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Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

By Carleton R. Ball

Original miss. This was
rewritten to suit
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In preparing treatments of the genus Salix for certain manuals of botany, and for a final monograph, the changes in status require publication and discussion. The descriptions permitted in most manuals are to ^obrief to really acquaint students with novelties, and adequate discussion and citation of specimens are impossible. The writer has been guilty of such unfair practices occasionally in past years.

Subtitle

1. Salix Gooddingii and Its Glabrous-Capsuled Variety.

The writer published his Salix Gooddingii in 1905 (in Bot. Gaz. 40:376). It was based on Goodding 689 from Clark Co. (now), Nevada, a somewhat immature, partly insect-parasitized, and unusually pubescent specimen. Misled by foliar immaturity and by the dense pubescence of both vegetal and pistillate floral organs, the new species was assigned wrongly to Section Longifoliae (Sandbar Willows) instead of Section Nigrae (Black Willows). A specimen which should have been made the staminate type, Goodding 719, was overlooked entirely. These two errors were brought to the writer's attention by Prof. W. W. Rowlee and were acknowledged in his second paper on S. Gooddingii (l.c. 1921).

That early experience taught the writer never again to base a new species on a single collection, a fact well worth learning.

In 1921, the writer (l.c.) redescribed the species, ^{and} illustrated it by 3 photographs of Colorado Valley trees. The description was broadened to include the glabrous-capsuled expression of the plant in the species, as ^(l.c.)Schneider had done in 1918 and 1919. When accumulating material of both forms indicated that the glabrous-capsuled plant should be recognized as a variety, it was assumed that S. nigra var. vallicola Dudley (in Abrams, Fl. Los Angeles & Vic. 100. 1904) represented this variety. Abrams had described the capsules as "glabrous or more or less pubescent". Britton, in raising Dudley's variety to specific rank as S. vallicola (Dudley) Britton (in No. Amer. Trees 184. 1908), described the capsules simply as "glabrous". The writer overlooked the fact that, in spite of these descriptions, the type specimen Abrams had cited (Abrams 3256, from Orange Co., Calif.) actually had pubescent capsules. Under taxonomic rules, the type specimen, rather than the published description, governs the application of a name. Hence, both S. nigra var. vallicola Dudley and S. vallicola (Dudley) Britton are synonyms of S. Gooddingii Ball.

Because of the erroneous assumption that var. vallicola was a glabrous-capsuled ~~various~~ variation, large numbers of collections with glabrous ovaries and capsules have been determined as S. Gooddingii, "var. vallicola (Dudley) Ball" but, by oversight, that combination never has been published. In consequence of this series of errors, it now becomes necessary to publish this variety under a new and different name.

Salix Gooddingii Ball, var. variabilis, n. var. A specie differt
ovariis capsulisque glabris. Distinguished from the species by ovaries and capsules glabrous. In the species the ovaries are always more or less densely pubescent, and the young capsules also are pubescent, but in age the capsules tend to become glabrate or glabrous. ~~The pubescence or puberulence of vegetal organs~~

The pubescence or puberulence of vegetal organs (twigs, ~~foliolar~~ bud-scales, petioles, midribs, and blade bases) is variable in both variety and species. In general, these organs in the typical form are more pubescent, and retain the hairiness longer. In the variety, they usually are pubescent or puberulent only while young and generally become glabrate soon and entirely glabrous later. However, exceptions occur in both species and variety. Much depends on the stage of development of the various organs. . Staminate specimens add to the difficulty of determination, as they have no ovaries or capsules to reveal pubescence. They must be assigned to the species or to the variety, accordingly as one or the other occurs exclusively or commonly in the locality. More abundant hairiness probably is influenced by the higher temperatures characteristic of the lower elevations and more southern latitudes occupied by the species. While no hard and fast lines can be drawn between species and variety, the wide differences between the more extreme expressions still indicated that a varietal separation should be helpful.

Both species and variety are found commonly as shrubs to small or mid-sized trees 7-40 feet (2-12 m.) tall. Larger trees of both, 50-60 feet (15-18 m.) high, are found throughout their ranges, and very large trees 70-80 feet (21-24 m.) in height occur occasionally. The combined range of the two is from southern California eastward to western Texas, including adjacent Mexico and southern Utah and Nevada, with a long finger extending northward through the Central Valley of California as far as Shasta County.

Typical S. Gooddingii has its most abundant and practically exclusive distribution in the lower part of the Colorado River Valley. This area extends southward from Washington Co. in southwestern Utah and Clark Co. in southeastern Nevada through the western parts of Mohave and Yuma Counties in Arizona and the eastern parts of San Bernardino and Riverside Counties and all of Imperial Co. in California, to the Gulf of California in adjacent Sonora and Baja California in Mexico. The variety is practically absent from this area. The species extends sparingly westward in southern California, with the variety, to San Diego and Orange Counties, and to adjacent Baja California in Mexico. Northward, it occurs more sparingly, with the abundant variety, in the Central Valley of California to Kern and Fresno Counties, with one recorded occurrence in Yolo County.

S. Gooddingii occupies an area of relatively low base level. It occurs from sea-level to as much as 150 feet below in the Salton Sink of Imperial County. Throughout its range in southern California and adjacent Arizona and Mexico, and also in the Central Valley, it occurs at elevations of only a few hundred feet. In the mountains of these areas, however, it may reach elevations of 2000 feet (600 m.), and rarely 2800-3000 feet (840-900 m.) in Nevada and Utah.

Variety variabilis, on the other hand, is absent or relatively rare in most of this area of low base level, although it occurs at sea-level or below in the Death Valley of Inyo County, and commonly at a few hundred feet in the Central Valley as far north as Shasta Co., California. Its large area of exclusive occurrence is eastward across Arizona, southern Utah, New Mexico, and western Texas, with adjacent portions of Sonora and Chihuahua, in Mexico. In the mountains of these States it ascends to 4500 or 5000 feet (1350-1500 m.) and rarely to 5500 or 6500 feet (1650-1950 m.) in southern Arizona.

~~HERE~~ Specimens Cited. For the western area, where both species and variety occur, it seems ⁵desirable to cite ²specimens ^{of each}. Those listed are in the following herbariums: Carleton R. Ball (CRB), U.S. Forest Service (FS), and U.S. National Herbarium (USN). Where the labels bear collection numbers, the date is not cited here, except in cases where the same numbers were used in successive years. For convenience of students, the specimens are listed by counties in each State. The full name of the collector(s) is given only in the first listing, but merely the surname thereafter.

Salix Gooddingii. ARIZONA: Yuma Co.: Yuma, Carleton R. Ball 1740 (old capsules and (both CRB, USN) (USN) glabrous) ¹1901 (old capsules pubescent); Yuma Desert, Aven & Ruth A. Nelson 1291; Yuma, (USN). ¹ H. O. Wootton, April 21, 1913, ¹ Yuma-Mohave Co. Boundary: Alamo Crossing of Bill Williams River, Leslie N. Goodding Sal. 88, in 1938, ¹ Mohave Co.: Topeck, Colorado River, (USN); E. A. Goldman 2970; Willow Beach, Black Mtns., Russell K. Grater S 1, S 2, S 3, in 1938 (all CRB); 8 mi. above Pierce's Ferry, Marcus E. Jones 5077 u (USN); Beaver Dam Wash, Beaver Dam (Littlefield), Constant H. Robinson 39 (CRB); Near Petrified Springs, Littlefield (Beaver Dam), Ivar Tidestrom 9236 (CRB, USN). -----? Co.: Beaver Creek (several in Ariz.), B. E. Fernow, Aug., 1896 (USN, as S. fluviatilis).

UTAH: Washington Co.: St. George, elev. 900 m., W. W. Eggleston 14773 (USN); Banks of Virgin R., 3 mi. nw. of Hurricane, elev. 2800 ft., Bassett Maguire & H. L. Blood 1317, 1317a (CRB); Leeds, Goodding Sal. 17, in 1938 (CRB, not var. vallicola as det.): Along Santa Clara Creek, St. George, Tidestrom 9276 (USN). NEVADA: Clark Co. (formerly part of Lincoln Co.): Muddy Creek (River), Goodding 689 (pist. type), in 1902 (CRB); Rioville, Colorado River, Goodding 719, in 1902 (CRB, USN); Muddy Creek, Lincoln Co., P. B. Kennedy & Goodding 41 (CRB); Bunkerville, Tidestrom 9200 (USN), 9202 (CRB, USN). ^{stam. type;}

CALIFORNIA: Imperial Co.: Near Calexico, G. O. Abrams, April, 1910 (USN); End of ferry, Ft. Yuma, Ball 1941 (CRB); 22. km. no. of Brawley, Mrs. H. P. Bracelin 609 (CRB); near bridge over New River, 7.5 m. below sea-level, Bracelin 611, 612 (CRB); 6.5 km. west of Calexico, Bracelin 613 (CRB); Colorado R., Yuma Ind. Res., Agnes Chase 5517 (CRB, stipules glandular, fragrant); U.S. Yuma Field Station, Bard, Goodding & Charlotte Goodding Reeder 40 (CRB); San Bernardino Ranch, Mex. Boundary Line, Edgar A. Mearns 735, 1992 (USN); San Pedro R., M. B. L., Mearns 1110 (USN); San Bernardino R., Mearns 2543 (USN).

(USN); Fig-Tree John's Spring, Salton Sea, 150 ft. below sea-level, Minz, Street, & Williams 2342 (USN); Salton Basin, S. B. Parish 8092a (CRB); Unlucky Lagoon, Mex. Badry. Comm., L. Schoenfeldt 2918 (USN); Bard, H. L. Westover 1, 2, in 1913 (CRB, USN); Westover 3 in 1919 (USN). San Diego Co.: Bernardo, San Dieguito R., Le Roy Abrams 3371 (USN); Pine Valley, ~~RM~~ Mearns 3977 (USN). Orange CO.: ~~KAMBER~~ Santa Ana R. near Orange, Abrams 3256 (USN); Rancho Santa Ana, near Santa Ana R., Carl B. Wolf 2950, 2955 (CRB). Riverside Co.: Cameron Lake, Colorado Desert, T.S. Brandegge, Mar. 28, 1901 (CRB); Thousand Palms, Carl Epling, Mar. 27, 1927 (CRB); 1000-Palm Canyon, Colorado Desert, H. De Forest 1, in 1932 (CRB); North of Elsinore, Philip A. Minz 12032 (USN); About 800 m. from State Inspection Station, on way to Blythe Bridge, Wolf 3085 (CRB).

San Bernardino Co.: Beside Mohave R., 1.5 km. no. of Barstow, Bracelin 587, 588 (CRB); Ft. Moh(ave), J. G. Cooper, March 25, 1861 ~~XXXXXX~~ (CRB, USN); along Mohave River, Cooper, no No. or date (USN); San Bernardino, P.B. Kennedy 1672 (CRB); Colton, Jones 3195 (USN); Santa Ana R., San Bernardino, Alfred Rehder 165 (USN); Near Mohave R., 5 mi. west of Barstow, W. A. Setchell & Victor Duran 10 (CRB); Barstow, Tidestrom 9687 ~~XXXX~~ (USN); San Bernardino, Geo. R. Vasey 566 (USN). Kern Co.: Beside Old River Road, 32 km. sw. of Bakersfield, 576, 577 (CRB). Fresno Co.: Beside San Joaquin R. at Friant, Albert E. Thompson 1012 (CRB). Yolo Co.: River bank near Madison, ~~XXXXXX~~ A.A.

Heller 5419 (USN). Hills on the Salton River, Mearns 2869, 2877 (USN, stam.).

ff MEXICO: Baja California : Seven Sal. 39,
Variety variabilis. UTAH: Grand Co.: Moab, Goodding Sal. 33, in 1933 (CRB).

San Juan CO.: Augusta Natural Bridge, 48 mi. west of Hlanding, Goodding Sal. 33, in 1939 (CRB); San Juan R., 2 mi. east of Mexican Hat, McGuire 20167 (CRB). Washington CO.: Arizona Strip, ^e Barnell McAllister 60 (CRB); Zion Natl. Park, A.M. Woodbury 30 (USN). ----- ? CO.: Fremont's Exped. to California, 1845-47 (USN, in ink on label is "Utah", in faint pencil is "402a. Calif."). ~~NEVADA~~ NEVADA: ~~XXXXXX~~ Nye Co.: Ash Meadows, F.V. Coville & Frederick Funston 2145 (USN). CALIFORNIA: San Diego Co.: San Luis Rey River bottom, se. of Bonsall, Chas. B. Fiker 3349 B (CRB); Riverside CO.: Near spring at ~~28~~ 29-Palms, Colorado Desert, Clary Herb. 920 (CRB); Palm Canyon, Ivan Johnston 1056 (USN); North of Elsinore, Minz 12032 (CRB); Diablo Canyon, near Clary's Coral Reef Ranch, Colorado Desert, Carl W. Sharsmith 14 (CRB). San Bernardino CO.:

Along Mohave R., Helendale, Bracelin 590, 593 (CRB); Barstow, Frank W. Johnson, Apr. 23, 1910 (USN). Inyo Co.: Mitchell Ranch, Resting Springs Valley, Coville & Funston 262 (USN); Furnace Creek Ranch, Death Valley (cult.), Coville & Funston 469 (USN); Big Spring, Shoshone, Coville & M. French Gilman 454 (USN); Black Rock Springs, Mark Kerr 96 (CRB).

Central Valley. Kern Co.: Tulare Plains about 10 mi. south of Bakersfield, Coville & Funston 236 (USN). Tulare Co.: Hanford, Alice Eastwood 3846, 3851 (USN); Visalia, Eastwood 34 (USN); Kaweah R., between Ash Mountain and Three Rivers, Harold E. and Susan T. Parks 01037, ~~XXXXXX~~ 01070, 01071 (all CRB); Kaweah R. no. of Visalia, ~~XXXXXX~~ ^(USN) ~~XXXXXX~~ Thompson 1042 (CRB). Fresno Co.: Fresno, George L. Fisher 79 (USN); Centerville, Kings R. delta, Harold E. Parks 0932 (CRB); Beside San Joaquin R. at Friant, Albert E. Thompson 1013 (CRB). Madera Co.: Fresno R., J. W. Congdon, June 21, 1903 (USN); Power House 1, San Joaquin Forest, San Joaquin R., Ernest G. Dudley, Nov., 1911 Shore of Bass Lake (Reservoir), elev. 3400 ft., Thompson 1063 (CRB). (CRB). Merced Co.: East of Los Banos, Bracelin 702 (CRB). Stanislaus Co.: Denair, Paul A. Harvey 1, 3, in 1940 (CRB). San Joaquin Co.: Tom Payne's or Paradise Cutoff, Tracy Pike, abt. 15 mi. so. of Stockton, Ball 1929 (CRB, USN). ----- ? Co.: Sacramento Valley, U.S. Explor. Exped. under command of Capt. Wilkes 1234, no date (USN). Sacramento Co.: Sacramento, Lester F. Ward 89 (USN). Amador Co.: Sutter Creek, Ione, C.H. Merriam 4, in 1905 (USN); South Jackson, Geo. Hanson 198 (USN). Yolo Co.: Rumsey, C.F. Baker 2936 (USN). Nevada Co.: Penn Valley, west of Grass Valley, Heller 13183 (USN). Lake Co.: Shore of Clear Lake, in Highland Park, Milo S. Baker 5351, 5357 (CRB); Bank of Cache Creek, H.N. Bolander 2678 (USN); Near Clear Lake, John Torrey 490 (USN). Butte Co.: Near U.S. Rice Expt. Farm, Biggs, Ball 1820 (USN), 1821 (USN), 1939 1822, 1824, (all CRB); Along Chico Creek, Chico, Ball 2069, 2071, 2072 (CRB, USN); Chico-Groville Road, 12 mi. from Chico, Heller 11262 (USN). Tehama Co.: Red Bluff, L. E. Smith 596, 599, 600, 668, 669 (all USN). Shasta Co.: Bridge at north end of town, Redding, Bracelin 481 (CRB, USN); Reed Creek, Smith 610, (USN).

