

BIBLIOGRAPHICAL NOTES

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It is intended to publish in this Journal from time to time bibliographical notes on books and serial publications relating to systematic botany, which being undated or having inexact dates are a source of difficulty and error, particularly when questions of priority of publication are involved.

Any corrections or additions to this list will be gratefully received, and if important will be published. It is hoped that with such notes much information known at present in but few libraries will be made available to a larger number of botanical workers.

Nouveau Duhamel. In the preface to Duhamel's "Traité des arbres et arbustes qui se cultivent en France en pleine terre, 1755," he expresses the hope that the work which he has commenced may be continued on broader lines. After nearly half a century this work was undertaken in the form of a "Nouveau Duhamel" issued in 80 parts, from 1801 to 1819 and completed in seven folio volumes.

As the original issue appears to be very rare and the work to be represented in many libraries by a re-issue published about 1852, with partly differing title-pages and without dates, the following citations from an original copy in the library of the Massachusetts Horticultural Society are interesting and may prove useful.

The titles of the several volumes read as follows:

Vol. i. "Traité des arbres et arbustes que l'on cultive en France en pleine terre. Par Duhamel. Seconde édition considérablement augmentée. Paris. Chez Didot, ainé; Michel; Lamy."

This volume has a half-title, an engraved title-page, and a dedication to Madame Bonaparte.

Vol. ii. "Traité des arbres et arbustes que l'on cultive en France en pleine terre. Par Duhamel. Nouvelle édition, augmentée de plus de moitié pour le nombre des espèces. Avec des figures d'après les dessins de P. J. Redouté. Dédié à sa majesté L'Impératrice Reine. Paris. 1804."

Vol. iii. "Traité des arbres et arbustes que l'on cultive en France en pleine terre. Par Duhamel. Nouvelle édition, augmentée de plus de moitié pour le nombre des espèces. Avec des figures d'après les dessins de P. J. Redouté. Dédié à sa majesté l'Impératrice Reine. Paris. 1806."

Vol. iv. "Traité des arbres et arbustes que l'on cultive en France en pleine terre. Par Duhamel. Nouvelle édition, augmentée de plus de moitié pour le nombre des espèces. Avec des figures d'après les dessins de P. J. Redouté. Dédié à sa majesté l'Impératrice Reine. Paris. 1809."

Vol. v. "Nouveau Duhamel; ou, Traité des arbres et arbustes que l'on cultive en France. Rédigé par J. L. A. Loiseleur-Deslongchamps.

Avec de figures d'après les dessins de MM. P. J. Redouté et P. Bessa.
Dédié à sa majesté l'Impératrice Joséphine. Paris. 1812."

Vol. vi. "Nouveau Duhamel; ou, Traité des arbres et arbustes que l'on cultive en France. Rédigé par J. L. A. Loiseleur-Deslongchamps. Avec de figures d'après les dessins de MM. P. J. Redouté et P. Bessa. Paris. 1815."

Vol. vii. "Nouveau Duhamel; ou, Traité des arbres et arbustes que l'on cultive en France. Rédigé par J. L. A. Loiseleur-Deslongchamps; et Étienne Michel, éditeur. Paris. 1819."

At the end of vol. iv is an alphabetical list of the articles in vols. i-iv, with the name of the author of each article, and followed by a note signed by Étienne Michel, which announces that beginning with vol. v, M. Loiseleur-Deslongchamps will become the sole editor. At the end of vol. v, an "avis" states that the "Nouveau Duhamel" while taking its name and some of its material from Duhamel's "Traité" is neither a re-impression nor a new edition of it, but an entirely new work. "Tous les articles, même ceux que Duhamel avait le mieux travaillés tant sur les Arbres forestiers et d'ornement, que sur les Arbres fruitiers, ont été refaits en entier et considérablement augmentée."

A collation of the volumes is as follows:

Vol. i	[1801]	pp. 264, iv.
" ii	1804	" 244, v.
" iii	1806	" 234, iv.
" iv	1809	" 240, 4
" v	1812	" 330, 4
" vi	1815	" 266, 6
" vii	1819	" 252, 7

The copy of "Nouveau Duhamel" in the Arnold Arboretum library is evidently the re-issue of about 1852 and differs from the original only in the title-pages, which are all alike, with the exception of the volume numbers, are undated, and read: "Traité des arbres et arbustes que l'on cultive en pleine terre en Europe, et particulièrement en France. Ed. augmentée de plus de moitié pour le nombre des espèces distribuée d'après un ordre plus méthodique suivant l'état actuel de la botanique et de l'agriculture. Rédigé par MM. Veillard, Jaume Saint-Hilaire, Mirbel, Poiret, et continué par M. Loiseleur-Deslongchamps. Ouvrage orné de cinq cents planches d'après les dessins de MM. Redouté et Bessa. Paris, Librairie Encyclopédique de Roret." Vol. i has also the engraved title-page as in the original, the note opposite reading "Explication du frontispice" instead of "Explication de la vignette."

It would be very interesting to learn if in any library a copy of this work with the original covers of the 80 parts exists and if these covers are dated, so that it would be possible to get the exact date of each issue.

Torrey and Gray. Flora of North America.

Issued in parts, from 1838 to 1843, the "Flora of North America, containing abridged descriptions of all the known indigenous and naturalized plants growing north of Mexico, arranged according to the natural system," presents the important question of the exact date of issue of each part. These dates for vol. i are given on the verso of the dedication to Sir W. J. Hooker, but as most copies are bound without original covers it is important to know also the pages comprised in each part. They are, with their dates, as follows:

Vol. i.		
Pt. 1	pp. 1-184	July, 1838
" 2	" 185-360	Oct., 1838
" 3	" 361-544	June, 1840
" 4	" 545-711	June, 1840
Vol. ii.		
Pt. 1	pp. 1-184	May, 1841
" 2	" 185-392	April, 1842
" 3	" 393-504	Feb., 1843

Vol. i has a title-page bearing the dates 1838-1840, and an index. Vol. ii was never completed, ending abruptly with page 504 at the conclusion of "Compositae," and without title-page. In the Arboretum copy there is appended an "Index to vol. ii of Torrey & Gray's Flora of North America," which was compiled by G. C. Woolson and printed some time previous to 1890.

That it was the intention of the authors to publish more is indicated by the last paragraph of the preface in vol. i, "A complete index of the genera and species, and an enumeration of all the works which relate to North American botany, or are cited in this work, will be given with the concluding volume, and likewise, if space permit, some general observations respecting the geographical distribution of North American plants. A connected notice of those plants which are important on account of their active or medicinal properties or economical uses, will also be added."

In *Rhodora* for December, 1906, under the heading, "Two editions of Torrey & Gray's Flora of North America," Mr. H. W. Preston calls attention to the fact that variations in the copies of the "Flora" indicate clearly that portions of vol. i were reprinted, "an examination of the type shows that pages 321 to 360 inclusive were reset in a slightly different font." The copy in the library of the Arnold Arboretum has the reprinted pages substituted, and in a letter from Miss Mary A. Day we find that it differs from the original in the Gray Herbarium in the following respects:

"On page 324, line 34, the original has the name *H[osackia] micranthus*, while the reprint has changed this to *H. micrantha*. On the following

page, 325, line 4, a similar change occurs in *H. prostratus* in the original, and *H. prostrata* in the reprint. On page 355, line 14, the original ends with the word 'stem,' in the reprint with the word 'branched.' Other lines of this page and the following pages indicate that a part of the work was a reset. How much was reprinted, or how much later than the original we do not know. Surely Dr. Gray made some corrections in a reprint, but he never called it a different edition."

