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NOTES ON AMERICAN WILLOWS. VI.

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a. THE SPECIES OF THE SECTION PHYLICIFOLIAE

THE following study of the species of the section *Phylicifoliae* is chiefly based on the collections of the herbaria of the Arnold Arboretum, the Field Museum of Chicago, the Californian Academy, the Missouri Botanic Garden, the Geological Survey of Canada, the Leland Stanford University, of Professor W. L. Jepson, Berkeley, Cal., and of the Gray Herbarium and the National Herbarium, but I have been able to consult also some types from the Kew Herbarium and some specimens from the herbaria of the University of Washington and of the University of Wyoming. My thanks are due to the gentlemen in charge of these collections.

It is not without reluctance that I adopt the name Phylicifoliae Dumortier for the group to which I refer the following species. I have dealt with the forms of eastern Asia of this section in Sargent, Pl. Wils. III. 122 (1916). To the synonyms there given is to be added: Sect. Argenteae Ball in Coulter & Nelson, New Man. Rocky Mts. Bot. 136 (1909), non Koch, and sect. Argentea Rydberg, Fl. Rocky Mts. 189 (1917), pro parte. Even if we should place S. pellita and the other species with permanently hairy leaves in a different section, the name Argenteae used by Ball could, in my opinion, not be adopted because the American species cannot be united with those forms which have been referred by Koch (De Salic. Comm. 46. [1828]) to his section Argenteae for which the oldest name is sect. Incubaceae Dumortier (Fl. Belg. Prodr. 12 [1827]). Rydberg's Argentea group is a mixture of forms of very different relationship. He proposed, in 1906 (Fl. Colo. 93) a sect. Pellitae, and it might be the best to use this name for our group if a more thorough study of the relationship of the different sections should prove that the American forms of the Phylicifoliae are more closely related to each other than to the species of the Old World.

I am doubtful whether a species like S. pulchra Chamisso should be included in this section. It seems to me that it may have closer relations with S. Richardsonii Hooker and its allies. But, of course, that is a question which only can be decided if one is better acquainted with all these forms than I am at present. S. pulchra differs from the other species of this section by its well-developed and more or less persistent stipules. The following key is mainly based on the characters afforded by the leaves. I have not yet been able to elaborate separate keys for male and female specimens of which the determination is a rather difficult task owing to the precociousness of the aments and the great similarity especially of the male flowers. It needs a careful comparison of a well-collected series of flowering specimens of each species to thoroughly establish the differences between them without the aid of the leaves.

CLAVIS SPECIERUM VARIETATUMQUE

- Folia normalia superiora adulta glabra vel fere glabra (confer etiam 6b. S. pellitam var. psilam); ramuli hornotini annotinique plus minusve castanei vel purpureobrunnei et nitiduli sed haud vel raro leviter pruinosi.

 - 1b. S. pulchra var. yukonensis. Stipulae semper nullae vel etiam in ramulis vegetis quam petioli duplo breviores, deciduae et plantae aliis signis diversae.

Filamenta basi pilosula; folia superiora ramulorum breviorum vel (infima et) media ramulorum vegetorum anguste ad late obovata vel obovato-oblonga, basi plusminusve cuneata, apice subito brevissime acuta vel plicato-acuta, 4:1.8 — 6:3.3 vel ad 7.5:3 vel angustiora ad 6:2 cm. magna, initio subtus plus minusve breviter sericeo-pilosa; amenta feminea 4.5–6.5 (-8) cm. magna; fructus ellipsoidei subrostrati, ad 8 mm. longi pedicello ad 1.5 mm. longo excluso. 5. S. pennata.

- Filamenta glaberrima; folia haud vel rarissime late obovalia et plantae aliis signis diversae.
 - Fructus perfecte maturi 5–6 mm. longi pedicello brevi glandulam haud vel vix $\frac{1}{2}$ -plo superante excluso; styli 0.8–1.5 mm. longi; amenta fructifera vix ultra 4:1.2 cm. magna, mascula 1–2:1–1.2 cm. magna; folia (surculorum ex parte excepta) integerrima vel (pleraque tantum partim) satis indistincte glanduloso-crenato-denticulata, lanceolata. elliptico-lanceolata, elliptica vel obovato-oblonga, utrinque acuta vel apice obtusiora, rarius ovali-lanceolata, 2:0.7 ad pleraque haud ultra 5:2–1.5 cm. magna, superne vivide viridia, (novella saepe excepta) glaberrima, estomatifera vel stomatibus plusminusve numerosis praedita, subtus valde discoloria, glaucescentia, glabra vel sparse breviter pilosa (confer etiam *S. Nelsonii*, p. 80).

4. S. planifolia et var.

Fructus perfecte maturi 7–10 mm. longi pedicello glandulam 2- vel pluriplo superante excepto et plantae aliis signis diversae.

Folia normalia plus minusve distincte (interdum tantum partim) crenatovel dentato-serrata, adulta subrigide chartacea, 4:1.5 ad 8:3 cm. magna, superne glaberrima vel initio ad costam puberula, demum lucide viridia, subtus glaucescentia, glaberrima vel novella sparse (pilis interdum rufis)

3. S. paraleuca.

- Folia normalia superiora adulta subtus dense sericea vel sericeo-velutina, saepe micantia.
 - Ramuli hornotini annotinique plusminusve distincte pruinosi, etiam novelli glabri vel parcissime pilosi et cito glabrescentes.
 - Pagina inferior foliorum omnium pilis strictis brevibus adpressis dense (in ramulis vegetis satis tenuiter argenteo-tomentosa, costa elevata flavescente vel fuscescente subglabriore, folia adulta chartacea, majora anguste ad late lanceolata vel oblanceolata, basi obtusa vel sensim acuta, apice acuta vel breviter acuminata, 4:0.9 ad 6:1.5 vel majora latiora ad 8-10:2-2.8 cm. magna, integerrima vel satis indistincte undulato-crenata; petioli 2-7 (-10) mm. longi; amenta mascula 2-3.5:1.1 cm. magna, feminea sub anthesi 2-2.5:0.7, fructifera 2.5-5:1 cm. magna; fructus ovoideo-subrostrati vel ovoideo-conici, circ. 5 mm. longi, pedicello glandula subduplo breviore excluso; styli 0.8-1.5 mm. longi 7. S. subcoerulea.
 - Pagina inferior (saltem foliorum superiorum et surculorum) subtus pilis sericeolanugginosis vix strictis longioribus vix vel haud adpressis velutino-tomentosa, folia adulta in *S. pellita* saepe plusminusve glabrescentia et plantae alijs signis diversae.
 - Folia lingulato-lanceolata, oblanceolata, lineari-lanceolata ad lanceolata, basi obtusa vel sensim cuneata, apice sensim acuta vel subacuminata, maxima surculorum late lanceolata, 3:0.6 ad 5:1 vel ad 9:1 vel latiora 8:1.5, maxima ad 13:3 vel 12:1 cm. magna, integerrima vel indistincte subcrenata, saepe margine subrevoluta, superne brevipilosa adulta costa excepta glabra, nervis lateralibus subimpressis, subtus novella densissime sericeo-tomentosa vel velutina, demum plus minusve glabrescentia et saepe tenuiter reticulata; petioli 2–10 mm. longi; amenta mascula ignota, feminea 2–5:1 cm. magna et in fructu paullo majora; fructus maturi ovoideo-conici, subrostrati, pedicello glandulam paullo vel ad duplo superante excluso circ. 5 mm. longi, quam ovaria subglabriores; styli 1-1.5(-2) mm. longi . . 6. S. pellita. Folia inferioribus oblongioribus exceptis pleraque lanceolata, basi plus minusve obtuse cuneata, apice acutiora, 6:1.3 ad 8:1.6 vel maxima ad 11:2.5-3 cm. magna, integerrima vel obscure repando-crenulata, superne cito glabrescentia vel fere glabra nervis lateralibus subimpressis, subtus dense albido- vel subargenteo-sericeo-velutina, costa elevata glabrescente; petioli 4–14 mm. longi; amenta mascula 2–2.5:1.5 cm., feminea sub anthesi 2-3:1 cm., fructifera ad 4.5(-6):1.5 cm. magna; fructus submaturi 4.5-5.5 mm. pedicello ad 1.25 mm. longo glandulam $\frac{1}{4}$ ad duplo superante excepto longi; styli 1–1.5 mm. longi. 8. S. bella.

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Ramuli hornotini et saepe etiam annotini plusminusve pilosuli vel tomentelli, nunquam (vel rarius levissime) pruinosi.

Folia subtus ut in S. bella velutino-tomentosa, obovata, obovato-oblonga, elliptico-oblanceolata vel rarius elliptica, apice obtusa vel (pleraque subito) late acuta, basi cuneata ad obtusa, majora latiora ad 6:3, oblongiora ad 8.5-9:2-2.8 cm. magna; petioli 5-10 mm. longi; stipulae in ramulis.vegetis semiovato-lanceolatae, petiolo $\frac{1}{2}$ vel vix breviores; fructus elliptico-subrostrati, 5-7 mm. longi, pedicello ad 1.5 mm. longo excluso; styli 0.5-1 mm. longi. Folia subtus ut in S. subcoerulea sericeo-tomentosa, anguste oblanceolata, apice obtusa ad acuta, basi cuneata, majora angustiora 6.5-9:1.2 vel ad 10:2.5 cm., latiora ad 5:1.3 cm. magna; petioli vix ultra 7-8 mm. longi; stipulae tantum in surculis distinctae, semicordatae, ad 11 mm. longae; fructus 4.5-5.5(-6)mm. longi pedicello ad 1.25 mm. longo excluso; styli 0.75-1 mm. longi. 10. S. Jepsonii.

ENUMERATIO SPECIERUM

1. S. pulchra Chamisso in Linnaea, VI. 543 (1831). — Coville in Proc. Wash. Acad. Sci. III. 319, t. 38 (1901), excl. syn. ex parte. — Ostenfeld in Dansk. Vidensk.-Selsk. Skrift. I. Math.-Nat. Kl. 1909. no. 8, 34 (Vasc. Fl. Arct. N.-Am. Gjöa Exp. 1904–6) (1910), excl. syn. ex parte. — S. fulcrata a. subglauca Andersson in De Candolle, Prodr. xvI.² 244 (1868). — S. phylicoides Bebb in Bot. Gaz. XIII. 186, t. 10 (1888), pro parte maxima, non Andersson.

The type of this species came from Cape Espenberg, Alaska, and Chamisso also collected specimens on St. Lawrence Island. Not having seen the type which is preserved in the herbarium at Berlin, I rely on specimens from Port Clarence and St. Lawrence Island to supplement the ample description of the author. Judging by these specimens I believe that the typical form is one with glabrous or soon glabrescent twigs of which the one-year-old branchlets show very little or no trace of pubescence. But there occurs a public form which I shall describe later. Chamisso's name S. pulchra has been overlooked by most of the salicologists; it is not even mentioned in the Index Kewensis, and in 1866 Wimmer & Krause described another S. pulchra which has nothing whatever to do with our Andersson mentioned Chamisso's species only in 1858 (in Öfv. plant. Svensk. Vet.-Akad. Förh. xv. 120) under S. lapponum to which he refers specimens collected by Beechey at Kotzebue Sound unknown to me, in the following manner: "Non sine hesitatione permulta hic refero Salicem eam ' pulchram,' de qua Chamisso, a se in America arctica pluries lecta, mentionem fecit. . . . Amenta sessilia, capsulae non pedicellatae, sed folia, fere ut in S. phylicifolia, utrinque acutata viridia subtus pallidiora glaberrima, stipulae lineares persistentes. Unicum tantum specimen hujus formae ex herb. Berolinensi (a Chamisso lectum) vidi." In 1867 and 1868 Andersson does not mention this name, and I have not yet been able to discover to which species he referred Chamisso's specimen. He described, in 1858, a S. phylicoides (in Ofv. l. c. 123) from specimens collected by Seemann: Awatcha Bay, "in arctica America occidentali." The Awatcha

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(Avatcha, Avatchka, or Avacha) Bay is, however, as Coville (1901) already explained in southern Kamtchatka. On the northside of it is the harbor Petropavlosk where the ship "Herald," on which Seemann traveled, was in August 1848 when the type of *S. phylicoides* was collected according to the specimen in the Kew Herbarium. Andersson probably drew up his description from other specimens also collected by Seemann in the autumn of 1848 or 1849 in northwestern Alaska, but he does not cite them. In 1867, however, in his note to *S. fulcrata* (see later), the type of which has not been collected by Seemann, he mentions specimens of this collector without identifying them, and he cites, under *S. phylicoides*, only Seemann's plant from Awatcha Bay.

S. phylicoides has been regarded by Bebb (see later) as identical with the forms referred here to S. pulchra, but after having seen a good photograph and fragments of Andersson's type (Seemann, no. 1294, fr. im.; K.) I believe that it represents a different species not known from America. In S. phylicoides the stipules are, as Andersson correctly stated, small, linear-lanceolate, hardly more than 2 mm. long, and apparently deciduous or entirely wanting.

