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4909 Frew Street
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Email: huntinst@andrew.cmu.edu
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SALIX PETROPHILA RYDBERG REVIEWED
SALIX ANGLOPHUM CHAMISSE AND ~~THE VARIETIES THEREOF~~

Carleton R. Ball

Am. Midl. Nat. 43
224-241 1950

In preparing treatments of portions of the genus Salix for certain mammals, extreme brevity is essential. Discussion of previous mistreatments, statement of reasons for conclusions, and citation of reassigned specimens all are impossible. Likewise, the descriptions are too limited to make students acquainted with novelties, either previously or currently published. The writer has been guilty twice of such unfair taxonomic practices. The present paper attempts to clear up the misunderstandings of one widely distributed arctic-alpine group.

2.

THE MIXUP OF SALIX ARCTICA PALLAS AND S. ARCTICA R. BROWN
Chamisso,

Salix anglorum in one or another of its forms, is one of the most widely distributed and most frequently collected of American arctic and alpine willows. It has been so messed up, so successively, by so many botanists, however, that great confusion exists and frequently it is not recognized when collected. Briefly, Salix arctica Pallas (Fl. Rossica 1(2):86) was published in ~~1788~~ 1788. What happened in the next 130 years was fully discussed by Schneider (l.c., below) in 1918.

The trouble began when Robert Brown published a second and different S. arctica in 1819 as a nomen nudum and described it in 1823. Chamisso attempted to correct this error by publishing a new name for Brown's S. arctica in 1831. He merely said: "Salix anglorum N. - S. arctica R. Brown . . ." and cited two Bering Sea specimens which belonged, however, to an entirely different species. Unfortunately, this citation threw botanists off the track and his S. anglorum was considered a synonym of S. phlebophylla instead of a valid new name for S. arctica R. Brown. Only part of the numerous publications and discussions are listed below. Others will be found under the three Schneider varieties presented farther on.

Salix angulorum Chamisso, in Linnaea 6:541. 1931 (except for specimens cited; Oct, 1918; Johansen, Rept. Canad. Arctic Exped., 1913-18. Vol. 5 (Botany), - Pt. 5A:10, 1921; - Pt. 5B:18-19, 1922; - Pt. 5C:36-37, pl. 7, fig. 2, 1924; Ulke (Titus), (A Flora of Yoho Park, British Columbia)), Catholic Univ. of America, Biol. Lab. Bull. 14:64. 1934.

Salix arctica Robert Brown, in Ross, Voyage Explor. Baffin's Bay, App. p. 143, 1819, and Ed. 2, 2:194, 1819 (nomen nudum, non Pallas); Chloris Melvilliana 24 (desc.), 1923; Capt. Parry's Voyage, App., Suppl. p. 282, 1824. Richardson, in Franklin, Narr. Journey Polar Sea 752 (reprint p. 24), 1823; Ed. 2, p. 765 (reprint p. 37), 1823. Macoun, Cat. Canad. Pl. 1(3):444-445, 1886.

Salix arctica Pallas (in the broad sense, including S. angulorum Chamisso), Polunin, (Bot. Canad. East. Arctic), Natl. Mus. Canad. Bull. 92:157. 1940.

Salix arctica Pallas, var. Brownei Andersson, in DC. Prod. 16(2):286. 1868 (in part).

Salix Brownei (Andersson) Lundstrom, in Nov. Act. Reg. Soc. Sci. Upsala III(1877): 37 (for the most part).

Salix Brownii Rebb, in Bot. Gaz. 14:115, 1889 (for the most part); Macoun, Cat. Canad. Pl. 2(5):356. 1890 (in part).

Salix fullertonensis x S. groenlandica Schneider, in Bot. Gaz. 66:342-343, 1918, (for the most part). Oct., 1918 (for the most part).

Salix hudsonensis Schneider, in Bot. Gaz. 67:57-58, Jan., 1919, partly var. anti-plasta; Polunin (Bot. Canad. East. Arctic), Natl. Mus. Can. Bull. 92:161. 1940.

Schneider has given a detailed discussion of the materials studied and the conclusions reached by the other authors cited above, and of the errors of interpretation they made. In 1899, the writer discussed Andersson's S. arctica var. petraea and made the following statement (Trans. Acad. Sci. St. Louis 9:89-90). It is obvious, from the concluding sentence, that he did not then know of the publication of the name S. anglorum Chamisso.

"The methods by which Prof. Andersson succeeded in greatly augmenting the then existing confusion in regard to S. arctica R. Br. and S. arctica Pallas have been exposed by Mr. Bebb (Bot. Gaz. 14:115-117, 1889). The vigor and conciseness of his language render the accusation almost dramatic. But great as was the service he rendered, and good as his intentions undoubtedly were, it seems that he only added to the burden of synonymy when he renamed "Mr. Brown's S. arctica". His name was an evident homonym, for, while S. Brownii Bebb was published in 1889, S. Brownei (Anderss.) Lundstr. had been published in 1877. . . . Mr. Bebb was fully aware of this variety, even if ignorant of its elevation to specific rank, when he named his S. Brownii. We can attribute his action only to a strong desire to compensate the wrong done by Andersson to the labor and memory of Robert Brown. But in thus using a name which he knew to be occupied, he deliberately laid himself open to the very charge on which he had just accused Andersson so severely, and left the nomenclature of the species in worse shape than he found it. I shall not rename the plant now, for I believe the name which has been in use for eighty years (S. arctica R. Br.) can yet do duty until ~~the~~ both the numerous variations and the synonymy have been given careful study."

Almost simultaneously with the paper just quoted, Rydberg discussed Chamisso's species (Bull. N.Y. Bot. Gard. 1:266. 1899) and wrote:

"There is scarcely a species that has been so misunderstood as this. Even Mr. Bebb, who cleared up somewhat the discrepancy between S. arctica Pallas and S. arctica R. Br., had a very vague idea about the latter, for he included under the name S. Brownii a number of quite distinct forms. The more or less fruticose species named S. arctica or S. Brownii from the Rocky Mountains, Canada, Newfoundland, and Labrador do not belong here. S. anglorum is an arctic species and takes the place of S. arctica in the East."

Even if his strictures of Bebb had been true, Rydberg did not improve the situation because the plants he assigned to S. anglorum really represented S. arctophila Coll. (S. groenlandica (Anderss.) Lundström). He then inserted S. groenlandica and assigned to it a lot of specimens belonging to S. cordifolia. He then published his S. petrophila, recognizing it as closely related to S. anglorum, but separating it therefrom by assigning to it some characters (especially leaf green beneath) which it does not possess.

Recently, some American botanists have united S. arctica Pallas and S. anglorum Chamisso as a single species, under the older name, after keeping them as distinct species for 125 years. Curiously enough, some of those who are doing this are themselves making new species and varieties on the slightest of excuses.

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1. ~~Salix arctica R. Br.~~ SALIX ANGLORUM CHAMISSE.
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Salix arctica R. Br. was described by Richardson as having leaves elliptic-obovate and entire and finally glabrous, glaucous beneath; capsules elongated, sessile, gray-tomentose, with graceful styles; and scales obovate-rotund, blackish, and sericeous. Chamisso did not describe his S. anglorum but merely substituted that name for S. arctica R. Br., not Pallas.

In 1919, Dr. Camillo Schneider published the first paper in his series entitled "North American Willows". It dealt with "The Species Related to S. arctica Pall." Therein he discussed Salix anglorum (4.5 pages), described three new varieties of it (5 pages), maintained S. petrophila Rydberg, and reduced S. caespitosa Kennedy to the status of a variety under S. petrophila. His discussion of the species and of all his new varieties is filled with expressions of uncertainty as to the limits of variation in the different entities, and of doubt as to the identity and relationships of many of the specimens which he cites. These doubts were recorded also on his annotation labels.

Schneider gave (p. 127) only an 11-line Latin description of S. anglorum, with his 4.5-page discussion. He refers (p. 129) to "the ample material before me" but he certainly did not give an ample description of this species, so long and so widely misunderstood. No measurement is given for any organ except the staminate ament: "8-10 lin. longa." In general, his description is accurate, but without leaf sizes given it would include some of the varietal material, especially var. XX araioclada. A fuller description is given herewith.

In his second paper on American willows, Schneider published a supposed hybrid (Bot. Gaz. 66:342, 1918) from the west coast of Hudson Bay. He recorded, doubtfully: "The following specimens look to me more or less like forms that might be taken for S. fullertonensis x S. groenlandica." S. fullertonensis is a trailing species related to the erect S. brachycarpa of Section Glaucae. S. groenlandica is a former name for S. arctophila Mill. of Section Ovalifoliae and closely related to S. anglorum. Three months later, in his third paper, Schneider redescribed this "hybrid" as a supposed new species, S. hudsonensis (Bot. Gaz. 67:57, Jan., 1919), and correctly assigned it to Section Ovalifoliae. He says (p. 53) that it is:

" . . . closely related to S. arctophila, from which it chiefly differs in the shorter pedicels and the more elongated gland. Judging by the flowers alone, one might be inclined to take it for a form of S. anglorum but the leaves are mostly without any traces of stomata in the upper epidermis and their color and texture are more like in S. arctophila."

An examination of most of the material cited by Schneider in these two papers shows that the supposed hybrid of 1918 was based on specimens of S. anglorum, but that the type of S. hudsonensis belongs to S. anglorum var. antiplasta Schneider (Ball, Canad. Field-Nat. 62:150-152, S-O, 1948.) (fixed), which he does not even mention. These doubts, duplications, and overlappings show quite clearly that Schneider never developed a clear concept of S. anglorum and could not readily recognize or separate his varieties of it.

In evaluating Schneider's work, we must remember the conditions under which it was done. He arrived here on a visit from Germany just before we entered World War I. Interned as a German national, he was paroled to the Arnold Arboretum, and assigned by Dr. Sargent to prepare a revision of American Salices. Unfamiliar with our willows, he could not visit herbariums, but was required to publish rapidly, with novelties in each issue. A prisoner far from home, paid but little and worried about the support of his family in Germany, and working under the unfavorable conditions named, it is not surprising that he made frequent expression of doubt and uncertainty or published unwarranted novelties. The wonder is that he did so well.

For the following evaluation of S. anglorum and its varieties, the centripetal method (Journ. Arnold Arb. 27:377-378) for studying ample herbarium material was used. In brief, some 300 specimens of the four named entities were removed from their herbarium covers and arranged in one series by geographic units (States, Provinces, etc.). This material then was studied, sheet by sheet, to determine if each specimen showed the basic characters of the species. A few which differed from the accepted characters of the Section Ovalifoliae or of the species anglorum were set aside. (A later restudy of this material revealed several hybrids, two specimens of S. arctophila, and one specimen of Section Glaucae).

The original mass, without these few, then was separated into groups by obvious differences in vegetative characters, especially in the shape and size of the different leaf types found on each twig and by comparison of twigs of early and later growth. Comparison was made also of relative length, stoutness, and hairiness of branchlets. Then each group thus based on vegetative characters was studied to determine any correlations of differences in floral characters. All of this was done without reference to the original labels or to any determinations previously made. The same methods were used with the material in the U.S. National Herbarium.

After this grouping, all specimens in each group were restudied to determine if the range of variation in each specimen had been accurately grasped and if the characters of juvenile specimens had been correctly interpreted. This restudy shifted a few specimens. Often it is impossible to be sure of the future appearance of a juvenile specimen. Anyone who has tried to match correctly the childhood photographs of individuals with pictures taken in middle life will appreciate this problem in the willows. An expanded description of the species follows.

Prostrate, with stoutish more or less subterranean branches and more or less elongated (to 20 cm.) creeping or running branchlets, the younger yellowish to purplish, sometimes pruinose, and often more or less pubescent to glabrate, the older purplish to blackish and glabrous; buds ovate, 4-8 mm. long, sometimes pruinose, the younger sometimes thinly pubescent; stipules none (or rarely few, 2-5 mm. long, linear-lanceolate, denticulate); petioles 3-10 or 12 mm. long; blades chartaceous, elliptical-oval to narrowly or broadly obovate, 2.5-5 or 6 cm. long, 1-2.5 or 3.5 cm. wide, mostly rounded at apex or the apical acutish and sometimes plicate, acute to rounded at ~~in~~ base, entire (or rarely with a few denticulations), bright green and glabrous above and glaucescent to glaucous with raised and reticulated veins beneath at maturity, the very young sometimes more or less pubescent above and often ~~stubby~~^{long-} pilose beneath, sometimes remaining ciliate at maturity.

Aments coetaneous or ~~sometimes~~ rarely somewhat serotinous, 2-5 or rarely 6-7 cm. long, ~~in~~ 1.3-1.8 cm. wide, ^{rather densely flowered,} on leafy and more or less hairy peduncles 1-3 or 4 cm. long; scales narrowly to broadly obovate, mostly rounded or rarely subretuse at apex, occasionally acutish, dark brown to blackish, 1.5-2.5 mm. long, more or less long-villous, sometimes becoming glabrate outside; stamens two, filaments free, glabrous; ovaries ovate, white tomentose, capsules ovate ^{conic} or lanceolate, 5-7 or 8 mm. long, sessile or very short-pedicelled, densely gray-pubescent; styles slender, 0.7-1.2 or 1.5 mm. long, often more or less divided above; stigmas 0.4-0.7 mm. long, more or less divided; glands mostly slender, capitate, 1 or sometimes 2 in staminate flowers, 1 in pistillate.