JOURNAL

OF THE

ARNOLD ARBORETUM

VOLUME II

APRIL, 1921

NUMBER 4

NOTES ON AMERICAN WILLOWS. XI

CAMILLO SCHNEIDER

a. SOME REMARKS ON THE SPECIES OF SECTION CORDATAE

IN note x, on p. 65 of vol. II of this Journal I made the statement that I had not thoroughly studied this group because Mr. C. N. Ball was writing a monograph of it. Unfortunately he had not been able to finish his study, and by request of the editor I have prepared a short note based on my own observations on species of this section. It is with great reluctance that I do this. Mr. Ball has already proposed some new species and has used these names in different herbaria without, however, publishing descriptions of them. He has also applied several old names to certain forms and I have seen a good many specimens bearing his own determinations. In May, 1919 he kindly gave me a typewritten list of the species, varieties and synonyms including the species I have referred to sect. *Commutatae* and *Balsamiferae*; *S. Wolfii* was also included in his list. On June 15, 1919, I wrote him a long letter in regard to several names used by him explaining my opinion on some of Andersson's critical forms but I have not received an answer to this letter. At present I have to mention some of his new names, and I wish to state emphatically that I can not do more in this note than to give a few hints as to the species and forms belonging to this group. My study is based on the same material as mentioned on p. 67 of vol. I of this Journal, and I wish to express my best thanks also to Mr. R. V. Bradshaw of Eugene, Ore., for sending me good material of some species including *S. mackenzieana*.

The main difference of the species mentioned can be taken from the key given below, and also from the keys in note XII. As to the synonymy of the section the following is to be said:

Sect. *Cordatae* Barratt apud Hooker, Fl. Bor.-Am. II. 149 (1839). — Ball apud Coulter & Nelson, New Man. Rocky Mts. Bot. 132 (1909). — Sect. *Rigidae* (sive *Hastatae*) Andersson in Svensk. Vet.-Akad. Handl. VI. 157 (Monog. Salic.) (1867), pro parte; apud De Candolle, Prodr. XVI.² 251 (1868), pro parte. — Rydberg, Fl. Rocky Mts. 188 (1917), pro parte. — Sect. *Hastatae* Schneider, Ill. Handb. Laubh. I. 49 (1904), quoad *S. cordatam*.

CLAVIS SPECIERUM

Folia subtus discoloria, distincte pallidiora vel glaucescentia.

Ramuli floriferi pruinosi; pedicelli 0.8–1 (rarius ad 1.5) mm. longi... 54. *S. irrorata*.
 Ramuli nunquam pruinosi.

Ramuli annotini biennesque plusminusve castanei, fusciscentes, sordide brunnescentes vel subviridescences vel tomentelli.

Pedicelli fructuum vix ultra 2(–2.5) mm. longi vel ramuli etiam fructiferi satis tomentosi.

Pubescentia foliorum saltem juvenilium pilis griseis et fulvis mixta; folia lanceolata, oblanceolata ad oblongo- (rarius obovato-) lanceolata, apice obtusa vel breviter acuta, basi cuneata vel sensim attenuata, superne haud stomatifera; amenta pleraque sessilia, dense cylindrica; bracteae obovatae, praesertim extus dense breviter sericeo-subcrispo-pilosae... 55. *S. lasiolepis*.
 Pubescentia grisea vel folia diversa.

Ramuli etiam floriferi distincte tomentosi vel pubescentes; folia satis lanceolata vel anguste lanceolata, versus apicem saepissime plusminusve sensim acuminata; amenta fructifera ad 7–10 cm. longa et 2 cm. crassa; fructus 8–10 mm. et pedicelli interdum fere ad 3 mm. longi.

Ramuli floriferi glabri; fructus vix ultra 6–7 mm. longi vel plantae aliis signis diversae. 58. *S. missouriensis*.

Folia superne ut videtur semper stomatifera, margine dentata vel subintegra 56. *S. ligulifolia*.

Folia superne haud stomatifera, margine saepissime serrata vel serrato-dentata 57. *S. cordata*.

Pedicelli fructuum (2.5–)3–4 mm. longi..... 59. *S. mackenzieana*.

Ramuli annotini biennesque plusminusve lutescentes vel flavescences; pedicelli 1.5–3 mm. longi..... 60. *S. lutea*.

Folia utrinque concoloria, etiam subtus viridia vel distincte viridescencia.

Folia apice distincte acuta vel acuminata, dentata, serrata vel subintegra; petioli (4–) 6–14 mm. longi.

Pedicelli 2.5–4 mm. longi; folia etiam matura satis membranacea. 61. *S. monochroma*.

Pedicelli 1–1.75 (rarius ad 2.25) mm. longi; folia matura satis chartacea

63. *S. pseudocordata*.

Folia apice obtusa vel subacuta, crenato-dentata vel crenata; petioli vix ultra 3–4 mm. longi..... 62. *S. myrtillifolia*.

ENUMERATIO SPECIERUM

54. *S. irrorata* Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 117 (1858); in Proc. Am. Acad. iv. 57 (Sal. Bor.-Am. 11) (1858); in Walpers, Ann. Bot. v. 746 (1858); in De Candolle, Prodr. xvi.² 262 (1868). — Bebb apud Coulter & Nelson, Man. Rocky Mts. Bot. 336 (1885). — Rydberg, Fl. Colo. 95 (1906); Fl. Rocky Mts. 194 (1917). — Ball apud Coulter & Nelson, New Man. Rocky Mts. Bot. 132 (1909). — Wootton & Standley in Contrib. U. S. Nat. Herb. xix. 159 (Fl. New Mex.) (1915). — This well characterized Willow has been described by Andersson from specimens collected by Fendler (No. 812) in New Mexico, Santa Fé County, Santa Fé Creek, bottom of the creek, exposed to inundations, on January 16, 1847. I have seen the type and several cotypes. In 1858, Andersson stated that this species to the European "*S. daphnoidi* ita est similis, ut nullis notis nisi amentis eximie condensatis et foliis (novellis!) integerrimis utrinque viridibus ab ea distingui possit"; but later, in 1868, he more correctly said "maximam cum *S. daphnoide* habet affinitatem, sed distinguitur amentis condensatis, gemmis rotundatis, squamis obtusis, capsulis minoribus distincte pedicellatis stylo breviori apiculatis. . . ." After all, *S. daphnoides* belongs to a very different group not represented

in the New World, *S. irrorata* is easily distinguished from all the other Cordatae by the glaucous bloom on its branchlets.

I have seen good material from New Mexico (Rio Arriba, Santa Fé, San Miguel, Lincoln, Otero, Grant, Sierra and Socorro Counties), and Colorado (Conejos, Fremont, El Paso, Denver and Larimer Counties). Ball in 1909, states that it also occurs in southwestern Texas. In Arizona (Navajo, Cochise, Ima and Santa Cruz Counties) and in New Mexico (Socorro County) a form with tomentose twigs occurs which much resembles *S. lasiolepis* to which *S. irrorata*, probably, is most closely related.

55. *S. lasiolepis* Benth. Pl. Hartw. 335 (1857). — Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 118 (1858); in Proc. Am. Acad. iv. 58 (Sal. Bor.-Am. 12) (1858); in De Candolle, Prodr. xvi.² 264 (1868). — Bebb apud Watson, Bot. Calif. II. 86 (1879). — Britton & Shafer, N. Am. Trees, 198, f. 159 (1908). — Rydberg, Fl. Rocky Mts. 193 (1917). — Schneider in Bot. Gaz. LXV. 31 (1918). — ? *S. humilis* ♂, *angustifolia* f. *opaca* Andersson in De Candolle, Prodr. xvi.² 236 (1868), sec. specim. Wright no. 1878. — This species which according to Jepson is "the most common willow in the foothill country throughout the state" of California has been described from specimens collected by Hartweg in 1848 under no. 1955 (167) "on the banks of the river Salinas and Carmel near Monterey" according to the type in Herb. Kew. It also occurs in Lower California (and possibly in New Mexico) and Oregon. I am, however, not sufficiently acquainted with the species and the following varieties retained by Ball according to its MS.-list. It is probably the most arborescent species of this group reaching a height of more than 10 m.

