

extensively in these waste places, especially during the days when ballast was unloaded by incoming vessels.

Among the wool-waste plants are *Chloris elegans*, *C. cucullata*, the Boutelouas, and *Hordeum pusillum*.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF
HARVARD UNIVERSITY—NO. CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

M. L. FERNALD

(Continued from page 16)

1. *SALIX ERIOCEPHALA* Michx. Fl. Bor.-Am. ii. 225 (1803) is represented by a good branch (except for broken leaf-tips) of the foliage "oblongo-ovalibus, basi subretusis, serrulatis", which my note of 1903 described "foliage of oblong-leaved *cordata*", and a flowering branch which clearly gave the name to the species, "*S. diandra*: ramulis minutim tomentosis: . . . amentis ovalibus, confertim villosissimis", "*HAB.* in regione Illinoensi", my note on it being "flowering branch near *discolor*". The type is material of the tomentulose-branched *S. missouriensis* Bebb in Garden and Forest, viii. 379 (1895). It has been erroneously placed with *S. discolor* as *S. discolor* Muhl., var. *eriocephala* (Michx.) Anderss. in DC. Prodr. xvi². 225 (1868), the very large precocious aments and long (up to 1 cm.) capsules having deceived those who did not consider its other characters, into thinking it *S. discolor*. Michaux's "foliis oblongo-ovalibus, basi subretusis" is not good for *S. discolor* which becomes relatively local in southern Illinois and adjacent eastern Missouri. Michaux collected his *S. eriocephala* "in regione Illinoensi". That meant southernmost Illinois, for Michaux went down the Ohio, camped at the mouth of the Wabash and then proceeded to the Mississippi near the mouth of the Ohio. Here *S. missouriensis* abounds ("Plants of the Lower Wabash Valley", Robt. Ridgeway, no. 1580), Ball explicitly referring to it "in Illinois along the Ohio River near its

junction with the Mississippi" (Ball in Deam, Shrubs Ind. 52), just the region where Michaux got his *S. eriocephala*. The very weak photograph which I got of the foliage of Michaux's type might almost as well have been taken from *Ridgway*, no. 1580 from the Lower Wabash, from Glatfelter's material from Crève Coeur, St. Louis Co., Missouri, or from *Ball & Over*, nos. 2233, 2235 and 2246 from South Dakota—these all characteristic broad-leaved representatives of *S. missouriensis*.

2. *S. CORDATA* Michx. l. c. (1803). This, although omitted from *Index Kewensis*, has nothing to do with the later published and generally more southern *S. cordata* Muhl. It was from Lake St. John, the entire treatment being

CORDATA. *S. ramulis foliisque villosis: foliis cordato-ovalibus, acuminatis, argute serrulatis; stipulis foliaceis, maximis.*

HAB. in Canada, ad lacum *S. Joannis*.

The shrub was very familiar to me when I studied Michaux's type, for only three years earlier I had been collecting it along the Aroostook River in northern Maine, hence my memorandum: "The most extreme broad-leaved pubescent form of the Aroostook R., once taken by me for *S. adenophylla* [with absolute correctness as it proves]." See later discussion.

3. *S. INCANA* Michx. l. c. (1803), not Schrank (1789). My memorandum accords with the long-held identification: "The true *candida* with flocculent pubescence. The spec. labelled 'Lac Mistassins et Riv. des Goelands'."

4. *S. LONGIROSTRIS* Michx. l. c. 226 (1803). My note says merely "One of the *tristis* forms". It is generally treated as *S. tristis* Ait. (1789).

5. *S. CAROLINIANA* Michx. l. c. (1803). Although *S. caroliniana* is commonly placed in the unquestioned synonymy of *S. nigra* Marsh., with which, in 1903, I was very familiar, I did not recognize the Michaux material of his *S. caroliniana*. Michaux identified it with the "*S. pentandra?*" of Walt. Fl. Carol. 243 (1788), which had "foliis glabris serratis nitidis lanceolatis" and which, if it at all resembled the Eurasian *S. pentandra* L., could not have looked very much like *S. nigra* Marsh., with, to quote Deam's *Flora of Indiana*, "leaves linear-lanceolate". Michaux's *S. caroliniana* was described as follows:



Photo, B. G. Schubert

SALIX RIGIDA (*S. cordata* Muhl.): FIG. 1, leaf of type of *S. cordata* Muhl., $\times 1$, after Muhlenberg; FIGS. 2 and 3, staminate and pistillate flowering branches, $\times 1$; FIG. 4, portion of fruiting ament, $\times 5$.