S. anglorum is a species of arctic and alpine America. In the East, its known range is from 52° N on the Labrador coast, and 54° and 55° N on the east and west coasts, respectively, of Hudson Bay, north to at least 78° N in Greenland and thence westward on the mainland and the islands of the Arctic Ocean. In the West, it occurs from Glacier Natl. Park in NW. Montana northward and westward in Alberta, British Columbia, Mackenzie, Yukon, and Alaska, to 171° W. There is no specific type locality. The plants described by Brown and Richardson, including collections by Parry and Ross, were taken in the Eastern Arctic, from Baffin Bay westward as far as Melville Island. The varieties all occur still farther south, in both East and West.

Distribution is presented here in two principal divisions, Eastern and Western. ^{westward} Eastern extends from the Atlantic Ocean to Long. 102° W, the boundary line between Manitoba-Saskatchewan and Keewatin-Mackenzie. It also contains all of the principal arctic islands of Franklin District except Victoria Id. and Banks Id. Western extends from Long. 102° W to the Pacific Ocean and Bering Sea. It extend south into the United States in the Rocky Mountains. The species apparently does not occur in the southern area between ~~between~~ the west coast of Hudson Bay and the western mountains.

Many specimens from this entire area are cited herewith, in order that students may become acquainted with this widely distributed but little-known species. Schneider's brief description and failure to cite any specimens tended to focus attention on his three ^{or} varieties and cause neglect of the species itself. Most of the specimens cited were distributed as S. anglorum or as one of its varieties. Where distributed under other names, these are given in parentheses.

^{Nearly} all of the specimens cited under the species or each of the varieties are in the herbarium of the writer (CRB), and/or in the Langlois Herbarium of the Catholic University of America ^(CU) and the U.S. National Herbarium (USN). Unfortunately, not all of those in the herbarium of Catholic University are indicated by "(CU)" in these lists. This is partly because the lists had been prepared before that material was studied and partly because not all of the University collections are yet mounted. In general, all specimens collected by Pere A. Dutilly and Dr. Hugh O'Neill, either alone, together, or with others, are deposited there. A few specimens recently studied are in the herbariums of the U.S. Forest Service (USFS) and the New York State Museum (NYSM).

Many other specimens which certainly belong within the species are not cited here. Some, previously determined by the writer, are not now immediately available for re-checking. Others, studied again recently, belong to the species but are too juvenile or too fragmentary to be assigned with certainty to any variety. Most of the collections of the Canadian Arctic Expedition, 1913-1918 (Fritz Johansen) are in this class. Another source of confusion with these small arctic plants is the frequent inclusion of more than one variety under a single collection number. This was especially true of the ~~collections~~ (unnumbered) collections of J. A. Allen on Mt. Albert, Gaspe Peninsula, Quebec, in 1881, cited by Schneider under varieties kophophylla and araioclada.

Eastern Distribution (Atlantic Ocean to Long. 102°W.). Labrador (East Coast):
 Battle Island (Harbor) and Great Caribou Id. (52° 15' N), Potter & Brierly 8503, 8504
 in 1934 (CRB); Domino Harbor, Island of Ponds (53° 28' N), Dutilly, O'Neill, & Duman
 7133 in 1939 (CRB); Davis Inlet (55° 52' N), D., O'N., & D. 7626 in 1939 (CU); Main
 (cir. 56° 35' N), Mrs. F. W. Peacock 80 in 1945 (CRB); Port Manvers (56° 58' N), C. Gard-
 ner 321 in 1939 (CRB); Cape Magford (57° 55' N), Gardner 430 in 1939 (CRB); Magford
 Tickle (57° 55' N), Potter & Brierly 8571 in 1934 (CRB); Eclipse Sound (58° 50' N),
 Gardner 480 in 1939 (CRB); Mt. Elliott (59° 11' N), D., O'N., & D. 7859 in 1939 (CRB);
 Gardner 442, 443, 444, 446 in 1939 (CRB); Grenfell Tickle (between Eclipse ^{Sound} and Joksut
 Inlet), Potter and Brierly 8601 in 1934 (CRB).

Baffin Island (Franklin Dist.): Resolution Id., Acadia Cove (61° 18' N, 64° 53' W),
 A. Dutilly 9283, 9284, 9286, 9287 in 1941 (all CRB); E.P. Walker 780 in 1937 (CRB);
 Frobisher Bay, Brewster Point (62° 55' N, 65° 55' W), Walker 913 in 1937 (CRB); Lake
 Harbor (62° 50' N, 69° 52' W), N. Polunin 2141 in 1934 (CU); N.B. Sanson 6 in 1938 (CRB);
 Dorset (64° N, 76° W), Dutilly 990 in 1936 (CRB); Cumberland Sound, Pengnirtung (66° 8' N,
 65° 28' W), Dutilly 9463, 9464 B, 9466 in 1941 (all CRB); Hoffman Cove (69° 35' N, 67°
 25' W), R.W. Bartlett 230 in 1938 (USN); Clyde River, Clyde (70° 26' N, 68° 50' W), Dut-
 illy 9364 in 1941 (CRB); N.B. Sanson 2 in 1938 (CRB); Pond's Inlet (72° 50' N, 76° 40' W),
 Dutilly 1139 in 1936 (CRB); ^{CU}Strathcona Sound, Admiralty Inlet (No. Baffin, ^{about 85° W}),
 J. D. Soper 366 in 1923 (CRB).

Greenland. East Greenland, Manby Peninsula (69° 4' N), R. W. Bartlett 352 in 1939
 (USN); Franz Josef Land, R. H. Menzies (Louise A. Boyd Exped.) in 1931 (3 unnumbered ex
 colls., CRB). NW. Greenland: Salmon Lake region (77° 23' N, 67° 30' W), R.W. Bartlett
 157 in 1938 (USN); "Thule", North Star Bay (76° 30' N, 68° 50' W), W.E. Ekblaw 241 in
 1914 (USN); Northumberland Sound (72° 25' N, 72° 30' W), Bartlett 213 in 1938 (USN);
 Etah (area) (78° N, 72° 30' W), Bartlett 183 in 1938 (USN); Walter Koelz 157 in 1925
 (USN); J. D. Soper 205 (111440) in 1923 (CRB, CU).

Hudson Bay (East Coast) and Hudson Strait (South Coast). Quebec (Ungava) and Keewatin Dist., NWT. (Offshore Islands in Hudson Bay), 78°-80° W): Cape Jones Id. (54°-+ N), G. Gardner 1187 in 1939 (CRB); Bill of Portland Id. (55° 40' N), Gardner 1127 in 1939 (CRB); Frazier Id. (58° 15' N), Dutilly, O'Neill, and Duman 87850 in 1939 (CRB, CU); Gardner 1028 in 1939 (CRB); Port Harrison (Ungava) (58° 24' N), D., O'N., & D. 87614 in 1939 (CRB, CU); Gardner 933, 959 in 1939 (CRB); M. O. Malte 120817 in 1928, 127039 in 1933 (both USN); North Sleeper Id. (59° 17' N), EX D., O'N., & D. 87541 in 1939 (CRB); Gardner 844, 846, 872, 874, 875, 902, 903, 904, 905, 906 in 1939 (CRB); Pattee Id. (59° 42' N), Gardner 841 in 1939 (CRB); Gilmore Id., Ottawa Ids. (59° 50' N), Gardner 832, 833, 834, 836, 839 in 1939 (CRB); Ivivivik (Nuvuk), Ungava (62° 25' N), D., O'N., & D. 87306 in 1939 (CRB); Gardner 782 in 1939 (CRB). Hudson Strait: Wakeham Bay (61° 35' N, 71° 58' W), A. Dutilly 6030 in 1938 (CU); G. Gardner 658, 659, 660 in 1939 (CRB); M. O. Malte 120232, 120235, 120251 in 1928 (CU); Diana Bay (61° N, 69° 42' W), Gardner 603, 620, 621, 622 in 1939 (CRB).

Hudson Bay (West Coast and Offshore islands). Ontario: Sutton River (Trout R.) (55° 16' N), A. Dutilly 16970 in 1946 (CU); No locality (56° N), J. M. Macoun on Aug. 11, 1886 (CRB). Manitoba: Churchill (58° 40' N), N. E. Sanson 10 in 1938 (CRB). Keewatin Dist., NWT.: Rankin Inlet (~~62° 45'~~ 62° 45' N), J. M. Macoun 79162 in 1910 (CU); Iglooduar (63° N), Dutilly 9074 in 1941 (CRB); Chesterfield Inlet (63° 25' N), Dutilly 600 in 1936 (CRB); 4452 in 1937 (CU), 6706a in 1938 (USN); M. O. Malte 120483, 120517 in 1928 (CU); Southampton Id. (cir. 64° N, 82° W), Dutilly 780 in 1936 (CRB); Melville Penin., (at head of Ross Welcome) Repulse Bay (66° N, 86° W), Dutilly 6826 in 1938 (CU).

Franklin Dist. (mostly arctic islands). Somerset Id., Ft. Ross (72° N, 94° W), A. Dutilly 9344, 9345 in 1961 (CRB); N. E. Sanson 8 in 1938 (CRB); Devon Id., Dundas Harbor (74° N, 82° W), Duvall & Handley 65A, 65B in 1946 (CRB), J. D. Soper 272 (111242) in 1923 (CU); Cape Semarey (77° 51' N) J. W. Goodsell (Peary Arctic Club Exped.) 26 in 1908 (USN); Smith Sound (Cale Point, Port Foulke, or T(J?)essuissak, 78°-82° N), I. I. Hayes 42 in 1861 (USN, 2 sheets, an S. arctica Pallas).

Western Distribution (Long. 102° W to Pacific Coast). U.S., Montana, Glacier Natl. Park: Vicinity of Grinnell Glacier, P. C. Standley 16758 in 1919; vicinity of Gunsight Pass, Standley 18091 in 1919 (both CRB, USN). Canada, S.W.: Alberta (S.W.), mostly Banff Natl. Park: Lake Agnes, Malte & Watson 1146, 1147, 1149 (116831, 116832, 116834) in 1925 (all CRB); Mt. Coliseum, Nordegg, Malte & Watson 1490 (116861) in 1925 (CRB); vicinity of Mountain Park, Malte & Watson 2075, 2267, 2272 (116898, 116941, 116945) in 1925 (CRB); Bow Pass, W.C. McCalla 6634a in 1941 (CRB); Simpson Pass summit, N.B. Sanson ~~1494~~, 15, 16 in 1913; Lake Minnewanka Sanson 27 in 1913; Sunshine Chalet, Sanson 30, in 1913 (all CRB); Jasper Natl. Park, Shovel Pass, J.M. Macoun 95807 in 1918 (CU). British Columbia: S.E., mostly Yoho Natl. Park: Wapta Glacier, Edith M. Farr 925 in 1905 (CRB); Ross Lake, McCalla 8462 in 1944 (CRB); N.W., Mountains 10 miles south of Telegraph Creek, T. T. McCabe 8886 in 1941 (CRB); Cassiar Dist., Mtns, near head of Ingenika R., Preble & Mixer 686 in 1910 (USN).

Canada N.W.: Mackenzie Terr., Artillery Lake (63° N, 108° W), Seton & Preble 78 in 1907 (CRB); Liverpool Bay (129° W), A.E. & R.T. Forsail ^d2864 in 1927 (CU); Port Eschscholtz (132° W), Dutilly 18411 in 1940 (CU); Driftwood River (Mackenzie Delta) (68° N, 135° W), Dutilly 18086a in 1940 (CU); Franklin Dist., Victoria Id., Willows Patch near Collinson Point (71° N, 117° W), Dutilly 18683, 18761 in 1940 (CRB). Banks Id., De Salis Bay (72° N, 120° W), Dutilly 18958, 18960 in 1940 (CRB). Yukon Terr., Herschel (139° W), Dutilly 18278 (CRB), 18280 (CU) in 1940.

E.
Alaska: Russell Id. (S.W., about 60° N, 140° W), Cooper and Andrews 152 A in ~~1929~~ 1929 (CU); Mt. McKinley Natl. Park, W.A. & C.B. Setchell 180a in 1931 (CRB); David Raye 7 in 1932 (CRB); Steese Highway (NE. of Fairbanks), Eagle Summit, Setchells 535, 538 in 1932 (CRB); Seward Peninsula, Nome, (171° W), G.H. Jones 9042 in 1940 (CRB).