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MEXICO. Baja California: LA Paz, Edward Palmer 77, in 1890 (USN, as S. Bonplandiana); Gardener's Laguna, L. Schoenfeldt 2895, in 1894 (USN). State Uncertain: Lake Polonius (?), Mimbres Valley, Mearns 184, in 1892 (USN). Sonora: Alamo, near Magdalena, P. B. Kennedy 7030, in 1925 (USN); Vic. of Hermosillo, Rose, Standley, & Russell 12391, 12501, in 1910 (USN); Vic. of Navajoa, Rose et al. 13156, in 1910 (USN); Vic. of Magdalena, Rose et al. 15113, in 1910 (USN); Rio Bavispe, near Colonia Oaxaca, Stephen S. White 428, in 1938 (CRB); Arroyo Carretas, Carretas, border of Chihuahua and Sonora, Municipio de Janos, White 2615, in 1939 (CRB); Rio Bavispe, Bavispe, White 2881, in 1940 (CRB); Horconcos, Rio Hauchinera (Rio de Bavispe area), White 2973, in 1940 (CRB); Rio Fronteras, San Rafael, White 3862, in 1941 (CRB); Colonia Morelos, White 4102, in 1941 (CRB). Chihuahua: Dist. Guerrero, sw. of San Ysidro, Ynes Mexia 2534, in 1929 (CRB); Sta. Eulalia Mts., Wilkinson, in April, 1888 (USN); White 2615 and 4102, listed above in Sonora, may possibly be from adjacent Chihuahua.

Bibliography. Because the material comprising S. Gooddingii and its variety variabilis has ^{been} presented and discussed under many different names, it seems desirable to give a fairly full bibliography of these treatments. Where these publications cover southern or central California and adjacent portions of Arizona, Nevada, and Mexico, they may be discussing either the species or the variety, or both.

S. Gooddingii Ball (n. sp.) in Bot. Gaz. 40:376, ^{1905;} Ball, in Bot. Gaz. 72:227-234, figs. 2-4, 1921; Schneider, in Bot. Gaz. 65:12-13, 1918; Schneider, in Journ. Arnold Arb. 1:9, 1919; Tidestrom (Fl. Utah & Nev.), in Contrib. U.S. Natl. Herb. 25:135, 1925; Baker, Partial List Seed Pl. North Bay Counties (mimeographed), 22, 1934; and rev. ed. 28, 1945; Goodding (Willows in Region VIII), U.S. Dept. Agric., Soil Conserv. Serv., Reg. Bull. 66:6-7, 4 illus., 1940; Kearney & Peebles (Flow. Pl. & Ferns Ariz.), U.S. Dept. Agric. Misc. Publ. 423:219, 1942; Little (Checklist Native & Natur. Trees U.S.), U.S. Dept. Agric., For. Serv. (mimeographed), 263, 1944;

S. nigra ~~Marshall~~, as interpreted by numerous authors*, not Marsh., ~~is~~ in floras and forest floras of varying geographic coverage, so far as these apply to southwestern areas ~~westward~~ westward from western ~~1905~~ Texas. These works are not cited here in full, only author and year being given. For better understanding, they are grouped by size of area covered, as local, State-wide, regional, and national. Coulter (Bot. West. Texas) is classed as regional because of the large area covered. Local: Greene, 1894; Hall & Hall, 1912; Jepson 1901 & 1911; Merriam, 1893; Parish, 1913; State-wide: Bebb, 1897 & 1880; Eastwood, 1905; Jepson, 1909, 1909, 1910; Wootton, 1913; Wootton & Stanley, 1915. Regional: Coulter, 1894; Howell, Thomas, 1902; Sudworth, 1908. National: Sargent, 1896; 1905; Sudworth 1897, 1898.

S. nigra Marsh., var. vallicola Dudley, in Abrams, Fl. Los Angeles & Vic. 100, 1904, and suppl. ed. 100, 1911; Jepson, Man. Flow. Pl. Calif. 263, 1925; Pickwell & Sayle (Trees of Valley & Foothill), in West. Nature Study 1:199, fig. 90, 206, 1930.

* The writer, in 1921, used the commonly accepted but both inaccurate and misleading form of citation: "S. nigra of numerous authors, not Marsh.", when he should have written: "S. nigra, ~~Marsh.~~ as interpreted by numerous authors, not Marsh." Schneider, in 1918 and 1919 (l.c.), had similarly ascribed the publication of an "S. nigra" to each of nine authors, when they merely were wrongly interpreting S. nigra Marshall. The same error is repeated by the writer in 1923 (in Abrams, Fl. Pac. Coast States 1:490).

Marsh.,
S. nigra var. venulosa (Andersson) Bebb (n. comb.), in Coville (Bot. Death Valley Expedition), in Contrib. U. S. Natl. Herb. 4:199. 1893; Bebb (Review Willows Calif.), in Bot. Gaz. 16:102. 1891. (see discussion below). as interpreted by

S. nigra Marsh., var. Wrightii Andersson, as interpreted by Bebb (Review Willows Calif.), in Bot. Gaz. 16:102-103. 1891; as interpreted by Bebb, in Coville (Bot. Death Valley Exped.), in Contrib. U.S. Natl. Herb. 4:200. 1893; as interpreted by Coulter (Bot. West. Texas), in part, in Contrib. U. S. Natl. Herb. 2(3):419. 1894. (see discussion below).

S. vallicola (Dudley) Britton, No. Amer Trees 184, fig. 1141, 1908.

S. Wrightii Andersson, as interpreted by Wooton & Standley (Fl. N. Mex.), in Contrib. U.S. Natl. Herb. 19:160. 1915. (See discussion below).

Andersson first ^{published} described his var. venulosa in 1867 (Monog. Sal.), as a variety of S. nigra Marsh., subsp. longipes (Shuttleworth), and described the New Mexico plant as having leaves paler to glaucescent beneath. S. longipes is the eastern plant now known as S. caroliniana Michx., and belongs to Section Bonplandianae. Its range extends west to southern Texas, so a ~~typical~~ New Mexico plant with glaucescent leaves would represent either S. Bonplandiana (Sect. Bonplandianae) or S. Wrightii (S. amygdaloides var. Wrightii) of Sect. Triandrae. *but not with S. nigra*

When Bebb listed S. nigra var. venulosa or var. Wrightii as occurring in California, he was dealing with S. Gooddingii or its variety because neither S. Bonplandiana or S. Wrightii occurs as far west as California. In 1891, under S. nigra, he states that across New Mexico and Arizona it takes on the character of var. venulosa and that var. Wrightii is the same thing. These statements show conclusively that Bebb did not then distinguish between the green-leaved species, S. nigra and then unnamed S. Gooddingii, and the glaucous-leaved species, S. Bonplandiana and S. Wrightii.

Wooton & Standley, in 1915 (Fl. N. Mex.), under S. Wrightii Andersson, say that the "leaves are light green, of about the same color on both surfaces". Under S. nigra, they say: "It is very probable that further study of what is here considered S. nigra in New Mexico will show that it belongs to S. Wrightii, which is the common plant of the type". Apparently they were dealing with S. Gooddingii var. variabilis in both cases and did not recognize var. Wrightii at all because they limit S. amygdaloides to the extreme northern part of the State, where it does occur but var. Wrightii does not.

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Separation from S. nigra:

^ In the Southwest, S. Gooddingii and its var. variabilis are the counterparts of the abundantly-occurring S. nigra and its varieties in the eastern half of the United States. S. nigra and its southwestern variety Lindheimeri Schn. are marked by twigs light brown to dark brown and glabrous or sometimes puberulent; leaves smaller and green to dark green; stipules without glands on the upper (inner) surface, or occasionally a few such glands on var. Lindheimeri; and capsules shorter in S. nigra but sometimes as large in var. Lindheimeri, and always glabrous.

variabilis,
S. Gooddingii and variety ^ on the other hand, have twigs yellow to yellowish and more or less pubescent-puberulent to glabrous; leaves larger and mostly yellowish-green (those on vigorous shoots up to 15-19.5 cm. by 2-3 cm.); stipules commonly with abundant fragrant glands on the upper surface; and capsules commonly to 6.5-7 mm. long, and ovaries and capsules always pubescent in S. Gooddingii but glabrous in the variety.

In western Texas (north to south), variety variabilis is found on the Canadian River in Hemphill Co. in the northeast Panhandle, within the range of both S. nigra and its variety. On the headwaters of the Red River, it reaches Deaf Smith and Donley Counties in the southern Panhandle, Donley Co. being within the range of var. Lindheimeri. In the Staked Plains (Llano Estacado), it reaches Hale and Lubbock Counties in the Brazos drainage, Hale Co. being in Lindheimeri territory. Farther south and east, it occurs in Tom Green Co., of the Concho River drainage, occupied also by S. nigra. It occupies also most of the mountainous counties in the large triangular area south of New Mexico, as far east as Pecos and Brewster Counties, an area where neither S. nigra or var. Lindheimeri are found. It has one sporadic occurrence in Starr Co., in far southern Texas, where both S. nigra and var. Lindheimeri occur. This probably resulted from flotation down the Rio Grande.

All known Texas specimens showing the distribution of var. variabilis and of S. nigra and var. Lindheimeri are cited in Dr. Lundell's forth-coming Flora of Texas.

This eastern extension of variety variabilis ~~from~~ from New Mexico into western Texas is interesting ecologically. In northeastern New Mexico, it crosses the divide east of the Rio Grande and the Pecos and extends down the headwater¹ streams of the Canadian and Red Rivers, of Mississippi drainage. In west-central and southeastern New Mexico, it crosses the divide east of the Pecos River and extends down the headwaters of the White (Brazos) and Concho (Colorado) Rivers, of the Gulf drainage. It occurs along the Rio Grande and the Pecos River and their tributaries in southwestern Texas, as far east as Brewster and Pecos Counties, with the one sporadic occurrence noted far down the Rio Grande, in Starr County.

On the other hand, S. nigra and its var. Lindheimeri have not been able to cross these divides between the eastward-flowing rivers and the southward-flowing Pecos and Rio Grande. In fact, they apparently have been unable to ascend any of these streams to their headwaters. Undoubtedly, downstream spread is accomplished with comparative ease and ~~the~~ upstream spread with relative difficulty, but why did it not affect both of these species equally when they reached this divide? Did the long-recurring drives of large herds of grass-fed cattle from the southwest to the Kansas railroads help the eastward spread of western willows? Cattle browse freely on willows and a piece might be carried far in a steer's mouth, or a stem regurgitated while ^{during cud-chewing} bedded down for the night by a spring or stream. Only the few cowboys and covered wagons traveled the reverse direction.

Subtitle

2. Salix ligulifolia (Ball) Ball (S. lutea Nutt., var. ligulifolia Ball)

This willow has been so variously treated by so many writers that it seems desirable to review its history, ^{its} ~~write~~ ^{rewrite} ~~its~~ description, and cite carefully studied specimens to show its ^{recognized} wider distribution. It is chiefly in California and Oregon that the known range has been considerably extended. Specimens cited in 1921 are not relisted. *here*

Salix cordata Muhl., as interpreted by Bebb in Brewer & Watson, (Bot. Calif. 2:85. 1880 (preprinted with same pagination, as Bebb, Willows of California. 1879); by Bebb in Coulter, Man. Bot. Rocky Mtn. Region 335. 1885 (as to distribution in most of the Rocky Mtn. area); by Bebb in Bot. Gaz. 16:104. 1891 (Review of the Willows of California); and by Ball in Coulter & Nelson, New Man. Bot. Centr. Rocky Mtns. 132. 1909 (as to distribution in the Rocky Mtns. and westward); *not Muhlenberg*

Salix S. cordata Muhl., var. Mackenziana Hook., as interpreted by Bebb in Brewer & Watson, Bot. Calif. 2:86. 1880, and preprint 2:86. 1879 (so far as most occurrence in Calif. is concerned); by Bebb in Coulter, Man. Bot. Rocky Mtn. Region 335. 1885 (as far as occurrence in most of the Rocky Mtn. region is concerned), *not Hooker*

S. cordata Muhl., var. Watsoni Bebb, as interpreted by Wootton & Standley (Fl. N. Mex. 9 in Contrib. U. S. Natl. Herb. 10:159. 1915 (so far as southern distribution is concerned), *not Bebb*

S. ligulifolia Ball, in litt. --? (nomen nudum), Schneider in Journ. Arnold Arb. 2:188(-189). April, 1921. *new combination*

S. ligulifolia Ball (S. lutea var. ligulifolia Ball) ^{abund}, Smith (Willow of Colorado), in Amer. Midland Nat. 27:236(-237). Jan., 1942; Kearney & Peebles (as synonym of the variety, see below); Thompson, Albert E., Salix ligulifolia Ball, the Strap-leaved Willow and its Relatives in the Central Sierra Nevada. 6 pp. (typed, not published) 1942, rev. 1943.

S. lutea ligulifolia n. var., Ball in Bot. Gaz. 71:428(-430), June, 1921; Ball in Abrams, Illus. Fl. Pacific Coast States 1:494. 1923; Tidestrom (Fl. Utah & Nevada), in Contrib. U. S. Natl. Herb. 25:136. 1925; Kearney & Peebles (Flow. Pl. & Ferns of Ariz.), in U.S. Dept. Agric., Misc. Publ. 423:220. May, 1942 (S. ligulifolia Ball as synonym).

→ Shrub with clustered stems, commonly 1-3 m. tall, rarely 4-5 m. (Plumas Co., Calif.); general color effect dark-green; bark dark gray; branchlets varying with age, the new growth yellowish and generally puberulent, summer-grown twigs yellowish to brown and often pubescent to densely so, 1-year and 2-year twigs brown or reddish-brown to blackish, often shining, mostly glabrous or the 1-year retaining (or renewing) previous pubescence; buds ovate-lanceolate, 5-10 mm. long, acute or obtusish, colored and clothed as the twigs, often drying black; stipules semicordate and acute to semi-lunate and obtuse, 4-10 mm. long, or to 15-18 mm. on vigorous shoots, entire to serrulate, mostly glabrous, glaucous beneath; petioles stoutish, 5-10 mm. long, yellowish to brown, pubescent to glabrous; leaves mid-sized, ligulate, or lanceolate, or oblong-lanceolate (narrowly oblanceolate while unfolding), 5-10 cm. long by 1-2 cm. wide, or 11-13.5 by 2.5-3 cm. on vigorous shoots, acute or very short-acuminate at apex, broadened, rounded, truncate, or cordate at base, ~~XX~~ subentire or more or less serrulate or glandular-serrulate, the largest sometimes toothed near base, reticulate-veiny on both sides, especially beneath, dark green above, glaucous to white-glaucous beneath, glabrous after unfolding or the whitish midrib puberulent above on the basal portion.

✓ Aments coetaneous or somewhat precocious; the staminate slender, 2-3 cm. long, sessile and naked or with 1-2 small bracts at base; pistillate 2-4 or 5 cm. long, to 1.4 cm. wide in fruit, subsessile or on leafy-bracted peduncles 5-10 mm. long; scales elliptic-oblong, obtusish, brownish, drying black, densely white-tomentose or the apex becoming glabrate externally; stamens 2, filaments slender, glabrous, free; capsules small, lanceolate to ovate-lanceolate, 4-5.5 ~~mm~~ mm. long, glabrous; pedicels mostly 1.5-2.5 mm. long, rarely 3.5 mm., glabrous; styles 0.3-0.5 or 0.7 mm. long, mostly entire; stigmas short, entire, notched, or bifid; gland *short*.

← The flowering period covers late April and May, with fruiting continued thereafter.

Frutex; ramulis inferioribus fuscis, ferrugineis aut nigrescentibus, junioribus flavescentibus aut fuscentibus saepe pubescentibus; foliis liguliformibus anguste lanceolatis aut anguste oblongo-lanceolatis subtus glaucis; capsulis 4-5.5 mm. longis glabris.

Salix ligulifolia is a clumpy shrub of mountain streams and meadows, at elevations ranging from 3000 to 9000 or rarely 9500 feet (900-2700 or 2850 m.), but occurring most commonly at altitudes of 4000 to 7000 feet (1200-2100 m.). It often is associated with S. lasiandra ^{Benth} ~~S. lasiocarpa~~ and S. tamnifolia ^{Benth} in the Sierra Nevada. It ranges from the Black Hills of (So. Dak.) (Custer Co.), and the Laramie and Medicine Bow Mountains of southeastern Wyoming, southward across Colorado and New Mexico, westward in Arizona, and northward in the Sierras of California from Tulare County to Plumas and Tehama Counties. There is sparse or sporadic occurrence in southern Utah and Nevada, and in Klamath, Jackson, and Josephine Counties of extreme southern Oregon also.

It is the southwestern representative of the Section Cordatae, as S. lutea Nutt. is the western, S. Mackenziana (Hooker) Barratt the northwestern, and S. rigida Muhl. (S. cordata Muhl., not Michx.) the eastern. It parallels S. rigida most closely in the variability of hairiness on the vegetal organs. What one finds depends much on their stage of development when observed or collected. The ranges of the dark-twigged S. ligulifolia and S. Mackenziana scarcely overlap at all, but yellow-twigged S. lutea and its varieties occur throughout much of the range of both the others.