Photo. B. G. Schubert

SALIX CORDATA Michaux (*S. adenophylla* Hook.): FIG. 1, type of *S. adenophylla*, \times ca. $\frac{1}{2}$; FIG. 2, margin of leaf of type of *S. adenophylla*, \times 10; FIGS. 3 and 4, leafy tip and fruiting ament, \times $\frac{1}{5}$, from probable type-region of *S. adenophylla*.

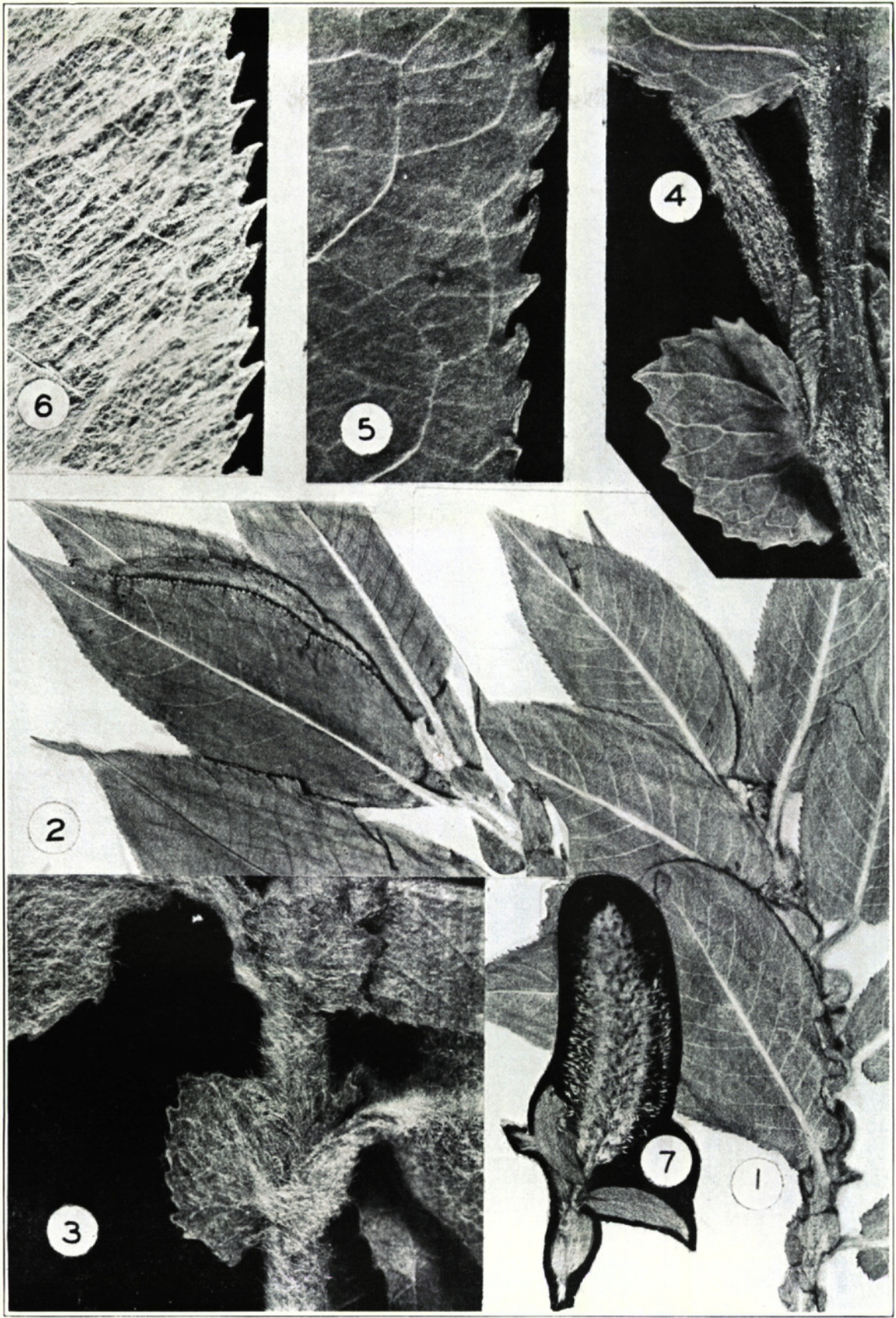


Photo. B. G. Schubert

SALIX CORDATA Michaux. FIGS. 1, 2, 3 and 6 from Michaux's TYPE-REGION: FIGS. 1 and 2, leafy tips, $\times \frac{4}{5}$; FIGS. 3 and 4, stipules and leaf-bases, $\times 5$; FIGS. 5 and 6, leaf-margins, $\times 10$; FIG. 7, staminate ament, $\times \frac{4}{5}$.