2 13-4. Varieties of Salix anglorum Chamisso

In his treatment of Salix anglorum Chamisso, in 1918, Schneider (Bot. Gaz. 66: 126-137) described three new varieties in great detail. To variety kophophylla he allotted 48 lines of description, to var. araioclada 28 lines, and to var. antiplasta 22 lines. These figures contrast with the 11 lines of description for ^{the} misunderstood species itself. This neglect of the species and undue emphasis on the varieties has been one large factor in the prevailing lack of knowledge of the species. Another factor is Schneider's peculiar, incomplete, and sometimes misleading method of comparing the varieties with the parent species. This will be illustrated in connection with the discussion of each variety.

For neither the species nor any of the ^{three} varieties did he give measurements of style length, although he did for nearly every other organ. For the species, he said: "stylus longitudine varians" and for each variety he said: "styli distincti". A style is distinct whether it is 0.3 or 3 mm. long. In this initial study of unfamiliar material, all from the arctic areas, he evidently was disturbed and confused by the variation noted on the same specimen and even in the same amount, caused by differentials in their rates of growth.

As in the case of two or more varieties of other species of Salix, it is not always possible to determine from juvenile specimens just which variety they will represent when more fully developed. There also will be some more fully developed specimens which will seem to lie almost on the border line between two varieties and may be easily assigned to either, depending on which characters seem most decisive ~~on~~ in the impression of the moment.

All three of these varieties reach the ~~the~~ most southern extension of their eastern range on Mt. Albert, in Gaspé County on Gaspé Peninsula, south of the St. Lawrence River in Quebec. Mt. Albert is the type locality for varieties araioclada and antiplasta, while the type of variety kophophylla came from NW. Newfoundland. The first two have their most extensive distribution in the far West. ↗

All three of the varieties differ from the species chiefly in having smaller leaves, but these also are of somewhat different shape, ^{Especially} in varieties kophophylla and antiplasta.

1a. Variety kophophylla Schneider

Salix anglorum var. kophophylla, nov. var. Camillo Schneider, Bot. Gaz. 66: 130-133. 1918.

Similar to the species in habit, and branchlet and bud size, color, and pubescence (perhaps more quickly glabrate or glabrous), and in the floral organs, but with smaller and rounder leaves and usually shorter peduncles and aments. Stipules (if any) and petioles as in the species; blades chartaceous, broadly elliptical to broadly oval, obovate, ovate-rotund, or suborbicular, 1.5-3 or 3.5 cm. long, 1.2-2.5 or 3 cm. wide, apex short-acute to plicate-apiculate to rounded, (apical leaf sometimes ovate, acute), base broadly cuneate to rounded or sometimes subcordate, color and reticulation as in the species; aments shorter but dense, 1-2.5 or 3.5 cm. long, on leafy peduncles 1-2.5 cm. long; other floral characters as in the species.

Although Schneider devoted 48 lines to the original description of this variety, he then says (l.c., p. 132): "In its rather short and dense catkins, at the base not or hardly loosely flowered, this variety approaches typical S. anglorum, but differs in its firmer, more rounded, and soon glabrous leaves and the glabrate twigs, in which characters it comes near to the following varieties." [araioclada, antiplasta].

The main character separating var. kophophylla from the species is the smaller and rounded blades. Schneider gave only an 11-line description of S. anglorum and, although he spoke of "ample material", he gave no evidence that he had studied the species closely. The leaves of S. anglorum seem about as firm as those of var. kophophylla but the aments average longer. Ament density seems about the same, including the base.

When he includes the "firmer, more rounded, . . . leaves" in the characters by which this variety approaches varieties araioclada and antiplasta, he is definitely misleading, because it is exactly by the rounder and firmer blades that var. kophophylla differs most from these other two varieties.

Var. kophophylla occupies the southeastern range of the species, from the Gaspé Peninsula of Quebec and NW. Newfoundland (type locality) along the east coasts of Labrador and Hudson Bay into Hudson Strait. It seems to be absent farther north unless represented by some very juvenile specimens. In the West, a few dubious specimens from Glacier Natl. Park in NW. Montana are referred here.

Salix arctica Pall. (in the broadest sense, including S. anglorum Chamisso), var. kophophylla (Schn.) Polunin, Journ. Bot. 77:271, 1939; Polunin (Bot. Canad. East. Arctic), Natl. Mus. Canad. Bull. 92:157, 1940.

Eastern Distribution. Quebec: Gaspé Peninsula, Gaspé Co., M.E. Albert (about 49° N, 64° W), J.A. Allen (as S. arctica var. Browni And.) on July 23, 1881 (USN); 1 twig probably var. araioclada but not so annotated by Schneider); Collins & Fernald 60, 62 in 1905 (CRB, USN, 2 sheets of each); Fernald, Criscom, Mackenzie, & Smith 25662 in 1923 (USN, leafs very variable, all finely reticulate above); Adrien Gosselin 3621 in 1936 (CRB); Marie-Victorin, Rolland-Germain, Brunel, and Rousseau 17607 (juv.), 17619 (mat.) in 1923 (USN); - Saguenay Co., (north shore of St. Lawrence R.), Quapitago Archipelago (60°-60° 40' W), Harold St. John 90841 in 1915 (CU). Newfoundland (NW), Bay of Islands, Blomidon ~~XXXX~~ Mts., Fernald & Wiegand 3233 (type) in 1910 (USN, paratype).

Labrador (east coast): Eclipse Harbor (Sound, 58° 50' N), Dutilly, O'Neill, & Duman 87001 in 1939 (CRB, this No. in CU is var. antiplasta); G. Gardner 479, 515 in 1939 (CRB); Mt. Elliott (59° 11' N), Gardner 447 in 1939 (CRB); Komaktorvik Fiord (59° 14' N), D., O'N., & D. 7867 in 1939 (CU); Clark's Harbor (60° 14' N), D., O'N., & D. 87038 in 1939 (CRB, CU); Gardner 555, 556, 557 in 1939 (CRB); Bowdoin Harbor (60° 20' N, 64° 30' W), Potter & Brierly 8577, 8578, 8579, 8580, 8581 in 1934 (all CRB). Franklin Dist., Hudson Strait: Port Burwell (60° 25' N, 64° 45' W), M.O. Maite 126819 in 1933 (CRB), N.B. Sanson 1 in 1938 (CRB); Button Id., Lacey Id. (60° 50' N, 64° 30' W), Potter & Brierly 8583, 8584 in 1934 (CRB); Resolution Id., (61° 20' N, 64° 53' W), A. Dutilly 9282, 9288 in 1941 (CRB, CU).

Keewatin Dist., offshore islands, east coast of Hudson Bay (for lat. & long. see under S. anglorum): Cape Jones Id., Dutilly, O'Neill, & Duman 97061, 97069 in 1939 (CRB, CU); Frazier Id., (opp. Hopewell Sound), Gardner 1027 in 1939 (CRB); North Sleeper Id., Gardner 843, 866 in 1939 (CRB). Quebec, Ungava: "Ungava", L.M. Turner 4817 (as S. arctica var.), no locality or date (USN); Ivuyivik (Nivuk), Gardner 784, 785, 788 in 1939 (CRB); Diana Bay, Hudson Strait, D., O'N., & D. 87114 in 1939 (CRB, CU); Gardner 558, 561, 580 in 1939 (CRB).

Western Distribution: U.S., Montana, Glacier Natl. Park, Swiftcurrent Pass, P.C. Standley 16265 in 1919; vicinity of Sexton Glacier, Standley 17218, 17251 (CRB), (all USN). These western specimens have more slender branchlets and smaller, thinner leafs, and with branchlets and leafs are glabrate-glabrous from the first.

1b. Variety araioclada Schneider

S. anglorum Chamisso, var. araioclada Schneider, Bot. Gaz. 66:133-134. 1918;
Ball in Standley (Fl. Glacier Natl. Park), Contrib. U.S. Natl. Herb. 22:322. 1921.

S. petrophilum of some American authors, in part, not Rydberg.

Habit as in the species; branchlets more slender and yellowish, less pubescent when young and more quickly glabrous, sometimes pruinose; bud scales more yellowish and glabrous, sometimes pruinose; stipules none (if rarely present, smaller); blades thinner, elliptic-oval, elliptic-obovate, obovate, or oval-obovate, 1.5-3 or 4 (rarely 5) mm. long, 1-2 or 2.5 (rarely 2.9) cm. wide, apex mostly obtuse to rounded or rarely retuse, sometimes apiculate or plicately so, base broadly cuneate to rounded, margin entire, color and venation as in the species; very young ^{more or} leaves ^{more or} less pubescent to glabrous above, less pilose and quickly glabrous beneath. Floral organs much as in the species; aments seldom exceeding 5.5 cm. long, often lax or distantly-flowered at base, and sometimes laxish throughout; scales obovate and rounded to oval and sometimes acute or acutish at apex, mostly about 2 mm. long; capsules 5-7 or rarely 8 mm. long

Variety araioclada differs from the species in twigs more slender, yellowish, and glabrous; in blades thinner, smaller, and more consistently obovate, the younger more quickly glabrous; in aments usually somewhat shorter (not "longer" as stated by Schneider), and lax at base; and the shorter and sometimes narrower and rarely acutish scales. Of this variety, Schneider said (p. 134):

"This peculiar variety differs from the type chiefly in in the less pubescent, mostly much more elongated and yellowish twigs, in the almost glabrous young leaves, and in its aments, which, on the average, are longer and thinner, at least much more loosely flowered toward the base. It is, apparently, closely connected with variety koshiphylla, which as a whole has firmer leaves and denser and shorter catkins, but in its glabrous character comes nearer to var. araioclada than to the typical anglorum. See also my remarks under the following form." (antiplasta).

Titus Ulke (A Flora of Yoho Park, Brit. Columbia), Catholic Univ. of Amer., Biol. Lab. Bull. 14:64, 1934.

Salix arctica R. Brown, var. petraea Andersson, Macoun, Cat. Canad. Pl. 1(3):445, 1886 (partly var. araioclada, partly var. antiplasta).

Var. araioclada has a wider range than the species in the south but does not penetrate commonly into the arctic areas and seems not to occur at all in the Southwest. In the East, it extends from the type locality on Gaspé Peninsula, Quebec, north on both sides of the Labrador Peninsula to southern Baffin Id., with one occurrence in northern Ellesmere Id. ($76^{\circ} 20' N$). In the West, it ranges from Colorado, Utah, and Nevada (elev. 9000-12000 ft.), and ~~Wyo~~ Wyoming, Montana, Idaho, and Oregon (elev. 6000-10000 ft.), to the southern mountains of Alberta and British Columbia (5500-9000 ft. elev.), with one occurrence on Banks Id. ($72^{\circ} N$, $120^{\circ} W$). The type locality is Allen's Ravine, Mt. Albert, Gaspé Co., Quebec. The type is Fernald & Collins 505 and the staminate paratype is their 500, both in 1906 (Gray).

Eastern Distribution, Atlantic Ocean to Long. $102^{\circ} W$. Canada, Quebec: Gaspé Peninsula, Gaspé Co., Mt. Albert: J. A. Allen, July 26-Aug. 9, 1981 (CRB, USN mixed with var. koshohylla); Fernald & Collins 61 in 1905 (CRB, USN 2 sheets annotated by Schneider as var. antiplasta); Fernald, ~~Macdon~~ Griscom, Mackenzie, & Smith 25660, 25661 in 1923 (CRB); Ernest Lepage 1149 in 1939 (CRB); Latane Co., Mt. Blanc, Lepage 3466 in 1942 (CRB). Quebec or Labrador (label reads "Quebec"): Yankee Harbor, Howard Cleves 24 in 1927 (CRB, fragm.). Labrador (East Coast): Indian Tickle ($53^{\circ} 30' N$), David Potter 8638 in 1937⁷ (CRB); Black Id., near Cartwright ($53^{\circ} 40' N$), G. Gardner 127 in 1938 (CRB); Bay south of Joksut Harbor ($60^{\circ} 12' N$), Potter 8665a in 1937 (CRB). ~~Franklin Dist.~~ Franklin Dist. (Hudson Strait & Baffin Id.): Port Anwell ($60^{\circ} 25' N$, $64^{\circ} 45' W$), A. Dutilly 1697 in 1936 (CRB); Button Ids., Lacey Id. ($60^{\circ} 50' N$, $64^{\circ} 30' W$), Potter & Brierly 8589 in 1934 (CRB); Resolution Id., Acadia Cove ($61^{\circ} 20' N$, $65^{\circ} W$), Potter 8665 in 1937 (CRB); Baffin Id., Frobisher Bay, Point Brewster ($62^{\circ} 55' N$, $65^{\circ} 55' W$), Potter 8672 in 1937 (CRB).

Ontario:

Hudson Bay (West Coast) and Northward./ Cape Henrietta Maria ($55^{\circ} 10' N$, $82^{\circ} 30' W$), R. H. Smith in 1944 (CRB, USN); Sutton River (Trout R.), ($55^{\circ} 15' N$, $84^{\circ} 30' W$), Dutilly & Lepage 16943 in 1946 (CRB). Keewatin Dist.: Fairway Id., off Chesterfield Inlet ($63^{\circ} N$, $90^{\circ} 40' W$), Dutilly 337 in 1936 (CRB); Winter Id., Point Fisher (south end of Melville Penin.), ($66^{\circ} N$, $83^{\circ} W$), Dutilly 6923 in 1938 (CRB). Franklin Dist.: Ellesmere Id., Craig Harbor ($76^{\circ} 20' N$, $81^{\circ} 30' W$), Dutilly 1257 in 1936 (CRB).