In 1857,* Torrey, Bot. Pacif. R. R. Exped. iv. 139, described a *S. Bigelowii* from specimens collected by Dr. Bigelow in 1854, on April 8, near San Francisco, of which I have seen the type. This species has been mentioned by Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 118 (1858); in Proc. Am. Acad. iv. 58 (Sal. Bor.-Am. 12) (1858); in Walpers, Ann. Bot. v. 747 (1858) [*S. Bigelowii*] and also in Svensk. Vet.-Akad. Handl. vi. 163, t. 8, fig. 94 (Monog. Salic.) (1867). In the last place he describes two varieties: *latifolia* and *angustifolia* without indicating a type for either form but citing besides Bigelow's specimen one from "Bokara (sec. Herb. Hook.)" a quotation unintelligible to me. In his monograph Andersson has also a *S. Bigelowii* **S. fuscior* which he made *S. Bigelowii* β, *fuscior* in De Candolle, Prodr. xvi.² 255 (1868) "in America septentrionali (Herb. Hook.)." He does not give the exact locality of the name of the collector of his type stating only that there were five different specimens on the same sheet in Hooker's herbarium of which "duo verisimiliter ad *S. humilem recurvatam* sunt referenda" while one is "*S. lasiolepidi* exacte simile" and the remaining two seemed to be closely related to *S. Bigelowii*. Without having seen this type of var. *fuscior* I cannot

* The title-page of vol. iv bears the date of 1856 but the preface of Torrey's article is dated Jan. 1857. See also Hooker in Jour. Bot. IX. 377 (1857).

say whether or not it really belongs to *S. lasiolepis* at all. Ball in his MS.-list does not mention this form. Bebb apud Watson, Bot. Calif. II. 86 (1879), proposed *S. lasiolepis* var. *Bigelovii*, and Ball, in his list, keeps this variety quoting as synonyms: *S. franciscana* Von Seemen in Bull. Torr. Bot. Cl. xxx. 634 (1903); *S. Sandbergii* Rydberg, l. c. xxxix. 304 (1912); Fl. Rocky Mts. 192 (1917), and *S. boiseana* Nelson in Bot. Gaz. LIV. 406 (1912). The type of *S. franciscana* came from the Cliff House near San Francisco while the types of the other two species had been collected in Idaho, Valley of Hatwai Creek, April 28, 1892, Sandberg, Mac Dougal and Heller (no. 71, f.; N. Y.), and near Boise, May 29, 1911, Miss June Clarke (no. 48, fr.). This variety also occurs in Nevada (Ormsby County) and in Oregon but I am not well enough acquainted with it to say more about its geographical distribution.

Bebb, in 1879, also proposed a var.(?) *fallax* of *S. lasiolepis* without however mentioning a type. Judging by what I have seen in Bebb's herbarium Torrey's no. 491 (from 1865) seems to represent the type of this obscure form which is not quoted in Ball's list.

In 1903, Von Seemen in Bull. Torr. Bot. Club xxx. 635, described a second species *S. Bakeri*, collected by C. F. Baker, on March 9 and May 10, 1902, on the foothills near Stanford University, Santa Clara County, California (No. 274, f., m.; type in Herb. Berol.). This species is kept by Ball as *S. lasiolepis* var. *Bakeri* Ball, in litt. The ovaries of the type are somewhat tomentose toward the apex. The geographical distribution of this form is unknown to me. Jepson Fl. Calif. 241 (1909), does refer *S. Bakeri* as a synonym to var. *Bigelovii*. Britton & Shafer, N. Am. Trees, 204, fig. 167 (1900), keep *S. Bakeri* a distinct species with capsules "hairy toward the top."

56. *S. ligulifolia* Ball, in litt. — ? *S. cordata* Ball apud Coulter & Nelson, New Man. Rocky Mts. Fl. 132 (1909), pro parte. — This species proposed by Ball and known to me only in a few specimens which I saw with Ball's own determination in Bebb's Herbarium (C.) seems to me most closely related to *S. lutea* which however has longer pedicels. Both species may be widely distributed from New Mexico and California to Colorado, Wyoming and farther north. Partly on Ball's authority I quote the following specimens as belonging to his species of which he, unfortunately, has not yet published a description. The specimens of which the numbers are marked with an * have not been determined by Ball. The leaves are mostly provided with stomata in the epidermis of the upper surface, a fact also observed by me in *S. lutea* and, partly, in *S. mackenziana*, but not in typical *S. cordata*.

NEW MEXICO. Without locality and date, *Greene* (sheet 3908 in Herb. Bebb; m., f., fr.).

COLORADO. Conejos County, Los Pinos, May, 1899, *C. L. Baker* (no. 270, m., f.; C., G.). La Plata County, Durango, June, 1891, *A. Eastwood* (No. 23, f., m.; C.). Routt County, Wolcott, July, 1891, *A. Eastwood* (No. 17, fr.; C.). ? Montezuma County, ? Mancos, June, 1891, same coll. (No.

22, m., fr.; C.). El Paso County, Manitou, May 8, 1878, [M. E. Jones (No. 30,* f.; A.). Jefferson County, Golden City, 1870, E. L. Greene (No. 371,* m. f.; G.; a somewhat doubtful form). ? County, Soda Springs Canyon, May, 1886, W. H. Shockley (No. 363, fr.; C.).

UTAH. Salt Lake County, Red Butte Canyon, May 8, 1909, J. Clemens (f.*; A.); Salt Lake, Cottonwood Creek, June 27, 1918, A. Eastwood (No. 7753,* f., m.; A.); City Creek Canyon, May 11, 1880, M. E. Jones (No. 1702,* f.; A.).

WYOMING. Albany County, Sand Creek, May 30, 1900, A. Nelson (No. 6964,* m; N. Cor.; partly mixed with female *S. monticola*).

NEVADA. Ormsby County, Empire City, May 20, 1882, M. E. Jones (No. 4077,* f.; A.).

57. *S. cordata* Muhlenberg in Neue Schr. Ges. Naturf. Fr. Berlin, iv. 236, t. 6, f. 3 (1803). — Michaux, Fl. Bor.-Am. II. 225 (1803). — Willdenow, Spec. iv. 666 (1805). — Pursh, Fl. Am. Sept. II. 615 (1814). — Poirlet in Lamarck, Encycl. Méth. Suppl. 69 (1817). — Koch, De Salic. Eur. Comm. 22 (1828). — Forbes, Salict. Wob. 277, f. 142 (1829). — Hooker, Fl. Bor.-Am II. 149 (1839), excl. var. — Barratt, Salic. Am. no. 26 (1840). — Torrey, Fl. N. Y. II. 211 (1843). — Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 124 (1858); in Proc. Am. Acad. iv. 64 (Sal. Bor.-Am. 19) (1858); in Walpers, Ann. Bot. v. 751 (1858); in Svensk. Vet.-Akad. Handl. VI. 157, t. 8, f. 91 (Monog. Salic.) (1867), pro parte maxima; apud De Candolle, Prodr. XVI.² 251 (1868), pro parte maxima. — Bebb apud Macoun, Cat. Can. Pl. 496 (1886), pro parte. — Britton & Brown, Ill. Fl. I. 503, f. 1198 (1896); ed. 2, I. 596, f. 0463, f. (0913). — Ball in Proc. Iowa Acad. Sci. VII. 151 (1900); in Elys. Mar. III. 29, t. 6, f. a (1910). — Britton, Man. 314 (1901). — Schneider, Ill. Handb. Laubh. I, 50, f. 11 r-s, 25 h (1904). — Robinson & Fernald in Gray's New Man. ed. 7, 323, f. 650 (1909) — Von Seemen apud Ascherson & Graebner, Syn. Mittel-eur. Fl. IV. 157 (1911), excl. synonym, pro parte. — *S. rigida* Muhlenberg in Neue Schr. Ges. Naturf. Fr. Berlin, I. c. t. 6, f. 4 (1803), fide Ball. — Willdenow, Spec. IV. 667 (1805). — Pursh, Fl. Am. Sept. II. 615 (1814). — Forbes, Salict. Wob. 277, f. 141 (1829). — *S. cordata* var. *rigida* Carey apud Gray, Man. Bot. 427 (1848). — Andersson in De Candolle Prodr. XVI.² 252 (1868), pro parte, — *S. myricoides* var. *cordata* Dippel, Handb. Laubh. II. f. 134 (1892). — *S. acutidens* Rydberg apud Britton, Man. 315 (1901), fide Ball. — This widely spread eastern Willow has been described by Muhlenberg from specimens from Lancaster, Pa. I am not well enough acquainted with its variability and its geographical distribution. Andersson, in 1867, proposed two subspecies *S. rigida* and *S. angustata* which he reduced to varieties in 1868. *S. rigida* Muhlenberg is referred by Ball in his list as a mere synonym to *S. cordata*, and *S. myricoides* Muhlenberg in Neue Schr. Ges. Naturf. Fr. Berlin, IV. 235, t. 6, f. (1803) (*S. cordata* var. *myricoides* Carey apud Gray, Man. 427 (1848)). — *S. cordata* α, *rigida* 6° *myricoides* Andersson in De Candolle, Prodr. XVI.² 252 [1868] is perhaps a hybrid with *S. sericea* according to Robinson & Fernald, Gray's New Man. ed. 7, 323 (1908). Ball, in Elys. Mar. III. 30 (1910), says: "A hybrid with *S. sericea* is occasionally found . . .

