREGON

Lake Co.

Klamath Co.

Jackson Co.

Josephine Co.

Curry Co.

S. caudata

S. parvifolia
S. montana

S. lasiantha

Abramsi

lanceifolia

macrophylla

S. pubescens

S. laevigata

ataquipa

congesta

S. gooddingii

vallicola

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Kernian = Linc. or Elko Co. Nev. laev. B.
Bunkerville : : gldy B.
Riverville : : " "

Baja California

Arizona
Gum Co.
Mohave

Nevada

Clarke
Lincoln

Nye

Esmeralda

Mineral

Douglas

Washoe

Oregon

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TO THE MAKER-UP

It is suggested that, if possible, this table be set on two opposite pages, the names forming the column heads to be repeated on the second page. This arrangement will greatly facilitate reference to the table and comparison of distributions.

The text on page should immediately precede the title, on the odd-numbered page, whereas the county map of California should follow the table on the even-numbered page.

CALIFORNIA WILLOWS of
SECTIONS PENTANDRAE, BONPLANDIANAE, and NIGRAE

By

Carleton R. Ball

INTRODUCTION

Temporary residence in California has afforded the ~~senior~~ writer a long-desired opportunity to become better acquainted with many western willow species in the field. The time seemed ripe also for assembling the material necessary to a satisfactory revision of the species occurring in California. The plan to do this has met with a most enthusiastic response from numerous botanists and other naturalists in the Pacific Area. So whole-hearted have been their efforts, and so fruitful their labors, that hitherto undescribed species and varieties have been found within the State. The recorded geographic ranges of many species and varieties ^{also} have been materially extended, making some of them known for the first time as components of the California flora.

The distribution of sets of willows collected in 1931 has now taken place, and that of the material collected in 1932 is progressing. Specimens of some of the new species and varieties have been sent out and their names, with those of some new combinations, appear on the printed labels. It is necessary to publish these as promptly as possible.

The genus Salix as represented in the Americas is divided by specialists into 15 or 20 sections, each containing a group of related species. It would be very desirable to prepare a revision of the entire genus, so far as it occurs in California, for publication in a single issue. This is impracticable, however, because of the limited time which can be devoted to the work, and the many problems which can be solved only by extensive studies in the field and herbarium. For these reasons the revision must appear in several parts, of which this is the first. New species and varieties, already recognized and distributed, but belonging to later sections, will be published in another ~~series of~~ paper.

Acknowledgement of Assistance

It is a pleasure to record the assistance, cooperation, and other friendly courtesies received from many persons in the University of California and elsewhere in the State, as well as in other States and Provinces. Especial appreciation is given to Dr. Wm. A. Setchell, head of the Department of Botany, for unmeasured assistance, counsel, and encouragement, without which the work scarcely would have been possible. To Dr. E.B. Copeland, ^{formerly} assistant curator of the herbarium many thanks are due for numerous acts of helpful cooperation. Many others connected with the Department have been helpful in many ways, including Dr. T.H. Goodspeed, Dr. W.L. Jepson, Dr. N.L. Gardner, and Miss Annetta Carter, not omitting Mrs. Rearwin and Mrs. Webster, the efficient mounters, and Mr. Matthews, the Department photographer. Nor should Mr. W.A. Flinn, former head of the Printing Division of the University Press (now retired), be forgotten, as he gave efficient personal attention to the difficult matter of label printing.

For making abundant material available for study and comparison, I am greatly indebted to Miss Alice Eastwood and Mr. John Thomas Howell of the California Academy of Sciences, Dr. LeRoy Abrams of Stanford University, Professor L.F. Henderson of the herbarium of Oregon University, Dr. Philip A. Munz of Pomona College, Dr. Wm.R. Maxon, of the U.S. National Museum, Dr. E.D. Merrill of the N.Y. Botanical Garden, Director S.C. Simms of the Field Museum of Natural History, ^{and} Dr. M.O. Malte of the National Herbarium of Canada, ~~and~~ Mrs. Carleton R. Ball of Washington, D.C.

Dr. W. L. Jepson of the University of California,

Many persons have responded heartily to the need for more material from all portions of the State and from adjacent portions of neighboring States. Especial appreciation is given to Mr. and Mrs. Harold E. Parks of Berkeley and Trinidad, and to Mr. Joseph E. Tracy (and Miss Ethel Tracy) of Eureka for extensive and critical collecting. Others whose help is gratefully acknowledged are: Dr. Vernon Bailey of the U.S. Bureau of Biological Survey, Mr. Milo S. Baker of Kenwood, Dr. W.C. Blasdale of Berkeley, Mrs. H.P. Bracelin of Berkeley, Mr. Victor Duran of Berkeley, Mr. Joseph A. Ewan of Los Angeles, Miss Edna M. Fisher of Berkeley, Mr. F. Ray Fosberg formerly of the Los Angeles Museum of Science, Mr. Ralph Hoffman (since deceased) of the Santa Barbara Public Museum, Miss Beryl E. Kautz of San Francisco, Mr. Mark Kerr of the Eastern California Museum Association at Independence, Mr. H.D. MacGinitie of Arcata and Berkeley, Miss Frances D. Payne of Alturas and Alameda, Mr. Frank W. Peirson of Altadena, Miss Emily Smith and Dr. H.B. Smith of Los Gatos, Mr. Leland S. Smith of the Tahoe National Forest (U.S. Forest Service), Mr. Carl W. Sharsmith of the U.S. National Park Service, and Mr. Carl B. Wolf of the Rancho Santa Ana Botanical Garden, Anaheim. Collection have been made also by Professors Setchell and Gardner, and Dr. E. B. Copeland, mentioned previously.

PHYSIOGRAPHY OF THE PACIFIC COAST AREA

Certain physiographic features profoundly influence the distribution of species in the Pacific Coast Area. They must have at least a brief discussion in order that the nature of the problem of determining the complete range of species may be understood.

California is a State of enormous distances as well as of extremes in elevation and climate. It extends from approximately $32^{\circ} 30'$ to 42° North latitude. This is something more than 660 miles direct north and south or about 800 miles on the southeast-northwest axis, which is the actual direction in which the State extends. In elevation the range is from about 200 feet of depression below sea level in the Salton Sink of Imperial and Riverside Counties of southeastern California and 280 feet below sea level in Death Valley in Inyo County of east central California, to elevations of nearly 14,500 feet on Mt. Whitney and over 14,000 feet on other peaks in the Sierra Nevada Range of east-central California. The casual assumption is that the mountain ranges and separating valleys of the State extend in general from south to north, an assumption which easily leads to a serious misunderstanding of the floristic problem.

In the great southern section of the State, commonly called Southern California, or "south of the Tehachipi", the general trend of the major physiographic features is east-west, not north-south. The larger and more important ranges, as the San Bernardino, the San Jacinto, the San Gabriel, and the Tehachipi, as well as many minor ones, have this characteristic. The significance of this lies not in this directional trend but in the fact that they thus interpose no barrier to the ingress of plants of the Sonoran-Zone from the east. Only by keeping this in mind can the distribution of the species characteristic of that Zone be understood. These ranges also afford stepping stones which may carry eastern montane species nearly or quite to the coast.