The distribution was well indicated by the specimens cited in 1921, except for California and southern Oregon. California was credited then with a single collection and Oregon with none at all. Below are cited the collections recognized since 1921.

WYOMING. Laramie Co.: Sybille Creek, Elias Nelson 672, in 1901 (CRB). Albany Co.: Woods Creek, L. N. Goodding 1432, in 1903 (CRB); Sand Creek, Aven Nelson 6965, in 1900 (CRB); Laramie River, near Laramie, ^{alt} elev. 7000 ft., Louis C. Williams 2812, in 1935 (CRB), and in USN as no. 2212). COLORADO. (Counties alphabetically): Alamosa Co.: Alamosa, Hazel M. Schmolz 1032, 1033, in 1924 (CRB). Archuleta Co.: San Juan Natl. For., S. Duval Anderson & 49 $\frac{1}{2}$, in 1925 (FS, 50272 $\frac{1}{2}$). Boulder Co.: ^{alt} Ward, elev. 9150 ft., Schmolz 601, in 1922 (CRB). Conejos Co.: Conejos River, L. N. Goodding Sal.-50A, in 1938 (CRB). Costilla Co.: 10 mi. w. of La Veta Pass, Goodding & Leaton Goodding Sal.-20-39, in 1939 (CRB). El Paso Co.: near Colorado Springs, E. C. Schneider J-1, J-4, NC-4, NC-6, PS-3, WC-3, WC-5, all in 1910 (all CRB); Beaver Creek, 3 mi. sw. of Monument, E. R. Warren 3, 4, on June 9, 1926 (CRB, USN). El Paso-Teller Cos.: Pikes Peak Forest Res., S. J.

Flintham, on Sept. 2, ---- (USN, as S. lutea var. Watsoni); Pikes Peak Region, elev. 6750-9500 ft., I. M. Johnston 2779, 2780, 2781 (USN), 2782 (USN), 2783, 2784, 2785, 2786, in 1920 (all CRB). Gunnison Co.: Anthracite Creek, elev. 8800 ft., E. R. Warren 21, in 1927 (CRB); Fitzpatrick Mesa, 2 mi. w. of Blue Creek, elev. 8500 ft. R. C. Rollins 1991, in 1937 (CRB). Larimer Co.: La Porte, Ernest C. Smith 660, ^{818,} in 1935, 721, 723, in 1936 (all CRB). Rio Grande Co.: Vic. of Monte Vista, Schmoll 1040, 1057, in 1924 (CRB). Teller Co.: East of Divide, J. H. Christ 213, in 1935 (CRB). Teller-El Paso Cos. (see El Paso-Teller, above). Weld (?) Co.: Chimney Rock, on Sand Creek, 50 mi. N-NE of Ft. Collins, Smith 1710, in 1945 (CRB).

NEW MEXICO. Catron Co.: Beaverhead Ranger Sta., Goodding & Goodding Sal. 5-39, in 1939 (CRB). Colfax Co.: Cimarron Creek, Soden & Baldy Meadow, Goodding & Goodding Sal. 6-39, in 1939 (CRB). Rio Arriba Co.: 81 mi. n. of Santa Fe, on road to Chama, Goodding Sal. 54, in 1938 (CRB); West slope Sierra Nacimiento, Goodding Sal. 83, in 1938 (CRB, as S. Mackenziana var. macrogenma). Grant, Lincoln, & Union Cos. cited in 1921. UTAH. Kane Co. cited in 1921. ~~NEVADA~~ NEVADA. Washoe Co.: Reno, Ivar Tidestrom 10623, in 1919 (CRB). ARIZONA. Numerous specimens from east-central portion cited in 1921; County Unknown: Beaver Creek, B. E. Fernow, in Aug., 1896 (USN).

OREGON. Klamath Co.: Johnson Prairie, Elmer ^{I.} Applegate 2472, in 1898 (USN); south end of Lake of the Woods, F. V. Coville 1205, in 1902 (USN); 5 mi. nw. of Ft. Klamath, Morton E. Peck 19722, in 1937 (CRB); near creamery, Klamath Agency, Wood River, F. A. Walpole 2217, in ~~1902~~ 1902 (USN). Jackson Co.: Jackson Creek, $\frac{1}{2}$ mi. west of Jacksonville, L.R. Abrams & J. T. Benson 10261, in 1924 (CRB, distr. as S. lasiandra; det. later by CRB. as S. Mackenziana); Medford, H. B. Humphrey 2054, in 1916 (CRB, as S. Mackenziana); Gold Hill, Walpole 149, in 1899 (USN, too juvenile for complete certainty). Josephine Co.: Gravelly floodplain, E. Fork of Illinois River, near Highway 199, Carleton R. Ball & Harold E. Parks 01278, in 1932 (CRB).

Coconino Co.: Upper Oak ~~XXXX~~ Creek near Flagstaff, H.J. Fulton 7166, in 1930 (USN);

CALIFORNIA. Tehama Co.: So. Fork Battle Creek, 1.7 km. ^{with} (ne) of Mineral, Ball, Bracelin, & Kautz 379, in 1931 (CRB, USN). Plumas Co.: 1 mi. (se) of Fowler Peak, D. Axelrod 6791, in 1934 (CRB); No. Fork of Feather R. at Chester, Ball, Bracelin, & Kautz 393, 394, 397, 398, in 1931 (CRB, several sheets each; USN). Butte Co.: Jonesville, E. B. Copeland 621, and 3 unnumbered, on June 10, 18, and 20, 1931 (CRB); in May 1938 (CRB). Placer Co.: French Meadows, American River, Tahoe Natl. For., L.S. Smith 3, in 1931 (CRB). El Dorado-Placer Cos.: Tahoe-to-Placerville Road, with S. Lemmon, Emily Smith 14, in 1933 (CRB). Tuolumne Co. (Yosemite Natl. Park): Carl Inn, Big Oak Flat & Tioga Roads, Ball, Bracelin, & Emily Smith 552, in 1931 (CRB); ^{several} ~~se.~~, Smith 3a, in 1933 (CRB); So. Fork of Tuolumne R., in west edge of Park, Albert E. Thompson 1195, 1197, 1199, in 1941 (CRB). Mariposa Co. (mostly Yosemite Natl. Park): Illilouette Canon, alt. 1940-1970 ^{meters} ~~ft.~~, E. B. Babcock 1058, in 1912 (USN, as S. cordata Mackenziana); Crane Flat on Big Oak Flat Road, Ball, Bracelin, & Kautz 509, in 1931 (CRB, USN); Big Creek, tributary of So. Fork of Merced R. (just outside Park), Thompson 1105, 1106, 1109, in 1941 (CRB); Wawona, Thompson 1182, in 1941 (CRB). Madera Co.: The Falls, Bass Lake, Thompson 253, 255, 256, 257, in 1939 (CRB); ^{same} ~~se.~~, 1008, in 1941 (CRB); area of So. Fork of Willow Creek, Thompson 1043, 1044, 1045, 1046, 1048, 1049, 1051, 1052, 1053, 1075, 1076, 1084, 1092, 1097, in 1941 (all CRB); area of Big Creek, near Fresno Dome, and Beasore Meadow, etc., Thompson 1099, 1122, 1123, 1205, ~~1206~~, 1214, 1217, 1219, in 1941 (CRB). Fresno Co. near shore of Hume Lake, Thompson 255, in 1939 (CRB); Indian Basin, Kings River Canyon Highway, Thompson 259, 262, 264, in 1939 (CRB); area of Sequoia Lake Dam, Thompson 391, 396, in 1940 (CRB); ^{same} ~~se.~~, Thompson 1029 in 1941 (CRB); Huntington Lake, elev. 7000 ft., Thompson 929, 938, in 1939, and 1172 in 1941 (CRB). Tulare Co.: ~~XXXXXXX~~ ~~XXXXXXX~~ South end of Crescent Meadows, elev. 7240 ft., Mrs. H. P. Bracelin 802, 803, in 1933 (CRB); Heather Lake Trail, elev. 7500-7600 ft., Bracelin 807b, 808, in 1933 (CRB).

3. *Salix lasiolepis* Benth. var. *braceliniae*, n. var.

Salix irrorata (in part), as understood by Ball in Coulter & Nelson, New Man. Bot.

Centr. Rocky Mts. 132. 1909 (by twigs "or downy-puberulent" and by the Texas, and probably some of the New Mexico, distribution), not Andersson.

S. lasiolepis Benth. Pl. Hartweg. 355. 1857 (in part); Andersson, in *Öfvers. Kon. Vet.-Akad. Förhandl.* 15:118. 1858 (in part); printed simultaneously in *Proc. Amer. Acad. Arts & Sci.* 4:58. ~~1858~~ 1858 (reprinted as *Salices Boreali-Americanae*, p. 12); omitted from *Monog. Salicum*, 1867; Andersson in *DC. Prodr.* 16(2):264. 1868 (in part); Wootton & Standley (*Fl. New Mex.*), ⁱⁿ *Contrib. U.S. Natl. Herb.* 19:159. 1915; Schneider, in *Bot. Gaz.* 65:31. 1918 (distribution in Mexico); Schneider, in *Jour. Arnold Arb.* 2:187-188. 1921 (in part); Ball, in *Abrams, Illus. Fl. Pac. Coast States* 1:496. 1923 (in part); Goodding (*Willows in Region VIII*), U.S. Dept. Agric., Soil Conserv. Serv. Regional Bull. 65:8, illus. 1940 (mimeogr.); Kearney & Peebles, (*Flow. Pl. & Ferns Ariz.*), ~~in~~ U.S. Dept. Agric., Misc. Publ. 423:219. 1942.

A forma typica species differt foliis linearibus, lineari-ellipticis, lineari-lanceolatis, aut lineari-oblancoelatis.

(17 to 30 ft.)

Shrub 2-5 or 6 m. or small tree 5-8 or 9 m. tall, with clustered stems and grayish bark; twigs mostly stoutish, the seasonal yellowish and pubescent to puberulent, the 1-year yellowish to brownish and often pubescent or puberulent before the epidermis peels in the spring and sometimes becoming puberulent thereafter, the older chestnut-brown to dark brown, glabrate to glabrous; buds stout, 2-6 mm. long, or 6-10 mm. long and 2-4 mm. wide on vigorous shoots, colored and clothed about as the supporting twigs; stipules 2-4 mm. long, or to 8 mm. on vigorous shoots, semicordate, ovate, or subulate, sometimes serrulate; petioles stoutish, 5-10 or 15 mm. long, yellowish and pubescent while young, becoming brownish and glabrate-glabrous with age; leaf-blades narrow, linear-oblancoelate, linear-elliptical, linear-lanceolate, or sometimes narrowly oblong, 6-10 cm. long and 0.8-1.5 cm. wide, or to 11-15 cm. by 1.5-2 cm. on vigorous shoots, narrowed at base, acute or short-acuminate at apex, the somewhat revolute margins subentire to irregularly undulate-denticulate or undulate-serrulate, gray-pubescent while unfolding, ^{usually} becoming glabrate to glabrous with age, dark green and somewhat shining above, densely glaucous and reticulate beneath, the yellowish midrib prominent on both sides and often minutely puberulent above in maturity.

ad?

aments precocious, sometimes appearing in Dec.-Jan., in the axils of the old leaves, especially southward, subsessile at first, 3-7 cm. long; the staminate 1.2 cm. wide, stamens 2, filaments glabrous, usually united for $\frac{1}{2}$ or more of their length; pistillate 1-1.4 cm. wide, the peduncle in fruit 2-5 or 8 mm. long and bearing 2-4 tiny bract-like leaves; scales in both sexes persistent, obovate, very obtuse, 1-1.2 mm. long, dark brown or blackish, densely clothed with long straight or tangled hairs; capsule lanceolate, 3.5-4.5 mm. long, greenish, glabrous; pedicel 0.5-1 or 1.5 mm. long, glabrous; style 0.4-0.8 mm. long, entire or more or less bifid; stigmas shorter, usually notched.

This southern and eastern variety of S. lasiolepis is named for Mrs. H.P. Bracelin of Berkeley, California, in recognition of her extensive and discriminating collecting, and her careful and informative labelling, of California willows over a series of years. The material thus made available has added greatly to our knowledge of the characteristics, habitats, and distribution of the species of that State.

The narrow-leaved arroyo willow is a shrub or small tree, occurring mostly along mountain streams at middle elevations from Southern California and northern Baja California eastward in southern parts of Nevada and Utah, most of Arizona and New Mexico, southwestern Texas, and northern Sonora and Chihuahua. In California it ranges in elevation from 2500 or 3000 feet to 6000 and sometimes 7200 feet. In the other States it occurs mostly from 5000 to 7500 or 8000 feet. It flowers in Jan. and Feb. southward and at lower elevations, and in March and April northward and at higher elevations.

Variety Braceliniae is the southern and narrow-leaved form of the S. lasiolepis complex. The species occurs in the northern part of the variety range and northward. It is marked by leaves oblanceolate or broadly so. Its twigs also usually darken more rapidly and more completely and the aments are more nearly sessile. In the coastal part of the species range occurs var. Bigelovii (Torr.) Bebb, with leaves broadly lanceolate to obovate, while in the northern part occurs var. Sandbergii (Rydb.) Ball, with leaves elliptical to obovate or obovate-oval. Leaf-width, especial apical, thus broadens consistently from south to north.

The center of distribution for S. lasiolepis is in the southern two-thirds of California, where the species and all of its five (?) varieties are found. Their total distribution area is shaped like a boot facing east, the foot to the south and top to the north. The heel (Baja California) and sole (Sonora, Chihuahua) are in Mexico. ~~The~~ The foot extends from the southern half of California and adjacent Nevada and southern Utah across Arizona and New Mexico, with the toe in southwestern Texas. The top extends northward from northern California and Nevada into Washington and Idaho.

There is a progressive widening of the leaves from south to north in this total area. Variety Braceliniae, with ^{rather linear} ~~obovate~~ leaves, occupies the foot of the boot. S. lasiolepis, with oblanceolate leaves, ranges from the heel in Baja California northward to Washington and Idaho. Variety fallax Bebb, with elliptical leaves, occurs in the Sierra Nevada. Variety Bigelovii, with obovate leaves, is found mostly near the ~~LM~~ Coast, and variety Sandbergii, with elliptic-oval or obovate-oval leaves, is found in northern California and Idaho. The species not only has broader leaves than variety Braceliniae but the twigs usually darken more rapidly and more completely. In southern California and adjacent Nevada, the species is about as common and widely distributed as is var. Braceliniae and it also occurs sparingly in northern Arizona.

Because the center of distribution for ^{the} species and its varieties is near the coast in central California, distribution is indicated here from north and west to south and east. Authenticated specimens are cited, for States and Counties, by collector, number, and year. Where there is no collection number, fuller data are given so that the specimen may be recognized. Citation of Mexican specimens follows that of U.S. specimens. Containing herbariums are indicated as follows: Carleton R. Ball, (CRB); U.S. Forest Service, (FS); N.Y. State Museum, (NYSM); U. S. National Herbarium, (USN); Omer E. Sperry (OES), Pomona College (PC), Southern Methodist University (SMU), Texas A. & M. College (TAC), Texas State University (TU), U. S. National Herbarium (USN).

CALIFORNIA, ~~NEW~~ CENTRAL. Sonoma Co.: Bodega Bay, W. A. Satchell 19, in 1931 (CRB); Russian River between Monte Rio and Duncan's Mills, Satchell 22, in 1931 (CRB). Yuba Co.: Horst Hop Ranch, Wheatland, Carleton R. Ball 1718, in 1911 (CRB, USN). Contra Costa Co.: Antioch, Alice Eastwood 3726, 3727, 3728, 3729, Feby. 24, 1914 (USN, 3728 ^{Alpine Co.:} ~~stam. type~~; 3729 pist. type; both with persistent leaves of 1913). ^{alt} Markleeville, Diamond Valley, 5500 ^{alt} ft. elev., H. Lee 107, in 1934 (CRB). Madera Co.: Northfork, E. G. Dudley, in Sierra Natl. For., Nov., 1911 (CRB). Fresno Co.: Millwood, J. D. Culbertson 4665, in 1904 (USN). Monterey Co.: Bet. Jolon & Memorial Park, Milo S. Baker 7932, in 1934 (CRB). Tulare Co.: Near Visalia, F. V. Coville & Fredk. Funston 268, in 1891 (USN, vigorous shoot with large leaves). Inyo Co.: All from Panamint Mtns.: Coville & Funston 493, 597, 625, in 1891 (USN); Coville & M. French Gilman, alt. 7300 ft., 221, 222, in 1931 (USN); Gilman 2134, 2138, 2156, 2232, in 1936 (USN); Willow Springs, 14 mi. east of Independence, Mark Kerr 71, in 1932 (CRB); some others are too juvenile for certain determination.