Forms of *S. cordata* with twigs pubescent, young leaves thinly silky, and capsules occasionally thinly villose (*S. myricoides* Muhl.) should not be confused with it." But in his MS.-list Ball regards *S. myricoides* as probably *S. cordata* \times *sericea*, and he mentions only one variety of *S. cordata*, namely var. *angustata* Andersson in De Candolle, Prodr. xvi.² 252 (1868). (*S. angustata* Pursh, Fl. Am. Sept. II. 613 [1814;] *S. cordata* 2 *S. angustata* Andersson in Svensk. Vet.-Akad. Handl. VI. 158 [1867], pro parte). Andersson proposed some forms which partly do not belong to *S. cordata* (see *S. lutea* p.191). *Salix cordata angustata* seems to be a very common variety. A mere form of it apparently is the so-called f. *purpurascens* Hort. (*S. Nicholsonii* f. *purpurascens* Dieck, Neuheiten-Offerte 1889-90, 18 [1889].—Dippel, Handb. Laubh. II. 284 [1892].—*S. cordata* var. *rigida* f. *purpurascens* Schneider, Ill. Handb. I. 50 [1904]) which has been regarded as a hybrid of *S. cordata* with *S. nigra* but it is nothing than typical *cordata* or a form of it. There is, certainly, no hybrid with *S. nigra* in existence.

S. cordata is so far as I know not represented in the west. I do not, however, know the exact eastern limits of its geographical range.

58. *S. missouriensis* Bebb in Garden & Forest, VIII. 373 (1895). — Glatfelder in Trans. Acad. Sci. St. Louis, VII. 137 (1896). — Sargent, Silva, IX. 137, t. 480 (1896); XIV. 104 (1902). — Ball in Proc. Iowa Acad. Sci. VII. 152 (1900). — Britton, Man. ed. 2, 314 (1905). — Robinson & Fernald, Gray's New Man. ed. 7, 323, f. 651 (1908). — Britton & Shafer, N. Am. Trees 197, fig. 158 (1900). — *S. cordata* 1. *S. rigida* d. *vestita* Andersson in Svensk. Vet.-Akad. Handl. VI. 159 (1867). — *S. cordata* α *rigida* 7° *vestita* Andersson in De Candolle, Prodr. xvi.² 252 (1868). — *S. cordata* Britton & Brown, Ill. Fl. ed. 2, I. 596, f. 1463 (1913), pro parte. — The type of this, as Robinson and Fernald say, "poorly understood tree" has been collected "a Duce Neuwied prope Fort Osage fluv. Missouri." According to Ball (1900) it is distinguished from *S. cordata* by its larger size, densely puberulent twigs, large leaves, and longer, fertile aments, and other more minute differences." See also the characters given in the keys. I have not had the opportunity to make a special study of this species which according to Britton (1908) "is known in the valleys of the Missouri and Mississippi rivers and of tributary streams, from Kentucky, Illinois, and Missouri to Iowa and Nebraska.

59. *S. mackenzieana** Barratt apud Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 125 (1858); in Proc. Am. Acad. IV. 65 (Sal. Bor.-Am. 10) (1858); in Svensk. Vet.-Akad. Handl. VI. 160, t. 8, f. 91* (1867); in De Candolle, Prodr. xvi.² 252 (1868). — Britton & Shafer, N. Am. Trees, 197, fig. 157 (1908), pro parte. — Ball apud Coulter & Nelson, New Man. Rocky Mts. Bot. 133 (1909); in Piper & Beattie, Fl. Northwest Coast, 115 (1915). — Henry, Fl. Brit. Col. 9 (1915). — Rydberg, Fl.

* Hooker spells the name *Mackenzieana*, and Anderson does the same in 1858 quoting Hooker. Later he writes *Mackenziana*, a spelling adopted by all the later authors. I suppose the first spelling is the correct one.

Rocky Mts. 193 (1917). — *S. cordata* α *Mackenzieana* Hooker, Fl. Bor.-Am. II. 149 (1839). — Bebb apud Macoun, Cat. Can. Pl. 497 (1886); in Garden & Forest, VIII. 473 (1895). — Jepson, Fl. Cal. 341 (1909). — This Willow was first mentioned by Hooker, l. c., as follows: "Mackenzieana: foliis obovato-lanceolatis—*S. Mackenzieana* Barratt, mst." Anderson, in 1858, stated under *S. cordata*: "Sub hac specie duas formas attulit Hooker l. c. 1. *S. balsamiferam* Barratt, et 2) *S. Mackenzieanam* Barratt." He added: *S. Mackenzieana* mihi hybrida proles ex *S. cordata* et *vagante* [= *S. Bebbiana*] videtur." In 1867 and 1868 he also regarded *S. mackenzieana* as such a hybrid. It is, however, a good species, and has nothing in common with *S. Bebbiana* except the very long pedicels. I have seen material from the North West Territories where Richardson collected the type in June 1826 on the Mackenzie River and from Alberta, British Columbia, Idaho (Latah, Custer, Lincoln Counties), Washington (Whitman, Spokane, Adams and Columbia Counties), Montana (Lewis and Clark, Powell, Gallatin, Flathead and Park Counties), Wyoming (Yellowstone Park), Oregon (Washington, Good River, Wasco, Umatilla, Union and Lane Counties) and California (Siskiyou County). Probably the species is much more widely spread but sometimes it is not easy to distinguish young flowering specimens of it from those of *S. lutea* or *S. monochroma*.

Ball apud Piper & Beattie, Fl. Northwest Coast, 116 (1915), describes a var. *macrogamma* with densely pubescent-tomentose branchlets and elongated densely pilose-tomentose buds from Seattle, Portland and Corvallis. This form and the typical *S. Mackenzieana* have hitherto been confused with the eastern *S. cordata*.

60. *S. lutea* Nuttall, N. Am. Sylva, I. 63, t. 19, f. dextr. sup. (1843) — Ball apud Coulter & Nelson, New Man Rocky Mts. Bot. 132 (1909). — Rydberg, Fl. Rocky Mts. 193 (1917). — *S. cordata* 2. *S. angustata vitellina* Anderson in Svensk.Vet.-Akad. Handl. VI. 159 (Monog. Salic.) (1867), an excl. f. *crassa*? — *S. cordata* β *angustata* 3 *vitellina* Andersson in De Candolle, Prodr. XVI². 252 (1868). — *S. cordata* var. *Watsoni* Bebb apud Watson, Bot. Calif. II. 86 (1879), fide Ball; Jepson, Fl. Calif. 341 (1909). — *S. cordata* var. *lutea* Bebb in Garden & Forest, VIII. 473 (1895). — *S. flava* Rydberg in Bull. Torr. Bot. Club, XXVIII. 273 (1901). — *S. Ormsbyensis* Von Seemen, l. c. xxx. 635 (1903), fide Ball. — *S. Watsonii* Rydberg, l. c. XXXIII. 137 (1906); Fl. Rocky Mts. 193 (1917). — Nuttall, in his good description, says of this species: "It is . . . remarkable for its smooth light yellow branchlets and pale green, rather small, lucid leaves." Ball, in 1909, states that the pedicels are only up to 2 mm. long but according to my own observations they sometimes attain a length of 3–3.5 mm. Ball adds: "Distinguished only with difficulty from *S. cordata* and may perhaps prove to be only a variety of that species." I am not well enough acquainted with the typical *cordata*, especially its western forms, to say anything about the taxonomic value of *S. lutea*

which seems to be a widely spread species of which I have seen specimens from Alberta, Saskatchewan, Idaho, Montana, North and South Dakota (det. by Ball), Wyoming, Oregon, Utah, Colorado, Nevada and California. Here we find the so called *S. cordata* var. *Watsonii* which occurs according to Jepson on the San Jacinto Mts. and the northern Sierra Nevada.