As to S. fulcrata Andersson (in Svensk. Vet.-Akad. Handl. vi. 139 [1867]) the following can be said. The author mentions as a synonym S. cordata var. Seemann, Voy. Herald 54, where only the locality "Fort Simpson to Bear Lake River " (Andersson quotes ' to Great Barelake ') is given. The collector was Capt. W. J. S. Pullen. I have not seen this specimen, nor the one cited by Andersson of Stubbendorff from Kamtchatka. In his remarks Andersson says: "Hujus formae tantum specimina perpauca examinare mihi licitum fuit, ut de iis vix certi quidquam urgere audeam. S. phylicoidi et S. chlorophyllae sine dubio maxime est affinis." From both it differs by its large linear-lanceolate stipules. The leaves are said to measure from "3-4 pollices" in length being above the middle " $\frac{3}{4}$ -1 poll." wide. Such leaves may be observed on strong shoots of S. pulchra, and I believe that this American form of S. fulcrata can be regarded as identical with our species but I have not yet seen a specimen of S. pulchra from the region between Fort Simpson and Great Bear Lake or from any other part of the western Northwest Territories except a doubtful fragment of Richardson's from Fort Franklin (no. 64, Hb. H.B. & T., f., m.; N.¹). See also my remarks under S. planifolia the northwestern form of which seems to meet S. pulchra in the Mackenzie region.

If Andersson's fig. 73 on plate VII, in his monograph (1867) really represents the typical S. fulcrata it certainly does not fit the description because the stipules are not very large, linear-lanceolate and longer than the petioles but more or less ovate and as long as the petiole. Neither does the drawing agree with the Asiatic form which, in 1868, was made the type of S. fulcrata β . subphylicifolia of which the author expressly states that it " a vera S. phylicifolia . . . optime distinguitur stipulis petiolum brevem . . . saepe quadruplo superantibus." I doubt if this variety is identical

¹ For abbreviations for herbaria see footnote on p. 1.

with any American form, and I am unable to decide what the true S. fulcrata is. In 1868, Andersson described a form from "Ameriac arctica occidentali (B. Seemann, Hb. Hook.)" the type of his S. fulcrata a, subglauca. Fortunately I have a photograph and fragments of it (Seemann, no. 1789, in 1849, f.; K.) before me which show that it belongs to S. pulchra. This is the plant which Bebb (1888) in the explanation of plate X, figs. 1–7 calls "Seemann's plant, 'N.W. America,' type of S. phylicoides and afterwards of S. fulcrata," while, as I have just pointed out, it is not the type of either species but only of S. fulcrata subglauca. In his remarks on this variety Andersson, strange to say, made the following statement (cited already by Bebb): "Huc forsan etiam pertinet S. phylicoides And., Sal. amer. boreal. I. c. p. 123" but nevertheless he gives a full description of the last species on the following page in the Prodromus.

Coville (1901) accepted Bebb's critical investigation, but he was the first to restore the name *S. pulchra* of which Bebb apparently had no knowledge. Coville, however, thought it probable that the type of *S. phylicoides* came from the American coast instead of from Awatcha Bay, but as I have shown above there is no reason for this.

S. pulchra ranges, as Coville already said, in Alaska from "the islands of Bering Sea to Point Barrow on the Arctic Coast, to Kodiak Island on the south coast, and to the upper Yukon valley in the interior." In the north I have seen it from as far east as Herschel Island and Dawson in the Yukon Territory, and Lake Bennett in the northwestern corner of British Columbia. As already mentioned it may occur as far east as Fort Franklin and Fort Simpson, but the specimens from these regions are uncertain. Coville also quotes a specimen from the Siberian Coast which I have not yet seen.

There are a good many specimens which differ from the type by their densely hairy branchlets, and I propose the following variety:

1b. S. pulchra, var. yukonensis, var. nov. — A typo nonnisi differre videtur ramulis novellis dense griseo- vel flavescenti-villoso-tomentosis (pilis vix $\frac{1}{2}$ mm. longis), annotinis plerisque etiam satis dense sed interdum tantum partim tomentosis, vetustioribus saepissime glabris et nitidulis, ut in typo castaneis vel intense purpurascentibus.

TYPE LOCALITY: vicinity of Dawson, Yukon Territory.

SPECIMENS EXAMINED: YUKON TERRITORY: vicinity of Dawson, June 26, 1914, A. Eastwood (no. 373, fr. submat., type; A.); June 11, 1914, A. Eastwood (No. 181, st.; 182., fr.; A.); May 7, 9, and 14, 1914, A. Eastwood (Nos. 37, f., 40, m., 55, f.; A.; amentis praecocibus in ramulis sordide flavescenti-tomentosis); June 9, 1914, A. Eastwood (No. 171, st.; A.); June 23, 1914, A. Eastwood (No. 359, st.; A.); along Forty Mile Creek, near Yukon River, May 26, 1893, F. Funston (No. 40, f.; W.).

ALASKA. Rampart on the Yukon, low marshy ground, May 26, 1901, J. Jones (No. 2, m.; W.; "tree 6 to 9 ft., bark on trunks and old wood rough and dark in color, new wood smooth and shiny bright brown"; a fruiting specimen under the same number is typical); June 16, 1901, J. Jones (No. 21, fr. im.; W.); along river bank, June 5, 1905, J. Jones (No. 5, f.; W.); Vicinity of Cape Lisbourne, Collie River, July 27, 1904, C. Washburne (fr.; W.; "not seen over 4 or 5 inches in height"); Copper River region, along river banks, June 23, 1902. W. L. Poto (No. 58, fr.; W.; "slightly

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inclined to be bushy, 8 feet high"); ridge north of camp 8/5-8, 1150 m., common at high elevations, August 8, 1902, W. L. Poto (No. 131, fr.; W.; "1-2 ft. high").

The systematic position of *S. pulchra* is by no means certain to me. As already stated it differs from all the other Willows of this group by the development of large persistent stipules, a character found in species like *S. Richardsonii* to which var. *yukonensis* bears a certain resemblance, but *S. Richardsonii* has a much more hirsute pubescence and glabrous ovaries.

2. S. phylicifolia Linnaeus, Spec. 11. 1016 (1753), exclud. var. β . — For further literature see Schneider in Sargent, Pl. Wils. III. 123 (1916). -The first author who adopted Linnaeus' name for an American Willow was Tuckerman (1843), who was followed by Carey (1848) as stated later under S. planifolia. When, in 1858, Andersson commenced his study of American Salix he referred Carey's plant with a query to what he then called S. (phylicifolia*) discolor, and said: "Specimina numerosa, quae attente examinavi, parum differunt a vera S. phylicifolia . . . " In 1867, however, he proposed S. chlorophylla for these forms, saying "est species parum dubiae affinitatis, ut jam propositum est, inter S. discolorem americanam et S. phylicifoliam boreali europaeam evidenter ambigans, nunc illi nunc huic adscripta." In the 5th edition of his Manual (p. 464 [1867]) Gray followed Andersson in taking up the name S. chlorophylla, but Bebb who (in 1889) studied the matter, first expressed the opinion that the differences between S. phylicifolia and S. chlorophylla given by Andersson did not exist. He said: "Carey, Tuckerman, Barratt and all the early New England botanists were quite right in referring the plant in question to the old Linnean species." Therefore, in the 6th edition of the Manual, Bebb reinstated the name S. phylicifolia but, as explained later, his own remarks prove that he was not fully convinced of the identity of the two plants. Robinson & Fernald (1908) and Britton & Brown (1913) also have adopted the name phylicifolia.

In 1899, Ball dealt with the 'western' S. chlorophylla, and he explained "the story of the confusion of S. phylicifolia and S. chlorophylla." He came to the conclusion that the typical S. phylicifolia is only found in Labrador, and that "the few White Mt. specimens examined, though old and imperfect, present a decidedly American variation towards the Rocky Mt. form." Ball gave a comparison of phylicifolia with chlorophylla, but, at that time, he, apparently, was very imperfectly acquainted with the eastern forms. To decide the question whether or not the true S. phylicifolia, or a form inseparable specifically from it occurs in North America we must determine the characters by which this species is to be recognized.

Linnaeus' type is "351. Salix foliis serratis glabris lanceolatis, crenis undulatis" in his Fl. Lap. 283, t. 8. fig. d (1737). From his description I take the following characters: ". . ramuli recentes purpurascentes. Folia lanceolata, glabra, distincte serrata, . . superne saturate viridia, nitida . ." S. J. Enander, the foremost living salicologist (in his Stud. Salices Linnés Herb. 17, no. 7a, and 83, no. 89 [1907]) has not only given an exact description of the material of *S. phylicifolia* preserved in Linnaeus'

herbarium, but he has also distributed among his Salic. Scand. Exsiccatae under no. $118\frac{1}{2}$ a photograph of "Salix phylicifolia L. originalis et typica," and besides this under no. 116, 117 and 119 a-c he has distributed male and female specimens of what he regards as typical phylicifolia. Therefore I base my judgment as to the characters of this species on Enander's specimens and descriptions. Of the so-called American phylicifolia I have all the material before me that can, possibly, be brought together from existing collections.

In 1868, Andersson said under S. chlorophylla: "Cum nostra S. phylicifolia congruit forma et colore foliorum ut etiam habitu amentorum sessilium, sed differt foliis pilis argenteis plus minusve dense conspersis etiam demum subderelictis, amentis angustioribus et compactioribus, capsulis subsessilibus, stylo multo longiore (saepe capsulae longitudine aequante et filiformi), stigmatibusque elongatis integris." He believed his var. denudata to be most closely related to phylicifolia, saying: "Jam monui me specimina Salicis a White Mountains vidisse quae nullo modo, nisi foliis ellipticis integerrimis, a nostra S. phylicifolia recedunt. Num hujus speciei forma maxime denudata ?" In 1889, Bebb, as I have already pointed out, declared that these differences mentioned by Andersson had not been confirmed by his investigations. He had compared material from Lapland, collected by Dr. Hankenson, which he, at first, could not distinguish from specimens collected by Faxon in the White Mountains. But a few months later in the same year (in Bull. Torr. Bot. Cl. xvi. 211), in a note, Bebb made the following statement: "Concerning the general character of the White Mountain S. phylicifolia, my remarks were unguarded and do not fairly state the amount of actual divergence from the Old World type. While I do not wish to qualify at least what was said of the closeness of resemblance observed between some of Mr. Faxon's specimens and certain others of genuine *phylicifolia* from Lapland, it is nevertheless true that from the common meeting ground thus indicated, the European forms vary mainly in the direction of S. nigricans, S. caprea, etc., whereas in this country the variation is in the direction of S. chlorophylla, and hence in so far as any difference appears in a series of specimens, it is a difference marked by shorter pedicels, longer styles, and more slender aments. I intended my closing words to cover this, but was not sufficiently explicit." I have investigated the Lapland material which Bebb had before him. It is preserved in his herbarium in herb. C. under Nos. 11449-11452 from Prtcå (?), Gustafsho, and Skadsön (?), collected at different times during 1879, 1883, 1885 and 1886. The differences are not very obvious but a careful comparison shows that these forms are distinguished by larger fruits, larger and thicker fruiting aments, more distinctly crenate leaves, and especially by the fact that the larger leaves point to forms different from those observed in America. In my key I have tried to indicate the main differences between S. phylicifolia sensu stricto and S. chlorophylla denudata (now S. planifolia). The young branchlets of the American species very often show, more or less distinctly, a glaucous hue which never seems to be present in S. phylicifolia

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of which the dried twigs are less decidedly blackish purple. That the pubescence of the European species sometimes also shows a mixture of bright red brown hairs is expressly stated by F. B. White (Jour. Linn. Soc. xxvii. 396 [1890]).

There seems to be no doubt that S. planifolia is closely related to S. phylicifolia but the only American specimen I have seen which might represent typical S. phylicifolia is a sterile one collected by Fernald & Wiegand at Brigus Junction in the southeast corner of Newfoundland, August 5, 1911 (No. 5272; G.). Without flowers or fruits I am unable to decide the identity of this plant, but I suspect that it belongs to S. discolor to which species Fernald refers a specimen collected by him and Wiegand at St. Johns a few miles east of the former locality, August 1, 1911 (No. 5256, st.; G.).

3. S. paraleuca Fernald in Rhodora XVI. 175 (1914). — S. stenocarpa Fernald, l. c. 176, non Gandoger, 1890. — Professor Fernald agrees with me that S. stenocarpa cannot be separated from S. paraleuca; the differences pointed out by him are too insignificant and disappear entirely in certain specimens. This species of which the male plant is still unknown needs further study. Its existence again proves how rich the Gaspé region is in endemic species.