CALIFORNIA, SOUTHERN. Kern Co.: Edge of desert, 1 mi. east of Walker Pass Summit, alt. 5250 ft., Mrs. H. P. Bracelin, Carl Skottsberg, ^{and} J. T. Howell 2870, 2871, in 1948 (CRB, some old leafs persisting); Tejon Mts., F. R. Fosberg 7054 (CRB, USN), 7055 (CRB), 7056 (CRB 5 sheets, USN), all in 1931; Johnson Canyon, Walker Basin, Fordyce Grinnell 61, in 1905 (USN); Mt. Pinos, San Emigdio Ptueros, H. M. Hall 6390, in 1905 (CRB). Ventura Co.: Topa Topa Mtns., L. R. Abrams & E. A. McGregor 105, in 1908 (USN); Mt. Pinos Region, W. R. Dudley & F. H. Lamb 4616, in 1896 (USN); ^{and} C. Epling & L. C. Wheeler 1831, in 1933 (CRB); ^{same} Ralph Hoffman, on June 5, 1930 (CRB); Mt. Pinos, Carl W. Shersmith 1, on Oct. 25, 1931 (CRB). Los Angeles Co.: Inglewood, Abrams 3103, in 1902 (USN); Bracelin & Fosberg 572, in 1931 (CRB); Sierra Sta. Monica, W. H. Brewer 86, 87, & 88, on Dec. 23, 1860 (USN, new aments with old leaves persisting); ^{same} Fosberg 5852, in 1931 (CRB); ^{same} Fosberg 7172 (USN), 7173, 7176 (USN), 7177 (USN), 7178 (USN), 7179, all Jan. 26, 1932 (all CRB); ^{same} Fosberg 7410, 7412, 7414, 7415, all Mar. 3, 1932 (CRB); Walter M. Moode on Oct. 6, 1912 (CRB); San Gabriel Mts., Geo. L. Moxley 1038, in 1921 (USN); ^{same} Ojai, S. F. Peckham on Feb. 4, 1866 (USN); ^{same} F. W. Peirson 4281, in 1919, 9767 in 1932 (both CRB); Shersmith 3, 4, in 1931 (CRB); San Gabriel Canyon, Shersmith 6, 7 (USN), 7a, 9 (USN), 10, all in 1932 (all CRB, with some persisting leaves of 1931); ^{same} Wheeler 1467, 1472, ~~in~~ in 1933 (CRB). Orange Co.: Temiscal Range, Brewer 154, in Jan., 1861 (USN). San Diego Co.: ~~Bracelin 618, 619.~~

Pine Valley Creek Bridge, 9.5 km. east of Descanso, alt 1020 m., Bracelin 618, 619, in 1932 (CRB, USN); San Diego, J. G. Cooper, in 1860-67 (USN); Carl V. Meyer 828, on Dec. 26, 1931 (CRB, old leaves persisting); Camp Kearney, Harold E. Parks 0332a, in Jan., 1929 (USN); H. E. Parks & Susan T. Parks 01091 a & b, 01092 a & b (b in USN), 01093 a & b, all Jan. 17, 1932 (all CRB, all stem. spec. (a), and 1 pist. spec. (b), with old leaves persisting); some other collections by Bracelin and by Meyer too juvenile for certain determination as variety.

CALIFORNIA, SOUTHEAST. San Bernardino Co. (practically all from San Bernardino Mts.): alt. 6200 ft., Cajon Pass, Coville & Funston 129, in 1891 (USN); So. Fork, Santa Ana R., J. & H. W. Grinnell 356, in 1906 (USN); San Bernardino, J. B. Leiberg 3242, in 1898 (USN); San Bernardino, C. D. Mearns, on Feb. 10, 1904 (CRB); P. A. Minz 12664, 12709, in 1932 (CRB); S. B. Parish 3004, in 1894, 4625 in 1901 (both USN); Frank W. Peirson 9972, in 1932, at 6900 ft. elev. (CRB); San Bernardino, Geo. R. Vasey 271, 273, in Jan., 1881 (USN); Vasey, in Feb., 1881 (USN, 1 sheet with pist. aments & persisting old leaves; 3 others, including 274, represent the species). San Bernardino or Riverside Co. (mostly in San Bernardino Mts.): Minz & Johnston 5241, in 1922 (CRB); Minz 5732, in 1922 (CRB); Minz 12905, in 1932, at 7200 ft. elev. (CRB); S.B. & W.F. Parish 675, in 1881 (NYSM, USN) new aments & old leaves on Dec. 20). Riverside Co.: Corona, Richard L. Cosby on Jan. 11, 1945 (CRB, "good pollen and nectar plant for bees"); W.L. Jepson & Hall in Strawberry Valley, May 17-June 1, 1901 (NYSM); San Jacinto Mts., Minz & Johnston 5518, in 1922 (CRB); Setchell & Duran 7, in 1935 (CRB).

NEVADA. Nye Co.: 20 mi. ne. of Warm Springs, K. H. McKnight & Calvin McMillan 38, in 1942 (CRB). Lander Co.: up Skull Creek near Grass Valley Ranch, F. S. Goodner & W. H. Henning 446, in 1937 (CRB); Le Madre Mts., Iver Tidestrom 10964, in 1919 (USN). Clark Co.: Ex-celsior Canyon, Charleston Mtns., W. W. Clokey 8752, in 1941 (CRB); Toyabe Range, 1919 (USN, probably the variety, but other collections there are the species). UTAH. Washington Co.: 3 mi. east of Pine Valley, elev. 7000 ft., Frank W. Gould 1781, in 1942 (CRB). Iron Co.: Parawan, elev. 1800-2000 m., W. W. Eggleston 14903, in 1918 (USN). All other Utah specimens seen are the species.

ARIZONA. Coconino Co. (all Flagstaff): Chester F. Deaver 44, in 1941 (CRB); Mt. Elden, elev. 7500 ft., E. A. Goldman 2059, in 1913 (USN); Yavapai Co. (all Prescott): Elmer D. Ball, in Aug.-Sept., 1932 (CRB); E.W. Gifford, on June 12, 1932 (CRB); Peebles, Harrison, & Kearney 2618, in 1926 (USN). Apache & Navajo Cos. (southern parts, and perhaps adjacent parts of Coconino & Gila Cos. mostly in White Mts. Indian Reservation and Black Mesa Forest Reserve): F. V. Coville 1008, 1018, 1056, 1064, 1077, 1085, & ~~1094~~ 1094, in 1900 (all USN); Coville 1912 (probably Gila Co.), ~~2083~~ 2083, in 1904 (USN). Gila Co.: Bassett Maguire 10054, in 1935 (CRB); the species is represented by Walter Hough 92, from Gila Co. in 1901 (USN). Graham Co.: E. G. H. 118, on May 20, 1914 (CRB, as S. irrorata); H. H. Rusby 372, in Feb., 1881 (USN, 2 sh.). Pima Co. (Sta. Catalina Mts.): David Griffiths 7037, in 1904 (CRB); J. Arthur Harris C 16437, in 1916 (USN); elev. 7500 ft., R. H. Peebles 4072, in 1927 (USN); elev. 7500 ft., Peebles & H.F. Loomis 7105, in 1930 (USN); elev. 7900 ft., R.D. Roseberry 79, in 1937 (CRB); J. J. Thornber, on Feb. 15, 1904 (USN); Ivar Tidestrom 12560, in 1927 (CRB); Geo. R. Vasey 8 (no. in pencil), in Mar., 1881 (USN). Pima or Santa Cruz Co. (Santa Rita For. Res.): Griffiths 4198, in 1903 (CRB, USN). Cochise Co. (Chiricahua Mts): Dan Axelrod, on May 7, 1941 (CRB); J. C. Blumer 2281, 2292, 2283, 2303, in 1906 (CRB); W.W. Eggleston 11011, in 1914 (USN); J. W. Toumey 183, in 1894 (CRB); Toumey, in Mar. & July, 1894 (USN); Toumey, on May 1, 1897 (USN). Cochise Co. (Huachuca Mts.): L. N. Goodding 372, 914, 1040, in 1949 (CRB); Kearney & Peebles 13846, in 1937 (USN); E.A. Mearns 2176, 2614, in 1893 (USN); T. E. Wilcox 81, 84, in 1894 (USN). County Unknown: Beaver Creek, B.E. Fernow, in Aug., 1896 (USN).

NEW MEXICO. Catron Co.: Beaverhead Ranger Station, Goodding 30, 31, on May 20, 1938 (CRB, twigs pruinose); Reserve, Goodding A 9633, in 1939 (CRB). Colfax Co.: Goodding A 9645, in 1939 (CRB). Dona Ana Co. (Organ Mts.): ^{all E.O. Wootton} Filmore Canyon, elev. 5500 ft., on Feb. 10, Mar. 12 (3 sh.), & Apr. 15 (2 sh.), 1899 (USN); elev. 7000 ft., on Apr. 15, 1899 (USN); elev. 7000 ft., on Apr. 18, 1903 (USN, 2 sh.); Organ Peak, elev. 8000 ft., on Apr. 18, 1903 (USN).

^E TEXAS (several with twigs faintly pruinose). Brewster Co.: Infrequentⁿ at Buena Vista, B. H. Warnock 123, in 1937 (USN); ~~Warnock 474~~

Culberson Co. (Guadalupe^g Mts.): Paul C. Standley 40485, in 1924 (USN); M. S. Young, on Aug. 29, 1916 (TU^S). Jeff Davis^M Co. (Davis Mts.): Vernon Bailey 407, in 1901 (USN); D. C. Correll 13548, 14064, in 1946 (SMU); V. L. Cory 53086 (USN), 53106, 53158, in 1946, (all SMU); L. C. Hinkley 1095, in 1935 (CRB, TU^S); C. L. & Amelia A. Lundell 14251, in 1945 (CRB, SMU); C. H. Miller 8184, in 1945 (SMU); E. J. Palmer 30799, 32008, 32157, in 1926 (CRB, TU^S, USN); Palmer 33431, 34479, in 1928 (USN); H. B. Parks & V. L. Cory 9098, in 1934 (CRB, TAC); Parks & Cory 18520, 18521, in 1936 (TAC); Omer E. Sperry T 2, on May 3, 1936 (CRB, USN). ↑

Presidio Co.: Sierra Tierra Vieja, Hinkley 2726, 2727, in 1943 (CRB); Chinati Mts., Hinkley & Warnock 46900, in 1946 (CRB). County Unknown: Valery Havard, in Oct., 1883 (USN).

Hamilton Ranch, Marcus E. Jones, on April 15, 1925 (USN);

^E MEXICO. Baja California: ~~this variety almost certainly occurs but the few spec-~~

~~imens seen belong to the species.~~ San Vicente & vicinity, Jones, on Dec. 16, 1927 (PC, as *S. laevigata*);

^ Nachoguero Valley, L. Schoenfeldt 3436 in 1894 (USN); 2 (mi. so. of Santo Tomas, elev.

585 ft.), Ira L. Wiggins 4271, in 1930 (USN); La Encinal, on west side of Sierra San Pedro Martir, ~~alt~~ elev. 6000 ft., Wiggins 9798, in 1941 (USN). Sonora (Region of Rio de Bavispe). Jarilla, Canon de Bavispe, Stephen S. White 3312, in 1940 (CRB); Las Tier-
ritas de El Temblor, Sierra de El Tigre, White 3397, in 1940 (CRB); Rancho del Robles, (na.) of El Tigre, ~~alt~~ elev. 6000 ft., White 4276, in 1941 (CRB).

CHIHUAHUA: Sierra Madre Mts., alt. 7000 ft., Jones, on Sept. 19, 1903 (PC); Mojarichie, Irving Knobloch 5849, in 1939 (?); ~~same~~ do., Knobloch 7052, in 1940 (?); Majalca, Harde Le Seuer 593, in 1936 (SMU); Valley near Chihuahua, C. G. Pringle 709, in 1886 (USN, 3 sheets).

COAHUILA: San Lorenzo Canyon, mts. near Saltillo, ~~alt~~ elev. 7000 ft., Pringle 10210, in 1906 (USN).

NEW COMBINATIONS IN SOUTHWESTERN SALIX

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Journ. Wash. Acad. Sci. 40
1950

In preparing treatments of the genus Salix for certain manuals of botany, and for a final monograph, the changes in status require publication and discussion. The descriptions permitted in most manuals are too brief to ^{really} ~~really~~ acquaint students with novelties, and adequate discussion and citation of specimens are impossible. The ^{deleted} ~~deleted~~ writer has been guilty of such unfair practices in past years.

1. Salix Gooddingii Ball and Its Glabrous-Capsuled Variety.

Salix Gooddingii was published in 1905 (Bot. Gaz. 40:376), based on Goodding 689 from what is now Clark Co., Nevada. This was a somewhat immature, partially insect-parasitized, and unusually pubescent specimen. Misled by foliar immaturity, and by the dense pubescence of both vegetal and pistillate floral organs, the new species was assigned wrongly to Section Longifoliae (Sandbar Willows) instead of Section Nigrae (Black Willows). A specimen which should have been made the staminate type, Goodding 719, was overlooked entirely. These two errors were brought to the writer's attention later by Professor W. W. Rowlee and were acknowledged in a second paper on S. Gooddingii (l. c. 1921). That early experience taught the writer never again to base a new species on a single collection, a fact well worth learning.

In the paper of 1921, the species was redescribed, and illustrated by 3 photographs of Colorado Valley trees. The description was broadened to include in the species the glabrous-capsuled expression of the plant, as Schneider (l. c.) had done in 1918 and 1919. When accumulating material of both forms indicated that the glabrous-capsuled plant should ~~should~~ be recognized as a variety, it was assumed that S. nigra var. vallicola Dudley (in Abrams, Flora of Los Angeles and Vicinity 100. 1904) represented this variety. Abrams had described the capsules as "glabrous or more or less pubescent". Britton, in raising Dudley's variety to specific rank as S. vallicola (Dudley) ^Britton (in North American Trees 194. 1908), described the capsules simply as "glabrous". The writer overlooked the fact that, in spite of these descriptions, the type specimen Abrams had cited (Abrams 3256, from Orange County, California) actually had pubescent capsules. Under taxonomic rules, the type specimen, rather than the published description, governs the application of a name. Hence, both S. nigra var. vallicola Dudley and S. vallicola (Dudley) Britton are synonyms of S. Gooddingii Ball.

Because of the erroneous assumption that var. vallicola was a glabrous-capsuled variation, large ^unumbers of collections with glabrous ovaries and capsules have been determined as S. Gooddingii "var. vallicola (Dudley) Ball" but, by oversight, that combination never has been published. In consequence of this series of errors, it now becomes necessary to publish this variety under a new and different name.

Salix Gooddingii Ball, var. variabilis, n. var. A species different ovaries capsule-like glabrous. Distinguished from the species by ovaries and capsules glabrous. In the species, the ovaries are always more or less densely pubescent and the young capsules also are pubescent, but in age the capsules to become glabrate or glabrous.

^{or puberulence}
The pubescence of ^uvegetal organs (twigs, bud scales, petioles, midribs, and blade bases) is variable in both variety and species. In general, these organs in the typical form are more pubescent, and retain the hairiness longer. In the variety, they usually are pubescent or puberulent only while young and generally become glabrate soon and entirely glabrous later. However, exceptions occur in both species and variety. Hairiness varies with the stage of development of the various organs. Staminate specimens add to the difficulty of determination, as they have no ovaries or capsules to reveal pubescence. They must be assigned to the species or to the variety accordingly as one or the other occurs exclusively or commonly in the locality. More abundant hairiness probably is influenced by the higher temperatures characteristic of the more southern latitudes and lower ~~mountain~~ altitudes occupied by the species. While no hard and fast lines can be drawn between species and variety, the wide differences between the the more extreme expressions still indicate that a varietal separation should be helpful to students.