The type of Andersson's *S. cordata angustata vitellina* had been collected by Bourgeau in Saskatchewan "bords de la rivière à côté des Berges Carlton." I have seen co-types of it in Herb. Berol. but I am not acquainted with Andersson's form *S. cordata* 2. *S. angustata vitellina crassa*, mentioned only in 1867, based on another specimen of Bourgeau's from "dans le marais glace près le Fort Carlton."

I suppose Ball will give a good account of this species and its variability. He has already proposed two varieties of it but has not yet published descriptions of them. Therefore I had best refrain from mentioning the type specimen of one of his new varieties which I have seen.

61. *S. monochroma* Ball in litt. — ? *S. rotundifolia* β *ovata* Nuttall, N. Am. Sylva, 75 (1843). — *S. cordata* Piper in Contr. U. S. N. at Herb. xi. 214 (F. Wash.) (1906), pro parte — *S. Mackenzieana* Britton & Shafer, Trees 196 (1908), pro parte. — *S. pyrifolia* Ball apud Coulter & Nelson, New Man. Rocky Mts. Bot. 133 (1909), non Andersson. — This species is in several respects a counterpart to *S. mackenzieana*. Specimens with mature leaves are easily recognized by their greenish under surface. The texture is thin compared with that of the leaves of the following species. In 1909, Ball referred to his *pyrifolia* the variety of Nuttall cited above, but in the MS.-list Ball marks this name with a ?. According to Nuttall it had been collected "by the late Dr. Gairdener, on the hills of the Wahlamet." I have not seen the type specimen but from the description I judge it should be regarded as the same as *S. monochroma*.

The typical *S. rotundifolia* Nuttall has been considered by Ball (1909) a synonym of what he then called *S. pyrifolia obscura*. From Nuttall's description I am inclined to take his *rotundifolia* for a form of *S. myrtillifolia*. Of Andersson's *S. pyrifolia obscura* I have already spoken in my note VII. on p. 169 in vol. 1 of this Journal. Since that was published I have seen a sterile fragment of the type in Herb. Berol. (ex Herb. Mus. Bot. Stockholm). It consists of a piece of a branchlet with mature leaves which are not quite concolor beneath, the upper ones being of a rather lanceolate-elliptic shape, broadly cuneate at base, acute at apex, somewhat coarsely crenulate-dentate, and measure up to 7.5 cm. in length and 2.4–3 cm. in width. They are glabrous on both sides except a sparse minute pubescence on the midrib above and in the groove of the petioles which are about 15 mm. long. The stipules are semicordate-lanceolate and glandular-serrate to dentate and 5 mm. long. According to Andersson the capsules have shorter pedicels than those of *S. pyrifolia*. I am at present unable to decide the question whether or not this var. *obscura* Andersson is a form of *S. monochroma*; but I am inclined to believe it may belong to

S. lutea. Ball, in his MS.-list, is inclined to refer this form to a new species of his of which I have not yet seen a specimen.

Of *S. monochroma* I have been able to examine specimens from British Columbia (Revelstoke), Washington (Whitman, Columbia Counties), Idaho (Nez Perces, Latah, Bannok Counties), Montana (Chouteau, Gallatin, Lewis and Clark, Teton Counties), Wyoming (Yellowstone Park), and Oregon (Crook, Umatilla, Union, Wallowa Counties). It is probably a widely distributed species on the mountains of these states and until now mostly mistaken for *S. cordata* or the so called *S. pseudo-myrsinites* of authors.

62. *S. myrtillifolia* Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 132 (1858); in Proc. Am. Acad. iv. 74 (Sal. Bor.-Am. 28) (1858); in Walpers, Ann. Bot. v. 756 (1858). — Bebb in Bot. Gaz. xv. 54 (1890). — Coville in Proc. Wash. Acad. Sci. III. f. 22 (1901). — Fernald in Rhodora, xvi. 170 (1914). — Rydberg, Fl. Rocky Mts. 194 (1917). — *S. myrsinites* Hooker, Fl. Bor.-Am. II. 151 (1839), an pro parte? — *S. pseudo-myrsinites* Andersson in Öfv. Svensk. Vet. Akad. Förh. xv. 129 (1858); in Proc. Am. Acad. iv. 25 (Sal. Bor.-Am. 10) (1858); in Walpers, Ann. Bot. v. 754 (1858), an tantum ex parte? — *S. myrsinites* 2. *S. curtiflora* Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 130 (1858); in Proc. Am. Acad. iv. 71 (1858); in Walpers, Ann. Bot. v. 756 (1858), an tantum ex parte? — *S. Novae Angliae* 1. *S. pseudo-myrsinites* Andersson in Svensk. Vet.-Akad. Handl. VI. 160 (1867) ex parte. — *S. Novae Angliae* 2. *S. pseudo-cordata* Andersson, l. c. 161 (1867), pro parte maxima — *S. Novae Angliae* 3. *S. myrtillifolia* Andersson, l. c. 162 (1867). — *S. Novae Angliae* 3. *S. pseudo-myrsinites* Andersson in De Candolla, Prodr. XVI.² 253 (1868), pro parte. — *S. Novae Angliae* 4. *S. myrtillifolia* Andersson, l. c. (1868). — ? *S. myrtillifolia curtiflora* Rose in Contrib. U. S. Nat. Herb. III. 573 (1896). — I fully agree with Bebb and Fernald that *S. myrtillifolia* is the correct name to be applied to the forms of the British American and the Rocky Mountain Willows passing as *S. novae angliae* or *S. pseudomyrsinites*. In 1858 Andersson described two American subspecies of *S. myrsinites* as *S. pseudomyrsinites* and *S. curtiflora*, and besides these two to which he gave binomial names, although they were not intended by Andersson to be regarded as species but as subspecies (later changed into varieties), he proposed *S. myrtillifolia* as a good species. In his Monograph in 1867 (not 1865 as quoted by Fernald in 1914), Andersson "in his mature judgment" (as Fernald said) considered these three shrubs as belonging to one North American species," for which he unfortunately proposed a new name: *S. Novae Angliae*, and (in 1868 as varieties) he proposed "tres formas habitu inter se haud parum diversas sed modificationibus numerosis indubie connexas," using the names *S. pseudo-myrsinites*, *S. pseudo-cordata* (instead of the older *S. curtiflora* of 1858) and *S. myrtillifolia*. In 1868 (not 1864 as quoted by Fernald) in De Candolle, Prodr. XVI.² fasc. II, Andersson went even a step farther in reducing the three subspecies to varieties, and keeping the names used in 1867.

The type of *S. myrtillifolia* of which I have before me a photograph and fragments ex Herb. Kew was collected by Drummond "June 22nd, low situations, Rocky Mountains east side." Of Andersson's subspecies *S. pseudomyrsinites* (1858) the type was found by Douglas "on the grandrapid of Sascatchewan." It is probably preserved in the Hookerian Herbarium, but I have only seen a co-type in Herb. Gray. This specimen is cited by Andersson, in 1867 and 1868, as the type of his forma *lingulata* of the subspecies or variety *pseudomyrsinites*, and Ball in Herb. W. and in his MS.-list regards this form as *S. myrtillifolia* var. *lingulata* (see below.).

Andersson, however, in 1858, under *S. pseudomyrsinites* mentioned another specimen from the Rocky Mountains which is probably the same as the type of what he (in 1867 and 1868) called var. *cordata* of the subspecies or variety *pseudo-myrsinites*. This variety *cordata* has been in the first place described from sterile specimens ("Folia attamen tantum vidi") collected by Drummond which also should be looked for at Kew, but Andersson had before him also a piece of Bourgeau's.* Unfortunately he does not quote the localities where these specimens came from, and I have only seen the material quoted in the footnote which could be regarded as the type of this var. *cordata*. Ball is now using this name for a variety of what he (in Herb. C. and his MS.-list) calls *S. pseudocordata* (see below).