SPECIMENS EXAMINED: QUEBEC. Gaspé Peninsula, Gaspé District, banks of the Grand River, June 20–July 3, 1904, *M. L. Fernald* (fr. type of *paraleuca*; G.). Bonaventure District, Matapedia, ledgy banks of Restigouche River, June 28, 1904, *M. L. Fernald* (fr. type of *S. stenocarpa*; G.).

4. S. planifolia Pursh, Fl. Am. Sept. II. 611 (1814); ed. 2. II. 611 (1816). — Poiret in Lamarck, Enc. Suppl. VI. 62 (1817). — Hooker, Fl. Bor.-Am. II. 150 (1839), tantum pro parte minima. — S. phylicifolia Tuckerman in Am. Jour. Sci. Arts, xcv. 35 (1843), non Linnaeus. — Carey in Gray, Man. 428 (1848); ed. 2. 416 (1856). — Bebb in Bull. Torr. Bot. Cl. xvI. 39 (1889); apud Watson & Coulter, Gray Man. ed. 6. 484 (1890). — Britton & Brown, Ill. Fl. I. 502, fig. 1195 (1896); ed. 2. I. 600, fig. 1475 (1913). — Ball in Trans. Acad. Sci. St. Louis IX. 83 (1899). — Robinson & Fernald, Gray's Man. 328, fig. 668 (1908). — S. (phylicifolia*) discolor Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 123 (1858), pro parte. — ? S. arbuscula labradorica Andersson, l. c. 130. — S. chlorophylla denudata Andersson in Svensk. Vet.-Akad. Handl. vI. 138 (1867); in De Candolle, Prodr. xvI.² 244 (1868). — S. chlorophylla Gray, Man. ed. 5, 464 (1867), prob. haud Andersson sensu stricto. — Macoun, Cat. Can. Pl. I. 446 (1886). — Britton, Man. 318 (1901); ed. 2. 318 (1905).

Pursh's description is very short and is based on specimens from Anderson's ¹ garden which had been introduced from Labrador. There is, in my

¹ It may be stated that this is George Anderson, an English salicologist (see Britten & Boulger, Biogr. Ind. Brit. Bot. 4 [1893]) who is not to be confounded with N. J. Andersson, the Swedish botanist, as apparently the printer did in my second note in Bot. Gaz. LXVI. 343, when he changed Anderson into Andersson.

opinion, only one species among the Willows of Labrador to which the description can be applied, namely the so-called *S. phylicifolia* or *chloro-phylla*. Pursh says: "S. erectiuscula, divaricata; ramulis laevigatis, foliis oblongo-lanceolatis utrinque acutis medio serrulatis glaberrimis patentibus glaucis discoloribus, stipulis nullis." "This singular species distinguishes itself at first sight by its plain and patent leaves; it is inclined to rise from the ground on a single low stem, and approaches to the following division" (caule erecto). Professor Fernald agrees with me that there is nothing in this description that does not fit the species for which I now take up this name.

Hooker (1839) referred to S. planifolia specimens from Labrador collected by Miss Brenton. According to a photograph and fragments before me they belong to S. cordifolia Pursh. (See my remarks in Bot. Gaz. LXVI. 344 [1918].) Hooker also mentions specimens collected by Richardson in the Northwest Territories and by Drummond in the Rocky Mountains, of which No. 58 Hb. H. B. & T. in N. from Fort Franklin seems to represent Richardson's plant. Of this number some sterile pieces apparently belong to S. planifolia while others (partly with fruits) represent S. glauca glabrescens (And.) Schn. Of Drummond's specimens I saw a photograph and fragments (Herb. K.). The locality is "Lac la Pierre" which I have been unable to find on any map at my disposal. Andersson determined two sterile pieces marked (no. 1) quite correctly as S. Richardsonii and referred the four others (no. 2) to "S. glauca (villosa glabrata)" having apparently in mind his glaucops glabrescens now glauca glabrescens to which the male, the fruiting pieces and the remaining two sterile ones seem to belong. Hooker also mentions a var. "foliis unicoloribus" without indicating a type, only saying " β , though not marked as a var. by Barratt, has the leaves of the same color on both sides, and decidedly serrated." I suspect that this form belongs to one of the Cordatae group.

As the type of Andersson's S. chlorophylla has to be taken his var. vestita for which he, unfortunately, did not indicate a type specimen. He, probably, based it, at least partly, on specimens collected by Richardson at "Norway House Fort," because he cites as the first synonym Hooker's S. discolor β . (Fl. Bor.-Am. II. 147 [1839]) of which Richardson's plant is the type. I have not yet seen it. Andersson's second synonym, "S. (phylicifolia) discolor Ands." "p.p." for the most part belongs to S. discolor Muhl., but there are specimens in Herb. N. which partly represent S. discolor, like those collected apparently by Bourgeau, "Lac Winnipeg 26 Juin," and partly are very like S. planifolia. The sheet on which they are mounted has also a label in Andersson's handwriting: "Specimina hacce, habitu et characteribus S. nostram phylicifoliam omnino simulant mihi tamen ad S. discolorem pertinere videntur." According to a note on the sheet these specimens have been regarded as the type of S. chlorophylla, but one of them is clearly a very glabrescent S. discolor while the other has the fruits of S. planifolia although the young twigs are rather densely villose, and even the one-year-old branchlets show distinct traces of pubescence. The half-

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grown leaves are narrowly oblanceolate, at first sparsely pubescent with grayish and fulvous hairs, very soon becoming glabrous (except a few hairs on the midrib of the upper side). This plant, therefore, does not agree with var. *vestita*, and probably represents a form closely related to *S. planifolia*. I am not yet sure whether Andersson's var. *vestita* is only a form of the latter or has to be regarded as a distinct species. See also my remarks under *S. pellita*, p. 82.

In 1867, Andersson furthermore described as a "varietas singularis" S. chlorophylla *S. pychnocarpa from specimens collected by Bourgeau "ad Carlton-house" which, in 1868 he called S. chlorophulla 8. puchnocarpa. In his note (1867) he said: "Est forma valde singularis ad sequentem [S. pellitam] transitum evidentissimum efficiens. Frutex non altus videtur, ramis Foliis iis S. chlorophyllae sat similia sed fere glaberrimis fusco-castaneis. angustiora et subtus tomento haud denso subargentea; amenta ut in S. grisea et capsulae eximie condensatae ut fere undique divaricatae adpareant." I have seen a photograph and fragments of a specimen collected by E. Bourgeau at "Carlton, bord de la rivière, 6 Mai 1858" (No. 13, m., f.; K.). The flowers generally agree with those of S. planifolia but the filaments are sparsely pilose, and, owing to the absence of leaves, I cannot decide whether it belongs to one of Andersson's forms or to S. pellita (see It certainly does not represent the type of var. pychnocarpa. later). Of this form Bebb (1889) spoke as follows: "The characters specified by Prof. Andersson as serving to distinguish his S. chlorophylla from the Old World S. phylicifolia, are most noticeable in the Rocky Mountain S. chlorophylla var. pycnostachya (sic!) . . ." So far as I can judge by Bebb's statement he did not see Andersson's type but was entirely guided in his deductions by the description. The type came from Carlton in central Saskatchewan, and before we can judge its relationship it is necessary to investigate what the typical S. chlorophylla (var. vestita) is. This cannot be done without comparing the types of Andersson which, if at all, must be preserved in the Hookerian Herbarium (K.) or in the herbarium at Stockholm or Upsala.

I have seen material of typical S. planifolia (S. chlorophylla denudata) from Labrador (where the most northern point of its known distribution seems to be Nain), northeastern Quebec (Saguenay County, as far north as Lake Mistassini, Rupert Land, J. M. Macoun, No. 24706, O.; m., f., and the Gaspé Peninsula), Maine (Mt. Katahdin), New Hampshire (White Mountains) and Vermont (Mt. Mansfield). In addition to these I have before me the following specimens from Keewatin and the Northwest Territories which come very near S. planifolia. The most typical one is a specimen collected by J. W. Tyrull at Chesterfield Inlet on the southwestern coast of Hudson Bay, September 11, 1893 (No. 1763, fr.; O.). The twigs are glabrous, the fruits measure up to 7 mm. in length, and the leaves possess a good many stomata in the upper surface, which seem to be entirely wanting in the leaves of the type. More different is J. M. Macoun's (No. 179153, O.; fr. adult.) from Churchill on Hudson Bay. Here the fruits are up to 8 mm. long, and the young twigs are more or less covered with a short.

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pubescence of grayish and fulvous hairs. From Churchill is also E. A. & A. E. Preble's No. 23, st.; W. which looks rather typical. In other fragments brought by J. W. Tyrull from the region between Athabasca and Chesterfield Inlet, August 11, 1893 (No. 1763ª, O; fr. juv.) and September 1, 1893 (No. 1763^b, O.; fr.) the pubescence of the twigs is less developed and the leaves are even more narrowly lanceolate. Seton & Preble collected a specimen in the region of Great Slave Lake and near Stone Island, July 14, 1907 (No. 37 [=78399, O], fr.). It has larger aments (up to 5.5:3 cm.), and the fruits are about 7 mm. long with a style 1 mm. in length. Another specimen is A. E. Preble's from Fort Resolution, July 14, 1901 (No. 143, st.; W.). The same collector brought some more specimens from the Mackenzie River in 1904. One, collected at Fort Norman, June 12 (No. 322a, fr. im.; W.), has half-developed young leaves without any stomata in their upper epidermis and no trace of stipules. It looks like typical S. planifolia. The others came from Fort Simpson, May 12 (No. 303^B. f; W.) and May 15 (No. 305, m. and st., with very young leaves; W.) In the male flowers the bracts are acute, otherwise there seems to be no difference between the last two numbers and No. 322^a. I have suspected that S. pulchra might grow in this region, but I have not yet seen specimens of it from the Northwest Territories except very poor and uncertain fragments mentioned under S. pulchra on p. 71, which after all may be referable to S. planifolia; but the Mackenzie region is, probably, the meeting ground of these species.

It is possible that typical S. planifolia also occurs in the northern Rocky Mountains from Alberta to northern Wyoming. On the other hand the western form hereto referred to S. chlorophylla seems to represent a distinct variety. The name S. chlorophylla cannot be used, and the majority of the western specimens before me (I have a well-collected representative series at hand) are most closely related to S. monica Bebb. This species is nothing but the dwarfed high alpine form of this western variety for which I propose the name.

4b. S. planifolia var. monica, nov. var. — S. monica Bebb in Watson, Bot. Cal. II. 90 (1879); in Bot. Gaz. XVI. 107 (1891). — Ball in Trans. Acad. Sci. St. Louis, IX. 84 (1899). — Jepson, Fl. Cal. I. 344 (1909), pro parte. — Hall, Yosem. Fl. 69 (1902), prob. tantum pro parte. — S. chlorophylla Bebb¹ in Coulter, Man. Rocky Mts. Bot. 337 (1885). — Porter & Coulter in U.S. Geol. Surv. Misc. Publ. no. 4. 128 (Syn. Fl. Colo.) (1874). — Macoun, Cat. Can. Pl. I. 446 (1886), pro parte. — Nelson in Bull. Wyo. Exp. Sta. XXVIII. 179 (1st Rep. Fl. Wyo.) (1886). — Ball in Trans. Acad. Sci. St. Louis, IX. 83 (1899), excl. syn.; in Coulter & Nelson, New Man. Rocky Mts. Bot. 137 (1909). — Rydberg, Fl. Colo. 96 (1906); Fl. Rocky Mts. 198 (1917). — Daniels in Univ. Mo. Stud. Sci. Ser. II. 248 (Fl. Boulder, Colo. 100) (1911).

Bebb described his species from "poor stunted specimens" collected by Bolander at Mono Pass Summit. The real collector was probably W. H.

¹ Bebb and the following authors also include the forms of the northern Rockies which, as I have already stated, may, at least partly, be referable to the typical eastern S. planifolia.