Both species and variety are found commonly as shrubs to small or mid-sized trees 7-40 feet (2-12 meters) tall. Larger trees of both, 50-60 feet (15-18 meters) high, are found throughout their ranges, and very large trees 70-80 feet (21-24 meters) in height occur occasionally. The combined range of the two is from southern California eastward to western Texas, including adjacent Mexico and southern Utah and Nevada, with a long finger extending northward through the Central Valley of California as far as Shasta County.

Typical S. Gooddingii has its most abundant and practically exclusive distribution in the lower part of the Colorado River Valley. This area extends southward from Washington County in southwestern Utah, and Clark County in southeastern Nevada, through the western parts of Mohave and Yuma Counties in Arizona, and the eastern parts of San Bernardino and Riverside Counties and all of Imperial County in California, to the Gulf of California in the States of Sonora and Baja California in adjacent Mexico. The variety is practically absent from this area. The species extends sparingly westward, with the variety, to Orange and San Diego Counties of California and western Baja California in Mexico. Northward, it occurs more sparingly, with the abundant variety, in the Central Valley of California to Kern and Fresno Counties, with one known occurrence in Yolo County.

S. Gooddingii occupies an area of relatively low base level. It occurs at sea level to as much as 150 feet below in the Salton Sink of Imperial County. Throughout its range in southern California and adjacent Arizona and Mexico, and also in the Central Valley, it occurs at elevations of only a few hundred feet. In the mountains of these areas, however, it may reach elevations of 2000 feet (600 meters), and rarely to 2800-3000 feet (840-900 meters) in Nevada and Utah.

Variety variabilis, on the other hand, is absent or relatively rare in most of this area of low base level, although it occurs at sea level or below in the Death Valley of Inyo County, and commonly at altitudes of a few hundred feet in the Central Valley as far north as Shasta County, California. Its large area of exclusive occurrence is eastward across Arizona, southern Utah, New Mexico, and western Texas, with adjacent portions of the States of Sonora and Chihuahua in Mexico. In the mountains of these States it ascends to 4500 or 5000 feet (1350-1500 meters), and rarely to 5500 or 6500 feet (1650 or 1950 meters) in southern Arizona.

Specimens Cited. For the western area, where both species and variety occur, it seems desirable to cite specimens of each. Those listed are in the following herbariums: Carleton R. Ball, (CRB); U.S. Forest Service, (FS); and U.S. National Herbarium, (USN). Where the labels bear collection numbers, the date is not cited here, except in some cases where the same numbers were used in successive years. For convenience of students, the specimens are listed by counties in each State, as counties are shown on most maps whereas many creeks, small lakes, canyons, mountains, and small towns are not. The full name of the collector is given in the first listing and only the surname thereafter. Specimens of the species are cited first, then those of the variety. Listings are from east and south to ~~WESTERN~~ west and north.

Salix Gooddingii. ~~MOHAWE~~ ARIZONA. Yuma County: Yuma, Carleton R. Ball 1740 (old capsules glabrous), 1901 (old capsules pubescent), (both CRB, USN); Yuma Desert, Aven and Ruth A. Nelson 1291 (USN); Yuma, F.O. Wooten, April 21, 1913 (USN); Yuma-Mohave County Boundary: Alamo Crossing of Bill Williams River, Leslie H. Goodding Sal.-38, in 1938 (CRB). Mohave County: Topock, Colorado River, F.A. Goldman 2970 ^u (SH); Willow Beach, Black Mts., Russell K. Grater S 1, S 2, S 3, in 1938 (CRB); 8 miles above Pierce's Ferry, Marcus W. Jones 5077 ^u (USN); Beaver Dam Wash, Beaver Dam (Littlefield), Constant H. Robinson 39 (CRB); near Petrified Springs, Littlefield, Ivar Tidestrom 9236 (CRB, USN). ^{and} County Unknown: Beaver Creek (several in Arizona); B. E. Fernow, Aug., 1896 (USN, as S. fluviatilis).

UTAH. Washington County: St. George, alt. 900 meters, W. W. Eggleston 14773 (USN); Leeds, Goodding Sal.-17, in 1938 (CRB, not var. vallicola as determined); Virgin River 3 miles northwest of Hurricane, alt. 2800 feet, Bassett Maguire and H.L. Blood 1317, 1317a (CRB); Along Santa Clara Creek, St. George, Tidestrom 9276 (USN). ~~NEVADA~~. Clark County (formerly part of Lincoln County): Muddy Creek (River), Goodding 689, in 1902 (CRB, pist. type); Riverville, Colorado River, Goodding 719 in 1902 (CRB, stan. type; ^e USN); Muddy Creek ("Lincoln County"), P. E. Kennedy and Goodding 41 (CRB); Bunkerville, Tidestrom 9200 (USN), 9202 (CRB, USN).

CALIFORNIA. Imperial County: near Calaceia, G. O. Abrams, April, 1910 (USN); End of ferry, Ft. Yuma, Ball 1941 (CRB); 22 km north of Brawley, Mrs. H. P. Baccalin 609

(CRB); near bridge over New River, 7.5 meters below sea level, Bracelin 611, 612 (CRB); 6.5 km west of Calexico, Bracelin 613 (CRB); Colorado River, Yuma Indian Reservation, Agnes Chase 5517 (CRB, stipules glandular, fragrant); U.S. Field Station, ^{Ranch}Yuma Bard, Goodding and Charlotte Goodding Reeder 40 (CRB); San Bernardino ~~RIVER~~ (Mexican Boundary Line), Edgar A. Mearns 735, 1992 (USN); San Pedro River (same), Mearns 1110 (USN); San Bernardino River (same), Mearns 2543 (USN); Fig-Tree John's Spring, Salton Sea, ~~about~~ 150 feet below sea-level, Munz, Street, and Williams 2342 (USN); Salton Basin, S.B. Parish 8092a (CRB); Unlucky Lagoon (Mexican Boundary Commission), L. Schoenfeldt 2918 (USN); Bard, H.L. Westover 1, 2, in 1913 (CRB, USN); Westover 3, in 1919 (USN). San Diego County: Bernardo, San Dieguito River, Le Roy Abrams 3371 (USN); Pine Valley, Mearns 3977 (USN). Orange County: Santa Ana River, near Orange, Abrams 3256 (USN); Rancho Santa Ana, near River, Carl B. Wolf 2950, 2955 (CRB). Riverside County: Cameron Lake, Colorado Desert, T.S. ^{Grandegoe}March 23, 1901 (CRB); Thousand Palms, Carl Epling, March 27, 1927 (CRB); 1000-Palm Canyon, Colorado Desert, H. De Forest 1, in 1938 (CRB); north of Elsinore, Philip A. Munz 12032 (USN); near State ⁿDispection Station, on way to ⁿBythe Bridge, Wolf 3085 (CRB).

San Bernardino County: Beside Mohave River, 1.5 km north of Barstow, Bracelin 597, 598 (CRB); Ft. Moh(ave), J.G. Cooper, March 25, 1861 (CRB, USN); along Mohave River, Cooper (USN, without other data); San Bernardino, P.B. Kennedy 1672 (CRB); Colton, Jones 3195 (USN); Santa Ana River, San Bernardino, Alfred Rehder 165 (USN); near Mohave River, 5 miles west of Barstow, W.A. Setchell and Victor Duran 10 (CRB); Barstow, Tidestrom 9687 (USN); San Bernardino, George R. Vasey 566 (USN). Kern County: beside Old River Road, 32 km southwest of Bakersfield, Bracelin 576, 577 (CRB). Fresno County: San Joaquin River at Friant, Albert E. Thompson 1012 (CRB). Yolo County: river bank near Madison, A. A. Heller 5419 (USN). MEXICO. BAJA CALIFORNIA: Seven Hills, on the Salton River, Mearns 2869, 2877 (USN, stan.).

Variety variabilis. UTAH. Grand County: Moab, Goodding Sal.33, Sal. 39, in 1933 (CRB). San Juan County: Augusta Natural Bridge, 48 miles west of Blanding, Goodding Sal. 33, in 1939 (CRB); San Juan River, 2 miles east of Mexican Hat, Maguire 20167 (CRB).

Washington County: Arizona Strip, Bernell McAllister 60 (CRB); Zion National Park, A. M.

Woodbury 30 (USN). County Unknown: Fremont's Expedition to California, 1845-47 (USN, in ink on label is "Utah"; in faint pencil is "402a. Calif."). NEVADA. Nye County: Ash Meadows, F. V. Coville and Frederick Funston 2145 (USN). CALIFORNIA. San Diego County: San Luis Rey River bottoms, southeast of Bonsall, Chas. B. Fiker 3349 B (CRB). Riverside County: near spring at Twenty-nine Palms, Colorado Desert, Clary Herbarium 920 (CRB); Palm Canyon, Ivan Johnston 1056 (USN); north of Elsinore, Manz 12032 (CRB); Diablo Canyon, near Clary's Coral Reef Ranch, Colorado Desert, Carl W. Sharnsmith 14 (CRB). San Bernardino County: along Mohave River, Helendale, Bracelin 590, 593 (CRB); Barstow, Frank W. Johnson, April 23, 1910 (USN). Inyo County: Mitchell Ranch, Resting Springs Valley, Coville and Funston 262 (USN); Furnace Creek Ranch, Death Valley (cultivated), Coville and Funston 469 (USN); Big Spring, Shoshone, Coville and M. French Gilman 454 (USN); Black Rock Springs, Mark Kerr 96 (CRB).

Central Valley of California. Kern County: Tulare Plains about 10 miles south of Bakersfield, Coville and Funston 236 (USN). Tulare County: Hanford, Alice Eastwood 3946, 3951 (USN); Visalia, Eastwood 34 (USN); Kaweah River, between Ash Mountain and Three Rivers, Harold E. and Susan T. Parks 01037, 01070, 01071 (USN), (all ~~LEAK~~ CRB); Kaweah River north of Visalia, Thompson 1042 (CRB). Fresno County: Fresno, George L. Fisher 79 (USN); Centreville, Kings River Delta, H. E. Parks 0932 (CRB); beside San Joaquin River at Friant, Thompson 1013 (CRB). Madera County: ~~Madera~~ River, J.W. Congdon, June 21, 1903 (USN); Power House 1, San Joaquin Forest, Ernest G. Dudley, Nov., 1911 (CRB); shore of Bass Lake (Reservoir), alt. 3400 feet, Thompson 1063 (CRB). Merced County: east of Los Banos, Bracelin 702 (CRB). Stanislaus County: Denair, Paul A. Harvey 1, 3, in 1940 (CRB). San Joaquin County: Tom Payne's or Paradise Cutoff, Tracy Pike, about 15 miles south of Stockton, Ball 1929 (CRB, USN). County Unknown: Sacramento Valley, U.S. Exploring Expedition under command of Capt. Wilkes (USN, no date). Sacramento County: Sacramento, Lester F. Ward 89 (USN). Amador County: Sutter Creek, Ione, C.H. Merriam 4, in 1905 (USN); South Jackson, George Hanson 198 (USN). Yolo County: Runney, C.F. Fiker 2936 (USN). Nevada County: ^{Clear} Fern Valley, west of Grass Valley, Heller 13163 (USN). Lake County: Shore of ~~Clear Lake~~ Lake in Highland Park, Milo S. Baker 5351, 5357 (CRB); Bank of

Cache Creek, H. N. Bolander 2678 (USN); near Clear Lake, John Torrey 490 (USN).
Butte County: near U.S. Rice Experiment Farm, Biggs, Ball 1820 (USN), 1821 (USN),
1822, 1824, 1839 (all CRB); along Chico Creek, Chico, Ball 2069, 2071, 2072 (CRB, USN);
Chico-Groville Road, 12 miles from Chico, Heller 11262 (USN). Tehama County: Red Bluff,
L.E. Smith 596, 599, 600, 638, 669 (all USN); Shasta County: Redding, bridge at north
end of town, Bracelin 491 (CRB, USN); Reed Creek, Smith 610 (USN).

MEXICO. BAJA CALIFORNIA: La Paz, Edward Palmer 77, in 1890 (USN, as S. Bonpland-
iana); Gardener's Laguna, L. Schoenfeldt 2895, in 1894 (USN). State Uncertain: Lake
Polonius (?), Mimbres Valley, Mearns 184, in 1892 (USN). SONORA: Alamo, near Magdal-
ena, Kennedy 7030, in 1925 (USN); vicinity of Hermosillo, Rose, Standley, and Russell
12391, 12501, in 1910 (USN); vicinity of Navajon, Rose et al., 13156, in 1910 (USN);
vicinity of Magdalena, Rose et al. 15113, in 1910 (USN); Rio Bavispe, near Colonia
Oaxaca, Stephen S. White 423, in 1938 (CRB); Arroyo Carretas, Carretas, border of Chi-
hua and Sonora, Municipio de Janos, White 2615, in 1939 (CRB); Rio Bavispe, Bavispe,
White 2881, in 1940 (CRB); Horeoncitos, Rio Hauchinara, (Rio de Bavispe area), White
2975, in 1940 (CRB); Rio Fronteras, San Rafael, White 3862, in 1941 (CRB); Colonia
Morelos, White 4102, in 1941 (CRB). ZACATECAS: Southwest of San Ysidro, Dist.
Guerrero, Ynes Mexia 2534, in 1929 (CRB); Santa Eulalia Mts., Wilkinson, in April,
1898 (USN); White 2615 and 4102, listed above in Sonora, may possibly be from adjacent
Chihuahua.

Bibliography. Because the material comprising S. Gooddingii and its variety
variabilis has been presented and discussed under so many different names, it seems
desirable to give a fairly full bibliography of these treatments. Where these pub-
lications cover southern or central California and the adjacent portions of Nevada,
Arizona, and Mexico, they may be discussing either the species or the variety, or both,

S. Gooddingii n. sp., Ball, Bot. Gaz. 40:376. 1905; Ball, Bot. Gaz. 72:227-234, figs. 2-4. 1921; Schneider, Bot. Gaz. 65:12-13. 1918; Schneider, Journ. Arnold Arb. 1:9. 1919; Tidestrom (Flora of Utah and Nevada), Contrib. U. S. Nat. Herb. 25:135. 1925; Baker, Partial List of Seed Plants of the North Bay Counties, 22. 1934, rev. ed. 23. 1945 (mimeographed); Goodding (Willows in Region VIII), U.S. Dept. Agric., Soil Conservation Serv., Reg. Bull. 66:6-7, 4 illus. 1940; Kearney and Peebles (Flowering Plants and Ferns of Arizona), U.S. Dept. Agric., Misc. Publ. 423:219. 1942; Little (Checklist of the Native and Naturalized Trees of the United States), U.S. Dept. Agric., For. Serv. (mimeographed). 263. 1944.

S. nigra, as interpreted by numerous authors, * not Marshall, in floras and forest floras of varying geographic coverage, so far as these apply to southwestern areas from western Texas westward. These works are not cited here in full, only author and year

 * The writer, in 1921, used the commonly accepted but both inaccurate and misleading form of citation: "S. nigra of numerous authors, not Marsh." when he should have written: "S. nigra, as interpreted by numerous authors, not Marsh." Schneider, in 1918 and 1919, (l. c.), similarly had ascribed the publication of an "S. nigra" to each of nine authors, when they merely were ^{wrongly} interpreting S. nigra Marshall. THE SAME error was repeated by the writer in 1923 (in Abrams, Flora of the Pacific States 1:490.

 being given. For better understanding, they are grouped by size of area covered, as local, State-wide, regional, and national. Coulter, Botany of Western Texas, is listed as regional because of the large area covered. Local: Greene, 1894; Hall and Hall, 1912; Jepson, 1901, 1911; Merriam, 1893; Parish, 1913; State-wide: Bobb, 1879 and 1890; Eastwood, 1905; Jepson, 1909, 1909, 1910; Wootton, 1913; Wootton and Standley, 1915. Regional : Coulter, 1894; Howell (Thomas), 1902; Sudworth, 1908; National: Sargent, 1896; 1905; Sudworth, 1897, 1898.

S. nigra Marsh., var. vallicola Dudley, in Abrams, Flora of Los Angeles and Vicinity 100. 1904, and suppl. ed. 100. 1911; Jepson, Man. Flowering Pl. Calif. 263. 1925; Pickwell and Sayle (Trees of Valley and Foothill), in West. Nature Study 1:199, fig. 90, 206. 1930.