Andersson proposed still another form, *aequalis*, of his subspecies or variety *S. pseudomyrsinites*. In 1867 he quotes as type a specimen collected by Bourgeau "in campement forêt brûlée Rocky Mountains 15 Aug. 1858." I have not seen this type or any other specimen truly representing the form Andersson had in mind. In 1909, Ball described a *S. pseudomyrsinites* var. *aequalis* (!), and in Herb. W. and his MS.-list he changes this name to *S. pseudocordata aequalis*. Ball's variety seems to me to present a good species but I doubt whether it is really the same as Andersson's form.

Andersson's second subspecies *S. curtiflora* (1858) is founded on a specimen collected by Richardson at Fort Franklin on the Mackenzie River. There are two specimens of Richardson's in Herb. N. Y. of which the one numbered "no. 69 Hb. H. B. & T." (m., f., fr.) may be identical with the real type (probably preserved in Herb. Kew), but it does not exactly fit Andersson's description made in 1858 in which he states that the pedicels are three times longer than the bracts and four times longer than the gland; some flowers however agree rather well with these indications, and I am unable to distinguish this no. 69 or the second specimen ex Herb. Barratt (N. Y.) "Fort Franklin, low depressed shrub 12 or 14

* This may have been the same of which there is a fragment bearing an old fruiting ament in Herb. Berol. ex Herb. Stockholm, coll. by Bourgeau in 1858 (Palliser's Exped.) in the Rocky Mts. and named by Andersson "*Salix (cordata) pseudomyrsinites*". It agrees with the description of var. *cordata* but the branchlets are pubescent and the leaves hardly more than half an inch wide.

inches long" (m., f.) from typical *S. myrtillifolia*, and Ball, too, in his MS.-list refers *curtiflora* as a synonym to this species.

In 1867 and 1868, Andersson, as already mentioned, changed the name *curtiflora* to *pseudocordata* referring to it also specimens of Bourgeau's ("ad fl. Saskatchewan, prope Fort Pitt"), of which there are male and female fragments in Herb. Berol., and Burke's ("Jaspers house") which I have not yet seen. The specimen from near Fort Pitt represents nothing but typical *S. myrtillifolia*. Besides it he adds "in Rocky Mountains (Drummond)." This last specimen is in the Gray Herbarium and represents No. 659 of Drummond's. According to the label it came with No. 665 which I have seen in Herb. N. Y. Those two numbers consist of male and female pieces with young flowers and leaves, and there is hardly a good character to separate them from *S. myrtillifolia* except that the bracts (at least of the male flowers) are mostly "crispo-albo-villosae" in No. 665 while they are almost glabrous in No. 659, and agree in every respect with those of typical *S. myrtillifolia*. Of course the size and shape of the leaves cannot even be guessed.

There is good reason to doubt whether Andersson's subspecies or variety *pseudocordata* has anything to do with *S. pseudocordata* of Ball in his MS.-list. Rydberg, Fl. Rocky Mts. 194 (1917) has used the names *S. curtiflora* (with the synonym *pseudocordata*) and *S. pseudomyrsinites* apparently for forms different from those which Andersson had before him. I can only hope that Ball will be able to elucidate these critical forms which have been named and renamed by Andersson, as Fernald, said, but also by later authors "in a perplexing fashion."

Fernald, in *Rhodora* xvi. 172 (1914), proposed a *S. myrtillifolia* var. *brachypoda* from Newfoundland, and Ball, as already mentioned, keeps a *S. myrtillifolia* var. *lingulata* in Herb. W. and his MS.-lists (*S. myrsinites* 1. *pseudomyrsinites* Andersson in 1858, see synonymy given above; *S. Novae Angliae* 1. *S. pseudo-myrsinites* b *lingulata* Andersson in 1867; *S. Novae Angliae* α, *pseudo-myrsinites*, 2° *lingulata* Andersson in 1868). I have seen specimens determined by Ball from the Northwest Territories (Fort Providence, Fort Resolution and Hudson Bay) and Saskatchewan, without exact locality, collected by Bourgeau in 1859. The var. *lingulata* does not seem to represent anything but a vigorous form of the type.

Of this I have been able to examine specimens from Alaska (Copper River Region, Yukon Valley), the Yukon Territory (Dawson, Lake Bennett), the Northwest Territories (Fort Franklin, Yahami Mts., Tazin River, Fort Providence, Hudson Bay, Churchill) Alberta, Saskatchewan, Ontario (Lake of Woods), Quebec and Labrador; it probably also occurs in the northern parts of the Rocky Mountains in the United States, where it seems to be replaced by the following species.

63. *S. pseudocordata* Rydberg, Fl. Col. 94 (1906). — ? *S. Novae Angliae* 1. *S. pseudo-myrsinites* Andersson in Svensk. Vet.-Akad. Handl. vi. 161 (Monog. Salic.) (1867), quoad var. a. *cordatam* pro parte et var. c.

aequalem. — *S. Novae Angliae* 2. *S. pseudo-cordata* Andersson, l. c., pro parte. — ? *S. Novae Angliae* α, *pseudo-myrsinites* Andersson in De Candolle, Prodr. XXI.² 253 (1868), quoad 1° *cordatam* pro parte et 3° *aequalem*. — *S. Novae Angliae* β, *pseudo-cordata* Andersson, l. c., pro parte. — *S. cordata* Piper in Contrib. U. S. Nat. Herb. xi. 214 (Fl. Wash.) (1906), pro parte. — *S. pseudomyrsinites* Ball apud Coulter & Nelson, New Man. Rocky Mts. Bot. 133 (1909), incl. var. *equali* Ball. — Rydberg, Fl. Rocky Mts. 194 (1917), pro parte. — *S. curtiflora* Rydberg, l. c. 194 (1917), an tantum pro parte? — As I have already pointed out, I have not been able to compare the specimens which ought to be regarded as the types of Andersson's var. *cordata* (see, however, my footnote on p. 194), var. *aequalis* and his subspecies or variety *pseudocordata*. In 1909, Ball used the name *pseudomyrsinites* "Andersson" for the forms I am inclined to refer to the present species. Andersson did not publish such a species but only a subspecies which he later (1867) reduced to a variety. As explained above Andersson's first subspecies *S. pseudomyrsinites* (1858) is nothing but a form of *S. myrtillifolia* (var. *lingulata* [And.] Ball). Strictly speaking Andersson's subspecies *S. pseudocordata* (1867) is the same as his subspecies *S. curtiflora* (1858) which, as already stated, must be regarded as a synonym of *S. myrtillifolia*. Rydberg did not publish the name *S. pseudocordata* with a new description; he only said: "13. *Salix pseudo-cordata* Andersson (*S. Novae-Angliae pseudocordata* Andersson)." Therefore, in my opinion, the name *S. pseudocordata* Rydberg can hardly stand. I think that the so called *S. pseudomyrsinites* and *pseudocordata* or *curtiflora* of Rydberg and Ball should receive a new name. Ball in 1909 had a *S. pseudomyrsinites* var. *equalis* (having in mind Andersson's var. *aequalis* cited above) and referred it in his MS.-list to *pseudocordata*, of which he also proposes a var. *cordata* which in his opinion is the same as Andersson's var. *cordata* mentioned above. Not having seen Andersson's types I do not know whether Ball is right in regarding them as identical with the forms mentioned below. Without a careful study of the type specimens it seems to me impossible to understand the real meaning of Andersson's descriptions. I sincerely hope that Mr. Ball's investigations will throw much light on these obscure forms. He certainly will give us a good description of this species and its variability.

The following specimens I am inclined to refer to it, partly on the authority of Ball himself. See also the details given in the keys. The forms with pilose pedicels need special observation, and they sometimes remind one of *S. monticola*, having, however, concolor leaves. There may be hybrids among them.