The central and north-central parts of the State are ~~well~~ occupied by two well-defined mountain systems which extend north and south. They are not confined to California, but also cross Oregon and Washington, parallel to the Pacific Coast. The lower and more western system, lying nearest the ocean, is called the Coast Range in California, Oregon, and British Columbia, and includes the Olympic Mountains of southwestern Washington. The loftier and more eastern system, lying some 200 miles east of the ocean, is known as the Sierra Nevada in California and the Cascade Mountains in Oregon and Washington. This combined system contains such famous peaks as Mts. Whitney, Dana, Lassen, and Shasta, in California; Pitt, Three Sisters, Jefferson, and Hood in Oregon; and Adams, Baker, and Rainier in Washington. Where unbroken, it forms a mighty barrier against plant migration from the east.

The Coast Range and Sierra Nevada systems are separated by the San Joaquin-Sacramento Valley in California, the Willamette Valley in Oregon, and Puget Sound in Washington, all districts of low elevation. The great central valley of California also is relatively hot and dry during the rainless summer and constitutes a northern extension of the Sonoran Zone. These facts and are well known ^{and} are mentioned here chiefly as a background for a brief discussion of a somewhat intermediate and less well-known area, which lies along the California-Oregon boundary.

In northern California and southwestern Oregon the two north-south systems of mountain ranges are rather completely interrupted. Between their northern and southern halves there is interjected another system trending east and west and made up of many more or less distinct ranges. The three major ranges in this transverse system are the Siskiyou Mts., ^{Oregon and} in northern California, the Rogue River Mts. in adjacent Oregon, and the Calapooia Mts. between the Umpqua River and the head of the Willamette Valley which leads northward down to the Columbia River. This area of transverse ranges is drained by several rivers running westward to the Pacific Ocean. In northwestern California are the Klamath and the Smith, and to the northward in southwestern Oregon are the Illinois-Rogue and the Umpqua.

This intermediate and transverse area is more or less intermediate also in its fauna and flora. The plants characteristic of the northern Transition and Canadian Zones push into and sometimes across it from the north. Examples are Salix commutata and S. sessilifolia. Likewise, the plants of the Upper Sonoran Zone push into it from the south and also from the east. For instance, Salix laevigata and its varieties and Salix Hindsiana reach here their most northern extension from the Sonoran of the Sacramento Valley. In similar manner, Salix exigua and S. lutea creep in through this Sierran gap from the great basins to the east. Some Transition-Zone species of the Sierras, such as Salix Lemmoni and S. Jepsoni likewise occur. In addition, there are species and varieties endemic to this intermediate transverse area. Cases in point are Salix delnortensis, S. Parksiana, S. Tracyi, and others. Illustrations of all these points are equally available, of course, in other genera than Salix.

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To summarize, in the southern end of the State the general run trend of the mountain ranges is east-west. In the central and north-central portions the trend is south-north. In the extreme northern part the ranges again run east-west. Picture the State then as a garden, 4 times as long as broad, with rows of plants running crosswise at both ends and lengthwise in the large middle portion. This gives a not inaccurate idea of plant distribution in the State and the admitted exaggeration serves to impress the infrequently recognized fact. Carrying the simile a bit farther, let us assume that movement within the garden is only between the rows of plants. We see that at both ends there may be movement from east to west, ^{and the reverse,} but in the center movement occurs ^{chiefly} ~~only~~ from south to north or vice versa.

The central part of the State has five more or less distinct physiographic and vegetational bands or ^hstips running north and south. From the ocean inward these are (a) the usually very narrow coastal strip, (b) the relatively wider Coast Range area, (c) the San Joaquin-Sacramento Valley of similar width, (d) the broader Sierra Nevada, and (e) the rift lying east of the Sierran escarpment and containing Owens, Mono, Tahoe, Pyramid, Honey, Lower, Middle, Upper, and Goose Lakes. Regarding the lofty Sierra Nevada as a grand barrier, any ingress of eastern basin plants would be expected to occur only at the southern and northern ends of the State and this is exactly what happens, as will be pointed out in the discussion of the various species and varieties. Furthermore, the central valley, of low elevation, and the more elevated but still drier eastern rift, provide narrow northward ~~exte~~ extensions of the Sonoran Zones and permit a far northern extension of such ~~austral~~ species as S. laevigata, and S. Gooddingii and their varieties. On the other hand the elevated Sierra Nevada ranges provide a causeway for a far southern ^{occurrence} ~~extension~~ of species of the Hudsonian and Canadian Zones, such as S. nivalis, S. psuedo-cordata, S. crestera and S. planifolia monica. S. petrophila caespitosa, ^{representing groups normal to the} ~~extension~~ ^{flora}

- 1 *Candata*
- 2 *araguisa*
- 3 *parvifolia*
- 4 *lasiandra*
- 5 *abramsii*
- 6 *lanceifolia*
- 7 *macrophylla*
- 8 *f. pubescens*
- 9 *laevigata*
- 10 *araguisa*
- 11 *angustifolia*
- 12 *gooddingii*
- 13 *vallicola*
- 14 *hindsiana*
- 15 *leucodendroides*
- 16 *parishiana*
- 17 *exigua*
- 18 *nevadensis*
- 19 *stenophylla*
- 20 *unnamed*
- 21 *parkiana*
- 22 *globata*
- 23 *melanopsis*
- 24 *holanderianum*
- 25 *gracilipes*
- 26 *leucosoma*

Distribution of laevigata by counties

North Coast Range and Valley.

- Del Norte none
- ✓ Humboldt B & U (1 broad lvs)
 - ✓ Mendocino B & U
 - ✓ Sonoma B (total) U (4)
 - ✓ Napa U 2, CAS 1, PC 1, J²
 - ✓ Glenn U, CAS (2)
 - ✓ Lake (St) B, U, CAS 2
 - ✓ Solano B (total) CAS 1, U 2
 - ✓ Yolo B (total)
 - ✓ Sacramento J¹.

Bay Region and Southward

- ✓ Alameda U & CAS 1
- ✓ Contra Costa U & CAS 1
- ✓ San Mateo (St)
- ✓ Santa Clara B & U, CAS 1
- ✓ Santa Cruz (St) CAS 1
- ✓ Monterey CAS 1
- ✓ San Luis Obispo U (2)
- ✓ San Benito (St) B U CAS 4
- ✓ Stanislaus CAS 1
- ✓ Merced CAS 2

Valley and Sierras

- ✓ Siskiyou U PC 1
- ✓ Shasta CAS 1
- ✓ Tehama (St) CAS 1 J¹.
- ✓ Sutter U
- ✓ Butte B, U CAS, PC 1
- ✓ Amador (St) CAS 2
- ✓ Sacramento U CAS
- ✓ Placer U CAS 1
- ✓ Tuolumne (St) 1000 ft CAS 1
- ✓ Mariposa (St) CAS 1
- ✓ Calaveras (CAS) PC 1
- ✓ Tulare U, 35 mi E. of Visalia
- ✓ Madera B 5, PC 1
- ✓ Fresno (St) J¹ CAS PC 1
- ✓ Kern (4600 ft.) U 4, B, CAS 2

Southern California

- ✓ Santa Barbara U 2, CAS 4 PC 1
- ✓ Ventura U 6, Mt. Pinos 5 100 ft, CAS 1
- ✓ Los Angeles { Lancaster } U CAS PC 6
- ✓ Santa Catalina Id. { Laguna Can. } U CAS PC 6
- ✓ Orange (St) Wolf. U, B, CAS 1
- ✓ San Diego { Chuyamaca L. } U CAS
- { Escondido } U CAS
- { Rancho } U CAS
- { San Pedro Martin Reg. U } U CAS
- { narrow, serrulate lvs. }

- ✓ Mono (St)
- ✓ Inyo { Panamint Mts. } U
- { Lava Wash } U
- { Argus } PC CAS 2
- ✓ Riverside U CAS PC 3
- ✓ San Bernardino U CAS B, CAS 1
- ✓ Chino Crk, So. Calif (St)
- ✓ Walker Pass (Purpus) U
- ✓ Riverside or San Ber. C

~~Caps to 6 mm. Wolf 1949 Orange~~
~~San Diego 237~~ ~~San Ber. also Orange~~

Pistillate spec. coll. by Dunn at Sta Inex Mts. (Sta Barbara Co?) has aments 6-8.5 cm. long, and capsules 5-6 mm. long, with pedic acute bases, and pedicels 2 mm. long.