- S. nigra Marshall, var. venulosa (Andersson) Bebb, n. comb., in Coville (Botany of the Death Valley Expedition), Contrib. U.S. Nat. Herb. 4:199. 1893; as interpreted by Bebb (Review of the Willows of California), Bot. Gaz. 16:102. 1891 (see discussion below).
- S. nigra Marshall, var. Wrightii, as interpreted by Bebb, Bot. Gaz. 16:102-103. 1891; as interpreted by Bebb, in Coville, Contrib. U.S. Nat. Herb. 4:200. 1893; as interpreted by Coulter (Botany of Western Texas), in part, Contrib. U.S. Nat. Herb. 2:419. 1894, ~~not~~ ~~Andersson~~, not Andersson. (see discussion below).
- S. vallicola (Dudley) Britton, North American Trees 184, fig. 1141. 1908.
- S. Wrightii, as interpreted by Wootton and Standley (Flora of New Mexico), Contrib. U.S. Nat. Herb. 19:160. 1915, not Andersson. (see discussion below).

Andersson first published his variety venulosa in 1867 (Monographia Salicium) as a variety of S. nigra Marsh., subspecies longipes (Shuttleworth), and described the New Mexico plant as having leaves paler to glaucous beneath. S. longipes is the southeastern plant with glaucous leaves now known as S. caroliniana Michx. and belongs to Section Bonplandiana. Its range extends west to southern Texas, so a New Mexico plant with glaucous leaves would represent either S. Bonplandiana (Section Bonplandiana) or S. Wrightii (S. amygdaloides var. Wrightii) of Section Triandra.

When Bebb listed S. nigra var. venulosa, or var. Wrightii, as occurring in California, he was dealing with S. Gooddingii or its variety variabilis, because neither S. Bonplandiana nor S. Wrightii occurs as far west as California. In 1891, under S. nigra, he states that across New Mexico and Arizona it takes on the character of variety venulosa and that variety Wrightii is the same thing. These statements show conclusively that Bebb did not then distinguish between the green-leaved species, S. nigra and the then unnamed S. Gooddingii, and the glaucous-leaved species, S. Bonplandiana and S. Wrightii.

Wootton and Standley (Flora of New Mexico), in 1915, under their interpretation of S. Wrightii Andersson, state that the "leaves are light green, of about the same color on both surfaces". Under S. nigra, they say: "It is very probable that ^{further study of} what is here considered S. nigra in New Mexico will show that it belongs to S. Wrightii, which is the common plant of the type". Apparently they were dealing with S. Gooddingii variety

variabilis in both cases and did not recognize var. Wrightii at all because they limit S. amygdaloides to the extreme northern part of the State, where it does occur but variety Wrightii does not.

Separation from S. nigra. In the Southwest, S. Gooddingii and its variety variabilis are the counterparts of the abundantly-occurring S. nigra and its varieties in the eastern half of the United States. S. nigra and its southwestern variety Lindheimeri Schneider are marked by twigs light brown to dark brown and glabrous or sometimes puberulent; leaves smaller and green to dark green; stipules without glands on the upper (inner) surface, or occasionally a few such glands on var. Lindheimeri; and capsules shorter in S. nigra but sometimes as large (as those of S. Gooddingii) in variety Lindheimeri, but always glabrous in both.

S. Gooddingii and variety variabilis, on the other hand, have twigs yellow to yellowish and more or less pubescent-puberulent (especially when young) to glabrous; leaves mostly yellowish-green and larger (those on vigorous shoots up to 15-19.5 by 2-3 cm.); stipules commonly with abundant fragrant glands on the upper surface; and capsules commonly to 6.5 or 7 mm long and ovaries and capsules always pubescent in S. Gooddingii but glabrous in variety variabilis.

In western Texas (north to south), variety variabilis is found on the Canadian River in Hemphill County in the northeastern Panhandle, within the range of both S. nigra and variety Lindheimeri. On the headwaters of the Red River, it reaches Deaf Smith and Donley Counties in the southern Panhandle, Donley County being within the range of variety Lindheimeri. In the Staked Plains (Llano Estacado), it reaches Hale and Lubbock Counties in the Brazos River drainage, Hale County being in Lindheimeri territory. Farther south and east, it occurs in Tom Green County of the Concho River drainage, occupied also by S. nigra. It occupies also most of the mountainous ~~extensive~~ ^{ties} in the large triangular area south of New Mexico to as far east as Pecos and Brewster Counties, an area where neither S. nigra nor variety Lindheimeri are found. It has one sporadic occurrence in Starr County, in far southern Texas, where both

S. nigra and variety Lindheimeri occur. This occurrence probably resulted from flotation down the Rio Grande.

All known Texas specimens showing the distribution of variety variabilis and of S. nigra and its variety Lindheimeri are cited in Dr. Lundell's forthcoming Flora of Texas.

The eastern extension of variety variabilis from New Mexico into western Texas is interesting ecologically. In northeastern New Mexico, it crosses the divide east of the Rio Grande ~~headwaters~~ and the Pecos River and extends down the headwater streams of the Canadian and Red Rivers, or Mississippi River drainage. In east-central and southeastern New Mexico, it crosses the divide east of the Pecos River and extends down the headwaters of the White (Brazos) and Concho (Colorado) Rivers, of the Gulf drainage. It occurs along the Rio Grande and the Pecos River and their tributaries, in southwestern Texas, as far east as Brewster and Pecos Counties, with the one sporadic occurrence noted far down the Rio Grande in Starr County.

On the other hand, S. nigra and its variety Lindheimeri have not been able to cross these divides between the eastward-flowing rivers and southward-flowing Rio Grande and Pecos River. In fact, they apparently have not been able to ascend any of these streams to their headwaters. Undoubtedly, downstream spread is accomplished with comparative ease and upstream spread with relative difficulty, but why were both species not affected equally when they reached these divides? Did the long-recurring eastward drives of large herds of grass-fed cattle from the Southwest to the frontier Kansas railroads help the eastern spread of western willows? Cattle browse freely on willows and a piece might be carried far in a steer's mouth. Likewise a stem regurgitated during cud-chewing while bedded down for the night by a spring or stream might be dropped and trampled into the mud in the movements of the following morning. Only the few returning cowboys and chuck wagons traveled in the reverse direction.

2. *Salix ligulifolia* (Ball) Ball. (*S. lutea* Nutt., var. *ligulifolia* Ball)

This willow has been so differently treated by so many writers that it seems desirable to review its history, rewrite its description, and cite authenticated specimens to show its recognized wider distribution. It is chiefly in California and Oregon that the known range has been considerably extended. Specimens cited in 1921 are not relisted here.

Salix cordata, as interpreted by Bebb, in Brewer and Watson, Botany of California 2:85. 1880 (preprinted, with same pagination, as Bebb, Willows of California. 1879); as interpreted by Bebb, in Coulter, Manual of the Botany of the Rocky Mountain Region 335. 1885 (as to distribution in most of the Rocky Mountains area); by Bebb (Review of the Willows of California), Bot. Gaz. 16:104. 1891; and by Ball, in Coulter and Nelson, (New Manual of the Botany of the Central Rocky Mountains) 132. 1909 (as to distribution in the Rocky Mountains and westward), not Muhlenberg.

S. cordata Muhl., var. *Mackenziana*, as interpreted by Bebb, in Brewer and Watson, Botany of California 286. 1880, and preprint 2:86. 1879 (so far as most occurrence in California is concerned); and by Bebb, in Coulter, Manual of the Botany of the Rocky Mountain Region 335. 1885 (so far as occurrence in most of the Rocky Mountain region is concerned), not Hooker.

S. cordata Muhl., var. *Watsoni*, as interpreted by Wootton and Standley (Flora of New Mexico), Contrib. U. S. Natl. Herb. 10:159. 1915 (so far as southern distribution is concerned), not Bebb.

S. ligulifolia Ball, in litt. --?, Schneider, Journ. Arnold Arb. 2:188(-189). April, 1921. (nomen nudum).

S. ligulifolia Ball (*S. lutea* var. *ligulifolia* Ball), n. comb., apud Smith (Willows of Colorado), Amer. Midland Nat. 27:236(-237), Jan., 1942; Kearney and Peebles (as synonym of the variety, see below); Thompson, Albert E., *Salix ligulifolia* Ball, the Strap-leaved Willow and its Relatives in the Central Sierra Nevada. 6 pp. (typed, not published). 1942; rev. ed. 1943.

S. lutea Nutt., var. *ligulifolia*, n. var., Ball, Bot. Gaz. 71:428(-430). June, 1921; Ball, in Abrams, Illustrated Flora of the Pacific States 1:494. 1923; Tidestrom (Flora of Utah and Nevada), Contrib. U. S. Nat. Herb. 25:136. 1925; Kearney and Peebles (Flowering Plants and Ferns of Arizona), U.S. Dept. Agric., Misc. Publ. 423:220. May, 1942 (*S. ligulifolia* Ball as synonym).

Frutex; ramulis vixioribus fuscis ferrugineis aut nigrescentibus, junioribus flavescentibus aurulentis saepe pubescentibus; foliis liguliformibus anguste lance-anguste-olatis aut oblongo-lanceolatis subtus glaucis; capsulis 4-5.5 mm longis glabris.

Shrub with clustered stems, commonly 1-3 meters tall, rarely 4-5 meters (Plumas County); general color effect dark green; bark dark gray; branchlets varying with age, the new growth yellowish and generally puberulent, summer-grown twigs yellowish to brown and often pubescent to densely so, 1-year and 2-year twigs brown or reddish-brown to blackish, often shining, mostly glabrous or the 1-year retaining (or renewing) previous pubescence; buds ovate-lanceolate, 5-10 mm long, acute or obtusish, colored and clothed as the twigs, often drying black; stipules semi-ovate and acute to semi-lunate and obtuse, 4-10 mm long, or to 15-18 mm on vigorous shoots, entire to serrulate, mostly glabrous, glaucous beneath; petioles stoutish, 5-10 mm long, yellowish to brown, pubescent to glabrous; leaves mid-sized, ligulate, or lanceolate, or oblong-lanceolate (narrowly oblanceolate while unfolding), 5-10 cm long by 1-2 cm wide, or 11-13.5 by 2.5-3 cm on vigorous shoots, acute or very short-acuminate at apex, broadened, rounded, truncate, or cordate at base, subentire or more or less serrulate or glandular-serrulate, the largest sometimes toothed near base, reticulate veiny on both sides, especially beneath, dark green above, glaucous to white-glaucous beneath, glabrous after unfolding or the whitish midrib puberulent above on the basal portion.

Amens coetaneous or somewhat precocious, the staminate slender, 2-3 cm long, sessile and naked or with 1-2 small bracts at base; pistillate 2-4 or 5 cm long, to 1.4 cm wide in fruit, subsessile or on leafy-bracted peduncles 5-10 mm long; scales elliptic-oblong, obtusish, brownish, drying black, densely white-tomentose or the apex becoming glabrate externally; stamens 2, filamenta glabrous, free; capsules small, lanceolate or ovate-lanceolate, 4-5.5 mm long, glabrous; ~~sepal~~ pedicels mostly 1.5-2.5 mm long, rarely 3.5 mm, glabrous; styles 0.3-0.5 or 0.7 mm long, mostly entire; stigmas short, entire, notched, or bifid; gland short. The flowering period cover late April and May, with fruiting continued thereafter.

Salix ligulifolia is a clumpy shrub of mountain streams and meadows, at altitudes ranging from 3000 to 9000 or rarely 9500 feet (900-2700 or 2850 meters) but occurring most commonly at altitudes of 4000 to 7000 feet (1200-2100 meters). It often is associated with S. lasiandra Benth. and S. Lemmonii Bebb in the Sierra Nevada. It ranges from the Black Hills of South Dakota (Custer Co.), and the Laramie and Medicine Bow Mountains of southeastern Wyoming, southward across Colorado and New Mexico, westward in Arizona, and northward in the Sierras of California from Tulare County to Plumas and Tehama Counties. There is sparse or sporadic occurrence in southern Utah and Nevada, and in Klamath, Jackson, and Josephine Counties of extreme southern Oregon also.

It is the southwestern representative of the Section Cordatae, as S. lutea Nutt is the western, S. Mackenziana (Hooker) ^Burratt is the northwestern, and S. rigida Muhl. (S. cordata Muhl., not Michx.) is the eastern. It parallels S. rigida most closely in the variability of hairiness on the vegetal organs. What one finds depends much on the stage of their development when observed or collected. The ranges of the dark-twigged S. ligulifolia and S. Mackenziana scarcely overlap at all, but yellow-twigged S. lutea and its varieties occur throughout much of the ranges of both the others.

The distribution was well indicated by the specimens cited in 1921, except for California and southern Oregon. California was credited then with a single collection and Oregon with none. Below are cited those recognized by the writer since 1921.

WYOMING. Laramie County: Sybille Creek, Elias Nelson 672, in 1901 (CRB). Albany County: Woods Creek, L.N. Goodding 1432, in 1903 (CRB); Sand Creek, Aven Nelson 6965, in 1900 (CRB); Laramie River, near Laramie, alt. 7000 feet, Louis C. Williams 2812, in 1935 (CRB, and in USN as no. 2212). COLORADO. (alphabetical). Alamosa County: Alamosa, Hazel M. Schmoll 1032, 1033, in 1924 (CRB). Archuleta County: San Juan Nat. Forest, S. Duval Anderson A 49¹/₂, in 1925 (FS 50272¹/₂). Boulder County: Ward, alt. 9150 feet, Schmoll 601, in 1952 (CRB). Conejos County: Conejos River, Goodding Sal.-50A, in 1938 (CRB). Costilla County: 10 miles west of LaVeta Pass, Goodding and Leston Goodding Sal. 20-39, in 1939 (CRB). El Paso County: near Colorado Springs, E.C. Schneider J-1, J-4, NC-4, NC-6, PS-3, WC-3, W C-5, all in 1910 (all CRB); Beaver Creek, 3 miles west of Monument, E.R. Warren 3, 4, on June 9, 1926 (CRB, USN). El Paso-Teller Counties: Pikes Peak Forest Reserve, S.J. Flinham, on Sept. 2, ---- (USN, as S. lutea var. W

Watsoni; Pikes Peak Region, alt. 6750-9500 ft., I. M. Johnston 2779, 2780, 2781 (USN), 2782 (USN), 2783, 2784, 2785, 2786, in 1920 (all CRB). Gunnison County: Anthracite Creek, alt. 8800 feet, Warren 21, in 1927 (CRB); Fitzpatrick Mesa, 2 miles west of Blue Creek, alt. 8500 feet, R. C. Rollins 1991, in 1937 (CRB). Larimer County: La Porte, Ernest C. Smith 660, 818, in 1935, 721, 723, in 1936 (all CRB). Rio Grande County: vicinity of Monte Vista, Schuch 1040, 1057, in 1924 (CRB). Teller County: East of Divide, J.H. Christ 213, in 1935 (CRB). Teller-El Paso Counties; see El Paso-Teller Counties, above). Weld (?) County: Chimney Rock, on Sand Creek, 50 miles north-northeast of Ft. Collins, Smith 1710, in 1945 (CRB).

NEW MEXICO. Catron County: Beaverhead Ranger Station, Goodding and Goodding Sal.-5-39, in 1939 (CRB). Colfax County: Cimarron Creek, Soden and Baldy Meadow, Goodding and Goodding Sal.-6-39, in 1939 (CRB). Rio Arriba County: 81 miles north of Santa Fe, on Road to Chama, Goodding Sal.-54, in 1938 (CRB); West slope of Sierra Maciniento, Goodding Sal.-83, in 1938 (CRB, as S. Mackenziana var. macrogonia Hall). Specimens from Grant, Lincoln, and Union Counties cited in 1921. NEVADA. Washoe County: Reno, Ivar Tidestrom 10623, in 1919 (CRB). ARIZONA. County Unknown: Beaver Creek, B.E. Fernon, in Aug., 1896 (USN). Numerous specimens from east-central portion cited in 1921. Coconino County: Upper Oak Creek near Flagstaff, H. J. Fulton 7166, in 1930 (USN).

OREGON. Klamath County: Johnson Prairie, Elmer I. Applegate 2472, in 1898 (USN); south end of Lake of the Woods, F.V. Coville 1205, in 1902 (USN); 5 miles northeast of Ft. Klamath, Morton E. Peck 1972E, in 1937 (CRB); near creamery, Klamath Agency, Wood River, F.A. Walpole 2217, in 1902 (USN). Jackson County: Jackson Creek, $\frac{2}{3}$ mile west of Jacksonville, L.R. Abrams and J. T. Benson 10261, in 1924 (CRB, distr. as S. lasiantha; det'd. later by Hall as S. Mackenziana); Medford, H. B. Humphrey 2054, in 1916 (CRB, as S. Mackenziana); Gold Hill, Walpole 149, in 1899 (USN, too juvenile for complete certainty). Josephine County: Gravelly flood-plain, East Fork of Illinois River, near Highway 199, Carleton R. Ball and Harold E. Parks 01278, in 1932 (CRB).