Photo, B. G. Schubert

SALIX CORDATA Michaux: FIG. 1, staminate flowering branch, $\times \frac{4}{5}$; FIG. 2, pistillate flowering tip, $\times \frac{4}{5}$; FIG. 3, fruiting ament, $\times \frac{4}{5}$; FIG. 4, portion of young, and FIG. 5, portion of flowering staminate ament, showing blackish bracts, $\times 10$.

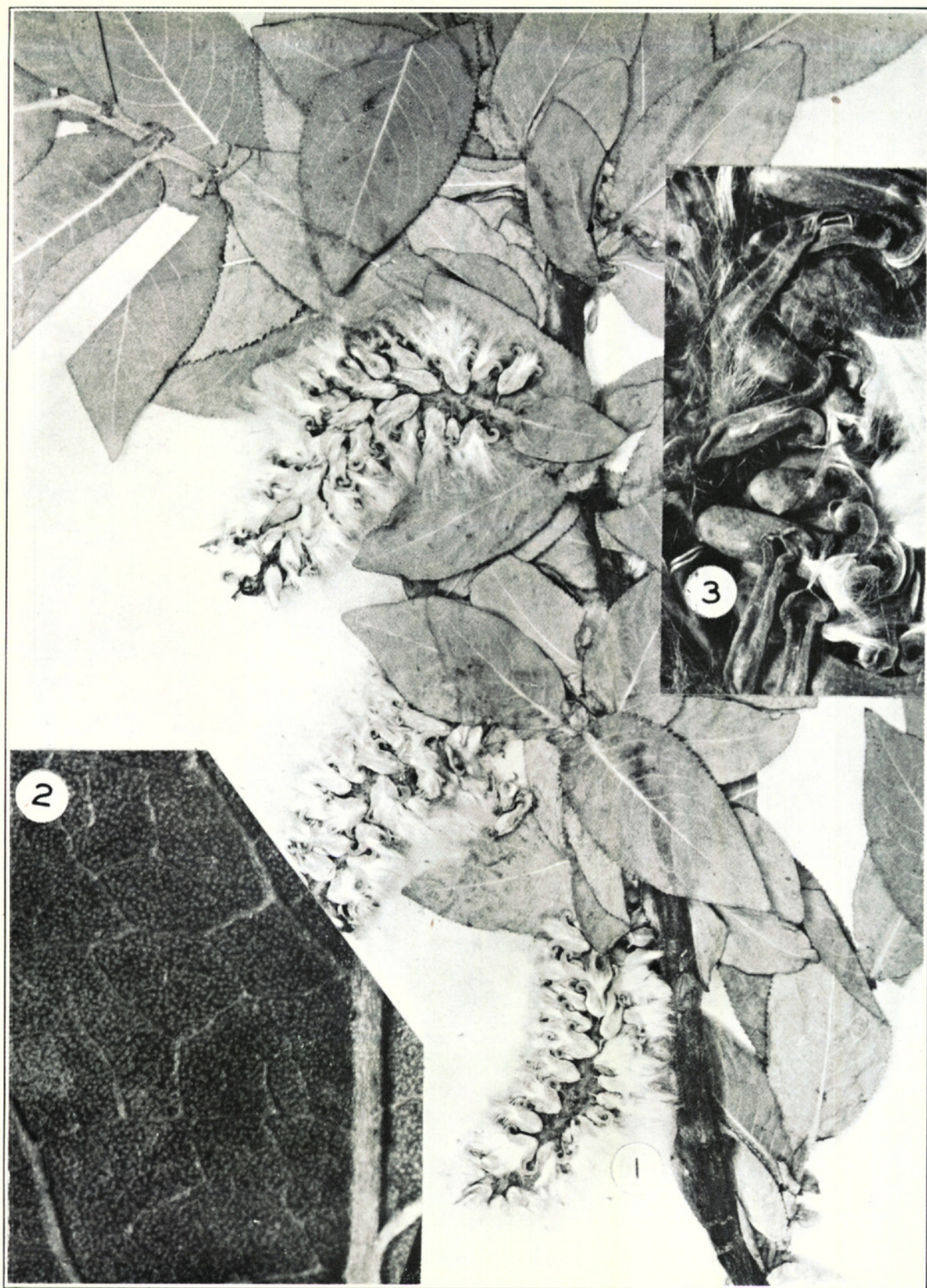


Photo. B. G. Schubert

SALIX CORDATA Michaux: FIG. 1, fruiting branch, $\times 1$; FIG. 2, lower surface of mature leaf, showing delicate venation, $\times 10$; FIG. 3, portion of fruiting ament, showing short pedicels, $\times 10$.



Photo. B. G. Schubert

SALIX SYRTICOLA: FIG. 1, pistillate, and FIG. 2, staminate branch, $\times \frac{4}{5}$, from TYPE.