State Survey No. 6333, of which another with same No. but somewhat different plant is from Mt. Diablo, has long dense aments, 4-6.5 cm. long, with broadly ovate capsules 3.5-4 mm. long by 2.2-2.5 mm. wide (var. congesta?)

Plant Length

Griffiths 4421 Madaga Co ♀ 11.4 cm.

Rearson 2668 Los Ang ♂ 10.5 "

Beach 207 San Bern ♂ 9 "

~~State Surv. 6333~~

Capsules

~~State Surv. 6333, Mt Diablo 4 x 2.5 = compressed~~

~~Wiggins 4601 Santa Rosa Co red base, short~~

Elevations

Tern 2700

Madaga 1000, 2700

Los Ang 1700

Placer 6,225 (Lake Tahoe) Deer Park near

Leaves

Copeland Chico diam

20 cm broken

Sutter Butte Co
Islem

narrow

Howell 2030 Stanislaus 8.5 x 4.2

Elevations

Calaveras, Mt. Diablo 6,225
Placer, Deer Park near Lake Tahoe (6,225)

laevigata aragripa 59 ~~Sharnoth 2, 11~~
California

✓ Alameda Co. Elmer 4367 (1903) uc; Jepson
(1891) Sth.

✓ Butte Co. Copeland (1923) uc

✓ Fresno Co. Eastwood 13977 (1926) cas.

✓ Humboldt Co. Chandler (1901) uc; Tracy 7301
1 (1925) uc; Tracy 9834 (1932) uc.

Imperial Co. (?) Coyote Canon, Colorado
Desert, elev. about 1500 ft. Hall 2774

Digitized by ⁹⁰² ~~John~~ Institute for Botanical Documentation

✓ Kern Co. Eastwood 13956 (1926) cas, 2 sheets

✓ Lake Co. Agnes Bowman (1902) Sth.

✓ ^{under} ~~under~~ Catalina Id. (1901) Sth;

✓ Los Angeles Co. ^(me) Abrams 1449 3253 (1903) Sth, uc;

Baker 5315 (1909) Sth, uc; Brachlin and

Fosberg 568 (1931) CRB, uc; Elmer 3673

(1902) Sth; Fosberg 4756, 4793 (1931) uc;

Grant (1902) Sth, Grant 1153 (1904) uc;

Moore (1917) CRB; Geissler 9609 (1923) CRB, uc; ¹⁸⁹⁶ ~~1896~~ Sharnoth 2, 11 (1932) CRB, uc;

✓ Mariposa Co. Ball, Brachlin & Kautz 506
(1931) CRB, uc.

✓ Orange Co. Helen Gibbs 552 (1902) Sth.

✓ Nevada Co. Ball 2301 (1925) CRB over

✓ Placer Co. Heller 12747 (1917) cas.

✓ Riverside Co. Jones (1927) ^{uc} Sh. Fosberg 1560 (1930) ^{uc}
Hall 2275, San Jacinto Mts, elev. 5200 ft.,
(1901) ^{uc}; ✓ Campbell 37 (1921) cas

Howell 2423 (1927) cas; Kennedy 1671 (1907) cas; (1906)
✓ San Bernardino Co. Johnston 1902 (1917) Sh;
Parish 4589 (1899) Sh; Parish 11674,
(1918) Sh.

Eastwood 2589, 2590 (1913) cas

3541 (1903) Sh; abrams
3615 (1903) Sh; abrams

✓ San Diego Co. Abrams 4916 (1912) Sh.
(5027) ✓ Fosberg 8245 (1932) ^{uc}
Brandegee (1904) Sh; Chandler 5019 (1904) Sh; ✓ Jones 2870 (1882) cas, 2 sheets

✓ Wiggins 3874 (1894) Sh; Wiggins 2030 (1926) Sh
✓ San Francisco Co. Gardner (1931) ^{uc} L. 13, l.c.
Dudley (1894) Sh.

Digitized by ^{uc} Institute for Botanical Documentation

✓ San Mateo Co. Dudley (1888) ^{uc}
✓ Santa Barbara Co. Stansbury 1893, Brandegee (1888)

✓ Santa Clara Co. Dudley (1895, 1908) Sh;
Newell (1914) cas; ✓

✓ San Benito (Mt. Pinos Region), above Ft. Tejon,
Dudley and Lamb 4555 (1896) Sh; East-
wood 7978 (1919) cas.
(Pendleton 1339 (1909) l.c.)

✓ Santa Cruz Co. Dudley (1908) Sh.

✓ Shasta Co., Smuh 584 (1914) cas.

Handwritten signature and notes at bottom right.

Larv. aragupa

Siskiyou Co. Howell 1393 (1884) SH
= congesta UC

✓ Sonoma Co. Baker 3946 (1930) SH
Haller 5348 (1902) SH

Digitized by Hunt Institute for Botanical Documentation
✓ Ventura Co. Forbush 8011, 8013 (1931) UC

✓ Yolo Co. Balf 1956 (1915) CRB

→
Nevada Washoe Co. (elev. 4650 ft.,
Washoe Co., Hills north of Reno) Heller
9578 (1909) CAS; near Pyramid Lake, Eastwood
14743 (1927) CAS

Nevada
Lincoln Co., along creek Calientes, L.N. Good-
ding 608, April 25, 1902 (CRB, SH, UC).

- 3/ laevigata arazquipa Nevada Co Ball 2301 (1925)
 - Yolo Co CRB, 1956 (1915) B
 - Central Calif
 - Butte Co, Chico, Opeland (1923) UC
 - Alameda Co., Mocho Creek, ADE Elmer 4367,
 May 1903 (UC);

- city from Ball
 - San Francisco Co. Lake Merced, N. L. Gardner, June 14, 1931 (B, UC).
 - Sta Clara Co., near Stanford University, elev. 100
 ft. R. L. Pundleton 1339, Mar 1, 1909 (UC); ~~also,~~ Santa
 Cruz Mts., N. Brandegee, April 22 (B, UC).