UTAH. Kane County cited in 1921.

CALIFORNIA. (north to south). Tehama County: South Fork of Battle Creek, 1.7 km northeast of Mineral, Ball, Bracelin, and Kautz 379, in 1931 (CRB, USN). Plumas County: 1 mile southeast of Fowler Peak, D. Axelrod 6791, in 1934 (CRB); North Fork of Feather River, at Chester, Ball, Bracelin, and Kautz 393, 394, 397, 398, in 1931 (CRB, several sheets of each; USN). Butte County, Jonesville, E. B. Copeland 621, and 3 unnumbered, on June 10, 18, and 20, 1931 (CRB); Copeland, in May 1938 (CRB). Placer County, French Meadows, American River, Tahoe National Forest, L.S. Smith 3, in 1931 (CRB). El Dorado-Placer Counties: Tahoe-to-Placerville Road, with S. Lemmonii, Emily Smith 14, in 1933 (CRB). Tuolumne County (Yosemite National Park): Carl Inn, Big Oak Flat and Tioga Roads, Ball, Bracelin, and Emily Smith 552, in 1931 (CRB); same, Smith 3a, in 1933, (CRB); South Fork of Tuolumne River, in west edge of Park, Albert E. Thompson 1195, 1197, 1199, in 1941 (CRB). Mariposa County (mostly Yosemite National Park): Illilouette Cañon, alt. 1940-1970 meters, E. B. Babcock 1059, in 1912 (USN, as S. cordata Mackenziana); Crane Flat on Big Oak Flat Road, Ball, Bracelin, and Kautz 509, in 1931 (CRB, USN); Big Creek, tributary of South Fork of Merced River, just outside Park, Thompson 1105, 1106, 1109, in 1941 (CRB); Kaweah, Thompson 1182, in 1941 (CRB). Madera County: The Falls, Bass Lake, Thompson 1043, 1044, 1045, 1046, 1048, 1049, 1051, 1052, 1053, 1075, 1076, 1084, 1092, 1097, in 1941 (all CRB); area of Big Creek, near ~~Bass~~ Fresno Dome, and Beasore Meadow, etc., Thompson 1099, 1122, 1123, 1205, 1206, 1214, 1217, 1219, in 1941 (CRB). Fresno County: near shore of Hum Lake, Thompson 255, in 1939 (CRB); Indian Basin, Kings River Canyon Highway, Thompson 259, 262, 264, in 1939 (CRB); area of Sequoia Lake Dam, Thompson 391, 396, in 1940 (CRB); same, Thompson 1029, in 1941 (CRB); Huntington Lake, alt. 7000 feet, Thompson 929, 938, in 1939, and 1172, in 1941 (CRB). Tulare County: south end of Crescent Meadows, alt. 7240 feet, Mrs. H. P. Bracelin 802, 803, in 1933 (CRB); Heather Lake Trail, alt. 7500-7600 feet, Bracelin 807b, 808, in 1933 (CRB).

Thompson 253, 255, 256, 257, in 1939 (CRB); same, Thompson 1008, in 1941 (CRB); area of South Fork of Willow Creek,

Subtitle

Salix lasiolepis Benth., var. *braceli*^(a), n. var.

Salix irrorata, in part, as interpreted by Ball, in Coulter and Nelson, New Manual of the Botany of the Central Rocky Mountains 132. 1909 (by twigs "or downy-puberulent" and by the Texas, and probably some of the New Mexico distribution), not Andersson. *Salix lasiolepis* Benth., Plantae Hartwegianae 355. 1857 (in part); Andersson, Öfvers. Kon. Vet.-Akad. Förhandl. 15:118. 1858 (in part); printed simultaneously in Proc. Amer. Acad. Arts and Sci. 4:58. 1858 (reprinted as Salices Boreali-Americanae, p. 12); Andersson, in DC., Prodr. 16(2):264. 1868 (in part); Ball, in Abrams, Illustrated Flora of the Pacific States 1:496. 1923 (in part); Goodding (Willows in Region VIII) U.S. Dept. Agric., Soil Conserv. Serv., Regional Bull. 65:8, illus. 1940 (miscogr.); Kearney and Peebles (Flowering Plants and Ferns of Arizona), U.S. Dept. Agric. Misc. ~~XXXX~~ Publ. 423:219. 1942; Schneider, Bot. Gaz. 65:31. 1918 (distribution in Mexico); Schneider, Journ. Arnold Arb. 2:187-188. 1921 (in part); Wootton and Standley (Flora of New Mexico), Contrib. U.S. Nat. Herb. 19:159. 1915.

A form typical species differt foliis linearibus, linear-ellipticis, linear-lanceolatis, aut linear-oblancoelatis. Shrub 2-6 or 10 meters, or small tree 5-8 or 9 meters (17-30 feet) tall, with clustered stems and grayish bark; twigs mostly stoutish, the seasonal yellowish and pubescent to puberulent, the 1-year yellowish to brownish and often pubescent or puberulent before the epidermis peels off in the spring and sometimes becoming puberulent thereafter, the older chestnut-brown to dark-brown and glabrate to glabrous; buds stout, 2-6 mm long, or 6-10 mm long and 2-4 mm wide on vigorous shoots, colored and clothed much as the supporting twigs; stipules 2-4 or 8 mm long, obliquely lanceolate, ovate, or subulate, sometimes serrulate, glaucous beneath.

Leaf-petioles stoutish, 5-10 or 15 mm long, yellowish and pubescent while young, becoming brownish and glabrate-glabrous with age; blades very narrow, linear-elliptical, linear-lanceolate, linear-oblancoelate, or sometimes narrowly oblong, 6-10 cm long and 0.8-1.5 cm wide, or to 11-15 cm by 1.5-2 cm on vigorous shoots, narrowed at base, acute or short-acuminate at apex, subentire to ~~moderately~~ irregularly undulate-denticulate or undulate-serrulate and somewhat revolute at margins, gray-pubescent

while unfolding, usually becoming glabrate to glabrous with age, dark green and somewhat shining above, densely glaucous and reticulate beneath, the yellowish midrib prominent on both sides and often minutely puberulent above in maturity.

Aments precocious, often appearing in December-January in the axils of the old leaves, especially southward, subsessile at first, 3-7 cm long; the staminate 1.2 cm wide, stamens 2, filaments glabrous, usually united for $\frac{1}{2}$ or more of their length; pistillate 1-1.4 cm wide, the peduncle in fruit 2-5 or 6 mm long and bearing 2-4 tiny bract-like leaves; scales in both sexes persistent, obovate, very obtuse, 1-1.2 mm long, dark brown or blackish, densely clothed with long straight or tangled hairs; capsules lanceolate, 3.5-4.5 mm long, greenish, glabrous; pedicels 0.5-1 or 1.5 mm long, glabrous; styles 0.4-0.8 mm long, entire or more or less bifid; stigmas shorter, usually notched.

This southern variety of *S. lasiolepis* is named for Mrs. H. P. Bracelin, of Berkeley, California, in recognition of her extensive and discriminating collecting, and her careful and informative labeling, of California willows over a period of years. The material thus made available has added greatly to our knowledge of the characteristics, habitats, and ^{do} distribution of the species and varieties in that State.

The narrow-leaved arroyo willow is a shrub or small tree, occurring mostly along mountain streams at middle altitudes from southern California and northern Baja California eastward in southern parts of Nevada and Utah, most of Arizona and New Mexico, southwestern Texas, and northern Sonora and Chihuahua in Mexico. In California, it ranges from 2500 or 3000 feet to 6000 and sometimes 7200 feet in altitude. In the other States it occurs mostly from 5000 to 7500 or 8000 feet. It flowers in January and February southward and at lower altitudes, and in March and April northward and at higher altitudes.

The center of distribution for S. lasiolepis is in the southern two-thirds of California, where the species and all of its four varieties are found. Their total distribution area is shaped like a boot facing east, the foot to the south and the top to the north. The heel (Baja California) and sole (Sonora, Chihuahua) are in Mexico. The foot extends from the southern half of California and adjacent Nevada and southern Utah across Arizona and New Mexico, with the toe in southwestern Texas. The top extends northwards from northern California and Nevada into Washington and Idaho.

There is progressive widening of the leaves from south to north in this total area. Variety Bracoliniae, with rather linear leaves, occupies the foot of the boot. S. lasiolepis, with oblanceolate leaves, ranges from the heel in Baja California northward to Washington and Idaho. Variety Bakeri, of the Bay Area, does not differ in leaf shape. Variety Bigelovii, with obovate leaves, is found mostly near the coast, and variety Sandbergii, with elliptic-oval or obovate-oval leaves, is found in northern California and Idaho. A fifth variety, fallax Babb, if recognized, has elliptical leaves and is found in the Sierra Nevada. The species not only has broader leaves than variety Bracoliniae but the twigs usually darken more rapidly and more completely. In southern California and adjacent Nevada, the species is about as common and widely distributed as is variety Bracoliniae and also occurs sparingly in northern Arizona.

Because the center of distribution for the species and its varieties is near the coast in central California, distribution is indicated here from north and west to south and east. Authenticated specimens of variety Bracoliniae are cited, for States and Counties, by collector, number, and year. Where there is no collection number, fuller data are given. Citation of Mexican specimens follows that of U.S. specimens. Containing herbariums are ~~herein~~ indicated as follows: Carleton R. Ball, (CRB); U.S. Forest Service, (F_S); N.Y. State Museum, (NYSM); Omar F. Sperry, (OS); Pomona College, (PC); Southern Methodist University, (SMU); Texas A. and M. College, (TAC); Texas State University, (TSU); and U.S. National Herbarium, (USN).

CALIFORNIA, CENTRAL. Sonoma County: Bodega Bay, W. A. Setchell 19, in 1931 (CRB); Russian River between Monte Rio and Duncan's Mills, Setchell 22, in 1931 (CRB). Yuba County: Heart Hop Ranch, Wheatland, Carleton R. Ball 1718, in 1911 ((CRB, USN). Contra Costa County: Antioch, Alice Eastwood 3726, 3727, 3728, 3729, in 1914 (USN, ³⁷²⁸ stem. 3728 ~~type~~ type; 3729 pist. type; both with persistent leaves of 1913). Alpine County: Markleeville, Diamond Ranch, alt. 5500 feet, H. Lee ¹⁰⁷, in 1934 (CRB). Madera County: Northfork, E. G. Dudley, Nov. 1911 (CRB). Fresno County: Millwood, J.D. Culbertson 4665, in 1904 (USN). Monterey County: between Jolon and Memorial Park, Milo S. Baker 7932, in 1934 (CRB). Tulare County: near Visalia, F.V. Coville and Frederick Funston 269, in 1891 (USN, vigorous shoot with large leaves). Inyo County (all from Bennett Mountains): Coville and Funston 493, 597, 625, in 1891 (USN); Coville and M. French Gilman, alt. 7300 feet, 221, 222, in 1931 (USN); Gilman 2134, 2138, 2156, 2232, in 1936 (USN); Willow Springs, 14 miles west of Independence, Mark Keen 71, in 1932 (CRB); some others are too ~~new~~ juvenile for certain determination.

CALIFORNIA, SOUTHERN. Kern County: Edge of desert, 1 mile east of Walker Pass Summit, alt. 5250 feet, Mrs. H. P. Bracelin, Carl Skottsberg, and J. T. Howell 2370, 2371, in 1948 (CRB, some old leaves persisting); Tejon Mts., F. R. Fosberg 7054 (CRB, USN), 7055 (CRB), 7056 (CRB, 5 sheets; USN), all in 1931; Johnson Canyon, Walker Basin, For-dyce Grinnell 61, in 1905 (USN); Mt. Pinos, San Raigdio Poturos, H. M. Hall 6390, in 1905 (CRB). Ventura County: Topa Topa Mts., L.R. Abrams and E. A. McGregor 106, in 1908 (USN); Mt. Pinos Region, W. R. Dudley and F. H. Lamb 4616, in 1896 (USN); same, C. Epling and L. C. Wheeler 1831, ~~in~~ in 1935 (CRB); same, Ralph Hoffman, on June 5, 1930 (CRB); Mt. Pinos, Carl W. Sharsmith 1, on Oct. 25, 1931 (CRB). Los Angeles County: Dinglewood, Abrams 3103, in 1902 (USN); Bracelin and Fosberg 572, in 1931 (CRB); Sierra Santa Monica, W. H. Brewer 86, 87, 88, on Dec. 23, 1860 (USN, new shoots, old leaves persisting); same, Fosberg 5952, in 1931 (CRB); same Fosberg 7172 (USN), 7173, 7176 (USN), 7177 (USN), 7178 (USN), 7179, all Jan. 26, 1932 (all CRB); same, Fosberg 7410, 7412, 7414, 7415, all Mar. 3, 1932 (CRB); same, Walter M. Moore on Oct. 6, 1912 (CRB); San Gabriel Mts., George L. Moxley 1038, in 1911 (USN); same, ~~same~~ Ojai, S. F. Peckham on Feb. 4, 1866 (USN); same, F. W. Peirson 4281 in 1919, 9767 in 1932 (both CRB); same same, Sharsmith 3, 4, in 1931 (CRB); San Gabriel Canyon, Sharsmith 6, 7 (USN), 7a, 9 (USN);

10, all in 1932 (all CRB, with some persisting leaves of 1931); same, Wheeler 1467, 1472, in 1933 (CRB). Orange County: Temescal Range, Brewer 154, in Jan. 1861 (USN). San Diego County: Pine Valley Creek bridge, 9.5 km east of Descanso, alt. 1020 meters, Bracelin 618, 619, in 1932 (CRB, USN); San Diego, J.C. Cooper, in 1860-67 (USN); same, Carl V. Meyer 828, on Dec. 26, 1931 (CRB, old leaves persisting); Camp Kearney, Harold R. Parks 0332a, in 1929 (USN); same, Parks and Susan T. Parks, 01091a, b; 01092a, b in USN); 01093a, b, all Jan. 17, 1932 (all CRB, all stan. spec. (a), and one pist. spec. (b), with old leaves persisting); some other collections by Bracelin and by Meyer are too juvenile for certain determination as variety.

CALIFORNIA, SOUTHEASTERN. San Bernardino County (practically all from San Bernardino Mts.): Cajon Pass, Coville and Funston 129, in 1891 (USN); South Fork Santa Ana River, alt. 6200 feet, J. and H.W. Grinnell 356, in 1906 (USN); San Bernardino, J.B. Leiberg 3242, in 1898 (USN); same, C.D. Moll, on Feb. 10, 1904 (CRB); same, P. A. Munz 12664, in 1932 (CRB); same, S. B. Parish 3004, in 1894, 4625 in 1901 (both USN); same, Peirson 9972, in 1932, at 6900 feet alt. (CRB); same, George R. Vasey 271, 273, in Jan. 1881 (USN); same, Vasey, in Feb. 1881 (USN, 1 shoot (pist.) with persisting old leaves; 3 others, including 274, represent the species). San Bernardino or Riverside Counties (mostly in San Bernardino Mts.): Munz and Johnston 5241, in 1922 (CRB); Munz 5732, in 1922 (CRB); Munz 12905, in 1932, at 7200 feet alt. (CRB); S.B. and W.F. Parish 675, in 1881 (NYSM, USN, new aments and old leaves on Dec. 20). Riverside County: Corona, Richard L. Coshy, on Jan. 11, 1945 (CRB, "good pollen and nectar plant for bees"); Strawberry Valley, W. L. Jepson and Hall, on May 17-June 1, 1901 (NYSM); San Jacinto Mts., Munz and Johnston 5518, in 1922 (CRB); same, Seftchell and Duran 7, in 1935 (CRB).

NEVADA. Nye County: 20 miles northeast of Warm Springs, K. H. McKnight and Calvin McMillan 38, in 1942 (CRB). Lander County: up Skull Creek near Grass Valley Ranch, F. St. Goodner and W.H. Henning 446, in 1937 (CRB); La Madre Mts., Ivar Tidestrom 10964, in 1919 (USN). Clark County: Excelsior Canyon, Charleston Mts., I. W. Clokey 8752, in 1941 (CRB); Toyahvale Range, Clokey 7885, in 1919 (USN, probably the variety, but other collections there are the species). UTAH. Washington County: 3 miles east of Pine Valley, alt. 7000 feet, Frank W. Gould 1781, in 1942 (CRB). Iron County: Parowan, alt. 1800-2000 meters, W. W. Eggleston 14903, in 1918 (USN). All other Utah specimens seen are of the species.