Western Distribution: Long. 102 W. to the Pacific Ocean. These specimens mostly were distributed as S. petrophila Rydberg, if otherwise, the name is given. U.S. Colorado: Clear Creek Co., J.H. Christ 2954B in 1936 (CRB); Chaffee Co., Mt. Harvard, C.L. Shear 3285 in 1896 (USN, vidi Schn.). Utah: Utah Co., Bassett Maguire 11500A in 1939 (CRB); Cache Co., Maguire 16193 in 1938 (CRB); R.S. Snell 1021 in 1938 (CRB). Nevada: Elko Co., A.H. Holmgren 1407 in 1941 (CRB, too juvenile for certainty). Wyoming: Albany or Carbon Co., Medicine Bow Peak, R.J. Davis 262-W in 1934 (CRB); near this Peak, elev. 9800 ft., Leon Kelso 509 in 1930 (USN); Fremont-Sublette Cos., Wind R. Mts., head of Late Fork, Vernon Bailey (as S. Brownii var. petraea Bebb) on Aug. 21, 1893 (USN, annot. Schn.); Sublette Co., E.H. & L. B. Payson 4464 in 1925 (CRB); Teton Co., Merrill & Wilcox 1073 in 1901 (CRB), O.J. Marie 67 in 1933 (CRB); NW. Wyo., Two-Ocean Mt., Louis Williams 1360 in 1933 (CRB); Park Co., Hitchcock & Muhlück 13508 in 1945 (CRB), Beartooth Mts., L.C. & Rus Williams 3703 in 1937 (CRB, USN); Rollins & Munoz 2848 in 1939 (CRB, USN), Big Horn Mts., Big Horn (?) Co., L.O. & Rus Williams 3217B in 1936 (CRB, CU), Williams and Griffiths in Aug., 1898 (CRB); Johnson (?) Co., head Big Goose Creek, Frank Tweedy 20 (as S. Brownii Bebb) var. petraea (And.) Bebb in 1893 (USN, annot. Schn.); Sheridan Co., Hunt Mt., 10000 ft. elev., J.G. Jack on July 21, 1900 (USN, mixed with S. tenera Hook.).

Montana: Sweetgrass Co., Hitchcock & Muhlück 13275B in 1945 (CRB); Madison Co., Old Hollowtop, elev. 9000 ft., near Pony, Rydberg & Bessey 3423 in 1897 (USN, vidi Schn.); Park Co., Absaroka Natl. Forest, C.L. Kalitowski 14 (F.S. 92773) in 1941; C.L. Larsen 213 (F.S. 92775) in 1941 (both USNS); ----- Co., above Stanton Lake, elev. 7500 ft., R.S. Williams 1030 in 1894 (as S. arctica R.Br., var. petraea And.) (USN, annot. Schn.). Glacier Natl. Park: Vernon Bailey on July 19-22, 1917 (USN, 3 fragments on one sheet; annot. by Schn. (Bot. Gaz. 66:135, 1918, as a form coming near S. anglicum); C. L. Hitchcock 1925, 2033 in 1933 (CRB), B. Maguire 661 in 1932 and 5318 in 1934 (CRB), L. S. Rose 32570 in 1932 (CRB, CU), P.C. Standley 15408, 15453, 16191, 16203, 16204 (USN), 16212 (USN), 16325, 16370 (mixed with var. antiplasta), 16371, 16430, 16453, 16780, 16802, 17225 in 1919 (all in CRB), Idaho: Blaine Co., J.W. Thompson 13582 in 1936 (CRB); Custer Co., R.J. Davis 1715 in 1939 (CRB), Hitchcock & Muhlück 11220 in 1944 (CRB). Oregon: Willowa Mts., W.C. Cusick (as S. reticulata var. nivalis) 3219 in 1907 (CRB, USN), M.E. Peck 18495, 18540 in 1954 (CRB).

Canada. Alberta (southern): Waterton Lakes Natl. Park, W.C. McCalla 7234 in 1942 (CRB); Banff. Natl. Park (and vicinity): Head of Ptarmigan Valley, Stewardson Brown 398 in 1906 (USN); O.S. Day thro With M. Farr (as S. petrophila) in 1904 (CRB); Pipestone Pass, head of Bow R., I.M. Cowan 29 (thro G.A. Hardy in 1943 (CRB); Lake Louise, E.M. Farr 855, 856, 857, 860 (all as S. petrophila) in 1905 (all CRB); J. Macoun 94320 (as S. saximontana) in 1897 (CRB), 68831 (as S. petrophila) in 1904 (CRB); Malte & Watson (different localities) 1143, 1148, 1491, 2107, 2277, 2280, 2282, 2328 (116828, 116833, 116947, 116862, 116902, 116946, 116948, 116950, respectively) in 1925 (all CRB); Mt. Aylmer, W.C. McCalla (as S. petrophila) in 1899 (USN *); Bow Pass, McCalla 6634 in 1941 (CRB); 7069 in 1942 (CRB); Slope opp. Mt. Aylmer, N. B. Sanson (as S. petrophila) in 1901 (CRB, mixed with var. antipalata); Vermilion Mtn., Sanson (as S. petrophila) in 1902 (CRB); Different localities, Sanson 1918, 2050, 2113, 2115, 2129, 2158, 2166, 2185 in 1909-1913, 14 in 1913, 107 in 1926, 8 in 1939 (all CRB); Jasper Natl. Park: I.M. Cowan (Mt. Southesk) 22 in 1945 (CRB); J. M. Macoun 95398, 95401 in 1917 (CRB); E. H. Moss 4874a, 4874b, 4914, 4977 in 1939 (CRB).

British Columbia (mostly Yoho Natl. Park): Edith M. Farr 901, 903, 910, 929, 931, 950 (all as S. petrophila) in 1905 (all CRB); G.A. Hardy 5, 13 in 1944 (CRB), 18276 in 1945 (CRB); W.B. Johnstone 414 in 1943 (CRB); J. Macoun, Kicking Horse Lake (as S. arctica var. petraea) in 1885 (CRB, mixed with var. antipalata); Lake O'Hara, J. Macoun 68882 (labeled "Plants of Rocky Mountain Park") in 1904 (CRB); W.C. McCalla 7056 in 1942, 8463 in 1944 (both CRB); Titus Ulke 8 in 1928 (CU); Moose Pass, J.H. Riley 42 in 1911 (USN, annot. by Schneider as intermediate between var. aricioclada and S. nivalis var. saximontana but it shows no traces of such admixture); Rogers Pass, Selkirk Mtns., J. Macoun 18a (as S. Brownii petraea) in 1890 (USN *); Selkirk & Rocky Mtns., about 51° 30' N, R. T. Shaw 962 (as S. glauca L) in 1905 (USN, annot. Schn.). Kootenay Park, N.B. Sanson A in 1940 (CRB); Line Dyke, E.W. Scheuber on Aug. 15, 1904 (USN *); Downie Creek, C.H. Shaw 1138 (as S. Brownii) in 1905 (USN *). Franklin Dist.: Banks Id., De Salis Bay (72° N, 120° W), A. Dutilly 18955a in 1940 (CRB). Specimens regarded as S. petrophila by Schneider are indicated by "vidi Schm." when distributed under that name, and by "annot. Schn." when distributed under some other name. The * indicates annotation as var. aricioclada.

1 c. Variety antiplasta Schneider

Salix anglorum Chamisso, var. antiplasta Schneider, Bot. Gaz. 66:134-136, 1918.

Salix arctica Pallas, var. petraea Andersson, in DC. Prodr. 16(2):287, 1868 (doubtful; Andersson's description probably is based on specimens of var. antiplasta and of the S. desertorum-S. glauca complex. See discussion below).

Salix arctica R. Brown, var. petraea Andersson, Macoun, Cat. Canad. Pl. 1(3):445, 1886 (partly var. antiplasta, partly var. araioclada).

Salix petrophila Rydberg, Bull. N.Y. Bot. Garden 1:268, 1899; Rydberg (Fl. Colo.), Colo. Agric. Expt. Stat. Bull. 100:96, 1906; Rydberg, Fl. Rocky Mtns. & Adjac. Plains 198, 1917; Ball in Coulter & Nelson, New Man. Rocky Mtn. Bot. 136, 1909; Schneider, Bot. Gaz. 66:135-136, 1918; Ball in Standley (Fl. Glacier Natl. Park), Contrab. U.S., Natl. Herb. 22:322, 1921; Smith (Willows of Colorado), Amer. Midland Nat. 27:243-244, 1942.

Habit as in the species; ~~branchlets~~ branchlets more slender, 0.5-1 dm. long, somewhat pubescent when young, becoming glabrous, yellowish to brownish, sometimes ru-
inose; bud scales to 7 mm. long, yellowish, glabrate or mostly glabrous; stipules none;
younger petioles somewhat pubescent; blades relatively narrow, elliptic-oblong to most-
ly elliptic-oblongate or the lower narrowly obovate, practically entire, 1.5-3.5 or
4.5 cm. long, 0.7-1.5 or 1.8 cm. wide, acute to abruptly acute, plicately acute, or pli-
cately apiculate, or sometimes obtusish at apex, acute to somewhat rounded at base, green
above, glaucescent to glaucous and rather strongly veined and somewhat reticulate beneath,
the young sparingly pubescent above and more or less pilose beneath, the margins often
remaining thinly pubescent to ciliate. Aments coetaneous to somewhat serotinous, leafy-
pedunculate, the staminate 1.5 to 4 cm., the pistillate 2-4 or 5, rarely 6 cm. long, and
about 1.2-1.4 cm. wide in fruit. lax at base and sometimes laxish throughout; scales
obovate or oval, rounded or sometimes acutisⁿ at apex, blackish or brownish toward base,
more or less oilse, especially within; ovaries white-tomentose, capsules lanceolate
to ovate-lanceolate, sessile or subsessile, 5-6.5 or rarely 7 mm. long, gray-tomentose;
styles and stigmas as in the species or slightly shorter.

In publishing his new variety antiplasta, Schneider cited but five specimens, all collected by Fernald and Collins on Mt. Albert, Gaspé Peninsula, Quebec, in 1905 and 1906. Why did he fail to recognize its identity with S. petrophila Rydberg? He had been studying western material because he had just assigned several specimens from the Canadian Rockies to his preceding variety araioclada, for which Mt. Albert also was the type locality. Here is what he said about antiplasta and its relationships:

"At first sight this variety much resembles S. petrophila in its habit, the shape of the leaves, and the yellowish color of the young twigs, but the leaves are of a deeper green on the upper surface and much paler and glaucescent on the lower surface, and do not differ in this respect from any other form of S. anglorum. . . . The two species meet each other in the Rockies of Alberta and British Columbia, and there also are certain forms in northern Montana and even in Wyoming which at present I am at a loss to determine." (p. 135).

Schneider then discusses S. petrophila Rydberg (pp. 135-136) and says (p. 136):

"S. petrophila differs from S. anglorum in the color of the pale or grayish green leaves, which are not distinctly paler and never whitish beneath. . . . As I have already said, there are some forms in the northern habitat of petrophila which I have not yet been able to interpret properly."

From these two statements it is clear that Schneider had a fixed obsession that the leaf-blades of S. petrophila not only are paler green above but "are not distinctly paler and never whitish beneath". The fact is, however, that its fully opened leaves are always paler, practically always glaucescent ("whitish"), and often glaucous (white) beneath. In that very year, 1918, Schneider annotated ^{at} scores of Rocky Mountain specimens as "S. petrophila Rydberg" and practically every one of them had leaves glaucescent to glaucous beneath. It is to avoid conclusions like these that the writer advocates the centripetal method of studying ^y ample but questionable material.

What did Rydberg himself say about the leaves of his new S. petrophila? It was published merely as a new name for Salix arctica var. retroea Andersson so Rydberg gave no full description, but ~~stated~~ cited some 36 specimens, mostly from the United States, and stated :

"This should, I think, be regarded as a distinct species, differing from S. anglorum in the following respects: The leaves are narrower and greener, the branches are more slender and do not turn blackish in drying; the catkins are much smaller and narrower, and the capsule is shorter, rather ovoid, and more densely villous. It is, however, much nearer to S. anglorum than the species of the Rockies that have been regarded as that species."

This comparison with S. anglorum is general in terms, without mention of actual shapes or measurements of organs. In his keys (p. 283), Rydberg separates S. petrophila by "Leaves obovate, catkins many-flowered", but he was comparing it with S. tenera Hooker (S. cascadiensis Ckll.) and not with S. anglorum. In 1906 again (Fl. Colo., p. 93), his key reads: "Shrubs creeping, leafblades obovate to oblanceolate", but here also he was not comparing it with S. anglorum but with two wholly unrelated species. In 1917 (p.190), he made the same comparison with S. cascadiensis as in 1899. Thus, three times within 19 years, Rydberg keys his S. petrophila as having "obovate" leaves, which it does not, and insists that it is different from S. anglorum, which does have obovate leaves. This was standard practice for Rydberg, who almost never compared his novelties directly with the most closely related species.