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Brewer, and his No. 1732 from the given locality, June 27, 1863, of which I have seen specimens in Herb. G. and W., represents the type number. There are, however, only female specimens under this number. Later (1891) Bebb thought it would be best to drop "a species of such questionable validity" which possibly might represent a form of S. chlorophylla. Ball (1899) discussed the question, and suggested "that the staminate aments of S. monica with their linear scales, may be found to belong to some other species" but he had not seen Bebb's type. Jepson (1909) mixed S. monica with forms with glabrous ovaries that really belong to a variety of S. Eastwoodiae Cock. He, however, collected good flowering material at the type locality on July 19, 1911, at an altitude of about 3500 m. (No. 4466, m., f.; A.) which is identical with Brewer's No. 1732. The difference of the bracts of the male and female flowers alluded to by Bebb cannot be observed in Jepson's plants. The scales of both the sexes are narrowly oblong to ovate-lanceolate, and in the male plant only somewhat more acute; after all their shape is variable to a certain degree in both plants. The aments are from subglobose to short-cylindric, the female measuring up to 1.5:1 cm., while the male are subglobose and hardly more than 1 cm. long and thick. In the young leaves the different (glaucous) color of the lower surface is scarcely visible, and only the lowermost (first) leaves are sometimes covered beneath with a few silky hairs. The number of stomata is almost equal in the epidermis on both surfaces. There are a few remaining old leaves of a narrowly elliptic or oblanceolate shape which measure up to 22:9 mm. The style is a little longer (up to 0.8 mm.) than in Brewer's No. 1732, and the ovaries are subsessile in both, the very short pedicel being about half the length of the gland. On July 14, 1899, Jepson already had collected a very similar form on the saddle of Mount Dana, at the same altitude (No. 3308, fr.; A.) with a few old male aments, and rather adult female aments, and also with almost fully developed narrowly or broadly elliptic or obovate-elliptic leaves measuring up to 2:1 cm. They are more or less distinctly glaucous beneath; the lowest ones bear some fulvous silky hairs beneath, and the youngest show a scanty pubescence on both surfaces soon becoming glabrous. The main difference between these specimens and those mentioned above is found in the ovaries which have a more distinct pedicel which in the oldest flowers is somewhat longer than the gland.

In describing his S. pennata (see later) Ball said that "little S. monica is found in the central Sierra Nevada." I have carefully compared many specimens from the Rockies referred to S. chlorophylla, and there are quite a number among them, especially from high alpine regions in Colorado, which I cannot distinguish at all from typical S. monica. They also are provided with numerous stomata in the upper surface of the leaves, and often have short styles hardly as long as the stigmas. The leaves, as a whole, are smaller and broader, more elliptic or obovate-elliptic than in the eastern type, but the shape is rather variable, and seems not to afford a good taxonomic character. Such forms are for instance: J. H. Cowen's

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No. 470, Colorado, mountains northwest of Boreas, Summit County, mountain slopes near timber line, about 3500 m., August 2, 1895 (f., fr. juv.; N., W.), and C. L. Shear's No. 4280, Mt. Blanca, Costilla County, about 4300 m., July 31, 1900 (fr.; N., W; "spreading, 2 ft. high"). They gradually pass into the more vigorous forms with stouter aments and larger leaves which have more or less numerous stomata in the epidermis of the upper surface until we come to forms in Wyoming (like Albany County, August 23, 1904, F. V. Coville, No. 2070, fr.; W.) and in Alberta (Calgary, June 5, 1897, J. Macoun, No. 94427, O., fr.; stomata in pagina superiora non visa; and Jumping Pound Creek, June 12, 1897, J. Macoun, No. 94425, O., st; magis intermedia inter var. typicam et var. monicam videtur) which I am at a loss how to distinguish from certain forms of the White Mountains, New Hampshire. A vigorous western specimen does not look more different from the typical dwarf high alpine var. monica than an eastern specimen, grown in a protected situation in the Great Gulf on Mt. Washington, diverges in habit, etc., from the "depressed and prostrate shrub, seldom rising more than one foot from the ground" (Faxon) in exposed situations of the Alpine Garden on the same mountain, where I had an opportunity to observe it myself in September 1918. Therefore, I leave it, at present, an open question where the line can be drawn between the range of the type and var. monica. I have seen specimens which I refer (partly only provisionally) to this variety from California (Mono and Tuolumne Counties), Utah (Salt Lake, Wasatch, Duchesne or Summit, and Sevier Counties), New Mexico (Mora County), Colorado (through the Rockies from Costilla to Larimer County), Wyoming (Albany, Frémont, Sheridan Counties, and Yellowstone Park), Montana (Madison and Park Counties), to Alberta (see above). There is a specimen said to have come from the "interior of Washington Territory," 1841, C. L. Pickering & W. O. Breckenridge (Wilke's Exped. No. 481, f.; N., W.) which had been in 1909 named S. chlorophylla by Ball (W.) who in 1915 cites it under his S. pennata. Judging by Piper's remarks (Fl. Wash. 15) as to the labeling of this collection it seems that the locality is not correct. It does not look to me like S. pennata but is extremely alike var. monica sensu meo. While on the other hand, the chlorophylla mentioned by Bebb (1891) as occurring "on Mt. Adams and the higher summits of the Cascades" is S. pennata.

In 1905 (Bot. Gaz. XL. 379, t. 13, figs. 8–11) Ball described a S. Nelsonii the type of which was collected by A. Nelson on Laramie Peak, Albany County, Wyoming, along creek, July 13, 1890 (No. 7580, fr.; L.). Professor A. Nelson has kindly loaned me all the material from Herb. L. I a'so have had an opportunity to discuss this plant with Mr. Ball, who tells me that he is now inclined to believe that S. Nelsonii is nothing but a form of S. chlorophylla (= S. planifolia). In his remarks with the original description Ball said that S. Nelsonii "is most closely related to S. chlorophylla" but that "it is readily distinguished by the oblanceolate leaves which, when mature, are prominently nerved above and reticulated beneath." In his treatment of the Rocky Mountain Willows (apud Coulter &

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Nelson, New Man. 137 [1909]) Ball contrasted the two Willows as follows: leaves broadly elliptic-ovate or obovate, mostly obtuse at apex; styles 1-1.5 mm. long: S. chlorophylla, and leaves oblanceolate, acute at both ends, styles 0.5-1 mm. long: S. Nelsonii. I have been able to examine most of the specimens enumerated by Ball, and I believe that almost all of the Colorado specimens and Tweedy's No. 47 from the Bighorn Mountains in Wyoming are not separable from S. planifolia monica and typica. But in specimens of A. Nelson and E. Nelson named by Ball S. Nelsonii I find that the color of the one-year-old branchlets is more brownish red and not chestnut colored as in S. planifolia and that the narrower lanceolate or oblanceolate leaves very often show a rather distinct but fine glandular crenulate denticulation. Their nervation is about the same as in S. planifolia, and Ball's statement (1909) that the mature leaves are "rather strongly veined on both surfaces" applies as well to certain specimens of S. planifolia. J. G. Jack collected at Centennial, Wyoming, at an altitude of about 2700 m., on August 19, 1918 (Nos. 1068, 1069, st.; A.; "bushes 6-8 ft. high, stems yellow or purplish green") good material of a form with ovate-lanceolate or narrow-lanceolate (sometimes oblanceolate), rather acuminate leaves which are more or less distinctly crenate-serrate, firm, and prominently nerved beneath. This form, too, seems to represent typical S. Nelsonii which, after all, may be regarded as another variety of S. planifolia more closely connected with var. typica than with var. monica. There is no male material of S. Nelsonii known, and before I dare express a definite opinion on it, I must study a larger set of specimens, and get a better understanding of the forms of the Athabasca Region and the Northwest Territories which I mentioned on p. 77. Some of these forms closely resemble S. Nelsonii which has been quite amply described by Ball, but he says: "stipules none" while the type specimen as well as A. Nelson's No. 8822 are provided with distinct lanceolate or ovate-lanceolate rather acute, glandular-denticulate stipules which are 2 to 4 mm. long. Jack's Nos. 1068 and 1069 show the same kind of stipules which become dry and fall off later.

All the forms of *S. planifolia*, and especially *S. Nelsonii*, need a careful study in the field. Without having before me young material of both sexes and mature leaves and fruits of the same individuals I am not able to decide the taxonomic value of *S. Nelsonii*. There are some sterile specimens which look much like *S. monticola* Bebb but may be referable to a form like *S. Nelsonii*. I shall deal with them later.

5. S. pennata Ball in Bot. Gaz. LX. 45, fig. 1 (1915); in Piper & Beattie, Fl. Northwest Coast, 117 (1915). — S. chlorophylla Bebb in Bot. Gaz. XVI. 107 (1891), pro parte, non Andersson. — Piper in Contr. U.S. Nat. Herb. IX. 216 (Fl. Wash.) (1906). — This rather rare and local species has been amply described by Ball but he states that the filaments are "glabrous," while I find that they are distinctly but minutely pilose at base in all the flowers I have examined. In this character S. pennata differs from all the species included by me in this section to which it otherwise shows the closest relationship. Ball says: "In relationship it lies between S. chlorophylla and S. pulchra, geographically, also, it occupies a position between these two species." He states that on a sterile shoot (Applegate, No. 2758, Oregon, Marion County, 10 miles west of Olay Butte, September 4, 1898) stipules were present and 4-8 mm. long. I did not see this specimen, and on the shoots of such specimens as W. N. Suksdorf's No. 9271, Washington, Skamania County, Chiquash Mts., August 12, 1886, there is hardly a trace of stipules, while on the specimens of Jack cited below, the youngest leaves have ovate-lanceolate stipules of about half the length of the petioles.

The type of S. pennata was collected by W. N. Suksdorf on Mount Paddo (Adams) in Washington, and it also has been found in Washington by J. G. Jack in Pierce County, Mt. Rainier, Longmire Springs, on August 20, 1904. It is also known from Mt. Hood, Hoods River County, and from Marion County, Oregon (see above).

6. S. pellita Andersson in Svensk. Vet.-Akad. Handl. vi. 139, t. 7, fig. 72 [excl. fig. sinistra g] (Monog. Salic.) (1897), quasi subspecies S. chlorophyllae, pro parte. - Ball in Trans. Acad. Sci. St. Louis, IX. 81 (1899) pro parte. - Fernald in Rhodora vi. 191 (1904). - Robinson & Fernald, Gray's Man. 327, fig. 667 (1908). - Britton & Brown, Ill. Fl. ed. 2. 1. 598, fig. 1468, (1913). - Rydberg, Fl. Rocky Mts. 197 (1917), pro parte. - S. chlorophylla β. pellita Andersson in De Candolle, Prodromus XVI.² 244 (1868), pro parte. - As Fernald (1904) has already explained in his note on "the identity of Andersson's Salix pellita," this author mixed two different plants in basing his new species on specimens from Lake Winnipeg, collected by E. Bourgeau, and also on a Rocky Mountain plant found by Lyall. The first which has to be taken for the type represents an eastern species while the second is S. subcoerulea Piper. Until Fernald pointed out this fact, the eastern form usually has been referred to S. candida Fluegge from which, however, S. pellita is easily separated by its different shining velvety or silky pubescence while S. candida possesses a "dull whitish lanate or flocculent tomentum" (Fernald). As to the differences between S. pellita and S. subcoerulea see under this species.

When Andersson described S. pellita he made it a quasi subspecies of S. chlorophylla saying: "Difficile sane est dijudicatu cuinam Salicum formae magis sit affinis," and he thought that it probably might be a "modificatio maxime tomentosa" of S. chlorophylla "aut e S. chlorophylla et sericea hybrida." As I have already stated I do not yet know what the typical S. chlorophylla (id est var. vestita) really is. It came from the same region (Winnipeg) where it also was collected by Bourgeau, and Andersson's description of it is: " — vestita: foliis initio utrinque, praecipue subtus tomento argenteo micante obtectis; capsulis fere sessilibus obtusis, dense argenteo-lanatis." From this diagnosis I strongly suspect that the typical chlorophylla may turn out to be used for it. From Andersson's remarks quoted above I can only surmise that he was far from having a good idea

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of the real relationship of these intricate forms. He had before him nothing but a few specimens which were in part at least rather poor, and it is not surprising that frequently he was not able to understand the scanty material upon which he based his opinions.

I have seen forms which I refer to S. pellita from southern Labrador (Fernald & Wiegand, No. 3182, st.; G., O.; forma quamvis incerta, porro observanda), western Newfoundland, New Brunswick (as far north as Woodstock in Carleton County), Maine (Aroostook and Somerset Counties), Vermont (Bloomfield in Essex County), and westward from Quebec (as far north as Lake St. John), Michigan (Isle Royale, Houghton County), Ontario (Savanne, Thunder Bay County), and the Lake Winnipeg region. These specimens include the type and the glabrescent form for which I propose the name S. pellita f. psila,¹ nov. forma: a typo ut videtur nonnisi differt foliis normalibus tantum novellis plus minusve pilosis citissime glabris. - For the type I take Fernald & Wiegand's No. 5282, from Newfoundland, Valley of Exploits River, Grand Falls, thickets along river, July 4, 1911 (fr.; G.). It seems to be associated with the type everywhere in the northeastern part of its habitat from Newfoundland through northern Maine, the Gaspé Peninsula to the Quebec District in Quebec. I do not think it represents a good variety but is apparently connected with the typical form by many intermediates. In a young state, if the branchlets are not pruinose, it is much like S. planifolia but it differs a good deal from that species in the shape of the narrowly lanceolate leaves. specimens the leaves of which show a rather distinct reticulation beneath and are a little more rugulose, too, on the upper surface, look not unlike the glabrous form of S. candida which is called var. denudata Andersson, but this form usually shows distinct traces of the peculiar pubescence of S. candida on the branchlets.