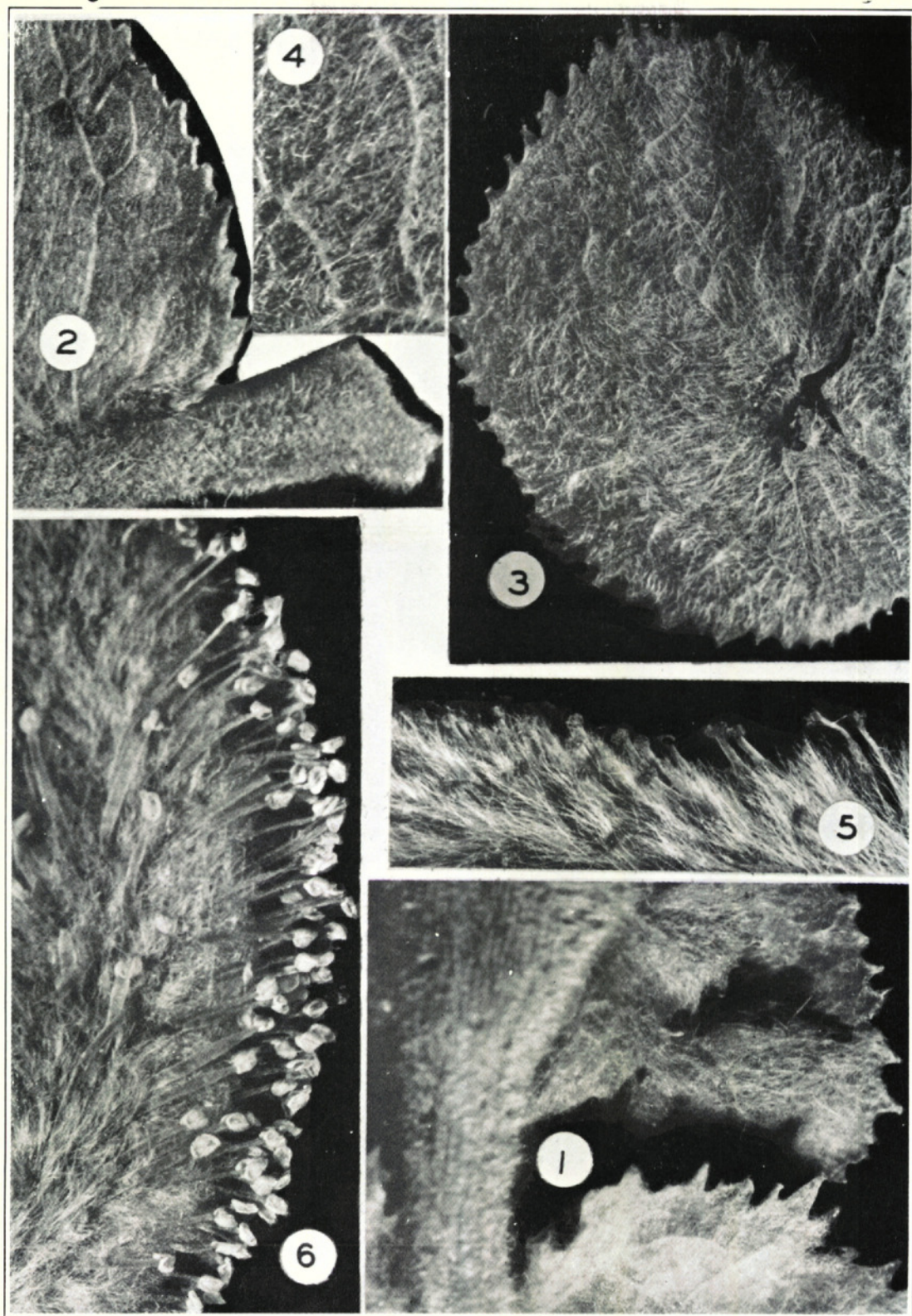


Photo. B. G. Schubert

SALIX SYRTICOLA: FIG. 1, portion of stipule, petiole and leaf-base, $\times 5$; FIG. 2, petiole and leaf-base, $\times 5$; FIG. 3, portion of stipule, $\times 5$; FIG. 4, venation of lower leaf-surface, $\times 10$; FIG. 5, portion of flowering pistillate ament, $\times 5$; FIG. 6, portion of staminate ament, showing pale bracts, $\times 5$, from TYPE.



Photo. B. G. Schubert

SALIX RETICULATA: FIG. 1, portion of staminate ament, $\times 10$.

S. RETICULATA, var. *SEMICALVA*: FIG. 2, portion of TYPE, $\times \frac{4}{5}$; FIG. 3, staminate ament and lower surface of leaf, $\times 3$, from TYPE; FIG. 4, portion of staminate ament, $\times 10$, from TYPE.

CAROLINIANA. *S. foliis lanceolatis, subtiliter arguteque serrulatis, subsessilibus: staminibus 4-6: amenti foeminei squamis oblongis, minutissime partimque lanuginosis; ovariis oblongis, glabris.*

S. pentandra ? WALT.

OBS. Affinis *S. triandrae*.

HAB. in Carolina et Georgia.

In studying the American willows Schneider had before him the vast accumulations in all the larger American herbaria and it is significant that, with all these collections before him, he was unable to find any typical *S. nigra* from much of North and South Carolina and Georgia: "A very well-known eastern species the range of which seems to extend along the Atlantic coast from southern New Brunswick to northern North Carolina, and westward through northwestern South Carolina and northern Georgia (from where I have not yet seen typical