Southern Calif

Digitized by Hunt Institute for Botanical Documentation
 Sta Barbara Co. Island of Santa Cruz, J. S. Brandegee, 1888 (UC)

- canon-arroyo,
 Los Angeles Co., Avalon, Sta Catalina Id., Blanche
 - Irash, April, 1896 (UC); ^{stream bed,} Cape Canyon, Sta
 Catalina Id., elev. 220 m., F. R. Fosberg 4793,
 May 6, 1931 (UC, as S. lasiocarpus).
 - Moore (1912) CRB

- occasional on creeks
 ✓ San Bernardino Co. Red Hill, East of Highland, D. Johnston
 76, March 17, 1911 (UC, as S. lasiocarpus)
 ✓ La Co. - Co. San Antonio Canon, C. F. Baker
 5315, May 15, 1909 (UC)
 Co.

- Los Angeles River, near Riviera, I R Abrams 3253
 - April 14, 1903 Pasadena, Geo. B. Grant 1153 April, 1904
 - Palmita Creek Benson (1923) B
 (UC)

4
S. laevigata araguipua

So. Calif. Contd

Riverside (?) Strawberry Creek
Co. 01.50 [^] San Jacinto Mts, elev. 5200 ft., H.M. Hall
or Inyo Co. 2278, June, 1901. (UC)

— ✓ San Diego Co. Ramona, J.S. Brantley, 1904. (UC)
— ✓ Fosberg 8245 (1932) UC

— ✓ Imperial (?) Co., "By trees, at the willows", Coyote
Canyon, Colorado Desert, in the Lower Sonoran
Zone, elev. about 1500 ft., H.M. Hall 2774,
April, 1902 (UC).

— ✓ Inyo Co. Fosberg 8011, 8013. (1932) UC
Digitized by Hunt Institute for Botanical Documentation

Nevada: Along creeks, Calientes, L.N.
✓ Goodding 608, April 25, 1902 (UC)

— ✓ Riverside Co. Little SB Mts., Fosberg 1560 (1930) UC
(broad leaves) 2 x 4,

— ✓ Mariposa Co. Baldy, Stachler Kuntz 50 (1931) UC

— Los Angeles Co. 11, 13
— Shersmith 2, (1931) UC very narrow leaves.

— Bruchlin & Fosberg 568 (1931) 13 UC

— Fosberg 4756, 4793 (1931) UC 7427 (1932)
Stachler
= laevigata

— Abrams 3753 (1903) UC

— Grant 1153 (1904) UC

Salix laevigata araguipsa

Stanford

Junction of North & South Forks of Eel River, W.R. Dudley, June 21, 1899 (St.)

Sonoma Co. near Sonoma, A. A. Heller 5348, Apr. 23, 1902 (St.)

Lake Co. Sulphur Banks, Agnes M. Bowman, Apr. 25, 1902 (St.)

Glameda Co. Berkeley, W. L. Jepson, Apr. 11, 1891 (St.)

Santa Mateo Co. By bridge above San Mateo, W.R. Dudley, Apr. 21, 1894 (St.)

Santa Cruz Co. near R.R. W. side Wood Lagoon, W.R. Dudley, Nov. 27, 1908 (St.)

Clara Co., Los Gatos Ravine above W. right, W.R. Dudley, Apr. 19, 1893 (St.)

Sanoma Co. Banks of Santa Rosa Creek, M. S. Baker 3946 (Same as 3745) Apr. 11, 1930 (St.)

Santa Clara Co. Between Lake Lagunita & Adelante Villa, Stanford U. W.R. Dudley, May 3, 1893 (St.)

" " Lagunita, Palo Alto, W.R. Dudley, Mar. 24, 1893 (St.)

Mt. Pinos Region, Teyon Pass, Cajon de las Uvas - above Fort Teyon, W.R. Dudley & F. H. Lamb 4555 June 16, 1896 (St.)

San Diego Co. Harvey's ranch near El Nido, L. R. Abrams 3541, May 20, 1903 (St.)

" " Witch Creek 2700 ft, Tree 25-40 ft, Thick with brown fissured bark, Harley P. Chandler, 5027, Apr. 4, 1904 (St.)

" " Co. Witch Creek, L. R. Abrams 4916, July 11, 1912 (St.)

" " " Stream banks, Campo, L. R. Abrams 3615, May 26, 1903 (St.)

" " " Jamul Creek at El Nido P. O., Edgar A. Mearns 3874, July 4, 1894 (St.)

" " " Foster, 500 ft, Harley P. Chandler 5019, Apr. 6, 1904 (St.)

San Bernardino Co. Vicinity of S. Bernardino, 1000-2500 ft., S. B. Parish 489 March 26, 1899 (St.)

" " " Red Hill, near Upland, Largest tree occasional along creeks Ivan Johnston 1902, Mar. 17, 1917 (St.)

Siskiyou Co. Hornbrook, Thos. Howell 1393, Apr. 14, 1889 (St.)

" " " = *S. congesta*

Nevada

> Calientes, Along creeks, Leslie K. Gooding 608, Apr. 25, 1902 (St.)

SB - San Antonio Mts., Evly Canon, Tree along creek, J. Johnston 1906, (St.) May 6, 1917 (St.)

> A. Co., Lancaster, A. D. E. Elmer 3673, June 1902

" " " L. A. River near Caluenga Pass, L. R. Abrams 1449, Apr. 8, 190 (St.)

" " " Pasadena, Eagle Rock, Apr. 9, 1902 (St.)

" " " Marango Cañon, Geo B. Grant, Apr. 9, 1902 (St.)

9. FOREST RESOURCES.

A. GENERAL

The forest resources of California comprise not only timber, but also water for power, irrigation, transportation and industrial use, protection against flood and erosion, grazing for livestock, fish and game for the sportsmen, and recreation and education for the people at large. This chapter is concerned with the forest as a producer of timber.

The area of California, second largest of the States, is 158,297 square miles, and its land area is 99,617,280 acres. Of the total land area, it is estimated that 19,196,000 acres, or approximately 20 per cent, originally were forest and woodlands. The recent condition and ownership of this fifth (1923) is given in the following table [U. S. Dept. Agr. Misc. Circ. 94: 29, 1927.]

Ownership	Forested or potential forest area, Total	Virgin tim- ber area, 1923	Deforested, cut and burned
	Acres	Acres	Acres
Federal	12,319,000	10,531,000	1,788,000
State	95,000	95,000	0
Private	6,782,000	4,406,000	2,376,000
Total	19,196,000	15,032,000	4,164,000

✓ S. Diego Co, along San Felipe Creek, near ranch house of San Felipe Ranch
Sta L. Wiggins 2030, Mar. 20, 1926 (St)

S. Bernardino Co, S.B. Valley, 1000 ft. stream bank, S.B. Ranch 11674, May 5, 1928 (St)

L.A. Co., Mts. near Claremont, C.F. Baker 5315, May 15, 1909 (St)

Orange Co., Santa Ana, Helen D. Geis, 552, 1902 (St)

Riverside Co., The Pipes, near Morongo Valley, Marcus E. Jones, Apr. 12, 1927 (St)

L.A. Co., L.A. river, near Rivera, L.R. Abrams 3253, Apr. 14, 1903

? Gavranza, S. Cal, grant, Ex 1153 = 1623, 1903 St

var congesta

Riverside Co. San Bernardino Co. 7 Cays
Ranch near Quail Springs in Lost Horse
Canyon, of Little San B. Dots, Colorado

Wesley Clary Herb. 923, May 12, 1932 (w
(caps. 3-4 mm. long, base acute or rounded, pedicel 1.5 mm.
long).