There may be hybrids with species with which S. pellita is growing, and I am at present unable to interpret properly some specimens before me. Among them are the following collected by Fernald & Wiegand which Fernald has determined as S. phylicifolia. In part they are nearly identical with S. pellita psila, and in part they look like a very narrow-leaved form of S. planifolia of which I have not yet seen the typical form from Newfoundland. The specimens came from Birchy Pond Stream in the eastern drainage area of the Humber River system, July 11, 1910 (No. 4239, fr.; A., G.; "shrub 1-4 m. high": very similar to var. psila); river bank between Mt. Musgrave and Humber Mouth Bay (Bay of Islands Station), July 15, 1910 (No. 3190, fr.; G.; looks a little more like S. planifolia), and Laurentian area at the head of Exploits River system, granite barrens, slopes and summits of hill near Quarry, July 7, 1911 (No. 5270, fr.; G.; as the preceding). The pubescence of the young shoots is partly ferrugineous. In a later note I shall discuss under S. humilis Marshall a form from Quebec, Newfoundland and New Brunswick of which the pubescence of the leaves closely simulates that of S. pellita.

¹ Derived from $\psi \hat{\iota} \lambda \delta s$, with little hair.

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7. S. subcoerulea Piper in Bull. Torr. Bot. Club xxvII. 400 (July, 1900),¹ excl. specim. Torreyi No. 489. - Ball in Coulter & Nelson, New Man. Rocky Mts. Bot. 136 (1909). - Wooton & Standley in Contr. U.S. Nat. Herb. XIX. 161 (Fl. N. Mex.) (1915). - Henry, Fl. S. Brit. Col. 99 (1915). -Rydberg, Fl. Rocky Mts. 197 (1917). — S. cuneata Nuttall, N. Am. Sylva 1. 66 (1843), pro parte, non Turczaninow. - S. pellita Andersson in Svensk. Vetensk.-Akad. Handl. vi. 139 (Monog. Salic.) (1867), ex parte. -Ball in Trans. Ac. Sci. St. Louis, IX. 81 (1899), pro parte. - Howell, Fl. Northwest Am. 621 (1902). — Jones, Willow Fam. 25 (1908), pro parte. — Rydberg, Fl. Rocky Mts. 197 (1917), pro parte. - S. chlorophylla, var. pellita Andersson in De Candolle, Prodr. XVI.² 244 (1868), pro parte. — S. sitchensis, var. angustifolia Bebb in Watson, Bot. Cal. 87 (1879), quoad synon. - S. Covillei Eastwood in Zoë, V. 8 (October, 1900). - S. pachnophora Rydberg in Bull. Torr. Bot. Cl. xxxi. 403 (1904); Fl. Colo. 95 (1906); Fl. Rocky Mts. 197 (1917). - S. sitchensis Piper in Contr. U.S. Herb. XI. 216 (Fl. Wash.) (1906), quoad specim. Sandbergii & Leibergii No. 72, non Sanson. - S. glaucops Jones, Willow Fam. 16 (1908), pro parte, non Andersson. — S. macrocarpa argentea Jepson, Fl. Cal. 342 (1909), pro parte, non Bebb. — This species was first mentioned by Nuttall (1843) as S. cuneata which, however, is a mixture of S. sitchensis Sanson and S. subcoerulea so far as I can judge by his description. Nuttall says that the branches are "at first villous and downy, but at a later period brown, and sometimes quite blue, with a glaucous bloom." He, apparently, did not collect fruiting material of S. subcoerulea but only of S. sitchensis, but he distinguished narrow-leaved and broad-leaved varieties, the first probably being S. subcoerulea. He found his plants "growing in clumps near the rocky margin of the Oregon [Columbia] at its confluence with the Wahlamet" [Willamette], a region from which I have hitherto seen only S. sitchensis, but a Willow with pruinose twigs and leaves which are "always clad beneath with a whitish close tomentum, producing all the brilliant display of the finest velvet" can be nothing but S. subcoerulea which also in a rather young state has been mistaken for S. sitchensis by such an acute observer as C. V. Piper, who probably relied on Bebb's determination of Sandberg & Leiberg's No. 72 from Hangman Creek, Spokane County, Washington, May 24, 1893 (fr. im., W.) as S. sitchensis but the slightly pruinose branchlets and the aments at once point to S. subcoerulea. W. N. Suksdorf collected the same form near Spangle, Latah Creek, July 17, 1889 (No. 9306, st.; A.).

The pubescence of the species is indeed very similar to that of *S. sitchensis* but that species differs widely in every other respect, and never has pruinose twigs. From *S. pellita* with which *S. subcoerulea* had been mixed by Andersson, it differs by the characters given in the key. *S. pachnophora* **Ry**dberg of which I have seen the type cannot, in my opinion, be distin-

¹ This name has already been used by Gandoger (Fl. Eur. XXI. 136 [1890] for a quasi subspecies of *S. nigricans* Smith, and cannot be applied to our species according to the Philadelphia Code. The International Rules however seem to allow the use of the later *S. subcoerulea* because Gandoger's *subcoerulea*, like most of his countless new names, represents nothing but a mere synonym. If *S. subcoerulea* is rejected the name *S. Covillei* Eastwood has to be taken up.

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guished even as a variety. Rydberg indicates practically no other difference than "the sessile and naked aments" which are said to be peduncled and leafy in *S. subcoerulea*. Unfortunately the type of the latter has distinctly subsessile aments which hardly can be called pedunculate (as Piper says in his description) while the type of *pachnophora* has several almost sessile aments but also one with a distinct peduncle bearing a few small leaflets. Rydberg himself states in his description of the aments that they are subsessile.

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As to S. Covillei Eastwood of which I have also seen the type it is rather strange that the author did not herself suspect its extremely near relationship or identity with S. subcoerulea. She believed that Coville & Funston's No. 1427 was identical with her species which, I think, was quite correct, and she herself refers to the fact that this specimen has been regarded by Piper as probably belonging to his S. subcoerulea. There may be a slight difference between the forms of the typical subcoerulea from Alberta to Oregon and northern New Mexico, and the Californian S. Covillei to which certain forms from Utah are extremely alike, but it will need a series of more copious and well-collected specimens than I have at present at hand to decide Jepson obviously mistook S. Covillei because he puts this this question. name in the synonymy of S. macrocarpa argentea without having seen the type. Miss Eastwood is quite right in saying that her new species "is so unlike that species that it would be a waste of time to enumerate the differences" because, as she states, S. macrocarpa (now S. Geyeriana) has peduncled aments subtented with leaves, and the flowers and the long pediceled fruits are entirely different from those of S. Covillei. In determining Willows one is only too often entirely misled at first, and even by a slow and careful examination it is not always possible to determine the proper identity of the plant.

I have seen specimens of what I am inclined to call typical S. subcoerulea (including S. Covillei sensu stricto) from eastern Oregon (Union County where the type was collected by W. C. Cusick, No. 1302, in the Powder River or Wallowa Mountains, in wet meadows near the head of Eagle Creek, in July-August, 1886, and in Harney County), northeastern Washington (Spokane County), Idaho (Idaho, Adams, Canyon, Blaine Counties; Lyall's syntype of S. pellita which came from "49 N. Lat." may have been collected in Boundary County), Montana (Glacier National Park, Flathead and Gallatin Counties), Wyoming (Yellowstone Park, Sheridan and Albany Counties), northeastern Nevada (Elko County), Utah (Salt Lake, Summit, Piute and San Juan Counties), Colorado (Routt, Larimer, Clear Creek, Lake, Gunnison, Ouray, Montrose, Dolores, Huernfano Counties), New Mexico (Rio Arriba, San Miguel County), and California (Fresno and Tulare Counties). A special form of S. subcoerulea may be represented by specimens collected by W. N. Suksdorf on Mt. Paddo (Adams) in Washington, July 11, August 28, 1886 (No. 9259, m., st.; A.; and in C. without No. The slender branchlets are hardly pruinose and rather yel-[sheet 2644]). lowish brown becoming purplish later. The leaves are linear-lanceolate,

measuring from 2:0.3 to 5:0.8 cm., bearing the same pubescence as the typical *subcoerulea*. The male aments are coetaneous, up to 2 cm. long and 1 cm. thick, with very short leafy peduncles. This form needs further observation; it somewhat resembles the forms with pubescent branchlets mentioned under *S. Drummondiana* but the twigs bear only a few scattered hairs at their tips.

8. S. bella Piper in Bull. Torr. Bot. Cl. XXVII. 399 (1900). — Rydberg, Fl. Rocky Mts. 196 (1917). — S. glaucops glabrescens Jones, Willow Fam. 16 (1908), quoad syn., non Andersson. — The type of this species came from Whitman County, Washington, 6 miles east of Pullman, near Garrison, where it was collected by L. F. Henderson in 1895 and 1896. I have seen the type (Herb. Pu.) and Piper's No. 2922 which is marked in Herb. G. "from type tree." S. bella is certainly a beautiful Willow but its relations to S. subcoerulea and S. pellita are not yet fully understood. I have pointed out the differences in the key. Piper states that the branches are very brittle, while in S. subcoerulea he does not note this fact. According to the information which Professor J. G. Jack has given me, it seems that all the species of this group have brittle jointed branches. Piper furthermore said in the note to his description that S. bella belongs to "the obscure S. pellita group," and that "its relationship is with S. candida." This species, however, belongs to a different section.

I add an enumeration of the specimens of *S. bella* which I have seen. Among them are some in which the lower (first) leaves are not distinguishable from those of *S. subcoerulea*, and bear the pubescence characteristic of that species, while the upper (later) leaves are distinctly covered with the less adpressed, not so lustrous silvery pubescence of *S. bella*. After all I am not sure if *S. bella* represents a variety of the other species. It is true that the pubescence of the lower surface of the leaves of *S. bella* is not unlike that of *S. pellita*, but in this species the lower leaves usually become more glabrous, glaucous and reticulate. To detect good characters in the male and female flowers of these very closely related species it would need an investigation of a series of well collected specimens accompanied, in order to be sure of their identity, by mature leaves of the same plant. Of *S. pellita* I have not yet seen male flowers, and perfectly ripe fruits of all the species are rare in herbaria because the specimens were mostly collected before the fruits were mature.

SPECIMENS EXAMINED: EASTERN WASHINGTON. Whitman County: near Garrison, August 18, October 14, 1895, April 4, m., May 5, f., 1896, L. F. Henderson (type material, Pu.); April 30, July 2, 1899, C. V. Piper (No. 2922 partim, f., st.; A., G.); same place, August 31, 1918, J. G. Jack (No. 1227, st.; A.; "bushes 10–12 feet high") 6 miles east of Pullman, April 30, July 2, 1901, C. V. Piper (No. 2922 partim, f., m., st.; A., W.); April 13, September, 1901, C. V. Piper (No. 3590, m., f., st.; A. G., W.); Spokane, October 1, 1900, C. V. Piper (No. 3517, st.; G.; forma quamvis incerta foliis inferioribus satis late obovatis, ad 6: 2.5 cm. magnis, summis satis typicis.)

NORTHWESTERN IDAHO. Latah County: Jansville, July, 1898, C. V. Piper

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(No. 2919, st.; a form with narrow leaves, much resembling S. pellita, but with twigs finely puberulous and stipules distinctly developed); Boville, thickets along stream, September 5, 1918, J. G. Jack (No. 1355, st.; A.; "8-10 feet high"; same as preceding). Shoshone County: Coeur d'Alene Mts., north fork of Coeur d'Alene River, 950 m., August 13, 1895, J. B. Leiberg (No. 1533, st.; A., M., N., W.). Kootenai County: Coeur d'Alene, in sand along Fernau(?) Creek, April, 1914, August, 1913, H. J. Rust (No. 492, fr. partly teratological, st.; W.; "scrubby willow"); Fernau(?) Lake Shore, in sandy soil, same date and collector (No. 502, m., st.; W.; mixed with S. Scouleriana leaves). Bonner County: Priest Lake, August, 1901, C. V. Piper (No. 3742, st.; W.); west fork of Priest River, alt. 900 m., August 4, 1897, J. B. Leiberg (No. 2841, st.; W.)

NORTHEASTERN MONTANA. Flat Head County: Swan Lake, alt. 1000 m., August 24, 1908, *M. E. Jones* (No. 9138, st.; M., W.). Glacier National Park, St. Mary, September 14, 1918, *J. G. Jack* (No. 1517, st.; A.; "5-6 feet high").

ALBERTA. Rocky Mountain District: Crow's Nest Pass, Oldman River, alt. 1300 m., August 14, 1897, J. Macoun (No. 7, st.; N.; folia inferiora ut in S. subcoerulea sericeo-pilosa); Banff, side of Cascade Creek by bridge, alt. 1550 m., June 6, August, 1899, W. C. McCalla (No. 2247, f., st.; N.; same as the preceding).