material) to central and eastern Alabama . . . , southern Arkansas", etc. (Schneid. in Journ. Arn. Arb. i. 6 (1919)). In *S. nigra*, according to Sargent, Silva, ix. 104, "The stamens vary from three to five in number"; similarly, Andersson, the most accurate student ever to work on *Salix*, said in DC. Prodr. xvi². 200 (1868) "masc. 3-5-andris". Michaux's "4-6" slightly exceeds this and his "amenti foeminei squamis . . . partimque lanuginosis" is not too well described by Sargent's "scales . . . coated on the inner surface with pale hairs" nor by Andersson's "squamis in amentis . . . foemineis . . . glabriusculis vel basi et margine villosis".

In view of the great rarity in or absence from much of the area of "Carolina et Georgia" of *Salix nigra* and, likewise in view of Michaux's "OBS. Affinis *S. triandrae*", it would seem the obvious procedure to look for some common species of Carolina and Georgia which looks like the Eurasian *S. triandra* L. and which has 4 to 6 stamens, and the scales of the pistillate aments woolly at base. This is obviously *S. longipes* Shuttlew. ex Anders. (1868) and especially *S. Wardi* Bebb (1895), which Schneider treats as *S. longipes*, var. *Wardi* (Bebb.) Schneid. Typical *S. longipes* was recorded by Schneider in Journ. Arn. Arb. i. 25 et seq., "from Cuba to northern Florida . . . and from . . . adjacent southeastern Georgia . . . , South Carolina . . . , . . . eastern North Carolina . . . and in the southeastern corner of Virginia", the barely or hardly separable var. *Wardi* extending