* fragment CRB.

ARIZONA. Coconino County (all from Flagstaff): Chester F. Deaver 44, in 1941 (CRB); Mt. Elden, alt. 7500 feet, E. A. Goldman 2069, in 1913 (USN), Yavapai County: (all Prescott); Elmer D. Ball, in Aug.-Sep. 1932 (CRB); E.W. Gifford, on June 12, 1932 (CRB); Peebles, Harrison, and Kearney 2618, in 1926 (USN). Apache and Navajo Counties (southern parts, and perhaps adjacent parts of Coconino and Gila Counties also, mostly in the White Mountain Indian Reservation and Black Mesa Forest Reserve): Coville 1008, 1018, 1056, 1064, 1077, 1085, 1094, in 1900 (all ^{USN} ~~CRB~~); Coville 1912 (probably Gila Co.), 2023, in 1904 (USN). Gila County: Bassett McGuire 10054, in 1930 (CRB); the species is represented by Walter Hough 92, from Gila Co. in 1901 (USN). Graham County: E.G. Hall, on May 20, 1914 (CRB, as S. irregularis); H. H. Rusby 372, in Feb. 1881 (USN, 2 sheets). Pima County (Santa Catalina Mts.): David Griffiths 7037, in 1904 (CRB); J. Arthur Harris C 16437, in 1916 (USN); alt. 7500 feet, R.H. Peebles 4072, in 1927 (USN); same alt., Peebles and H.F. Loomis 7105, in 1930 (USN); alt. 7900 feet, R. D. Roseberry 79, in 1937 (CRB); J.J. Thornber, on Feb. 15, 1904 (USN); Tidestrom 12560, in 1927 (CRB); George R. Vasey B (no. in pencil), in Mar. 1881 (USN). Pima or Santa Cruz County (Sagat Rita Forest Reserve): Griffiths 4198, in 1903 (CRB, USN). Cochise County (Chiricahua Mts.): Dan Axelrod, on May 7, 1941 (CRB); J. C. Elmer 2281, 2282, 2283, 2303, in 1906 (CRB); W.W. Eggleston 11011, in 1914 (USN); J. W. Toumey 185, in 1894 (CRB); Toumey, in Mar. and July, 1894 (USN); Toumey, on May 1, 1897 (USN). Cochise County (Huachuca Mts.): L.N. Goodding 372, 914, 1040, in 1949 (CRB); Kearney and Peebles 13846, in 1937 (USN); E. A. Mearns 2176, 2614, in 1893 (USN); T. R. Wilcox 81, 82, in 1894 (USN). County Unknown: Beaver Creek, B. E. Fernow, in Aug. 1896 (USN).

NEW MEXICO. Catron County: Beaverhead Ranger Station, Goodding 30, 31, on May 20, 1938 (twigs somewhat pruinose); Reserve, Goodding A 9633, in 1939 (CRB). Colfax County: Goodding A 9645, in 1939 (CRB). Dona Ana County (all Organ Mts., by E. O. Wootton): Filmore Canyon, alt. 5500 feet, on Feb. 10, Mar. 12 (3 sheets), and April 15 (2 sheets), in 1899 (USN); same, alt. 7000 feet, on April 15, 1899 (USN); same, alt. 7000 feet, on April 18, 1903 (USN, 2 sheets); Organ Peak, alt. 8000 feet, , on April 18, 1903 (USN).

TEXAS (several specimens with twigs faintly pruinose). Brewster County: Infrequent at Buena Vista, B. H. Warnock 123, in 1937 (USN). Culberson County (Guadalupe Mts.): Paul C. Standley 40485, in 1924 (USN); M.S. Young, on Aug. 29, 1916 (TSU). Jeff Davis County (Davis Mts.): Vernon Bailey 407, in 1901 (USN); D. C. Correll 13548, 14064, in 1946 (SMU); V. L. Cory 53086 (USN), 53106, 53158, in 1946 (all SMU); L.C. Hinkley 1095, in 1935 (CRB, TSU); C. L. and Amelia A. Lundell 14251, in 1945 (CRB, SMU); C. H. Miller 8184, in 1945 (SMU); E. J. Palmer 30799, 32008, 32157, in 1926 (CRB, TSU, USN); Palmer 33431, 34479, in 1928 (USN); H. B. Parks and V.L. Cory 9098, in 1934 (CRB, TAC); Parks and Cory 18520, 18521, in 1936 (TAC); Omer E. Sperry T 2, on May 3, 1936 (CRB, USN). Presidio County: Sierra Tierra Vieja, Hinkley 2726, 2727, in 1943 (CRB); Chinati Mts., Hinkley and Warnock 46900, in 1946 (CRB). County Unknown: Valery Haverd, in Oct. 1883 (USN).

MEXICO. BAJA CALIFORNIA: Hamilton Ranch, Marcus E. Jones, on April 15, 1925 (USN); San Vicente and vicinity, Jones, on Dec. 16, 1927 (PC, as S. laevigata); Nachoguero Valley, L. Schoenfeldt 3436, in 1894 (USN); 2 miles south of Santa Teresa, alt. 595 feet, Dr. L. Wiggins 4271, in 1930 (USN); La Encinal, on west side of Sierra San Pedro Martir, alt. 6000 feet, Wiggins 9798, in 1941 (USN). SONORA (region of Rio de Bavispe): Jarilla, Cañon de Bavispe, Stephen S. White 3312, in 1940 (CRB); Las Tierritas de El Temblor, Sierra de El Tigre, White 3397, in 1940 (CRB); Rancho del Robles, northeast of El Tigre, alt. 6000 feet, White 4276, in 1941 (CRB). CHIHUAHUA: Sierra Madre Mts., alt. 7000 feet, Jones, on Sep. 19, 1903 (PC); Mojariche, Irving Knobloch 5849, in 1939 (); same, Knobloch 7052, in 1940 (); Majalea, Harde Le ^{Seuer} 593, in 1936 (SMU); Valley near Chihuahua, C. C. Pringle 709, in 1886 (USN, 3 sheets). COAHUILA: San Lorenzo Canyon, mountains near Saltillo, alt. 7000 feet, Pringle 10210, in 1906 (USN).

BALL, GARRETTON R. New combinations in southwestern *Salix*. Journ. Wash. Acad. Sci. 1950. --- Contains descriptions, ~~introduction~~ previous taxonomic treatments, distribution, discussion, and citation of herbarium specimens of three novelties from mostly southwestern U.S. and adjacent Mexico. *S. Gooddingii* Ball, var. variabilis n. var. is the glabrous-capsuled representative of the far-western species and extends eastward to western Texas. The drives of southwestern range cattle to the Kansas railroads may have aided this variety to cross the divides to streams flowing east to the Mississippi River. ~~Salix~~ ~~*S. ligulifolia* (Ball)~~ *S. ligulifolia* (Ball) n. comb. raises to specific rank the former *S. lutea* var. *ligulifolia* Ball, separated by brownish-black, often pubescent twigs, and ligulate leaves, with range extended to Calif. and Oregon. *S. lasiolepis* Benth., var. Bracelime n. var. is the most southeastern representative of the far-western species and its four other western varieties, and ~~extends~~ ranges east to sw. Texas and northern Mexico.

cm
 Ed.
 n.s. (new edition)
 no. Jr.
 pt.
 P.M.

m.m.
 cm

Substratum
 4, d.
 in fig 4d
 3a

(Fig. 4, n) but (vol 1 to vol. 10, no. 16)

Fig 4, a

p.
 pp.
 mel.
 vol.
 pl.
 (ebido)

illus.

31 (11:12, pl. 2, fig 16.
 pl. 2, figs. 12-14)

Bur. Amer. Ethnol

Naval Reserve No. 4

Digitized by Hunt Institute for Botanical Documentation

(nos. 8, 11)

app.	— — —	Park
	—	Creek
loc. cit.	— —	Province
	—	River
(et al.)	—	Lake
and not 2	—	Pass
	—	Range

14(4):
 14 (1):
 14

authors in
 title in title

U.S. National Museum
 U.S. Geological Survey
 Bureau of American
 Ethnology

TO 6408

41(2): 276 or 41 (2):

4892

(Fig. 14) but 16:486, fig. 12 or pl. 4
(ibid.), (et al.)

(no. 47)

(p. 113)

l. c. or loc. cit.

cc, cm, km, mm

but meters

~~meters in full~~

Digitized by ~~H. d.~~ ~~in figure (ibid.)~~ Institute for Botanical Documentation

but 4, a 4, d in other subdivisions

How about

Lat. or lat ; Long or Long.

Latin desc. in italics?

H. deleted = form Brachinus way

Look Up and Complete Records and Manuscripts

Salix Gooddingii Ball, var. *Braceliniae* Ball

mss. p. 22: find herbarium citation for 2 specimens by Irving Nobloch
Not in CRB herb; Not in USN.

Write Dr. Blake 2-Aug-58

S. Drummondiana Barratt, var. *subcoerulea*

Montana. Standley 17392 (fragment in XRB, not in USN) has twigs not pruinose,
leaves glabrate; probably hybrid or perhaps *S. Geyeriana*. Look up.

S. planifolia Ph., var. *Nelsonii* Ball

Idaho. Fremont Co. Henry's Lake, H. J. Rust 9180 in ? ()?
not in CRB or USN in either species of var. See mss.

Salix Drummondiana Barratt, var. *bella* (Piper) Ball

IDAHO, Bonner Co. Piper 6616b, 6634, 6648 are checked as not being in CRB.
Are left as being in WSC. Check the det. lists.

Epling 9625 and 9677, det. as *S. subcoerulea*, have been changed to *bella*
and are cited under var. *bella*. Check on Epling Idaho det list

Baja California:

No specimens certainly from there. Those collected by Annetta Carter and ? far south down the peninsula are the species.

- ✓ ~~MOJAVE DESERT~~, Aan Vicente & vicinity, Marcus E. Jone, Dec. 16, 1927 (Pomona Coll., as *S. laevigata*, leaf linear-elliptic)
✓ Johnson's Ranch, San Antonio, Jany, 1, 1925 (Pomona Coll., small old oblong leaf, like those from Mt. Eddy)

Sonora: (18.)

- ✓ Region of Rio de Bavispe: Shrub 4 m. high, Jarilla, Canon de Bavispe, Stephen S. White 3312, 12-14 Aug., 1940 (CRB, det. as *S. jaliscana*; fol.) OK
✓ Shrub 3 m. high, Las Tierritas de El Temblor, Sierra de El Tigre, White 3397, 18-24 Aug., 1940 (CRB, fol.) OK
Shrub 3 m. high, Rancho del Robles, ne. of El Tigre, elev. 6000 ft., White 4276, 5 Sept., 1941 (CRB, fol.) OK

- ✓ Baja Calif. Hamilton's Ranch, M. E. Jones on Apr. 15, 1928 (USN)
✓ Nachogueno Valley L. Schrenk 3436 in 1896 (USN) 4271
2 mi. S. of Santo Tomas, elev. 585 ft. in 1930 (USN)
✓ La Encinita, west side of Sierra San Pedro Martir, alt. 6000 ft. Dr. R. Wiggins 9798 in 1941 (USN)

Chihuahua:

- ✓ Moharichic, Irving Knobloch 5849, 9 Aug., 1939 (leaves 6-7 by 1 cm., pubesc. beneath, sparingly denticulate)
✓ As last, but 17 Jan., 1940, Knobloch 7052, "Catkins of a sp. previously sent with only leaves." (stam. aments very small, 1.5 cm. long; anthers dark).
✓ Majalca, Harde Le Sueur 593, June 24, 1936 (So. Meth. Univ., detd. Feby., 1946)
✓ Marsh Lake, Sierra Madre Mts., alt. 7000 ft., M. E. Jones, Sept. 19, 1903
Pomona Coll., leaf 4-6 by 0.8-1 cm., linear to linear-lance., acute, finely reticulate; branchlets pilose (Pomona Coll., unnamed).
✓ Valley near Chihuahua Ch. Pringle 709, in 1886 (USN) 30K
Coahuila
✓ San Lorenzo Canyon, ruins near Saltillo, elev. 7000 ft. Pringle 10210, in 1906 (USN)

Dr. Frederick J. Hermann,
Editor, Jour. Wash. Acad. Sciences,
Plant Industry Station,
Beltsville, Maryland.

3814 Jocelyn St., N.W.,
Washington 15, D.C.

20 June, 1950

Dear Dr. Hermann:

I am inclosing a 22-page manuscript entitled: New Combinations in Southwestern Salix. This is one in a continuing series of pre-monographic studies which tries to straighten out this complex and variable group.

The bibliographies of names previously applied, and the citations of specimens are rather unusually full but these netities have a rather wide range and have been treated differently by many different authors. For these reasons, I feel that this more extensive listing is extremely desirable.

I am submitting this for publication in the journal and trust that it will be found acceptable. These combinations are appearing in some State floras this autumn or early winter, so I am especially desirous of relatively early publication, if that is possible.

Usually I consult with Dr. Little about Journal manuscripts but he had left for Puerto Rico before I had completed it. He did furnish me with some of the brief Latin descriptions.

Appreciating your consideration of this, but regretting ahving to burden a busy man, I am

Cordially yours,

Carleton R. Ball

Dr. F. J. Hermann,
Plant Industry Station,
Beltsville, Maryland.

Washington 15, D.C.

3 July, 1950.

Dear Dr. Hermann:

I have your letter of 28 June and the *Salix* manuscript and wish to thank you and Dr. Oehser for your critical examination of the paper. I find that I carelessly had overlooked an unusual number of typographical errors, for which I am truly sorry.

I have retyped the entire manuscript and am returning it herewith. I hope that it now is in acceptable shape.

I have examined numerous papers which have appeared recently in the *Journal* of the Washington Academy, and have a few questions to ask.

I find that abbreviation *sp.* of words are used commonly, especially in citations of paper. In most cases the initial letter of the abbreviation is in lower case rather than in capital type. Exceptions were noted, however. The abbreviation of number was written No. in Naval Reserve No. 4, presumably as part of a proper name.

I note, however, that A.M. and P.M. were always in capitals, although the abbreviations of other Latin words, as *ibid.*, *idem.*, *loc. cit.*, *et al.*, etc., were in lower case initials. I suppose this capitalization would apply also to M. for meridian, although I did not see it in print.

I found that abbreviations were used commonly in two locations, namely, citations of literature and parenthetical references in the text. In literature references, the abbreviations (*fig.*, *p.*, *pp.*, *pl.*, *rev. ed.*, etc.) were uniformly printed with lower-case initials. But in the references in parentheses in the text, *Fig.* was printed rather commonly with a capital F, while other abbreviations had lower-case initials. I am somewhat confused by these differences.

In some literature citations, I noted differences in the abbreviation of the names of certain agencies, as Bureau of American Ethnology, U.S. National Museum, etc.

Another variation I noted in the *Journal* was in the form of citing subdivisions of a topic or illustration. Some were written as 3a, 4d, etc. Others were written as 3,a and 4,d, etc. There also was variation in the spacing between the comma and the letter which followed, some having 1 space between. This was also true in citing a part number between the volume number and the pages in a literature citation. (16(B); 24 or 16 (B): 24).

The deletion of the period after the abbreviations of units of metric linear measurement is the most puzzling of all. In what respect do these abbreviations (cm, dm, mm, km, etc. differ from all the other abbreviations used? Does this exception carry over to the abbreviations of all other metric systems as in weights, electricity, etc.? Any such exceptions seem to be in the nature of rather glaring inconsistencies and to have the effect also of nullifying the teaching of our schools and colleges. I wish the Board of Editors would publish their reasons for these exceptions. And also why meter (s) is denied any abbreviation at all.

Cordially yours,

Carleton R. Ball

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF PLANT INDUSTRY, SOILS, AND
AGRICULTURAL ENGINEERING

DIVISION OF
PLANT EXPLORATION AND INTRODUCTION

BUREAU OF PLANT INDUSTRY STATION
BELTSVILLE, MARYLAND

June 28, 1950

Dr. Carleton R. Ball
3814 Jocelyn Street, N. W.
Washington 15, D. C.

Dear Doctor Ball:

The few suggestions I had upon your manuscript are indicated in red pencil.

Mr. Oehser has indicated on page 15 what abbreviations would have to be spelled out, etc., to conform to the style of the Journal of the Washington Academy of Sciences.

Cordially yours,

F. J. Hermann

F. J. Hermann
Botanist

Encl.
FJH/enn