9. S. Drummondiana Barratt apud Hooker, Fl. Bor.-Am. 11. 144 (1838). -Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 123 (1858); in Svensk. Vet.-Akad. Handl. vi. 137 (Monog. Salic.) (1867); in De Candolle, Prodr. xvi.² 243 (1868). — Macoun, Cat. Can. Pl. 448 (1886). — Henry, Fl. S. Brit. Col. 99 (1915). - Rydberg, Fl. Rocky Mts. 196 (1917). - This is apparently a rare and rather critical species. The material before me is not sufficient to understand properly its taxonomic value, and to determine clearly its relationship to the preceding group of species and to the following one. The type was collected by Drummond in the "Rocky Mts.," probably in the Edson District of Alberta. I have before me a photograph and fragments of the type from the Kew Herbarium consisting of a piece with young female flowers, another with half-ripened fruits, and a third one with mature leaves. Besides this I saw a co-type in the Herbarium of the New York Botanic Garden. Both specimens have rather broad, obovate or obovate-elliptic leaves "below white with dense tomentum" as Hooker says, and glabrescent on the midrib. The pubescence is opaque as in S. bella, and not shining as in S. subcoerulea. The female aments and flowers are very much like those of S. subcoerulea, only the bracts of the flowers seem to be narrower and more acute, and the pedicels are mostly a little longer but their length seems to be rather variable in S. subcoerulea too, as also in other species of this group. The main difference are the broader leaves which in specimens like that of Rehder (see below) become rather ellipticlanceolate or elliptic-oblanceolate, a shape I have never noticed in S. bella but sometimes in S. subcoerulea, in which however the pubescence is thinner, adpressed, and silky, the veins being much more prominent. Besides the shape of the leaves there is the almost entire absence of the glaucous bloom of the branchlets which is so conspicuous in the two preceding species. If we have a better knowledge of the flowers and fruits they may afford additional good characters to separate these species, but at present I dare not to put much stress on the differences I have observed. I am not yet sure

whether the following specimens really all belong to S. Drummondiana, but I hope that we shall soon get more copious material from such frequently visited places as the vicinities of Banff and Laggan in Alberta. This species is mentioned by Macoun (1885) also from "on the beds of snow-slides, summit of the Selkirk Mountains, B.C." but I have not yet seen specimens from there. J. K. Henry (1915) does not cite a definite locality.

Hooker also mentions a form " β . ovariis glabris." He does not cite a type, and states that in β the pistils are quite glabrous, and that "in this var. the silky hairs of the scales are longer than in the usual state of the plant." Andersson said (1867) that he did not see a specimen belonging to this variety, neither have I.

SPECIMENS EXAMINED: ALBERTA. Edson District: Rocky Mountains, locality uncertain, *Drummond* (No. 672, f., st.; type in K.; No. "2. Hb. H. B. & T."¹ in N.) Jasper Park, Jasper, near Athabasca River, July 26, 1917, *J. M. Macoun* (No. 95,387, O., st.; A.). Rocky Mountain District: Lake Louise near Laggan, August 12, 1904, *A. Rehder* (fr.; A.; the specimen bears only one catkin with very poorly developed fruits, and the upper leaves are elliptic-lanceolate measuring up to 9: 2.8 cm., the lowermost are small and very narrow); vicinity of Banff, Cave Ave., July 4, 1891, *J. Macoun* (No. 31, st.; C.); bank of Cascade Creek by bridge, June 6, August 2, 1899, *B. C. McCalla* (No. 2247, f., st.; Cor.; "6 feet high"; leaves rather small obovate-lanceolate); at edge of snow-drift in a ravine on Mt. Aylmer, alt. 2300 m., August 4, 1899, *V. C. McCalla* (No. 2242^a, fr., 2247^a, f., m., female aments partly abnormal; Cor.; "3 feet high"; the fruiting aments measure up to 5.5:1.5 cm.); National Park, Banff, July 1897, *C. Van Brunt* (st.; N.; forma incerta porro observanda).

I am not sure whether McCalla's specimens present the real S. Drummondiana or the same form as the following specimens which partly look like S. Jepsonii, and to which I wish to draw the special attention of collectors and students.

MONTANA. Flat Head County: Flat Head Lake and vicinity, MacDougal Peak, 2000 m., July 31, 1908, Mrs. J. Clemens (fr. im., M.; fructus crasse ovoideoconici, pedicelli glandulam 2-plo superantes, 1.5 mm. longi, styli valde breves); same place and date, M. E. Jones (st.; M., W.); Old Marias Pass, circ. 2260 m., August 4, 1883, C. S. Sargent (st.; A.); Teton County: Midvale, streams, July 9, 1902, L. M. Umbach (No. 310, f., fr., M.). Park County: Emigrant Gulch, alt. 2250 m., August 23, 1897, P. A. Rydberg & E. A. Bessey (No. 3412, st.; N.; forma porro observanda).

BRITISH COLUMBIA. Kootenay District: north side of Wapta Lake, August 2, 1904, J. Macoun (No. 68,890, O., st.; G., N.)

ALBERTA. Rocky Mountain District: Lake Agnes, 2260 m., August 11, 1897, C. S. Sargent (st.; A.; "3-4 feet"); Laggan, July 11, 1911, M. O. Malle (No. 86,842, O., fr.; fructus satis longe pedicellati); Banff, east of Spray River, wet places, June 3, 1891, J. Macoun (No. 24,711, O.; st.; folia etiam superne satis sericea); Canmore, damp places, June 3, 1885, J. Macoun (25 [=24,286, O.], st.; like the preceding); Crows Nest Pass, August 4, 1897, J. Macoun (No. 94,322, O., st.); same Pass, the

¹ In Bot. Gaz. LXVI. 322 (1918) I spoke of a specimen labeled No. "6. Hb. H. B. & T.," consisting of a fruiting catkin of *S. glauca acutifolia* (Hooker) Schn., and a sterile branchlet of the identity of which I then was not sure. This piece apparently belongs to *S. Drummondiana*.

Gap, August 6, 1897, J. Macoun (No. 94,323, O., st.). Calgary South District: Elbow River, Bragg's Creek, July 4, 1897, J. Macoun (No. 94,324, O., st.; "a small tree").

There is also a specimen before me collected by W. C. Cusick in 1886 (No. 1302^{a} , st.; W.) in wet alpine meadows apparently at the type locality of *S. subcoerulea*, which in the pubescence of the young twigs and of the upper surface of the leaves agrees more with some of the forms just mentioned than with typical *subcoerulea* but the branchlets are partly somewhat glaucescent.

10. S. Jepsonii, ¹ spec. nov. —S. sitchensis var. angustifolia Bebb in Watson, Bot. Cal. 11. 87 (1879). - Jepson, Fl. Cal. 342 (1909). - S. pellita Bebb in Bot. Gaz. xvi. 105 (1891), non Andersson. — Ball in Trans. Acad. Sci. St. Louis, IX. 81 (1899), pro parte. — S. sitchensis Hall, Yosemite Fl. 67 (1912), non Sanson. - Frutex ut videtur erectus, habitu et altitudine mihi ignota; ramuli novelli laxe vel dense breviter villosulo-tomentosi, hornotini plusminusve glabrescentes et ut annotini glabri (vel tantum partim parce tomentelli) castanei vel atro-purpurascentes, plerique nitiduli, vetustiores cinerascentes; gemmae perfecte evolutae nondum visae, novellae ut ramuli pilosae; folia matura satis chartacea, firma, anguste oblanceolata, basi cuneata, apice obtusa ad acuta, minimis infimis exceptis 2:0.6 ad 6.5:1.2 cm. vel latiora obtusiora ad 5:1.3 cm., surculorum ad 12.5:1.5 cm. (Jepson no. 386) vel anguste elliptica vel etiam ovato-lanceolata ad 9:1.2 vel 10:2.5 cm. magna, margine integerrima, interdum leviter undulata, saepe subrevoluta, superne initio plusminusve sparse (vel in surculis dense) breviter sericeovillosula, dein costa tomentella excepta glabrescentia, intense sed ut videtur satis obscure viridia, costa nervisque lateralibus subplanis, epidermide estomatifera, subtus tomento sericeo denso adpresso micante vel subopaco ut in S. sitchensi (vel in S. subcoerulea) vestita, costa elevata flava etiam tomentella (rarius fere glabrescente), nervis lateralibus utrinque circ. 10-16 fere occultis vel paullo prominulis; petioli plusminusve tomentosi, 2-6, etiam in surculis vix ultra 7–8 mm. longi; stipulae nullae vel pleraeque parvae, semiovato-lanceolatae, integrae vel glanduloso-denticulatae, ut folia pilosae, ad 3 mm. longae, vel in surculis (specim. Jackii) semicordatae, ad 11 mm. longae et 5 mm. latae. Amenta subpraecocia vel coetanea, cylindrica; mascula subsessilia vel pedunculo ad 3 mm. longo foliola minima 2-4 dense normaliter pilosa gerente suffulta, 1-2:1 cm. magna; bracteae oblongo-obovatae, satis dilute brunneae vel apice subfuscae, dense sericeae pilis bracteam vix aequantibus; stamina 2, filamentis liberis vel in parte inferiore amenti saepe basi vel ad medium coalitis glabris bracteam demum ad 2-2 1/4-plo superantibus, antheris ut videtur semper aureis ellipsoideis circiter 1 mm. longis thecis inaequalibus; glandula 1, ventralis, ovoideoconica, truncata, bractea 1/2 vel 1/3 brevior; feminea sub anthesi 1.5-2.5:0.6

¹ It gives me great pleasure to dedicate this species to Professor W. L. Jepson without whose rich collections of Willows I should not have been able to elucidate several of the interesting but little understood Californian species.

cm., fructifera 2–4:1–1.3 cm. pedunculo foliolato 0.8–2 cm. longo excluso magna; bracteae ut in floribus masculis; ovaria sub anthesi ellipsoidea vel oblongo-ovoidea, dense breviter sericeo-tomentosa, pedicello brevi vix ad 1 mm. longo glandulam vix superante; styli breves, circiter 0.75–1 mm. longi, integri (vel in no. 12138 Helleri subbifidi), stigmatibus oblongis bifidis vix vel 1/2-plo longiores; glandula 1 ut in flore masculo; fructus maturi e basi ovoideo vel crasse ellipsoideo conici vel subrostrati, 4.5-5.5(-6)mm. longi pedicello ad 1.25 mm. (in no. 12318 ad 2 mm.) longo glandulam ad fere 2-plo superante excluso.

TYPE LOCALITY: high mountain near Donner Pass, Placer County, California.

SPECIMENS EXAMINED: CALIFORNIA. Placer County: high mountain near Donner Pass. 1865, J. Torrey (No. 489, fr. in.; type; G.); by brook between Donner Lake and Summit, July 14, 1900, W. R. Dudley (No. 5063, fr.; st.; an typica?); Lake shore above McKinney's June 24, 1900, W. R. Dudley (No. 5527, fr.; St.; mixed with sterile S. Lemmonii Bebb; Placer-Eldorado County line, lower valley of McKinney's Creek, June 24, 1900, W. R. Dudley (No. 5534, fr.; St.). Eldorado County: Lake Tahoe Region, Gilmore Lake, alt. 2700 m., July 29, 1911, L. R. Abrams (No. 4854, fr. im.; G.); Susie Lake, 1909, A. Eastwood (No. 1262, f.; Cal.); Tahoe Region, creek bank between Heather and Suzy Lakes, 2600 m., July 18, 1913, F. J. Smiley (No. 144, fr.; G.); moist shores of Echo Lake, in granite, alt. circ. 2500 m., August 15, 1915, A. A. Heller (Nos. 12137, 12138, fr.; A., G., M., St.; fructibus pedicellis ad fere 2 mm. longis bracteam subaequilongis suffultis, amentis pedunculo ad 1.5 cm. longo excluso ad 3.5; 1.3 cm. magnis); Glen Alpine Region, Trail to Lake Lucille, July 21 to August 15, 1906, A. Eastwood (No. 1038, f.; Cal.); near Glen Alpine Springs, June 1900, W. R. Dudley (No. 5662, fr.; St.); below Lake Lucille, June 1900, W. R. Dudley (No. 5653, fr.; St.); Lily Lake, August 2, 1906, A. Eastwood (No. 1202, m., Cal.); Heather Lake, same date and collector (No. 1212, m.; Cal.); Tuolumne County: Sonora Pass Road, 2900 m., August 27, 1915, A. L. Grant (No. 386, st.; Jeps.; foliis anguste lanceolatis ad 11:3 cm. longis). Mariposa County: Yosemite National Park, Bear Valley, 1872, H. N. Bolander (f.; G.); Lake Tenaja, August 18, 1917, A. Eastwood (No. 447, st.; Cal.; resembles Jack's specimen enumerated below); Yosemite Valley, 1300-1500 m., July 10, 1911, L. R. Abrams (No. 4672, fr. im.; G.); by brook beside Nevada Fall and Cloud's Rest Trail, June 11, 1894, W. R. Dudley (f.; St.); Lake Merced, Merced River, 2400 m., July 10, 1909, W. L. Jepson (Nos. 3200, 3206, f.; Jeps.; forma porro observanda); Stubblefield Canyon, 2500 m., July 28, 1911, W. L. Jepson (No. 4531, f.; Jeps.); Illiluette Canyon, 2100 m., June 20, 1912, E. B. Babcock (No. 1057, f.; N.); Chihuahua Trail, August 1, 1898, J. W. Congdon (m., fr.; G.). Madera County: Shuteye Mt., creek bank, 2600 m., July 19, 1914, F. J. Smiley (No. 563, fr. im.; G.); same mountain, 2200 m., August 8, 1907, J. G. Jack (st.; A.; shoots with long narrowly elliptic acute leaves up to 9.5:2.3 cm., and with distinct semicordate lanceolate stipules somewhat surpassing in length the petioles. In the shape and nervation of the leaves it recalls S. Coulteri but the pubescence is typical).