BRITISH COLUMBIA. Kicking Horse Pass, June 21, 1887, *J. Macoun* (No. 35, f., m.; C.). Kananaskis, thickets in the foothills, June 22, 1885, same collector (No. 14, fr.; C.).

ALBERTA. Rocky Mountain Park District, Banff, by the Bow River, June 26, 1891, *J. Macoun* (No. 36, fr.; C.); Banff, August 9, 1904, *J. G. Jack* (fr.; A.; forma incerta). Crows Nest Pass, The Gap, August 4, 1897, *J. Macoun* (No. 94438 and 94439, st., O.).

WASHINGTON. Whitman County, Pullman, *C. V. Piper* (No. 1173, in part, st.; W.; 3598, f.; W.). Kittitas County, Wenatchee Mt., head of Cook Creek, Sept. 3-4, 1901, *F. V. Coville* (Nos. 1175, 1176, st.; W.).

WYOMING. ? Fremont County, Boulder Creek, August 26, 1894, *A. Nelson* (No. 1122, st.; G.); bank of Little Sandy River near Leckie (?), June 28, 1901, *Merrill & Wilcox* (No. 592, m.; N.). Albany County, Woods Creek, along creeks, July 3, 1903, *L. N. Goodding* (No. 1432, f.; M.); forma porro observanda; Centennial, August 7, 1902, *A. Nelson* (No. 8823, fr.; Cor.). ? Sheridan County, Bighorn Mts., Big Goose Creek, July 15-24, 1893, *F. Tweedy* (No. 62, fr.; W.); same mountains, August, 1899, same coll. (No. 2437, fr.; N.; *pedicellis pilosis*). Yellowstone Park, Golden Gate, June 28, 1899, *A. & Nelson* (No. 5549, fr.; G., N.); Obsidian Creek, July 23, 1899, *A. Nelson*, (No. 6070, fr.; *pedicellis pilosis*; Cor.). Uinta County, Evanston, June 9, 1898, same coll. (No. 4533, m., f.; Cor.); Kemmerer, June 13, 1900, same coll. (No. 7178, fr.; A.; *pedicellis parce pilosis*). ? County, Green River, May 30, 1897, same coll. (No. 3036, fr. tantum; M.).

IDAHO. Custer County, Mackay (Bear Canyon), July 31, 1911, *Nelson & Macbride* (No. 1551, fr.; G.; *pedicellis pilosis*).

MONTANA. Park County: without exact locality, 1901, *E. W. Scheuner* (No. 74, m.; N.). Powell County, Deer Lodge Valley, *Blankinship* (No. 790; W.). Beaverhead County, Lima, June 29, 1895, *C. L. Shearer* (No. 3422; W.). Flathead County, Columbia Falls, June 5, 1893, *R. S. W. Williams* (No. 971; W.).

UTAH. ? Summit County, Uinta Mts., Dryer Mine, July 2, 1902, *L. N. Goodding* (No. 1227, fr.; A., G., W.; *pedicellis pilosis*). Salt Lake County, Salt Lake City, Kimballs, June 3, 1908, *Mrs. J. Clemens* (fr.; St.). Big Cottonwood Canyon, below Silver Lake, *Rydberg & Carlton* (No. 6612, f.; G., N.).

NEVADA. Burnt Timber Mts., Pole Creek, July 15, 1912, *Nelson & Macbride* (No. 2065, fr.; M.).

OREGON. Deschutes (or Crook?) County, swamps wells north slope of Paulina Mts., in water 1 m. in depth, alt. 1690 m., July 13, 1894, *J. B. Leiberg* (No. 422, m. f.; No. 952; A., C.; *pedicellis pilosis*, distributa sub nomine "*S. Leibergii* Bebb"); same Mts., in water at shore of West Lake, 2100 m., July 29, 1894, same coll. (No. 579, f.; C.; *pedicellis pilosis*); Deschutes River, at saw mill, 1½ mi. above Bend, August 8, 1913, *C. R. Ball* (Nos. 1901-1804, f., st.; W.). Crook County, on Little Deschutes River, about 1 mi. north of Pengra, August 14, 1897, *F. C. Coville & E. J. Applegate* (No. 537, st.; W.).

ARIZONA. ? County, White Mountains, Cienegas, head of Little Colorado River, July 10, 1912, *L. N. Goodding* (No. 1153, fr., m.; N.; somewhat doubtful).

b. SOME REMARKS ON THE GEOGRAPHICAL DISTRIBUTION OF THE AMERICAN WILLOWS

Before I conclude my notes on American Willows I wish to say a few words in regard to the geographical distribution of the different sections and species. I suppose it will be of some use to students of the genus and of the flora of a certain state or region in general to give an enumeration of all the species according to their occurrence in the different states based on the material I have been able to examine. Of some states I have seen very little material, and, therefore, my indications are far from exhaustive. I wish to draw the attention of students to the flora of those states or regions where I can give but an incomplete account of the Willows which may occur in them.

Among the twenty-three sections enumerated by me in a later note there are several groups peculiar to America and not represented in the Old World; namely, Sect. Nigrae, Bonplandianae and Longifoliae. Of the Nigrae the typical *S. Humboldtiana* is restricted to South America, probably ranging as far south as the Straits of Magellan, while its northern representative, *S. nigra*, reaches the 50th degree N. Lat. in Ontario. No other section covers such a wide area, as it is also found from the Atlantic to the Pacific coast in California.

The species of the Longifoliae, too, are widely spread from Guatemala (*S. taxifolia microphylla*) to the vicinity of Dawson in the Yukon Valley, Yukon Territory (*S. longifolia pedicellata*), and in the States from coast to coast.

The Bonplandianae inhabit a more restricted area from Guatemala (*S. Bonplandianae* forma) to northern California (*S. laevigata*) or even southern Oregon in the west, and Illinois to the District Columbia (*S. longipes Wardii*) in the east.

Other sections indigenous to Central and North America and apparently of no distinct relationship to forms of the Old World are: Mexicanae (three species) in Mexico; Wolffianae (one species) in Idaho, Wyoming, Montana, Oregon and Colorado.

The Candidae with *S. candida* (and possibly *S. cryptodonta*) are also a section the true affinity of which is by no means clear. It is a Willow of the northern United States from New Jersey to Montana, and of Canada from Labrador to Alberta and probably to British Columbia and the Great Slave Lake in the Northwest Territories.

The Fulvae, too, with *S. Bebbiana*, *Geyeriana* and *Lemmonii* are a distinctly American group of which *S. Bebbiana* is a widely spread member from New Mexico to the Yukon Territory, and from Newfoundland and New Jersey to northeastern Nevada and Washington.

Very limited is the range of the strange Brewerianae (California), and of the Sitchenses (Pacific coast from California to Southern Alaska).

Other sections, like the Cordatae, Adenophyllae, Balsamiferae, Discolores and Griseae, including only American forms, nevertheless show a more or less distinct affinity to Asiatic and European species, while the sections Reticulatae, Ovalifoliae, Glaucæ, Phyllicifoliae, Chrysanthæae and Roseae combine species of the Old and New World.

On the following pages I give an alphabetic enumeration of the species met with in the different states of the United States and of Canada as well as in Mexico and South America. Those species indigenous to or hitherto known only from one state or district are marked with an asterisk. A question-mark signifies that the occurrence of the species or form in the region is still doubtful or that it is not yet clearly identified.

UNITED STATES

ALABAMA: *S. nigra*, *longipes* var. *Wardii*.

ALASKA: *S. alaxensis* and var. *longistylis*, * *amplifolia*, *arbusculoides*, *arctica* and var. *obcordata*, *Barclayi* and var. *hebecarpa*, *Bebbiana* var. *perrostrata*, * *Chamissonis*, *commutata*, *fuscescens*, * *glacialis*, *glauc* var. *acutifolia*, * *lingulata*, *myrtillifolia*, *niphoclada*, *ovalifolia* and vars. * *camdensis* and * *subarctica*, *phlebophylla*, * *polaris* (typica?) *pulchra* and var. *yukonensis*, *reticulata*, * *rotundifolia* and f. * *pilosiuscula*, *Richardsonii*, *Scouleriana*, *sitchensis*, * *stolonifera* and f. * *subpilosa*, * *venusta* (doubtful), and * *Walpolei*.