Finally, it is by no means certain that Andersson's description of his variety petraea was based on plants related to those Rydberg included in his S. petrophila. The description (in Latin) reads: "leaves lanceolate, apex and base subequally attenuate, dark green throughout, scarcely paler beneath" (p. 287). He also describes the scales as "yellowish, narrow, apex fuscous" whereas the scales in all forms of S. anglorum, including S. petrophila, are blackish and broadish. It matters little now, but Andersson's description applies equally well to some forms of the S. desertorum-S. glaucones complex, of Section Glaucæ, especially in habit (*frutex humilis*), leaf shape, and scales. Andersson refer^S only to a collection by Bourgeau and in the Selkirk, where Bourgeau collected, the desertorum-glaucos complex is extremely abundant.

Variety antiplasta has a limited eastern distribution, from the Gaspé Peninsula of Quebec (type, Fernald & Collins 509) sparingly northward to central Riffin Id., and to a few points on both sides of Hudson Bay. In the West, it has a greatly extended southern range, from northern New Mexico, Colorado, and the northern parts of Utah and Nevada across Wyoming, western Montana, Idaho, and northeast Washington to southern west, Alberta and British Columbia. In the Far North, it occurs sparingly, as noted. In

Eastern Distribution, Atlantic Coast to Long. 102° W. Quebec, Gaspé Penin., Gaspé Co., Mt. Albert, Collins & Fernald 61a in 1905 (elev. about 1000 m.) (CRB, USN). Labrador (East Coast, for latitudes see S. anglorum): Great Caribou Id., Potter & Briery 8505 in 1934 (CRB); Muford Tickle, P. & B. 8575 in 1934 (CRB); Eclipse Harbor (sd.), Dutilly, O'Neill, & Duman 87001 in 1939 (Cu; this number in CRB is var. kophophylla); Grenfell Tickle, P. & B. 8600 in 1934 (CRB.). Franklin Dist.: Riffin Id., Resolution Id., Acadia Cove, A. Dutilly 9285 in 1941 (CRB); Cumberland Sound, Pangnirtung, Dutilly 9467 in 1941 (CRB).

Hudson Bay (East Side): Keewatin Dist. (offshore islands); Manitounuk Ids., Boat opening (55° 41' N, 77° 55' W), Dutilly 14245 in 1945 (CU); North Sleeper Id., Gardner 847 in 1939 (CRB). Quebec, Ungava, Ivuyivik (Nuvuk), Gardner 787 in 1939 (CRB). Hudson Bay (West Side): Keewatin Dist.: 50 miles south of Cape Eskimo (60° 25' N, 94° 30' W), E.A. & A. E. Preble 43 in 1900 (USN, paratype of S. hudsonensis Schm.); Chesterfield Inlet (62° 25' N), Dutilly 222, 526, 527, 528 in 1936 (CRB, CU); Iglooduar (8 miles from Chesterfield Inlet), Dutilly 9066 in 1941 (CRB, CU); Sarpik Id. (7 miles off the Inlet), Dutilly 4364 in 1936 (CRB); Wag Id. (4 miles off the Inlet), Dutilly 4144, 4144 a in 1936 (CRB, CU).

Western Distribution, U.S. and Canada from Lat. 102° W to the Pacific Ocean (as S. petrophila unless otherwise stated). New Mexico: Santa Fe Co., Lake Peak, vicinity of Santa Fe, elev. XX 3780 m., Bros. Arsene & Benedict 16269B in 1926 (USN); Mora-Rio Arriba Cos., Truchas Peak, elev. 12500 ft., P.C. Standley 4790 in 1908 (USN); Taos Co., Taos Mtns., elev. 11400 & 12600 ft., Vernon Bailey 861, 862 in 1904 (USN). Colorado: elevation above sealevel it ranges from 10000 to 14000 feet in Colorado and adjacent States to gradually lower elevations ~~and~~ northward, and to practically sealevel in the Arctic.

(County designations may not be exactly accurate because peaks and ranges often are on boundary lines; counties given from south to north, and east to west): Mineral Co., near Pagosa Peak, C.F. Baker 277 in 1899 (USN, *vidi* Schn.); John Murdoch Jr. 4830 in 1911 (CRB); San Juan Co., San Juan Natl. For., G. A. Loughridge 311 (F.S. 72518) in 1934 (CRB). San Miguel Co.: Telluride, elev. 13000 ft., Frank Tweedy 265, 266 in 1894 (USN, *vidi* Schn.); Vallecito, Whitman Cross 71 in 1901 (USN, *vidi* ERM Schn.); head of Vallecito, F.H. Knowlton 1 in 1903 (USN, *vidi* Schn.). Sagache Co., 13000 ft. elev., Whitehouse Mt., J.M. Coulter on Aug. 9, 1873 (USN, as S. arctica, annot. Schn.). Sagache-Gunnison Cos., Marshall Pass, Gunnison Watershed, C.F. Baker 504 in 1901 (USN, *vidi* Schn.). Chaffee-Gunnison Cos., Alpine Tunnel, W. Heustis in 1905 (CRB, USN). Gunnison Co., ~~NEBOLE~~ Mt. Carbon, Ivar Tidestrom 4055 in 1910 (CRB). Lake Co., Mt. Massive, W.W. Eggleston 11893 in 1915 (USN). Park Co.: Hoosier Pass, C.W. Penland 1308 in 1935 (USN); South Park, Penland & Hartwell 1308 in 1935 (CRB). Clear Creek Co.: Gray's Peak, 14000 ft. elev., Geo. W. Letterman (as S. Brownii petraea) on July 23, 1886 (USN); headwaters of Clear Creek, H.N. Patterson 136 (as S. arctica Pall.) in 1885 (USN, 2 sheets, annot. Schn.). Garfield Co., Wind R. Plateau, F.J. Hermann 5631 in 1933 (CRB). Grand or Summit Co., Rocky Mts., Lat. 39° 41' N., Hall & Harbour 520 (as S. arctica R. Br.) in 1862 (USN, annot. Schn.). Grand Co., James Peak, C.F. Cox 406 in 1929, 570 in 1928 (CRB). Larimer Co. (mostly in Rocky Mtn. Natl. Park), Iceberg Lake, J.H. Christ 846 in 1935 (CRB), R.A. Schneider 769 in 1937 (CRB); Longs Peak, Walter Kiener 1013 in 1931, 2261 in 1932, 5341 in 1937 (all CRB); above Loch Vale, E.C. Smith 1596, 1597 in 1942 (CRB); Trail Ridge, Smith 227A in 1933, 1634 in 1943 (CRB). Jackson Co., North Park, E.A. Barber on Aug. 11, 1874 (USN, *vidi* Schn.). Routt Co., Ethel Peak, L. H. Goodding 1913 in 1903 (CRB, USN).
(*elev. 9000-12000 ft.*);
Utah Plute Co., NE. of Delano Peak, Bassett Maguire 19730 in 1940 (CRB). Plute or Beaver Co.(?), Wahsatch Mts., Bald Mt., elev. 11000 ft., M.E. Jones 1241 (as S. arctica petraea) in 1879 (USN, annot. Schn.). Utah Co., Mt. Timpanogos, Maguire 11508B in 1939 (CRB). Duchesne Co., Uinta Mts., head of west fork of Whiterocks R., E.H. Graham 10128 in 1935 (CRB, USN). Summit Co., Uinta Mts., Maguire et al 4061 in 1933, 1436a, 14447 in 1936 (all CRB). Salt Lake Co., Big Cottonwood Canyon, A. O. Garrett 1549 in 1905 (USN). Cache Co., Mt. Naomi area, R.S. Snell 1012 in 1938 (CRB); Maguire et al 14195, 14196

in 1936 (CRB); Maguire 16192 in 1938 (CRB). Nevada: Elko Co., Ruby Mts., A. H. Holmgren 1741, 1743, 1916 in 1941 (CRB); Percy Train 4576 in 1940 (CRB). Washoe Co., Mt. Rose, (9000-12000 ft. elev.); Train 4444 in 1940 (CRB). Wyoming: Albany Co., Aven & Ruth Nelson 2277 in 1936 (CRB); R.C. Rollins 1057 in 1935 (CRB). Sublette Co., Saltlick Mtn., NE of Kendall, E.B. & L. B. Payson 2996 in 1922 (USN). Lincoln Co., Louis Williams 1285 in 1933 (CRB). Teton Co., Teton Mtns., Merritt Cary 600 in 1910 (USN, as S. "heterophylla", annot. Schn.); near Leigh's Lake, Merrill & Wilcox 1073 in 1901 (USN, vidi Schn.). Big Horn Co., Ten Sleep Lakes, L. N. Goodding 449 in 1901 (CRB, USN, mixed with S. tenera, vidi Schn.); L. O. & Rua Williams ³²¹⁷~~3235~~ in 1938 (CRB). Yellowstone Natl. Park: Upper Falls of Yellowstone R., Robert Adams on Aug. 27, 1871 (2 sheets as S. arctica Brownii And. and S. ~~Brownii~~ Brownii petraea And., USN, annot. Schn.); H.S. Conrad 1280 in 1924 (CRB); P.H. Hawkins 902 in 1922 (USN); Amethyst Mtn., P.H. Knowlton (as S. arctica R. Br., var. petraea And.) 166, in 1887 (USN, annot. Schn.); J.N. Rose ¹⁶⁶~~382~~, 462, 558 (as S. Brownii or var. petraea) in 1893 (USN, annot. Schn.) ----- (?) Co., Whirlwind Peak, elev. 10500 ft., Merritt Cary 579 (as S. tenera) in 1910 (USN, annot. Schn.).

Montana: Sweetgrass Co., Hitchcock & Muhlack 13275b in 1945 (USN, appr. var. araioclada). Flathead Co., McDonald Peak, M.E. Jones 9143 in 1908 (USN., vidi Schn., mixed with var. araioclada); Sperry Glacier, L. M. Umbach on Aug. 27, 1901 (USN, annot. Schn.). Glacier Natl. Park: J.W. Harshberger on July 4, 1926 (USN); A. S. Hitchcock 11947 in 1914 (USN, annot. Schn.); M. E. Jones in 1910 (CRB); Bassett Maguire 682 in 1932 (CRB); P. C. Standley 15402 (CRB), 15420, 15443 ⁵~~16370~~ (CRB), 17216 (CRB), 17278 (CRB), 17462 ^{3 (CR3)}~~18049~~ in 1919 (USN), ~~except 15455~~ ~~above Stanton Lake, R.S. Williams 1036 in 1904, USN.~~

Idaho: Blaine Co., Sawtooth Range, J.W. Thompson 13572 (USN), 13606 in 1936 (both CRB); Custer Co., Livingston Mine, R.J. Davis 667 in 1938 (CRB), Lost R. Mts., Hitchcock & Muhlack 11040 in 1944 (CRB). Washington: Okanogan Co., north of Hart's Pass, Ownbey & Meyer 2309 in 1940 (CRB, USN, appr. var. araioclada).

CANADA:- Alberta(SW), mostly Banff Natl. Park: Moose Mtn., John Macoun 94319 in 1897 (CRB); above Bow Pass, W. C. McCalla 7068 in 1942 (CRB); Kootenai Pass, C.H. Morse Simpson in 1920 (CRB); ~~Kootenai Pass~~ N.E. Sanson 2150 in 1904(CRB), Sulphur Mtn., Sanson 1920 in 1912 (CRB), Upper Kanasaskis Pass, Sanson 507 in 1922 (CRB), Sunshine Valley, Sanson 32 in 1942 (CRB). Jasper Park: W.P. Fraser 7 in 1940 (CRB); J. M. Macoun, Fitzhugh Mtn., 95379, 95397 in 1917 (CRB). British Columbia(SE): Paradise Valley, W.B. Anderson 2020 in 1923 (CRB); Paradise Mine, G.A. Hardy 7, 14 in 1944 (CRB); Yoho Valley, McCalla 7559 in 1943 (CRB); Mt. Odaray, Titus Ulke, 11198 in 1927 (CU).

Canada, Western Arctic: Franklin Dist., Victoria Id., Cambridge Bay & Mt. Pelley (69° N, 105° W), A. Dutilly 28097, 28100 in 1940 (CRB); Banks Id., De Salis Bay (72° N, 120° W), Dutilly 18955 A & B in 1940 (CRB). Mackenzie Dist.(arctic coast):Atkinson Point (70° N, 131° 20' W), A.E. & R.T. Forsild 2591A in 1927 (CRB, NMC); Richards Id. (about 134° W), the Forsilds 2197B in 1927 (CRB, NMC); Port Brabant (Tuktuk, 132° W), Dutilly 18399, 18401 in 1940 (CRB). Alaska :SE Coast, Alaska Glacier, Cooper & Andrews 178 in 1929 (CU); NE. Coast, near Yukon boundary, Demarcation Point (141 W), Dutilly 18336 in 1940 (CRB).