Inyo Co., Sand hills west of Laws, Heller
8239, May 12, 1906 (C.A.S., w.c., aments lax,
capsules minut-
ure, ovate, apex not produced, 3-4 mm. long,
pedicel 1.5-2 mm. long; styles sessile).

Inulare Co., near Inyarn Valley
35 mi. East of Visalia, P.S. Woolsey,
(Fl. of the Head of San Joaquin Valley)
March, 1898 (w.c., aments dense, 2-3
cm. long, caps. lanceolate to ovate, apex
3.5-4 mm. long, apex obsolete to produced
pedicel 1 or rarely 1.5 mm. long (stam.
aments normal)

Bentura Co., Foster Park, Alice
Eastwood 5013, Apr. 14, 1902 (C.A.S., am-
ents 3-4 mm. long, dense, capsules 3-3.5
mm. long, ovate, not produced; pedicel
1 mm. long; style wanting to 0.1 mm. long)

✓ Blacer Co., New Castle, State Survey
4632, 1861 (Uc., aments rather dense, 3-4
cm. long; capsules lanceolate to ovate,
base rounded to acute
3.5-4 mm. long, apex semi-produced,
style evident, pedicels 1-1.5 mm. long;
staminate aments rather dense also.

✓ Contra Costa Co., lower banks, Jersey
Island, Ira L. Wiggins 4601, April
18, 1930 (Uc., aments 4-5 cm. long,
semi-dense. capsules 3.5-4 mm. long,
ovate lanceolate, unfertilized, pedicels
1-2 mm. long.

✓ Solano Co. near Cordelia, A.A. Heller 5599,
May 23, 1902 (Uc., aments lax to semidense
4-7 cm. long; capsules nearly mature, ovate, 3.5-4
mm. long, apex scarcely produced, style obso-
lete to very short; pedicels 1.5-2 mm. long.

✓ Napa Co., Bed of Putah Creek, below the Bluffs,
W. L. Jepson, May 26, 1891 (Uc., aments dense,
2.5-4 cm. long; capsules ovate-lanceolate,
3.5-4.5 or 5 mm. long, apex moderately produced,
pedicels 1-1.5 mm. long.

✓ Glenn Co. Phenix on creek bank
8 miles south of Newville,
A.A. Heller 11430, May 26, 1914 (Cas, U.C., aments
dense, abnormal, probably paracarpous, 1.5-2.5 cm.
long; capsules ovate-lanceolate, mostly infertile,
3-3.5 or 4 mm. long; pedicels about 1 mm. long.

Humboldt R. Bush 15 ft. tall, South Fork
of El River, between Viranda and Redway,
alt 300 ft., J.P. Tracy 10/22 May 22, 1932 (UC,
aments dense to somewhat lax, variable, some
perhaps parasitized; capsules variable, ovate
to lanceolate, 3-4 mm. long; style indurated;
pedicels 1-2 mm. long.) (base acute to rounded);

Siskiyou Co. Hornbrook, Thos. Howell 1893
dist. as "*S. laevigatus* var. *angustifolia* Benth"
April 14, 1899 (UC, see notes elsewhere).

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Contra Costa Co. State Survey 6355 (another sheet
bearing label with this same number on a spec-
imen of *S. laevigata* so from Contra Costa
Co., Mt Diablo), (UC, aments dense, elongated,
3-6.5 cm.; capsules ovate, 2-2.5 mm. wide,
3.5-4 mm. long, base mostly rounded,
apex acute or shortly produced; style almost
absent; pedicels 1-1.5 mm. long.)

glabrate

S gooddingii vallicola

COUNTIES OF CALIFORNIA (North to South)

<u>Coast Range</u>	<u>Central</u>	<u>Sierran</u>
Del Norte	Siskiyou	Modoc
Humboldt	✓ Shasta C ⁴ , B ³ , U ² ³	Lassen
Trinity	✓ Tehama C ⁸ , J ¹	Plumas
Mendocino	Glenn	Sierra
✓ Lake B ² , U ¹	✓ Butte C ⁵ , U ¹ , U ² , U ³ , S ²	✓ Nevada C ⁵ , I
Sonoma	✓ Colusa C ⁵ , S ¹	✓ Placer C ⁵ , I,
Napa	✓ Sutter U ¹	Eldorado
Marin	Yuba	✓ Amador S ¹ , (1500 ft)
✓ Contra Costa S ² , U ² , Yolo C ¹ , B ¹ , J ² , U ² , P ²		Alpine
Alameda	Solano	✓ Calaveras C ⁵ , I
San Francisco	✓ Sacramento U ³	Tuolumne
✓ San Mateo S ¹	✓ San Joaquin B ¹ , U ²	✓ Mariposa C ⁵ , I, S ¹
Santa Clara	Stanislaus	Minno
Santa C ¹ , U ²	✓ Merced C ⁵ , I	✓ Madera B ²
San Benito	✓ Kings C ⁵ , I	✓ Fresno B ¹ , U ¹ , S ²
Monterey	✓ Kern B ⁵ , S ¹ , U ² , U ³	✓ Tulare C ⁵ , B ⁷ , S ² , U ² , U ³ , P ¹
San Luis Obispo	Los Angeles	✓ Inyo C ⁵ , I, U ¹ , J ¹ , U ²
Santa Barbara	✓ San Bernardino C ⁵ , B ² , S ¹ , U ² , U ³ , J ² , P ²	
Ventura	✓ Riverside B ³ , U ² , S ¹ , U ³ , P ²	
✓ Orange P ¹	✓ Imperial P ² , S ¹	
✓ San Diego C ¹ , S ² , U ² , U ³ , P ²		

Death Valley
Inyo Co, Owens, Mrs M. E. Young (1931) C⁵.
Shasta Co. Redding Brainerd 481 (1931) C⁵, B³, U²
U¹

~~Abraham~~ Lys C⁵

	Capules thmely pubescent	glabrous	Bristles + Shads
X Butte Co.	X CASI, UC1	Ballard	X CASI, UC1, X CRB3
X Colusa Co.	X CASI		X CAS2
X Contra Costa	X UC1 (mchong)		X UC2
X Fresno Co.			X UC3
Imperial Co.	UC3 densely	X UC1, 99	UC1 UC5
X Inyo Co.			UC2
X Kern Co.	X UC	UC1 UC1	
X Lake Co.			CASI
X Madera Co.			CASI
XX Merced Co.	X CASI, dense	X CASI	XX CASI
X Nevada Co.		X CASI, 100	CASI
XX Orange Co.	X CAS2 dense	UC2	XX CAS2 dense
XX Riverside Co.	UC3	UC3 UC8	UC1
X Placer Co. (Bear R. McCourtney's Bridge)		X CAS1	
X Sacramento		X UC2	
X San Bern Co.	X UC	X UC	X UC
X San Diego	X CASI, even pub		UC1 UC1 X UC3
X San Joaquin	X UC1	X CRB1	UC1 UC2
X Shasta Co.	X CAS1	X CAS3	X CAS1
X Sutter Co.			X UC1
X Tehama Co.	X CAS1	X CAS1	X CAS1
X Tulare Co.	CASI	UC1	CASI X UC4
X Yolo Co.	UC1, 99	X CAS UC1, full 99	X UC5 (Sgt)
X Yuba Co.			CASI

mohave Ariz

Butte Co to Chico (CRB)
Tehama to Redding

X = vallicola
XX = " gooddingii

Pinal
Pima
Yuma
Sanita Ariz
Graham
Cochise

vallicola G. gooddingi vallicola ii

New Mexico Chisos Co.