This puzzling Willow was described in 1879 by Bebb as S. sitchensis var. angustifolia. The type was collected by Torrey on a "high mountain near Donner Pass" in 1865. This is Torrey's No. 489 in the Gray Herbarium and in the Herbarium of the New York Botanic Garden. Bebb quoted as a synonym S. chlorophylla var. pellita Andersson stating that it "accords essentially (excepting the pointed leaves) with the description of S. chlorophylla var. pellita Anders., though when compared with Dr. Lyall's speci-

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mens from the Rocky Mountains, cited by the author, the discrepancy is greater." Later, in 1891, Bebb declared that "it was a mistake to arrange the little willow collected on a high mountain near Donner Pass by Dr. Torrey, as a variety of S. sitchensis," and that it belonged to S. pellita. Ball (1899) expressed the same opinion, in both cases S. pellita meaning S. subcoerulea to which as I have already explained on p. 82 Lyall's specimen belongs. I have before me Torrey's No. 489, and all the specimens enumerated below which apparently represent the same form. Almost all of them are female, but fortunately Eastwood's Nos. 1202 and 1212 are males and on a specimen of Congdon's I have also found a male ament. These specimens show that the flowers always have two distinct stamens, the filaments of which are mostly free, and the anthers obviously golden-yellow. This fact proves that var. angustifolia cannot be united with S. sitchensis nor with S. Coulteri notwithstanding the extreme similarity of the pubescence of the leaves with that of S. sitchensis. On the other hand it is certainly not identical with S. subcoerulea but may after all be best placed in the same section.

A. A. Heller's specimen from Butte County, west branch of the North Fork of the Feather River near Stirling, circ. 1000 m., June 7, 1913 (No. 10832, fr.; A., G., M., N.) is so much alike typical *S. sitchensis* which otherwise seems to be absent from California (unless some forms referred by me to *S. Coulteri* prove to belong to it) that I cannot decide whether it ought to be taken for *S. Jepsonii* as long as male flowers from the same locality are unknown. There is a specimen from Nevada, Churchill County, Carson Sink Region, alt. 1400 m., July 15, 1908, *P. B. Kennedy* (No. 1777, fr.; M., Reno), distributed as *S. Scouleriana*, which in the shape of the fruits and stigmas, somewhat longer than the very short style, points indeed to this species but otherwise can hardly be distinguished from *S. Jepsonii*. The leaves partly show an obscure glandular dentation. This Willow comes from a region which is not yet sufficiently explored.

In 1909 Jepson (Fl. Cal. 342) described a S. sitchensis f. Ralphiana from Sequoia National Park, Giant Forest, Marble Fork of the Kaweah River, Tulare County, 2300 m., June 24, July 2, 1900, W. L. Jepson (No. 690 f.; Jeps.). The type is before me, and it shows that the character of the pubescence is rather intermediate between that of S. sitchensis and S. Coulteri, and in all the flowers which I have examined I have found a distinct dorsal gland. The leaves measure up to 9.5:2.2 cm., and the aments up to 6:1.4 cm. This form apparently is closely related to S. Jepsonii or comes nearer S. Coulteri. It needs further study of young female and male material. This also applies to W. R. Dudley's No. 2837 from Bear Creek, Grant National Park, July 29, 1900 (fr.; St.).

b. THE SPECIES OF SECTION SITCHENSES

In 1891, Bebb (in Bot. Gaz. XVI. 105) proposed the sect. Sitchenses for S. sitchensis Sanson because this Willow differs from all the other American species (except S. Uva-ursi Pursh) in having only one stamen. In 1903

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von Seemen (Salices Japonicae 21) referred several Japanese species which have only one stamen (at least in part of the flowers) to a new section *Sieboldianae*, and he also mentioned (p. 13) *S. sitchensis*, *S. Coulteri*, and *S. ivigtutiana* as belonging to his group *Submonandrae*. Neither he nor I in 1904 when I published the Salices of my Ill. Handb. Laubh. I. 69, were aware of the fact that Bebb had already proposed a sect. *Sitchenses*. In 1916 (in Sargent, Pl. Wils. III. 161) I dealt with the sect. *Sieboldianae*, but I do not yet know if the Japanese species really ought to be united with *S. sitchensis* in the same group. *S. Uva-ursi*, of which *S. ivigtutiana* is only a synonym, cannot be included in this section, and its relationship is still doubtful as I have already pointed out (in Bot. Gaz. XLVII. 50 [1919]). To which of the other American sections the *Sitchenses* approach most closely is still a question I cannot definitely answer at present.

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Bracteae florum plus minusve distincte, praesertim ad apicem, fuscescentes; antherae (an semper?) violaceae; folia pleraque plusminusve oblanceolata, obovatolanceolata vel obovato-elliptica, subtus tomento denso brevi plusminusve adpresso argenteo micante obtecta, etiam adulta submembranacea . . . 1. S. sitchensis. Bracteae florum satis flavescentes vel ad apicem flavo-brunneae, sed vix fuscecentes; antherae aureae; folia normalia obovato-oblonga ad elliptico-oblonga, subtus tomento denso albescente subsericeo-villoso magis opaco quam argenteo-micante obtecta adulta chartacea, satis crassa 2. S. Coulteri.

1. S. sitchensis Sanson apud Bongard in Mém. Acad. Imp. Sci. St.-Pétersb. sér. 6. 11. 162 (1833). - Hooker, Fl. Bor.-Am. 11. 153, in nota apud no. 41 (1839). — Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 126 (1858); in Proc. Am. Acad. 1v. 66 (Sal. Bor. Am. 21) (1858); in Walpers, Ann. Bot. v. 752 (1858); in Svensk. Vet.-Akad. Handl. vi. 106, t. 6, fig. 59 b, d, g (Monog. Salic.) (1867), excl. planta masc., et *S. ajanensis; in De Candolle, Prodr. $_{\rm XVI.^2}$ 233 (1868), pro parte maxima et excl. var. γ . — Bebb in Watson, Bot. Cal. 11. 87 (1879), pro parte minima; in Bot. Gaz. VII. 25 (1852); XVI. 105 (1891), excl. S. Coulteri. - Sargent, Silva N. Am. IX. 149, t. 486 (1896) excl. syn. S. Coulteri; Man. Trees N. Am. 187, fig. 159 (1905), excl. specim. cal. -Coville in Proc. Wash. Acad. Sci. 11. 278. (1900); l. c. 111. 307, t. 33 (1901). — Howell, Fl. Northwest Am. 620 (1902), ex parte. — Piper in Contr. U.S. Nat. Herb. XI. 216 (Fl. Wash.) (1906). - Britton & Shafer, N. Am. Trees 202, fig. 165 (1908), excl. specim. cal. - Ball in Piper & Beattie, Fl. Northwest Coast, 116 (1915). - Henry, Fl. S. Brit. Col. 98 (1915). - Rydberg, Fl. Rocky Mts. 196 (1917). - S. Scouleriana Barrat apud Hooker, Fl. Bor.-Am. II. 145 (1839), pro parte, quoad folia, fide Andersson. — S. cuneata Nuttall, N. Am. Sylva, 66 (1843), pro parte, non Turczaninow. -S. sitchensis congesta Andersson in Svensk. Vet.-Akad. Handl. vi. 107 (1867); in De Candolle, Prodr. xvi.² 233 (1868).

The type of this peculiar and handsome species came from Sitka where it, as stated by Coville, was collected along Indian River by "Henry Martens, the botanist of Lütke's Expedition, in an excursion from Sitka to the

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summit of the neighbouring Mount Verstovia, in the year 1827." As Coville says, it "is a characteristic plant of the Sitkan floral district extending from the southernmost limit of Alaska northward and westward along the coast to Cook Inlet and the eastern end of Kadiak Island." South of Sitka it is a "very common plant at the coast" J. K. (Henry) of British Columbia, from where I have also seen specimens from the Yale and Kootenay Districts. In the United States it has been found in western Washington and western Oregon, but also in southeastern Oregon (Blue Mountains) and eastern Washington (Wallowa and Steins Mts.), in Idaho (Elk River, Clear County), and Montana (Belton, Flathead County). The species is readily distinguished by the satiny pubescence of the lower surface of its mostly more or less obovate leaves. Sometimes specimens of a pubescent form of S. Scouleriana with which I shall deal in a later article, have been taken for S. sitchensis, but the villose pubescence of these forms is very different as also usually is the shape (more elliptic) of their leaves.

Andersson (1867) proposed two varieties of S. sitchensis: "- congesta; foliis angustioribus; amentis ob capsulas crassissimas et breves subsessiles valde densifloris," and "- denudata; foliis subtus demum glabratis tenuibus." The types of both were collected by Lyall along the lower Frazer There is before me a specimen of Lyall's from this region collected River. in 1859 (m., f.; N.). The sheet on which it is mounted bears a label "Salix sitchensis Bong. congesta Ands." in Andersson's own handwriting. On the label is written by another hand "Lower Fraser River, C. B. Wood, 1839," and it is referred to a piece with rather old female aments. I do not know of a collector C. B. Wood. All the pieces, in my opinion, represent typical S. sitchensis. Another specimen of Lyall's, lower Frazer River, Sumass, swamps, April 20, 1857, does not agree with either variety. Whether var. denudata really belongs to S. sitchensis remains doubtful, especially as Andersson (in 1868) states that the leaves of it are "iis S. silesiacae v. S. cinereae haud absimilibus." There are specimens collected by Coville & Kearney (No. 442) and B. E. Fernow, on June 5, 1899, at Fort Wrangell, southeastern Alaska, which Coville regards (Herb. W.) as "probably a denudate" S. sitchensis. Fernow's plant in Herb. Cor. is mixed with S. Barclayi, and without mature leaves, flowers or fruits it is impossible to decide whether it is a hybrid or a variety of S. sitchensis. Andersson's third var. ajanensis (1868), which he (1867) first published as a quasi subspecies as S. sitchensis *S. ajanensis, came from northeastern Asia, and is unknown to me.

2. S. Coulteri Andersson in Öfv. Svensk. Vet.-Akad. Förh. xv. 19 (1858); in De Candolle, Prodr. xvi.² 264 (1868). — Bebb in Watson, Bot. Cal. 11. 90 (1879). — Behr, Fl. Vic. San Francisco, 217 (1888). — S. sitchensis Bebb in Bot. Gaz. vii. 25 (1882), pro parte, non Sanson; l. c. xvi. 105 (1891), pro parte. — Jepson, Fl. W. Middle Cal. ed. 2. 119 (1911). — S. sitchensis f. Coulteri Jepson, Fl. Cal. 342 (1909). — In 1882, Bebb discussed the specific value of this species which at this time was only known from Coulter's

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type specimens collected probably near Monterey, and Bolander's poor and uncertain specimen from Marin County. Therefore, Bebb, at this time and in 1891, regarded S. Coulteri as representing "nothing more than an abnormal development of S. sitchensis." Judging by the material enumerated below it seems to me that S. Coulteri, although certainly closely related to S. sitchensis, nevertheless presents some peculiar characters of its own which lead me to keep it as a species until more abundant material convinces me that no rigid line can be drawn between the two species. The difference in the pubescence of their leaves is much the same as that between S. subcoerulea and S. bella or S. pellita. In S. Coulteri the rather rigid old leaves bear a much more woolly and dull felt-like tomentum on their lower surfaces, which often is rather yellowish on the young leaves at the top of the branchlets which are clothed with the same kind of pubescence. The lowermost (first) leaves and those of the peduncles show a more or less shining covering of long silky adpressed hairs. The aments are more slender than those of S. sitchensis, the yellowish or light brown bracts are more lustrous silky, and the anthers are golden yellow. The fruiting aments sometimes measure up to 13:1.3 cm., and the well-matured fruits are usually from 0.5 to 1 mm. shorter than those of S. sitchensis. I refer the following specimens to S. Coulteri.