1, ca. Variety antiplasta Schneider, form ^{ca}caespitosa (Kennedy) n. comb.

Salix caespitosa Kennedy, Muhlenbergia 7:135 (134-136). 1912.

Salix petrophila Rydberg, Bull. N.Y. Bot. Garden 1:268. 1899 (in so far as California specimens are cited).

Salix petrophila Rydb., var. caespitosa (Kennedy) Schneider, Bot. Gaz. 66:136. 1918.

Form caespitosa has the characters of var. antiplasta, including the narrowed and usually pointed leaves. It differs solely in that most of the leaves on a given plant retain the gray pubescence of the upper surface throughout the season. Commonly, however, a few of the leaves on most plants will become glabrate or glabrous above. The juvenile leaves of variety antiplasta also are normally gray pubescent and therefore the form cannot be recognized with certainty in the juvenile condition where it occurs within the range of the variety. Fortunately, variety and form have separate distributions, for the most part.

Kennedy afforded an excellent illustration of the making of species without studying plants, when he published his S. caespitosa. He had but one collection, his No. 1173, a depauperate plant from Mt. Rose, Nevada. Of it, he says: "We have considered this Mt. Rose willow as Salix petrophila Rydberg, but in the first place it differs in having leaves elliptical and acuminate at both ends instead of "obovate". He quoted the word "obovate" and later referred to Rydberg's key.

Rydberg's errors in regard to his S. petrophila have been discussed above under variety antiplasta. Rydberg published no description but merely renamed S. arctica var. petraea Andersson. But Andersson had described his variety as having leaves lanceolate, attenuate at both ends. In keying his S. petrophila, in three different volumes, Rydberg cites the leaves as "obovate" in ^{one} ~~two~~ volumes and as "obovate to oblanceolate" in ^{two} one. Rydberg originally cited some 35 specimens from Colorado to California and northward into Canada. A few of these do have obovate leaves but they belong to variety ariciolada rather than to antiplasta. If Kennedy had looked in the herbarium, he would have known that the leaves of S. petrophila were not "obovate", but of exactly the same shape as those of his caespitosa.

Kennedy further says, in his discussion; "The leaves are all densely pubescent above, at least until the catkins are mature. . . . Rydberg, in his key, used 'leaves glabrous, or when young covered with long white hairs parallel to the midrib'. If the species in literature have been accurately keyed and described, then our plant shows characters sufficiently different for us to propose it as a new species."

Kennedy does not explain that the key characters on leaf hairiness quoted above were not used by Rydberg to set off his S. petrophila alone but to separate ~~of~~ 15 of the 18 species assigned by him to Section Arcticae as he understood it. Actually, Rydberg had included species from three different Sections and three of the species so keyed have leaves permanently hairy. So much for studying books instead of plants. Although Kennedy discussed the leaves as being densely pubescent above, which is correct, he described them as "densely pilose" above, which is incorrect. They are thinly pilose ^{when young,} beneath, as in all forms of S. anglorum. As Kennedy described only a single depauperate specimen, his measurements are all too small for more vigorous plants, which equal the measurements given for variety antiplata. Finally, he described the blades as gray green beneath when actually they are paler to distinctly glaucescent beneath.

The principal range of forma caespitosa is in the Sierra Nevada of California, ~~and~~ with the type locality on Mt. Rose in the adjacent Washoe Mountains of Washoe Co., Nevada. ~~A single specimen from the Teton Mountains area of western Wyoming represents a more eastern outpost.~~ Juvenile specimens from the Ruby Mountains of NE. Nevada have densely pubescent young leaves but no older specimens with mature leaves densely pubescent have been seen.

Single collections from the Wahsatch Mtns. of Salt Lake Co., Utah; the Teton Mtns. area of western Wyoming, and the Cascade Range in NW. Washington, represent far eastern and northern outposts.

elev. 10900 ft., headwaters of Snake River,
Western Distribution Only. U.S.: Wyoming, Lincoln Co., Double-top Mtn. (43° 10' N,
110° 40-50' W), McDonald & Shannon 62 (F.S. 55001) in 1926 (USFS). Nevada, Washoe Co.,
(type)
Mt. Rose, elev. 10000 ft., P.B. Kennedy 1173 on Aug. 17, 1905 (CRB, USN, paratypes).
Utah, Salt Lake Co., Brighton, elev. 10000 ft., Bassett Maguire 17432 in 1939 (CRB).
Washington, Whatcom Co., Mt. Baker, elev. 6500 ft., J. Wm. Thompson 8089 in 1931 (CRB).

10000-12000 ft. elev.);

California (southern): Fresno Co.: Sierra Natl. Forest, Evolution Lake, on slope
of Mt. Darwin, D. M. Bissell on Sept. 20, 1932 (CRB); Evolution Creek watershed, J.H.
Hatton 33 in 1912 (CRB); Silver Pass, J.H. Hatton 106, in 1912 (CRB), ~~521 from 10000~~
~~to 11000 ft. elev.~~ Inyo Co.: Mono Pass Trail, A. S. Crafts 465 in 1932 (CRB); Heart Lake,
Morris Halperin 469 in 1932 (CRB); Rock Creek Lake Basin, F. W. Peimison 9121 in 1930 (CRB);
unnumbered in 1933 (CRB), 12952 in 1940 (CRB, larger leaf); west side of Morgan Pass,
J. Thomas Howell 22461 in 1946 (USN, aments to 6.5 cm.). Mono Co.: Mt. Dana area: Milo
S. Baker 173a in 1925 (CRB); Ball, Bracelin, & Kautz 527, 531 (2 sheets) in 1931 (CRB, USN);
C.W. Sharsmith 107 in 1933 (CRB), 2098, 2124 (2 sheets) in 1935 (CRB); east of Mt. Conness,
elev. 10000 ft., John Coulter 8 in 1932 (USN). Madera Co., Yosemite Natl. Park, Mt. Flor-
ence, W.C. Blasdale & H.M. Evans on July 26-29, 1931 (CRB). Mariposa Co., Yosemite Natl.
Park, Vogelsang Pass, W.C. Blasdale on July 31, 1931 (CRB, 3 sheets). Tuolumne Co., Yo-
semite Natl. Park, Mt. Dana, Ball, Bracelin, & Kautz 522 in 1931 (CRB, 3 sheets); Gaylor
Lakes, Ball et al 537, 539 in 1931 (CRB); C.W. Sharsmith 2262 in 1936 (CRB); Mt. Lyell,
Helen Sharsmith (both sexes) in 1932 (CRB).

elev. 7700 - 9000 ft. Nevada Co.:

California (northern): Castle Peak, J.G. Lemmon (as S. arctica petraea) in 1875 (USN,
annot. Schn.); Castle Peak Ridge, L.S. Smith 2508 (F.S. 59703) in 1928 (CRB). Shasta Co.,
Lassen Volcano Natl. Park: Emerald Lake, Ball, Bracelin, & Smith 688 in 1932 (CRB); E.B.
Copeland (both sexes) on Aug. 16, 1931 (CRB, USN). --- (?) Co., Peaks of Sierra Nevada,
J.G. Lemmon (as S. arctica var. petraea) in 18 Aug., 1874 (USN). *elev. 10000-11100 ft.* California (southern ?):
Counties not Known: Mt. Brewer, W.H. Brewer 1734 in 1863 (USN, annot. Schn.); 2804 in 1864
(USN, annot. Schn.); At head of San Joaquin Valley, W.H. Brewer 2835 in 1864 USN, annot.
Schn.); Donohue Pass, H.M. Evans (as S. arctica), no date (CRB); Mt. Goddard, H.M. Hall &
H.P. Chandler 685 (as S. arctica petraea) in 1900 (USN, annot. Schn.); Sierra Nevada near
Summit Valley, C.G. Pringle (as S. arctica var. petraea) on Sept. 27, 1882 (USN, 2 sheets,
annot. Schn.).

without words

Salix anglorum and *Salix petrophila*

Carlton R. Ball

3914 Jocelyn St., N.W., Washington 15, D.C.

do

2 December, 1949

The long history and many misinterpretations of *Salix anglorum* Charissoe
Carlton R. Ball

(*S. arctica* R. Br., not Pallas; and many other names) are analyzed. The species is described, discussed, and distribution given. The three varieties, *koprophylla*, *arcticola*, and *antiplasta*, all by Schneider, 1918, are treated similarly, and the characters which separate them from each other and from the species are emphasized. *Salix petrophila* Rydberg is shown to be the same as var. *antiplasta*. The peculiar methods used by Kennedy in establishing his *Salix caespitosa* are presented. Later reduced by Schneider to varietal status under *S. petrophila*, it now becomes form *caespitosa* (Kenn.) Ball, under *S. anglorum* var. *antiplasta* Schn. Hundreds of herbarium specimens, arranged by geographic areas, are cited under the species, three varieties, and form, so that botanists may recognize these entities and know their ranges.

Corrections and Additions

Prof. Mrs. Jupp. errors. C. B. Benson

1	1a-1b	0	0
2	1b-3pt	5	0
3	3-4a	5	2
4	4a-5pt	1	1
5	5pt-6pt	1	1
6	6pt-7-8pt	2	2
7	8pt-9-10pt	4	1
8	10-11pt	5	0
9	11pt-12	3	1
10	13-14pt	4	2
11	14pt-15	1	1
12	16-17pt	1	0
13	17pt-18-19pt	3	0
14	19-20pt	0	1
15	20pt-21-22pt	0	0
16	22pt-23-24pt	1	2
17	24pt-25-26pt	3	1
18	26pt.	2	4
		41	19

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SALIX ANGLOREM CHAMISSE AND ITS VARIETIES

Salix anglorum Chamisso is one of the best marked and most widely distributed of American willows. It has been so messed up successively by so many botanists that frequently it is not recognized when collected. ^{Briefly} The trouble all began with the innocent publication of Salix arctica Pallas (Fl. Rossica 1(2):86, 1788). ^{was published in 1788.} What happened in the next 130 years is fully discussed by Schneider (Bot. Gaz. 66: 127-137, 1918). ^{(See below).} Only part of the publications and discussion is cited here.

Salix anglorum Chamisso, in Linnaea 6:541. 1831 (except for specimens cited); Schneider, Bot. Gaz. 66:127-137, 1918.

Salix arctica Robert Brown, in Ross, Voy. Explor. Baffin's Bay, App. p. 143. 1819, and Ed. 2, 2:194. 1819 (nomen nudum, non Pallas); Chloris Melvilliana 24. (desc.) 1823; Capt. Parry's Voy., App. Suppl. p. 282. 1824. Richardson, in Franklin, Narr. Jour. Polar Sea 752 (reprint p. 24), 1823; Ed. 2, p. 765 (reprint p. 37); 1823.

Salix arctica Pallas, var. Brownii Andersson, in D.C. Prod. 16(2):286. 1868 (in part).

Salix Brownii (Andersson) Lundström, in Nov. Act. Reg. Soc. Sci. Upsala III. 1877, p. 37 (for the most part).

Salix Brownii Bebb, in Bot. Gaz. 14:115. 1889 (for the most part).

^{Schneider}
Other citations and discussion will be found under the varieties presented below.

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p.
19
In 1918, Dr. Camillo Schneider published his first paper in a series entitled "North American Willows." It dealt with "The Species Related to Salix arctica Pall." Therein he discussed Salix anglorum (4.5 pages), described three new varieties of it, maintained S. petrophila Rydberg, and reduced S. caespitosa Kennedy to the status of a variety under S. petrophila.

detailed

Schneider (l.c. above) has give a ~~short~~ detailed discussion of the materials studied and the conclusions reached by the other authors cited above, and of the errors of interpretation they made. In 1899, the writer discussed Andersson's Salix arctica R. Br., var. petraea and made the following statement (Trans. Acad. Sci. St. Louis 9:89-90).

3

"The methods by which Professor Andersson succeeded in greatly augmenting the then existing confusion in regard to S. arctica R. Br. and S. arctica Pallas have been exposed by Mr. Bebb (Bot. Gaz. 14:115-117, 1889). The vigor and conciseness of his language render the accusation almost dramatic. But great as was the service he rendered, and good as his intentions undoubtedly were, it seems that he only added to the burden of synonymy (p. 90) when he renamed "Mr. Brown's S. arctica". His name was an evident homonym, for, while S. Brownii Bebb was published in 1889, S. Brownii (Anderss.) Lundstr. had been published in 1877. . . . Mr. Bebb was fully aware of this variety, even if ignorant of its elevation to specific rank, when he named his S. Brownii. We can attribute his action only to a strong desire to compensate the wrong done by Andersson to the labor and memory of Robert Brown. But in thus using a name which he knew to be occupied, he deliberately laid himself open to the very charge on which he had just scored Andersson so severely, and left the nomenclature of the species in worse shape than he found it. I shall not rename the plant now for I believe the name which has been in use for eighty years (S. arctica R. Br.) can yet do duty until both the numerous variations and the synonymy have been given careful study."