CIB(1)

Grant Co. Cal 5/21,

Ill 2

 $u_2(1)$

Donna Ana

$$u_2(1)$$
Arg. Countries

Marcosa USC!

Cochise

CR/3(2)

Gila cas(3), CRB1,

 $uc(1)$

Graham

CRB(1)

Gela-Mariospa

Pinna CAS(3), CP94, 1 SU

Linal OKB2,

We have

CPB1, PC1

Urena (CAS 2)

Santa Cruz
(Lowell + Ft Lowell) 500

CRB (5)

Lee's Ferry Jones (890)
PC

Mexico

Chihuahua Cas(1), PC1

Timora Cas(1)

SM 1

we (2)

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Raya 2869, Apr 9, 1894 (CAS; UC); 2877, April 9,
1894 (SU); Induky Lagoon - ↑ means ...

1894 (Ill), Tia Juana River, Mrs S 2918, March 14, 1903 (Ser).
da 3484, May 14, 1903 (Ser).
wa Co. 401

Nevada 3484, May 14, 1903 (S. W.).

Myer Co. 46

$$u_2(1)$$

Washoe

Moore + Dyersman 3388 He

Texas. Brewster Co., Glenn Springs, alt 2666

St. James & Duncan 2986, July 15-18, 1921 (St. J., as
maza (absite). NE part, around playa luk

Hubbuck Co., N.E. part, aronie pinyon zone,
Mar 9, 1930 (SH).

D. Damaris 7610, May 9, 1930

El Paso, Mex. Jones 3760, April 23,

1884 (SU, as *nigra*. Sheets of this number in other herbariums have been *S. wrightii* And., wholly or in part.

1000-Palm Canon

8 mi North East of Indio
4 " " " of So track

Stanford Univ.

Look in lasiandra and var. laucifolia
for var. macrophylla
Esp. Kildale 3000 from Humboldt Co.

Coast Range

Central (314)

Sierran

- | | | |
|----------------------|---------------------|------------------------|
| ✓ Del Norte suc | ✓ Siskiyou uc | ✓ Modoc uc |
| ✓ Humboldt uc | ✓ Shasta uc | - Lassen |
| ✓ Trinity uc | ✓ Tehama suc | ✓ Plumas uc |
| ✓ Mendocino uc | - Glenn | ✓ Nevada st |
| - Lake | ✓ Butte uc | ✓ Sierra st |
| ✓ Sonoma uc | - Colusa | ✓ Placer uc |
| ✓ Napa u | ✓ Sutter st. | ✓ Eldorado st B |
| ✓ Marin CoB | - Yuba | ✓ Amador st |
| - Contra Costa | ✓ Sols (CRB) | ✓ Alpine st |
| ✓ Alameda uc | - Solano | - Calaveras |
| ✓ San Francisco uc | ✓ Sacramento uc | ✓ Inyo uc |
| ✓ San Mateo suc | - San Joaquin | ✓ Mariposa uc |
| ✓ Santa Clara uc | - Stanislaus | ✓ Mono st |
| ✓ Santa Cruz uc | - Merced | - Madera |
| ✓ San Benito uc | - Kings | ✓ Fresno uc |
| ✓ Monterey uc | - Kern | ✓ Inyo uc |
| ✓ San Luis Obispo uc | ↓ | ✓ Inyo |
| ✓ Santa Barbara | ✓ Los Angeles uc | |
| - Ventura | ✓ San Bernardino uc | |
| - Orange | - Riverside | |
| ✓ San Diego | - Imperial | |

Counties of California (North to South)

S. lasiandra Bth

S. lasiandra — = no spec. initials = Herb.

42
S. lasiantha laevigata

- ✓ 3 Calaveras. Blaisdell (before 1919). Cas
- ✓ 1 Alameda Co. Copeland (1931); Japson (1891) 1/2 StU.
- ✓ 4 Fresno (or Tulare) (San Grant Nat. Park) Dudley 3095 (1900) StU.
- ✓ 2 Butte Co. Copeland (1931); Heller 11594 (1914). Cas.
- Del Norte Co. Ball and Parke, Tracy 10060 (1882)
- ✓ 5 Humboldt Co. Tracy 4218 (1913); 9797 (1932)
- ✓ 6 Los Angeles Co. Shasta Co. (Campbell (1921) Cas)
 - Kildale 3000 (1927) StU.
 - ~~Parks 0959 (1931)~~
 - Abrams 1449 (1901) StU;
 - ^{as laevigata} Ewan 4017 (1931); Grant 1160 (1904);
 - McClatchie (189-). StU.
 - Jones 3042 (1882). Cas
- ✓ 7 Modoc Co. Goldsmith 24 (1911).
- ✓ 8 Mono Co. Same (1905) StU. from voluminous meadows
- ✓ 9 Placer Co. Dudley 5798 (1900) StU. Mono Lake
- ✓ 11 Sacramento Co. Baker 5796 (1930) 582 lasiantha
- ✓ 10 Plumas. Eastwood 14645 (1921) (Billings (1923) StU.
- ✓ 12 San Bernardino Co. Abrams and McGregor 739 (1908) StU;
- Hall 2510 (1901); Munn 10472 (1926)
- ✓ Parish 546 (1882) StU.; 4635 (1901) StU;
- 4996 (1901) StU.; 11670 (1919) 4587, as S. laevigata (1889);
- ✓ 15 Santa Barbara Hoffman (1930). Cas
- ✓ 16 Shasta Co. Bracelet 504 (1931); Campbell (1921) Cas
- ✓ 17 Sierra Co. Dudley 5518 (1900) StU.
- ✓ 18 Siskiyou Co. Butler 1443 (1910); Dudley (1899) 2 spec.
- ✓ 14 San Luis Obispo Co. Dudley (1902, 1903) Eastwood 10828 (1921)
- ✓ 19 Sonoma Co. Setchell 14, 15, 16 (1931)

(OVER)

4 General

a Felonies

b Misdemeanors

c Riots

1 Illinois miners

2 Race riots - East St Louis, D. O., Chicago

3 Political riots Washington Bonus army

d Sick and injured ~~note~~

e Head bodies

f Missing & found persons, animals & property

g Fires

h Miscellaneous ~~Public~~ reports

i Accidents

j Lamp outages, water mains & hydrants, safe & alley lights,

atlas & house inspections, vacation inspections,

k License

l Suicide, Insane, F. O. M. ~~reference~~

j Reference

Violence & Labor

Dynamite

The I. W. W.

The Ku Klux Klan

Police reports

Suicide report, The Spectator, Mr Fred Hoffman

Suicide in California, Mr Muhl

" " Mass, Mr Strauss

Salix lasiandra lancifolia (And.) B. & P.

Sierrajon Co. ✓ Near Big Spring above Union, W.R. Dudley (Spec.) Aug 8, 1899 (St.)

" ✓ Callahan's

" " " " Aug 23, 1899 (St.)

Humboldt Co. ✓ Fernbridge, Eel River, elev. 35', Boris K. Kildale 3000, Mar. 27, 1927 (St.)

Alameda Co. ✓ Berkeley, W.L. Jepson, Aug. 15, 1891, (St.)

San Luis Obispo Co. ✓ Creek above Sycamore Spring, W.R. Dudley, Apr. 5, 1902, (St.)