ARIZONA: *S. Bebbiana* var. *perrostrata*, *Bonplandiana* var. *Toumeyii*, *exigua* var. *stenophylla*, *Geyeriana*, ? *irrorata*, *laevigata*, *monticola*, *pseudocordata*, *Scouleriana*.

ARKANSAS: *S. cordata*, *humilis*, *longifolia*, *longipes* var. *Wardii*, *nigra* and var. *altissima*.

CALIFORNIA: *S.* * *Breweri*, *cascadensis*, ? *commutata*, * *Coulteri*, * *delnortensis*, *Eastwoodiae* and var. * *callicoma*, *exigua* forma, *Geyeriana* var. *argentea*, *Gooddingii*, *Jepsonii*, *laevigata*, *lasiandra* and vars. *lancifolia* and *caudata*, *lasiolipsis* and vars. *Bigelovii* and *Bakeri*, *Lemmonii* and var. *Austinae*, *lutea*, *mackenziana*, *melanopsis* and var. *Bolanderiana*, *oresteria*, *planifolia* var. *monica*, * *Parishiana*, *petrophila* and var. *caespitosa*, *Scouleriana* and var. * *crassijulis*, *sessilifolia* vars. *Hindsiana* and * *leucodendroides*, *subcoerulea*.

COLORADO: *S. amygdaloides* f. *pilosiuscula*, *Bebbiana* var. *perrostrata*, *brachycarpa*, *candida*, *exigua* vars. *luteosericea* and *stenophylla*, *Geyeriana* and var. *argentea*, *lasiandra* and var. *caudata*, *irrorata*, *ligulifolia*, *lutea*, *monticola*, *nivalis* and var. *saximontana*, *petrophila*, *planifolia* var. *monica*, *pseudolapponum*, *Scouleriana*, *subcoerulea*, *Wolfii*.

CONNECTICUT: *S. Bebbiana*, *candida*, *discolor*, *cordata*, *humilis*, *longifolia*, *nigra*, *sericea*, *tristis*.

DELAWARE: *S. cordata*, *discolor*, *humilis*, *longifolia*, *lucida*, *nigra*, *tristis*.

DISTRICT COLUMBIA: *S. cordata*, *humilis*, *longifolia*, *longipes* var. *Wardii*, *nigra*, *sericea*, *tristis*.

FLORIDA: *S. Harbisonii*, *humilis*, *longipes*, ? *nigra*, *tristis*.

GEORGIA: *S. Harbisonii*, *humilis*, *ongipes*, *nigra*.

IDAHO: *S. amygdaloides* f. *pilosiuscula*, *argophylla*, *Bebbiana* var. *perrostrata*, *bella*, *brachycarpa*, *commutata* var. *puberula*, *exigua* and vars. *nevadensis* and *tenerrima*, *Geyeriana* and var. *argentea*, *lasiolipsis* var. *Bigelovii*, *mackenziana*, *melanopsis*, *monochroma*, *pseudocordata*, *Scouleriana*, *sitchensis*, *subcoerulea*, *Wolfii* var. *idahoensis*.

ILLINOIS: *S. adenophylla*, *amygdaloides*, *Bebbiana*, *candida*, *cordata*, *discolor*, *glaucophylloides* var. *glaucophylla*, *humilis*, *longipes* var. *Wardii*, *lucida*, *missouriensis*, *sericea*, *tristis*.

INDIANA: *S. amygdaloides*, *Bebbiana*, *candida*, *cordata*, *discolor*,

glaucophylloides var. glaucophylla, humilis, longifolia, lucida, nigra pedicellaris, petiolaris, sericea, tristis.

IOWA: *S. amygdaloides*, *Bebbiana*, *candida*, *cordata*, *discolor*, *humilis*, *longifolia*, *lucida*, *missouriensis*, *nigra*, *pedicellaris*, *petiolaris*, *sericea*, *tristis*.

KANSAS: *S. cordata*, *amygdaloides*, *longifolia*, *longipes* var. *Wardii*, *nigra*.

KENTUCKY: *S. cordata*, *discolor*, *humilis*, *longipes* var. *Wardii*, *missouriensis*, *nigra*, *sericea*, *tristis*.

LOUISIANA: *S. longifolia*, ? *longipes* var. *venulosa*, *nigra* var. *altissima*.

MAINE: *S. Bebbiana*, *candida*,* *coactilis*, *cordata*, *discolor*, *glaucophylloides*, *herbacea*, *longifolia* var. *Wheeleri*, *lucida*, *nigra*, *pellita*, *petiolaris* var. *rosmarinoides*, *planifolia*, *sericea*, *Uva-ursi*.

MARYLAND: *S. cordata*, *humilis*, *longifolia*, *longipes* var. *Wardii*, *nigra*, *sericea*, ? *tristis*.

MASSACHUSETTS: *S. amygdaloides*, *Bebbiana*, *candida*, *cordata*, *discolor*, *humilis*, *longifolia*, *lucida*, *nigra*, *pedicellaris*, *petiolaris*, *sericea*, *serissima*, *tristis*.

MICHIGAN: *S. adenophylla*, *amygdaloides*, *Bebbiana*, *candida*, *cordata*, *discolor*, *glaucophylloides* var. *glaucophylla*, *humilis*, *longifolia* vars. *pedicellata* and *Wheeleri*, *nigra*, *pellita*, *pedicellaris*, *petiolaris*, *sericea*, *serissima*.

MINNESOTA: *S. amygdaloides*, *Bebbiana*, *candida*, *cordata*, *discolor*, *humilis*, *longifolia* var. *pedicellata*, *nigra*, ? *pedicellaris*, *petiolaris*, *pyrifolia*.

MISSISSIPPI: *S. cordata*, *humilis*, *longifolia*, *longipes* var. *Wardii*, *missouriensis*, *nigra*, *tristis*.

MISSOURI: *S. amygdaloides*, *cordata*, *discolor*, *humilis*, *longifolia*, *longipes* var. *Wardii*, *missouriensis*, *nigra*, *sericea*, *tristis*.

MONTANA: *S. amygdaloides*, *Barclayi* and var. *conjuncta*, *Barrattiana* var. *Tweedyi*, *bella*, *brachycarpa*, *candida*, *commutata*, ? *Drummondiana*, *exigua* and var. *tenerrima*, *Geyeriana* and var. *meleina*, *lasiandra* var. *caudata*, *lutea*, *mackenzieana*, *melanopsis*, *monochroma*, *monticola*, *nivalis* and var. *saximontana*, *petrophila*, *planifolia* var. *monica*, *pseudocordata*, *pseudolapponum*, *Scouleriana*, *sitchensis*, *subcoerulea*, *vestita* var. *erecta*, *Wolffi* var. *idahoensis*.

NEBRASKA: *S. amygdaloides*, *Bebbiana* var. *perrostrata*, *cordata*, *exigua* var. *luteosericea*, *Geyeriana*, *humilis*, *longifolia*, *missouriensis*, *nigra*, *tristis*.

NEVADA: *S. amygdaloides* f. *pilosiuscula*, *Bebbiana* var. *perrostrata*, ? *commutata*, *Eastwoodiae* and var. *callicoma*, *exigua* and var. *nevadensis*, *Gooddingii*, *laevigata*, *lasiandra* and var. *caudata*, *lasiolepis* var. *Bigelovii*, *Lemmonii*, *ligulifolia*, *lutea*, *nivalis* var. *saximontana*, *orestera*, *petrophila* and var. *caespitosa*, *pseudocordata*, *Scouleriana*, *subcoerulea*.

NEW HAMPSHIRE: *S. argyrocarpa*, *Bebbiana*, *cordata*, *discolor*, *herbacea*, *longifolia*, *lucida*, *nigra*, *planifolia*, *pyrifolia*, ? *serissima*, *Uva-ursi*.



Schneider, Camillo. 1921. "Notes on American Willows. XI." *Journal of the Arnold Arboretum* 2(4), 185–204. <https://doi.org/10.5962/p.316345>.

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