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It is obvious, from the concluding sentence, that the writer did not then know of the publication of Salix anglorum Chamisso. Almost simultaneously with the paper quoted above, Rydberg discussed Chamisso's species (Bull. N.Y. Bot. Gard. 1:266, 1899) and wrote:

"There is scarcely a species that has been so misunderstood as this. Even Mr. Bebb, who cleared up somewhat the discrepancy between S. arctica Pallas and S. arctica R. Br., had a very vague idea about the latter, for he included under the name S. Brownii a number of quite distinct forms. The more or less fruticose species named S. arctica or S. Brownii from the Rocky Mountains, Canada, Newfoundland, and Labrador do not belong here. S. anglorum is an arctic species and takes the place of S. S. arctica in the East."

Even if his strictures of Bebb had been true, Rydberg did not improve the situation because the plants he assigned to S. anglorum really represented S. arctophila Ckll. (S. groenlandica (Anderss.) Lundström). He then inserted S. groenlandica and assigned to it a lot of specimens belonging to S. cordifolia. He then published his S. petrophila, recognizing it as closely related to S. anglorum, and separated it therefrom by assigning to it some characters which it does not possess. (Especially leaves greenish)

In the following evaluation of S. anglorum and its varieties, the centripetal method for studying ample herbarium material was used (Jour. Arnold Arb. 27:377-378, 1925). In brief, ^{some two} several hundred specimens of the species, its varieties, and ^{only} closely related species, were removed from their herbarium covers and arranged in one series by geographic units (States, Provinces, and Territories).

Then the assembled material was studied, sheet by sheet, to determine if each had the basic characters of the species. The few which seemed to differ from the accepted characters of the Section Ovalifolia and the species anglorum were set aside for further study. The mass remaining was then separated into ^{a few groups} piles by obvious differences in vegetative characters, such as stoutness and length of branchlets and shape and size of the different types of leaves found on each twig, and on early ^{shoots} developing as contrasted with later growth.

All of this was done without reference to the ^{original labels} determinations previously made. Then each ^{group} pile was restudied to determine if the range of variation on each plant had been accurately grasped and if the characters of juvenile specimens had been correctly interpreted. This restudy shifted only a few specimens. The same method then was employed with the material in the U.S. National Herbarium. The study of the material ^{Study} excluded on the first ever established two hybrids, one previously recognized, sent ^{two} one specimen to another species of the Section, and two to another Section. ^{3 in 4?}

revealed on specimen belonging to another Section, two specimens of S. aspera, and several actual or probable hybrids with other species.

3 A. Salix anglorum Chamisso.

Salix arctica Robert Brown was described by Richardson as having leaves elliptic-obovate and entire and finally glabrous, glaucous beneath; capsules elongated, sessile, gray-tomentose, with graceful styles; and scales obovate-rotund, blackish, and sericeous. These characters rather clearly define the plant, ^{species} Chamisso did not describe his S. ~~arctica~~ anglorum but merely substituted that name for S. arctica R. Brown, not Pallas.

→ Schneider (Bot. Gaz. 66:127) gave an 11-line Latin description with his 4.5 pages of discussion. He refers (p. 129) to "the ample material before me" but he certainly did not give an ample description of this species so long and so widely misunderstood. No measurement is given for any organ except the staminate ament: "8-10 lin. longe". ^{He gave it only} Finally, his discussion of the species and his three new varieties is filled with expressions of doubt as to the limits of variation in the different entities and as to the identity and relationships of many of the specimens which he cites. ^{of S. anglorum} Below is given a more detailed description.

Recently, some American botanists have united S. arctica Pallas and S. anglorum Chamisso as a single species, after 125 years of holding them to be distinct. Curiously enough, some of those who do this are themselves making new species and varieties on the slightest of excuses.

Sumner from 1b

Prostrate with stoutish mostly subterranean branches and more or less elongated (to 20 cm.) ~~horizontal~~ creeping or running branchlets, the younger ~~sometimes~~ sometimes pruinose, ^{to glabrate} ~~erect~~ yellowish to purplish, and often more or less pubescent ^{linear -} the older purplish or blackish and glabrous; buds ovate, 4-8 mm. long, sometimes pruinose, the younger sometimes pubescent; stipules none (or rarely 2-5 mm. long, lanceolate, denticulate); petioles 3-10 or 12 mm. long; blades ^{Chartaceous} elliptical-oval to narrowly or broadly obovate, 2.5-5 or 6 cm. long, 1-2.5 or 3.5 cm. wide, mostly rounded or the apical acutish and sometimes plicate at apex, acute to rounded at base, ^{with a few} ~~with a few~~ denticulations, bright green and glabrous above, ^{more or less pubescent above} ~~glaucous~~ glaucous and raised reticulate beneath, often pilose beneath when young and sometimes ciliate at maturity;

Aments coetaneous or rarely somewhat serotinous, 2-5 or rarely 6-7 cm. long, 1.3-1.8 cm. wide, on leafy peduncles 1-3 or 4 cm. long; scales obovate or broadly ^{more or less hairy} ~~so~~ rounded or rarely subretuse, ^{occasionally angled} dark brown to blackish, 1.5-2.5 mm. long, mostly more or less long-villous; sometimes becoming glabrate outside; stamens 2, filaments glabrous free; ovaries ovate, white tomentose, capsules ovate-conic or lanceolate, ⁷ 7 or 8 mm. long, sessile or very short pedicelled, densely gray-pubescent; ^{style} ~~stigma~~ 0.7-1.2 or 1.5 mm. long, often more or less divided; ^{above} stigmas 0.4-0.7 mm. long, more or less divided; glands mostly slender, capitate, 1 or sometimes 2 in staminate, 1 in pistillate flowers.

3B. Varieties of *Salix anglorum* Chamisso

In his treatment of *Salix anglorum* in 1918, Schneider (Bot. Gaz. 66:126-137) described three new varieties in great detail. To variety *kophophylla* he allotted 48 lines of text description, to var. *araioclada* 28 lines, and to var. *antiplasta* 22 lines. *This assortment with only 1 line for the species*

which The type locality for all three was Mt. Albert, in the Gaspé Peninsula of Quebec. Nor neither the species nor any variety did he give measurements of although he did for nearly every other organ, style length. For the species he said: "stylus longitudine varians" and for each of the three varieties he said: "styli distincti". A style is distinct whether it is 0.3 mm. or 3 mm. long.

As in the case of two or more varieties of other species of *Salix*, it is not always possible to determine from juvenile specimens just which variety they will represent when more fully developed. There also will be a few more fully developed specimens which will seem to lie almost on the border line between two varieties, and may be assigned to either, depending on which characters seem most decisive, or

on the impression of the moment.

All three varieties occur as far south as Mt. Albert, in Gaspé Co. Gaspé Peninsula in Quebec south of the St. Lawrence. *It occurs in the type locality for the last two while* var. *araioclada* and *antiplasta* while the type of var. *kophophylla* is from Mt. Newfoundland.

6a
This neglect of the species, and undue
emphasis on the varieties has been one
large factor in the prevailing lack of
recognition of the species. Another
factor was ~~Schindler's~~ ^{and some times} ~~speculation~~ ^{misleading}
~~and~~ incomplete method of compar-
ing the varieties with the parent
species. This will be illustrated
in connection with the discussion
of each variety.

Supply Corps Correspondence Course
Lesson 16

1. Discuss the general arrangement of stock.

Bulk stock.— Bulk packages of an item are not always uniform or issuable. The Dir. & A finds it economical to buy in commercial packages unless the nature of the stores require special packing. The size of the issue package therefore must be determined prior to the allocation of retail bin space. Goods should be stored as nearly as possible in the units in which they are received, even tho' this requires breaking the units as received. The time element is most important when called for issue. Large non-issuable bulk packages should be broken and repacked into uniform issuable packages when received or for replenishment of retail bins.

The arrangement of bulk storage must be decided, primarily by space (sq. ft.) available, and also by many features of storehouse construction and of floor weight capacity. The space for bulk stock of an entire class having been determined, that stock should be placed, item by item, in

Ret. 225 66:130-133, 1918

a. var. kophophylla Schneider. Similar to the species in habit, branchlet an bud size, color, and pubescence (perhaps more quickly glabrous or glabrate), and in the floral organs but with smaller and differently shaped leaves and usually shorter ^{anthers} aments and peduncles. Stipules none (or rarely 2 mm. long, linear-lanceolate, denticulate); petioles as in the species; blades chartaceous, broadly elliptical to broadly oval, obovate, ovate-rotund, or suborbicular, 1.5-3.5 cm. by 1.2-2.5 or 3 cm., apex short-acute, to plicate-apiculate to rounded, base broadly cuneate to rounded to sometimes subcordate, color and reticulation as in the species; aments mostly ^{shorter} 1-2.5 or 3.5 cm. long, on leafy peduncles 1-2.5 cm. long; ^{other floral char} ^{as in this genus}

Although Schneider devoted 48 lines to the original description of this variety, he then says (l.c. p. 132): "In its rather short and dense catkins, at the base not so or hardly loosely flowered, this variety approaches typical S. anglorum, but differs in its firmer, more rounded, and soon glabrous leaves and the glabrate twigs, in which characters it comes near to the following varieties." (araiclada, antiplasta).

~~The main separating character is the roundish leaf blades.~~
The main separating character is the ^{smaller and} roundish leaf blades. Schneider gave only an 11-line description of S. anglorum and, although he spoke of "ample material" he gave no evidence that he had studied the species closely. Apparently its leaves are about as firm but the aments average longer. When he includes the "firmer, more rounded . . . leaves" in the characters by which it approaches varieties araiclada and antiplasta, he is definitely misleading because it is exactly by the firmer and ^{more} rounded blades that var. kophylla differs ^{most} from these other two varieties.

^{more} The aments, although ^{seem to be} shorter, are equally dense including the basal portion.

Dr. John D. Mixelle, Editor,
The ~~MIDLAND~~ American Midland Naturalist,
University of Notre Dame, Notre Dame, Indiana. June 23, 1948.

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

Dear Dr. Mixelle:

I am inclosing a manuscript entitled: *Salix anglorum* and *Salix petrophila* Reviewed. It contains some 26 pages and discusses and cites some 300 specimens, so that botanists may understand these long messed-up and misunderstood species and varieties. I think that I have spent about 20 times as much time and work on them as the original writers ever did, and hope that I have done a better job than some of them.

I am sending it to the Naturalist for the following four reasons. 1, I have published some 37 papers on *Salix* (and 166 on all subjects) but none has ever been submitted to your journal. 2, In consulting Smith's Willows of Colorado (for which I furnished many records and the determinations), which you published in 1942, I was struck by the excellent job you had done on a difficult manuscript. 3, This paper treats of species and varieties ranging abundantly from the Atlantic to the Pacific Coasts across Canada, Greenland, Alaska, and our western mountain States. 4, Much of the material studied and cited was collected by men connected with Catholic universities, including Pere A. Dutilly, Dr. Hugh O'Neill, and Dr. Titus Ulke of the Catholic University of America; Father Ernest Legage of the Ecole de Agriculture, Rimouski, Quebec; and Dr. G. Gardner of the University of Montreal.

The relative ranks of the center headings are indicated by pencilled numerals on the left margin. Longer quotations are indented and written less than double-spaced, and presumably would be set in smaller type and more closely spaced. In the lists of specimens cited, I have made no attempt to indicate the type to be used for the major headings, such as "Eastern Distribution", "Western Distribution", etc., nor for the major subdivisions, such as the States and Canadian Provinces, etc.

I trust that the manuscript may be found to be acceptable. Stamps for return postage are inclosed.

Cordially yours,

Carleton R. Ball
(retired)

P.S. I have determined the *Salix* collections for many institutions in the United States and Canada, through the years. I do not recall if I have done so for the Univ. of Notre Dame. If there is accumulated material for which identification is desired, I will be glad to do it at any time.

The American Midland Naturalist

FOUNDED BY J. A. NIEUWLAND, C.S.C.

University of Notre Dame
Notre Dame, Indiana

JOHN D. MIZELLE, EDITOR

June 29, 1948

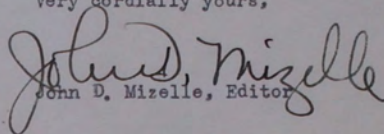
Dr. Carleton R. Ball
3814 Jocelyn St. N. W.
Washington 15, D. C.

Dear Dr. Ball:

This will acknowledge receipt of your manuscript concerning "Salix anglorum and Salix petrophila Rydberg Reviewed". It is this date being sent to the associate editor for his perusal and as soon as it returns from him I shall write you further.

Thank you very much for your interest in our journal.

Very cordially yours,


John D. Mizelle, Editor

JDM:rh

EDWARD A. CHAPIN
U. S. NATIONAL MUSEUM
WASHINGTON, D. C.