" " " ✓ Santa Margarita Mts. E of Paso on rd. to S.L.O., 2000 ft. W.R. Dudley, Apr. 3, 1903 (St.)

L. A. Co. ✓ L. A. River, L.R. Abrams 1449, April 8, 1901 (St.)

~~Redlands~~ Pasadena, Grant [$E_{1160} = 5353$], Feb 27, 1903 (St.)L. A. Co. ✓ Pasadena, A.G. McClatchie, ^{date} 189- (St.)

Sierra Co. ✓ Below Sierraville by stage rd. to Truckee, W.R. Dudley 3578, June 2, 1900 (St.)

Fr-Jul ✓ Genl Grant Park, W.R. Dudley 3095, Aug 1900 (St.)

Tulare Co. ✓ by Hunt Institute for Botanical Documentation 3008, Aug 6, 1900 (St.)

" " ✓ By river above falls, Kern Lake, Kern River, W.R. Dudley 2028, July 19, 1897 (St.)

S.B. Co. ✓ Redlands, Campus U.S., F.H. Billings, May 1923 (St.)

San Bernardino Co. ✓ S. Bernardino Valley S.B. + W.F. Parish 546, June 13, 1882 (St.)

" " ✓ Vicinity of S. Bernardino, 1000-2500 ft., S.B. Parish 4635, Mar. 10, 1901 (St.)

" " ✓ (Gammekin?) Park, San Bernardino Mts. 7000 ft., S.B. Parish 4996, June 3, 1901 (St.)

" " ✓ S.B. Valley, 1000 ft., S.B. Parish 1670, Mar 15, 1919 (St.)

" " ✓ S.B. Mts., Bear Valley, 6500 ft., L.R. Abrams + E.A. McGregor 737, July 10, 1908 (St.)

Placer Co. ✓ Tahoe City, near Fish Hatchery, W.R. Dudley, 5798, June 29, 1900 (St.)

Mono Co. ✓ from Tuolumne meadows to Mono Lake, Canon, Winifred Paine 1905 (St.)

Jepson, Willis Linn., Ph.D.

The Trees of California

Cunningham, Curtis & Welch, San Francisco, Cal.

228 pp., 125 original figs. Dec. 16, 1909

figs 75-81; Dec 75-78,

[Salicaceae 133-144; Salix 133-140]

Lasiandra Benth.
to 4500m N., & 8500m S.
Sierras.

1. *lasiandra* Benth. 134
Yellow W. (or F.H.)

figs
75c, d 135
76b. 137

laevigata Benth.
4500m S. Sierras

2. *laevigata* Benth. 134-136
Red W.

75a, b 135
76c 137

gooddingii Ball (excl.)

3. *nigra* March.
Black W.

76a 137

lasiolopia
"rarely 35 ft.

4. *lasiolopia* Benth. 136-138
77 138

scolymifera
4000-10,000m
Sierra F.B. mts.

5. *flava* Benth. 138-139
78a, b 139

6. *sitchensis* Sanson 139-140

cont.
Jepson
Sitch.

Sierra west slope 5000-7000 ft.

No present pub. to L. Cool. *laevigata* or
"often nearly alike on both faces". *lasiandra*
is given eastern range, ovary dense as
scarcely hairy but not hoary, capsule
globose"

Following are in herb U.C*

Las. laurifolia

1. ✓ Modoc Co., Goose Lake, elev. 4,700 ft, Goldsmith 24, (UC)
2. ✓ Siskiyou Co., ^{Yreka} Yreka, Geo. D. Butler 1443, (UC)
3. ✓ Humboldt Co., Van Duzen R., Joseph P. Tracy 4218, ^{sheets} (U.C.)
4. ✓ Sonoma Co., Bohemian Grove, W.A. Setchell 14, 15, 16, (UC)
5. ✓ Butte Co., ^{C.B.} Jonesville, elev. 1550 m., Copeland (B, UC)
6. ✓ Sacramento Co., Sacramento, ^{sheets} Milo S. Baker 5, 6, (U.C.)
7. ✓ Alameda Co., Berkeley, E.B. Copeland (B, UC)
8. ✓ Los Angeles Co., Pasadena Rio Hondo R., near Downey, ^{Geo. B.} Grant 1160, (UC)
9. ✓ " " " [↓] Ewan 4017 (UC)
10. — San Bernardino Co., San B. Valley, S.B. Parish & W.F. (UC)
11. ✓ " " " Strawberry Creek, San Jacinto Mts., elev. ^{H.M.} 5200 ft. Hall 2510 (UC)
12. ✓ " " " SB Mts. alt. 7,200 Ft. ^{Philips} Munz 10,472 (UC)
13. — State Survey No. 4711 (UC)

✓ San Bernardino Co. Dec of San Bernardino,
alt 10,000-2500 M. S.B. Parish 4587, Masch
25, 1899 (St. as *L. laurifolia* Bk)

Salix lasianдра lanifolia

UC

- ✓ 1. ✓ East shore of Goose Lake T46 NR14E MDM Belknap C. Goldsmith, May 21, 1911
♂ (UC) moist meadow. (L. congesta?)
- ✓ 2. ✓ Yalaka Creek June 1, 1910 ♀ (UC)
- ✓ 3. ✓ Dinamora's Ranch in V.D. River Valley opposite Buck Mt. 2000 ft,
June 20, 1913 ♀ old (UC) ^{at tree}
- ✓ 4. ✓ Lower banks of Russian River ^{at Bohemian} near Monte Rio, July 25, 1931 (fol.)
(UC)
- ✓ 5. ✓ Willow Creek, highest meadow, making thickets. Tree 8 m. tall
June 18, 1931 ♀ (UC)
- ✓ 6. ✓ American River along 12th St. Bridge ^{m.S.B. no. 5} Mar. 10, 1900 ♂ (UC)
" " " " " ^{m.S.B. no. 5, Apr. 1, 1900 ♀ (UC)}
" " " " " ^{nos. 5 & 6 probably same species, from m.S.B.}
" " " " " ^{no 6. Mar. 10, 1900 ♀ (UC)}
- ✓ 7. ✓ North fork, Strawberry Creek, second flowering, Sept. 8, 1931, ^{fls}
- ✓ 8. ✓ March. 04, ♀ (UC)
- ✓ 9. ✓ Feb. 2, 1931, (Joseph Andorfer Ewan) ♀ ♂ (UC)
Large trees along river banks. (L. laevigata Nutt. det. L. Ellerson)
- ✓ 10. — May 1888 ♀ (UC) ^{small} (tree 20 ft high) Banks of streams, etc.,
- ✓ 11. ✓ July 20, 1901 ♀ (UC)
- ✓ 12. ✓ 6-24-1926 ♀ (UC) banks of Bluff Lake Creek.
- ✓ 13. — collected 189— ♂

~~State State~~ Note I have placed a number on your
sheet and a corresponding one on this ^{sheet} with the balance
of the data for citation.

Lacianandra var. *lancea*

Humboldt Co.

- ✓ Warden River between Alton and Carlotta, alt. 15 m.
Tree 9-12 m. high, abundant, Harold E. Parker 0959, ♀,
May 14, 1931 (2 sheets - 1 fol. + 1 fr.) (UC)

Eel River Co.