CALIFORNIA. Santa Barbara County: May, 1879, E. Cooper (f.; G.); without date, J. C. Lemmon (st.; G.). Monterey County: locality and date uncertain, Coulter (No. 655, m.; type in K., cotype in G.); Santa Lucia Mountains, near seashore, 1880, G. R. Vasey (st.; A.); Pacific Valley, near Mansfield's, May 1-12, 1897, A. Eastwood (f., fr.; G.; ament's ad 9 cm. longis flexuosis); Willow Creek, same date and collector (m., fr.; A.; amentis fructiferis ad 12:1.2 cm. magnis); Santa Lucia Mountains, February, 1898, R. A. Plaskett (No. 29, m., st.; G.); March, 1898, same collector (No. 51, f., st.; G.); Lucia, June 14-20, 1901, W. L. Jepson (No. 1621, fr.; Jeps.; folia ad 13.5:7 cm. magna, obovali-elliptica); Monterey, May, 1875, C. L. Andersson (st.; A., M.); Point Sur, July, 1888, T. S. Brandegee (st.; A.). Santa Cruz County: Santa Cruz, 1875 and 1877, C. L. Andersson (fr., st.; A., G., M.; some of the specimens only partly). Santa Clara County: Wrights, August 3, 1895, A. Eastwood (No. 41, f., m.; G.); June, 1903, A. D. E. Elmer (No. 4687, fr.; M.); Black Mountain, April, 1903, A. D. E. Elmer (No. 4684, m., f.; M.); Stevens Creek Road, March 5, 1905, W. R. Dudley (f.; G.). San Mateo County: King's Mounta'n, along streams near the summit of the range, March 18, May 1, 1902, C. F. Baker (No. 390, m. f., fr. im.; G., M.); same mountain, March and September, 1902, L. R. Abrams (No. 2272, m., f., st.; M.); same place, March, 1902, A. D. E. Elmer (No. 4115, m., f.; M.); Portola, April, 1903, same collector (No. 4917, fr.; M.); Bear Gulch, 230 m., March 7, 1904, W. R. Dudley (No. 69, f., 70, m.; A.). Marin County: Lagunitas, March 28, 1915, A. Eastwood (No. 3992, m., f.; A.). Sonoma County: Sonoma Creek, foot of Mt. Hood, March 12, June 26, 1902, A. A. Heller (No. 5044, m., f., st.; A., G., M., St.; forma paullo ad S. sitchensem vergens, porro observanda); Fort Ross, April 23, 1903, A. A. Heller (No. 6602, fr.; M., G.). Humboldt County: vicinity of Eureka, March 6, 1904, November 5, 1905, J. P. Tracy (No. 2398, f., st.; G.).

The specimens collected by Bolander near San Francisco (No. 2451, m.; G.) represent an uncertain form with pilose filaments.

The form described by Jepson (Fl. Calif. 342 [1909]) as S. sitchensis f.

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parvifolia, from Mendocino County, Melbourne to Comptche, June-July 1903, W. L. Jepson (No. 2229, st.; Jeps.) seems to be a small-leaved form of S. Coulteri judging by the pubescence of its branchlets and leaves which measure up to 3.8:0.9 cm. Therefore I propose for it the name S. Coulteri f. parvifolia, nov. comb.

c. SECTION BREWERIANAE

As I shall presently explain, S. Breweri Bebb represents such an unique type among American Willows that it seems best to refer it to a separate section in which I also place S. delnortensis described below which apparently is most closely related to S. Breweri. Therefore, I propose sect. Brewerianae, sect. nov. — Frutices ut videtur satis parvi ramis divaricatis probabiliter basi tenacibus tenuioribus subangulatis. Folia matura crasse chartacea, lanceolata vel obovata, subtus densissime albescenti-tomentosa, distincte elevato-reticulata. Amenta praecocia vel coetanea, sessilia vel subsessilia, anguste cylindrica, densiflora, saepe flexuosa; flores masculi diandri, filamentis liberis glabris vel basi parce pilosis, glandula 1 ventrali anguste conica; feminei fructusque sessiles, dense sericeo-villoso-tomentosi; styli distincti, circ. 1 mm. longi, saepe plusminusve bifidi, stigmatibus brevissimis oblongis bifidis circ. $2\frac{1}{2}$ -plo longiores; glandula 1 ut in flor. masc.; fructus ovoideo-conici, 4.5-5 mm. longi, ut ovaria pilosi. — For further remarks see under S. Breweri.

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1. S. Breweri Bebb in Watson, Bot. Cal. II. 89 (1879); in Bot. Gaz. XVI. 106 (1891). - Jepson, Fl. Cal. 343 (1909). - When Bebb described this species from specimens collected by W. H. Brewer "on San Carlos Mountain in a dry ravine" he spoke of it as of a "genuine American representative of the Viminales." Later (1891) he said: "Beyond all comparison this is the rarest and most obscure of the North American willows." Having seen probably all available herbarium material I can speak as follows about this peculiar species. The most complete description which has been given of it is by Jepson, as Bebb did not know the male plant. Its normal upper leaves are oblong or narrowly lanceolate to almost linear-lanceolate, measuring from 4:0.5-1.2 to 6:0.8-1 cm.; they are rather dull green and never quite glabrous above, and densely villose-tomentose beneath where the reticulation is guite distinct. The petioles are very short, hardly up to 2 mm. long, and the stipules are wanting or ovate-lanceolate, and 1-3 mm. in length. The almost sessile narrowly cylindric aments appear before (or sometimes with) the leaves. The male aments measure up to 1.5-2: 0.5-0.6 cm., while the fruiting aments attain 3.5:1 cm. Both have yellowish

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scales which sometimes become reddish brown at the obtuse apex. They are densely clothed with long silky hairs. There are 2 stamens with free filaments which usually seem to be glabrous but occasionally bear a few hairs at the very base; the gland is very long and almost linear, resembling indeed that of S. viminalis L. Glands and bracts are alike in the two sexes. The ovaries are sessile, ovoid-ellipsoid, and bear a distinct filiform style about 1 mm. in length which usually is bifid at apex and has small, narrow, more or less bifid stigmas. The shape of the stigmas is rather different from that of the S. viminalis stigmas which are narrowly linear and much longer. I am not convinced that S. Breweri is at all closely related to the Viminales. The species of this European-Asiatic section have dark fuscous bracts, stouter male aments and longer petioles, and their leaves usually have a very different kind of pubescence of silky shining hairs. Although I am at present unable to make a definite statement as to the real relationship of S. Breweri, it seems best to regard it as the representative of a new section.

This Willow is an inhabitant of the arid region of the Inner Coast Range, and I have seen the following specimens. In the northwest corner of California an apparently very closely allied form is found which I describe below as *S. delnortensis*.

SPECIMENS EXAMINED: CALIFORNIA. San Benito County: San Carlos¹ Mountain, in a ravine, 1150 m., July 23, 18(60-62), W. H. Brewer (No. 788, fr.; G.; cotype); San Carlos Range, 1300 m., May 12, 1907, W. L. Jepson (No. 2957, f., m.; Jeps.); in the semiarid section of the inner South Coast Range, head waters of San Benito River, alt., 950 m., May 27, 1915, H. M. Hall (No. 9937, f., m., fr.; A.; "clumps 1 m. high"); Hernandez, April 11, 1903, L. M. Lathrop (m.; St.; amentis ad 3.5:0.6 cm. longis); near Hernandez, May 18, 1893, A. Eastwood (fr.; Cal.); Cantua Creek, near New Idria, May 19, 1893, A. Eastwood (m., f., St.); Clear Creek, May 31, 1899, W. R. Dudley (fr.; St.); above New Idria Falls, same date and collector (m., f., fr.; St.); Trail to Hepsadan Peak, June 2, 1899, W. R. Dudley (fr.; St.). Santa Clara County: San Antonio Valley, May, 1903, A. D. E. Elmer (No. 4648, f.; M., St.). Napa County: Mt. St. Helena, Mrs. Brandegee (No. 1299, f.; C.; mixed with fruiting S. lasiolepis). Lake County: 3 mi. northwest of Glenbrook, Sweetwater Valley, May 17, 1902, J. A. Gunn (m., f.; St.; floribus juvenilibus porro observandis, femineis abnormalibus fere semper 2-3 connatis); Middleton Grade, just beyond Mt. St. Helena, on the serpentine, May 5, 1893, W. L. Jepson (No. 27^s, m.; Jeps.); Mt. Hannah, A. Eastwood (m.; Cal.; filamentis ex parte basi paullo coalitis, forma incerta). Colusa County: Epperson, Mrs. Brandegee (No. 181, f.; C.).

2. S. delnortensis, spec. nov. — Frutex ut videtur habitu S. Breweri, altitudine mihi ignota; ramuli hornotini dense breviter griseo-tomentosi, etiam annotini plusminusve angulati sordide purpurascentes, satis tomentelli, vetustiores plusminusve glabrescentes; gemmae perfecte evolutae nondum visae, ut rami tomentosae et coloratae; folia tantum juvenilia et semimatura satis chartacea visa, obovato-oblonga, obovata vel late obovata, basi cuneata, apice obtusa ad rotundata, subito brevissime apiculata, ad 2.5:1-1.6 cm. magna, integerrima, superne initio dense plusminusve ad-

¹ This is in my opinion identical with Santa Carlos Peak southeast of Idria. I had an opportunity to discuss this Willow with Prof. L. R. Abrams, who has kindly given valuable information about the vegetation of the Inner Coast Range.

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presse villosulo-tomentosa, demum ut videtur paullo glabrescentia, sordide viridescentia, costa nervisque paullo impressis, subtus dense albescenti- vel flavescenti-tomentosa, costa nervisque lateralibus utrinque 6-9 elevatis tomentosis et etiam (matura probabiliter distinctius) reticulata; petioli vix ultra 2 mm. longi, dense tomentosi; stipulae nullae vel minimae punctiformes. Amenta coetanea (an semper?), pedunculis brevibus minime vel distinctius foliolatis suffulta; mascula ad 2.5:0.7 cm. magna, pedunculo ad 5 mm. longo excluso; bracteae oblongae, obtusae, brunnescentes (an in vivo roseae?), utrinque satis dense sericeae (pilis plerisque bractea brevioribus); stamina 2, filamentis liberis glabris bracteam dein ad fere 2-plo superantibus, antheris minimis crasse ellipsoideis vix ultra 0.6 mm. longis ut videtur violaceis; glandula 1, ventralis, anguste conica, truncata, bractea 2-plo brevior; feminea subpraecocia, sub anthesi ad 2.5:0.6 cm., fructifera ad 5:1 cm. magna pedunculo 2-8 mm. longo excluso; bracteae ut in flore masculo vel magis obovatae; ovaria ovoidea, dense breviter villosulo-tomentosa, sessilia; styli circiter 1 mm. longi, integri vel subbifidi, stigmatibus brevibus bifidis stylo circiter $2\frac{1}{2}$ -plo brevioribus; glandula 1 ut in flore masculo; fructus ellipsoideo-conici, circ. 5.5 mm. longi, ut ovaria pilosi.

TYPE LOCALITY: Gasquets, Del Norte County, California.

SPECIMENS EXAMINED: CALIFORNIA. Del Norte County: Waldo-Crescent City Road, Gasquets, April 23, 1907, A. Eastwood (No. 52, fr. submat.; Cal.; type!); Rock Creek, April 29, 1907, A. Eastwood (No. 177, f.; Cal.); Smith River near Adams, May 4, 1907, A. Eastwood (No. 233, m. paratype; Cal.).

At first, I was inclined to regard this plant as only a broad-leaved variety of S. Breweri, but the shape of the gland in the male and female flowers is different in the two. In S. Breweri the gland is narrower and often almost filiform, especially in the female flowers in which it is half the length of the young ovary. In S. delnortensis the gland is also narrow but shorter and never filiform. The anthers seem to be always yellow in S. Breweri and violet in the new species, but, of course, a careful observation is needed of more copious material with mature leaves and a study of the plants in the field to fix the specific value of S. delnortensis. It apparently also grows in a semiarid region; and Miss Eastwood collected another peculiar willow near Gasquets, which too seems to represent a new species the relation of which, however, is with S. Scouleriana notwithstanding a certain similarity to S. delnortensis in its external appearance. I shall deal with it when I speak of S. Scouleriana in a later note.

THE BONIN ISLANDS AND THEIR LIGNEOUS VEGETATION E. H. Wilson

SOME 520 miles almost due south of Tokyo, Japan, is a group of small islands known to the western world as the Bonin Islands and to the Japanese as Ogasawara-shima. These islands are governed by the Tokyo prefect, and communication is maintained by a monthly steamer plying from Yokohama. They lie between the parallels of Lat. 27° 5 m. and 26° 30 m. N.,

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Schneider, Camillo. 1919. "Notes on American Willows. VI." *Journal of the Arnold Arboretum* 1(2), 67–97. <u>https://doi.org/10.5962/p.185162</u>.

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