ALBERT L. DELISLE
UNIVERSITY OF NOTRE DAME
NOTRE DAME, INDIANA

CARROLL LANE FENTON
404 LIVINGSTON AVE.
NEW BRUNSWICK, N. J.

JOHN HOBART HOSKINS
UNIVERSITY OF CINCINNATI
CINCINNATI, OHIO

GEORGE NEVILLE JONES
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WASHINGTON, D. C.

The American Midland Naturalist

FOUNDED BY J. A. NIEUWLAND, C.S.C.

JOHN D. MIZELLE, EDITOR

UNIVERSITY OF NOTRE DAME

Notre Dame, Indiana
July 27, 1948

JEAN M. LINSDALE
HASTINGS RESERVATION
JAMESBURG ROUTE,
MONTEREY, CALIFORNIA

GEORGE WILLARD MARTIN
STATE UNIVERSITY OF IOWA
IOWA CITY, IOWA

HUGH M. RAUP
HARVARD FOREST
HARVARD UNIVERSITY
PETERSHAM, MASSACHUSETTS

KARL P. SCHMIDT
CHICAGO NAT. HIST. MUSEUM
CHICAGO, ILLINOIS

HARLEY JONES VAN CLEAVE
UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS

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

Dear Dr. Ball:

It is a pleasure to let you know that your manuscript on Salix
anglorum and Salix petrophila returned from the associate editor today with
approval for publication.

He has made occasional corrections here and there, none of which are
important. He and I both agree that "Chamisso" and "Rydberg" be deleted from
the title of your paper since this matter is adequately cared for in the body
of the text. With your permission, I shall make these two deletions and print
for you as soon as possible.

Thank you very much for your interest in the "Midland" and may you have
a most profitable summer.

Most cordially,

John D. Mizelle
John D. Mizelle, Editor

JDM:rh

(over)

Dr. John D. Mizelle, Editor,
American Midland Naturalist,
University of Notre Dame,
Notre Dame, Indiana.

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

July 29, 1948

Dear Dr. Mizelle:

Naturally I am very much pleased to learn, from your letter of July 27, that my paper on *Salix anglica* and *Salix petrophila*, etc., has been accepted for publication, and that it was found in fairly satisfactory condition.

The Deletion of the names of the species authors from the title is quite satisfactory to me.

I shall wish to order one hundred reprints when the paper is printed and assume that opportunity will be given when galley proof is sent to me.

The summer so far is hot, humid, and full of work, things that seldom prove fatal. Expect to finish two more papers before cooling off too much.

With appreciation and good wishes, I am,

Cordially yours,

Carleton R. Ball

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

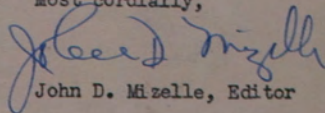
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November 28, 1949

Dear Dr. Ball:

If you can return your manuscript and proof immediately I shall try and include your article in the January issue which is being made up now.

Most cordially,

A handwritten signature in blue ink, appearing to read "John D. Mizelle", written over the typed name.

John D. Mizelle, Editor

American Midland Naturalist
Notre Dame, Indiana

University of Notre Dame,

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

Dr. John D. Mizelle,
Editor, Amer. Midland Naturalist,
Notre Dame, Indiana.

30 November, 1949

Dear Dr. Mizelle:

The manuscript and proof of my paper, and your card of 28 November EE, all arrived yesterday and I have given the proof-reading immediate attention. It was the hardest job of its kind I have ever had, because of the innumerable citations of specimens and the many references and quotations. My reasons for these were given when I submitted the manuscript.

I am amazed that so difficult a manuscript was set so relatively accurately and I congratulate your compositor or linetypist on the job. Just proof-reading it gave me a headache. I hope he has recovered. Now for a few comments.

1. In the mss. (p.4b, par. 1), I wrote "States, Provinces", with initial capitals. They are reduced to lower case initials. There is a recognized difference between geographic (political) areas bearing these designations and such things as states of mind, provinces for discussion, etc. The capitals help to make the meaning clear, as in the names of people, firms, etc.

2. In mss. (p. 7, last par.); proof p. 6, Greenland par), I wrote the word Land so imperfectly in "Franz Josef Land" (a Greenland area) that it was mistaken for "and" and Franz Josef was italicized as the first of two collectors. Sorry for this.

3. On mss. p. 7, end of Baffin Isl. par. (proof page 6, par. de.), I wrongly left space between the longitude and the final). Sorry for the deletion required.

4. On mss. p. 8, par. 1, line 2, (proof p. 6, last par, line 2) I wrote "70°-80°" The degree symbol on the 80 has been changed to minutes (80'). There being but 60 minutes in a degree of lat. or long., I have reinstated the degree mark.

5. On mss. page 12, par. 1, line 2, I did not close up the () inclosing USN and it was edited to insert asterisks there which need deleting. Sorry, because it may mean resetting the whole paragraph (proof p. 9, "Eatern Dist. par., line 3).

6. In the proof paragraph just cited above, I think that the name Newfoundland should be in capitals, same as Quebec.

7. On mss. page 22, par. 2, line 7, I forgot to insert "all" in the () before USN. I'M sorry if it means some resetting. (proof page 16, par. 2, line 8).

8. On mss. p. 25, par. 1, lines 2-3, I used a quotation within another quotation. The quotation was indicated by " ", and the secondary quotation within it by ' ', thus: 'leaves glabrous, or when young covered with long white hairs parallel to the midrib'. I believe that this is the accepted way of designating secondary quotations (occurring within a longer quotation) but it was changed in editing. I have restored it. (proof p. 17, par. 2, lines 3-4).

Out of some 60 corrections indicated on the proof, I find that 19 are required because of defects in my manuscript. These I have indicated by a pencilled dash (—) in the margin. I shall be glad to pay for these corrections if you so desire.

Proof sheets, manuscript, and abstract are going forward under separate cover.

Many thanks for your courtesy. Order for reprints inclosed.

Cordially yours,

Carleton R. Ball
Carleton R. Ball

The American Midland Naturalist

FOUNDED BY J. A. NIEWLAND, C.S.C.

University of Notre Dame
Notre Dame, Indiana

JOHN D. MIZELLE, EDITOR

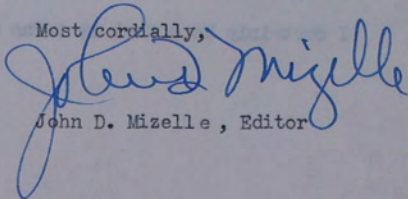
December 12, 1949

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

Dear Dr. Ball:

As I previously wrote, I am planning on printing your article in the January issue of the "Midland". I received your letter and the corrections you noted but as yet the manuscript and proof have not arrived. If there is any possible way that you can expedite matters please do so as soon as possible so that the issue can be put in shape for the press.

Most cordially,



John D. Mizelle, Editor

JDM:rh

(See over)

3814 Jocelyn St., N.W.,
Washington 15, D.C.
14 December, 1949

Dear Professor Miselle:

Your letter of December 12 is just here. I cannot understand why the mss. and proof have not arrived. Nor does there seem to be anything I can do about it.

The material was remailed, as I remember, in the same large envelope in which it came. The address slip you had pasted on the envelope had the name and address of the AMN printed in large black type, preceded by the word "From". I removed the lower part of the slip, which bore my name and address, and deleted the word "From".

I wrote my name and address in the upper left corner and mailed it promptly. I think that I put on the same postage which it bore when it came, because a printed statement said that mss. and proof went at a lower rate than mss. alone. It was not insured, and probably was mailed at the local mail box as I usually mail 5 to 10 pieces each day.

I certainly hope that it turns up promptly, as I know an editor's troubles.

Cordially yours,

Carlton R. Ball

EDWARD A. CHAPIN
U. S. NATIONAL MUSEUM
WASHINGTON, D. C.

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UNIVERSITY OF NOTRE DAME,
NOTRE DAME, INDIANA

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URBANA, ILLINOIS

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The American Midland Naturalist

FOUNDED BY J. A. NIEUWLAND, C.S.C.

JOHN D. MIZELLE, EDITOR

UNIVERSITY OF NOTRE DAME

Notre Dame, Indiana

December 22, 1949

JEAN M. LINSDALE
HARTINGS RESERVATION
JAMESBURG ROUTE,
MONTREY, CALIFORNIA

GEORGE WILLARD MARTIN
STATE UNIVERSITY OF IOWA
IOWA CITY, IOWA

HUGH M. RAUP
HARVARD FOREST
HARVARD UNIVERSITY
PETERSHAM, MASSACHUSETTS

KARL P. SCHMIDT
CHICAGO NAT. HIST. MUSEUM
CHICAGO, ILLINOIS

HARLEY JONES VAN CLEAVE
UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS

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

Dear Dr. Ball:

I have waited until the eleventh hour for return of your manuscript and proof before writing and sending a second proof to you.

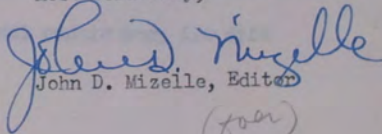
The January issue is being run at the present time and since your article is near the end of the issue, I am hoping that they will not get to your article before you can return the enclosed proof. I sincerely hope that you have a carbon copy of your manuscript with which to check.

This letter and proof are being sent air mail, special delivery and I sincerely hope that you will have an opportunity to check the proof immediately after its arrival, and return it by air mail, special delivery. This I believe would permit us to print the issue in an uninterrupted manner.

I am sorry that the mails have made things inconvenient for both you and the press, however, it seems well within the realm of possibility that we may be able to overcome the blow dealt by the Christmas rush.

May you have a merry Christmas and a happy New Year.

Most cordially,


John D. Mizelle, Editor
(over)

JDM:rh

Dr. John D. Mizelle, Editor,
American Midland Naturalist,
University of Notre Dame,
Notre Dame, Indiana.

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

24 December, 1949

Dear Dr. Mizelle:

Your letter of 22 Dec. and the new-run proof of my appear came yesterday and I have corrected all of the errors I can find. It is possible that a few insertions in the ribbon copy of the mss. may not have been inserted in my carbon copy and any errors they caused would not be corrected in this proof. But I doubt if this is a serious possibility.

The total number of corrections seems to be about that recorded in my letter as having been indicated on the first proof sent. Again I have marked those changes which seem to have been caused by my errors or omissions. This time they are indicated by an x in the margin. There did not seem to be as many as I listed before but that may be because of the slight difference between ribbon and carbon copies of the mss.

Anyway, I appreciate your helpfulness and trust that this comes in time to let you get the paper into the Jan. issue, as planned. The proof is sent by air mail, special delivery, as requested.

With all good holiday wishes, I am

Cordially yours,

Carleton R. Ball

In 54 years of writing and 175 manuscripts, I never before
have lost mss. or proof in the mails. Glory be.

Dr. John D. Mizelle, Editor, The American Midland Naturalist,
The American Midland Naturalist,
Notre Dame, Indiana.

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

31 January, 1950.

Dear Dr. Mizelle:

Many thanks for your courteous card of January 16. Few like it come in.

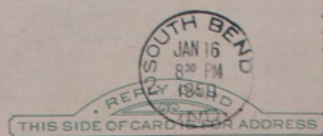
It occurs to me that I should begin worrying about my reprints. The order was mailed with my letter of November 30 and the corrected proof and therefore is lost. Foolishly, I kept no record of it.

My memory is that I wished a total of 150 reprints, without covers, and ordered that many, less whatever number you furnish to the author. I hope that it is not too late to get them printed. Should have thought of it before.

With all good wishes for this meteorologically topsy-turvy New Year, I am

Cordially yours,

Carleton R. Ball



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

January 16, 1950

Dear Dr. Ball:

I wish to thank you very much for your wholehearted cooperation regarding publication of your Salix paper with us. It was published in the January issue which is at the bindery at the present time.

Most cordially,

John D. Mizelle

John D. Mizelle, Editor

American Midland Naturalist
Notre Dame, Indiana

Dr. John D. Mizelle, Editor,
American Midland Naturalist,
Notre Dame, Indiana.

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

3 March, 1950

Dear Dr. Mizelle :

I have received the reprints of my paper reviewing S. anglossum and S. petrophila and have begun distributing them. Just now the invoice has arrived and I am glad to inclose check for \$15.02 in payment thereof.

I wish to thank you most heartily for your many courtesies, including the bearing up under the extra burden of the lost manuscript and corrected proof. No word has come to me concerning it.

I seem not to have sent any reprints of my numerous willow papers to any one in the Dept. of Botany at Notre Dame University. Can you tell me if they would be wanted there, and to whom they should be sent if they are wanted?

Cordially yours,

Carleton R. Ball

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

Dear Dr. Mizelle:

6 May, 1950.

Some weeks ago, in response to my inquiry, I think that you stated that you could use 5 copies of each of available Salix reprints. I have now checked through those remaining and am sending one copy of each, and three of a few of the recent ones.

I usually distribute promptly after receipt, but they have relatively remain after a few months. Sorry I cannot triplicate more. They go forward by mail tonight.

Am driving on manuscripts steadily.

Cordially yours,

Carleton R. Ball