- ✓ Smith River, gravel bars, 5 miles above the mouth,
alt. 50 ft., small tree 20 ft. tall, same tree as
#10060, from collecting trips of H. E. Parker and
Joseph P. Tracy, Joseph P. Tracy's collection 10821,
fol., Sept. 24, 1932 (U.C.)
- ✓ Smith River, 5 miles above the mouth, alt. 50 ft.,
Joseph P. Tracy 10060, ♀, May 15, 1932 (trips with
C. R. Ball and H. E. Parker, willow collecting) (UC)

Digitized by Hunt Institute for Botanical Documentation

Humboldt Co.

- ✓ Eel River, on gravel bars, Alton to Fortuna, alt.
50 ft., small tree, common, Joseph P. Tracy 9797,
April 17, 1932 (U.C.)

Shasta Co.

- ✓ Sacramento River, 7 km. north of La Moine, alt. 450^{m.}
Tree 5 m. high, 6 cm. in diameter, in gravel bar, ♀,
Mrs. H. P. Bracelin 504 (7 sheets), July 1, 1931 (UC)

Modoc Co.

- ✓ Parker Creek, 20 km. east of Alturas, alt. 1560 m.,
meadow south of Payne Ranch. Mrs. H. P. Bracelin
and Mrs. Frances D. Payne 490, ♀, June 30, 1931
(4 sheets) (UC)

- ✓ Parker Creek, 20 km. east of Alturas, alt. 1560 m., 4.5 m. high,
interspersed with *Salix lacianandra* and *Salix elaeagnifolia* in
meadows south of Payne Ranch, Mrs. H. P. Bracelin and Mrs. Frances D. Payne
498, June 30, 1931 (3 sheets) (UC)

Idaho

Boise, along the river, alt. 2880, June A. Clark,
no. 344, ♂ May 26, 1911 (Salix Fendleriana Anders.)
det. Aven Nelson, (UC)

British Columbia, Canada

Prince George, M.O. Maule, no. 122123 (Nat. Herb.
of Canada) July 29, 1916 fol. (UC)

Hazleton, Skeena River, J.M. Macoun, 97802
(Herb. Geol. Survey of Canada), June 29, 1917, ♀.
(S. lasiantha lanceifolia, det. Schneider) (UC)

Digitized by Hunt Institute for Botanical Documentation

Yukon Terr

Dawson + Klondike P.

Alaska

Tanana River

Nenana

Fairbanks

Yukon River

Holy Cross

Blackburn

Coast

Matanuska

SUGGESTIONS FOR SHORTENING MANUSCRIPT ON CALIFORNIA WILLOWS.

SECTIONS PENTANDRAE BONPLANDIANAE AND NIGRAE

Carleton R. Ball

Acknowledgements of assistance received. pp. 1-2.

Portions in brackets could be eliminated (about $\frac{1}{2}$ page).

Life Zones: The information on page 3 could be totally eliminated since it is available elsewhere and is generally known by botanists.

Literature citations may usually be shortened by citing only publications in which valid names or synonyms are published the first time. However in a monographic treatment citations of previous descriptions by the monographer are advisable and really necessary especially if his opinions have changed. The portion in brackets page 23, may be omitted without loss.

Specimen citations: The number of citations is not excessive for a monographic treatment. California citations may be restricted to one for each county except that it is desirable to give information as to classic or widely distributed collections.

All casual unicate collections should be omitted. These may be recognized often by the name of the collector. On pages 33-35 such collectors are indicated by "x" in the margin.

When a number of collections were made by the same collector at the same place, citations may be shortened by listing place and collector only once, thus lines 12-14, page 35, may be:

Glenbrook, near Truckee, June 28, 1900, W. R. Dudley,
5783, 5787.

Other similar cases could be shortened in the same way.

If further shortening of citations is necessary, it may be done by omitting months and days or dates altogether if the collector's specimens are numbered. Also such words as "along", "near", "below", "Sec. T. N. R.",

etc., may be omitted. Lines 1 to 6 page 35 may be shortened thus:

Placer Co. Monte Vista, W. R. Dudley, 1909 (CRB St U),
French Meadows, Middle Fork American River, 1931, L.
S. Smith 2630 (CRB UC); Lake Tahoe, 1926, James Moffit
(CAS).

The author has made similar condensations in citation on
page 59.

All specimens without localities should be omitted from
citations; also it is not desirable to cite localities as on
page 82, without specimens to verify them.

May 31, 1934.

Dr. T. H. Goodspeed,
Department of Botany,
Life Sciences Bldg,
U.C. Campus

Dear Dr. Goodspeed:

Herewith is the willow manuscript you returned to me for consideration and shortening some month ago. In the press of other work I had forgotten it.

As originally submitted it contained 86 pages plus 12 pages interpolated as 2b, 55, b, etc. making 98 pages in all. I have now removed 12 pages and reduced others by deletion or rewriting so that there is a total reduction of 14 or 15 pages as compared with the first draft.

About half of the material removed consisted of the lists of specimens cited, which are more expensive in type-setting than the same quantity of text.

This is as far as I would care to go in the matter of deleting data. Any further reduction can be accomplished only by abbreviating some of the citation data.

For instance, notes on habitat, initials of collectors, and the month and day in the date, can be deleted (without rewriting), if absolutely necessary to reduce further.

I will be interested in your reaction, and that of the Department and Printing Committees.

Thanking you for the many courtesies shown, I am

Most cordially,

Carleton R. Ball

March 28, 1937

Dr. T. H. Goodspeed,
Dept. of Botany,
Univ. of California,
Berkeley, California.

Dear Dr. Goodspeed:

I am reminded that I have no further word about the willow manuscript which was left with the Dept. of Botany when I departed from California nearly two years ago.

I take it that the financial situation as to publications has not been completely cleared up. I can well believe that many manuscripts have accumulated during the depression. Therefore I can easily understand why it may not have appeared.

What I am concerned with now is the question of what likelihood there is that it may get published at all. If, as seems probable, there is little chance for it in the near future, I will be glad to have it returned.

With personal regards, I am

Cordially Yours,

Carleton R. Ball
Exec. Secy., Coordinating Committee,
U.S. D.A., T.V.A., and Land-Grant Colleges.

UNIVERSITY OF CALIFORNIA
DEPARTMENT OF BOTANY
BERKELEY

May 17, 1937

Dr. Carleton R. Ball
Extension Service
U. S. Dept. of Agriculture
Washington, D. C.

Dear Dr. Ball:

I have your letter of March 28 and as you sur-
mized the financial situation in regard to publi-
cations by the University Press has been pretty
severe. However, your manuscript is being presented
to the Editorial Committee and I hope to have a de-
cision for you by early Fall.

With all good wishes,

Sincerely yours,

T. H. Goodspeed

T. H. Goodspeed
Professor of Botany and
Director, Botanical Garden

June 9, 1933.

Dr. W.A. Setchell,
Department of Botany,
Life Sciences Building,
Campus.

Dear Dr. Setchell:

I am transmitting herewith the manuscript covering a revision of the first 3 sections, namely: *Pentandrae*, *Bonplandianae*, and *Nigrae*, of the genus *Salix*, as it occurs in California, with a view to its publication in the University contributions to Botany. The manuscript is accompanied by one map and four photographs designed for reproduction as half-tone plates. Any suggestions concerning it which may occur to you will be appreciated.

Cordially yours,

Carleton R. Ball