to the District of Columbia "where it apparently reaches the most northern point of its distribution". One can hardly look at characteristic specimens of *S. triandra* without seeing marked resemblance in outline and breadth of leaves to those of *S. longipes* (including *S. Wardi*), but he would scarcely think of the more linear- and narrower-leaved *S. nigra*. Although Schneider in various papers talked around the subject, I fail to find him getting down to a concrete statement of the characters of *S. longipes* (and *Wardi*). Sargent's full description in his *Silva*, l. c. 107, of *S. Wardi* emphasizes "leaves lanceolate to ovate-lanceolate . . . or . . . linear-lanceolate . . . stamens . . . three to six", while *S. longipes* (as *S. occidentalis* Koch (1828), not Walt. (1788)) was defined with "leaves . . . lanceolate, . . . scales . . . oblong-obovate . . . and villous on the back . . . stamens five or six". Similarly, Ball, in his detailed description of *S. longipes* (including *Wardi*) in Deam's *Shrubs of Indiana*, 44, says "leaf-blades narrowly lanceolate to lanceolate, . . . scale oblanceolate or obovate, villous, . . . stamens 5-8". Assembling these modern statements and comparing with Michaux's we get for *S. longipes* (including *S. occidentalis* sensu Sargent and *S. Wardi*): leaves lanceolate (narrowly or broadly); scales of ament oblong-obovate or oblanceolate, villous on the back; stamens 3-8. Michaux said: leaves lanceolate; scales minutely and partly woolly; stamens 4-6; furthermore his *S. caroliniana* came from Carolina and Georgia, where *S. longipes* abounds and where *S. nigra* is rare or local.

Two more points. Quite unfamiliar with *Salix longipes* (*Wardi*) in 1903, I entered only a query against Michaux's *S. caroliniana*. This was "Form of *S. cordata*?". That was only an off-hand suggestion, but Bebb, who set up the species, *S. Wardi*, in *Gard. and For.* viii. 363 (1895), had originally published it as *S. nigra*, var. *Wardi* in Ward, *Guide to Flora of Washington*, 114 (1881). He then (1881) spoke of a form of the latter which "might be easily mistaken (in the absence of aments) for an extravagant growth of *S. cordata*". Again, in 1895, he wrote: "The statement made when this Willow was first described that in some of its forms the leaves alone, with their ample stipules, might easily be mistaken for *S. cordata*, finds striking exemplification in Professor Short's specimen in the Gray Herbarium, which

two no less competent salicologists than Mr. Carey¹ and Professor Andersson have mistaken for '*S. cordata angustata*'. Indeed it is apparent from the description that this identical specimen served as the type of *S. cordata angustata*, 1° forma discolor, Andersson (DC., Prod. xvi². 252)." When the foliage of Michaux's type of *S. caroliniana* reminded my then quite inexperienced eye of that of *S. cordata* (surely not of *S. nigra*) I was in distinguished company, for it is an honor to approach the class with the discerning John Carey, the highest of honors to get near the limited group of most cautious salicologists with Nils Johan Andersson!

Schneider states with seeming finality regarding *Salix caroliniana* that "unfortunately no type specimen seems to exist in Michaux's herbarium at Paris"—Journ. Arn. Arb. iii. 64 (1921). But, from what I have already noted, it is evident that Schneider did not at all understand the types at Paris of Michaux's *S. eriocephala* and *S. cordata* and probably never studied them. These types and that of *S. caroliniana* were all there in 1903, when I studied and photographed some of them; of course, since the invasion of Paris by Hitler's ravaging hordes they may now be missing; but shortly before the "*blitzkrieg*" in which Paris was invaded at the opening of the recent war the TYPE was there, for Cintract took the photograph of it which is before me. This photograph shows the relatively broad young leaves paler beneath than above and the toothing of *Salix longipes*, not of *S. nigra*. I am satisfied that *S. CAROLINIANA* Michaux. (1803) is *S. longipes* Shuttlew. (1858), i. e. *S. Wardi* (Bebb) Bebb (1895).

S. CORDATA Michx. Fl. Bor.-Am. ii. 225 (early 1803); Poiret in Lam. Encycl. Méth. vi. 661 (1804); not Muhl. in Ges. Naturf. Freunde Neue Schr. iv. 236, t. 6, fig. 3 (late 1803 or early 1804). *S. adenophylla* Hook. Fl. Bor.-Am. ii. 146 (1839); Schneid. in Journ. Arn. Arb. i. 158 (1920) in part (excl. *S. syrticola*); St. John, Vict. Mem. Mus. Mem. 125: 79 (1922); Raup in Sargentia, iv.

¹ In his *Salices Amer.* no. 22, Joseph Barratt had *Salix longipes* under a *nomen nudum* (in Index Kewensis and also cited by Schneider, so that I am not here publishing a useless name), with the following explanation: "22. *Salix Pitcheriana** Barratt, mss. Hab. Arkansas.—Dr. Pitcher. Sea Islands of Georgia. This undescribed species is allied to *S. nigra*. I possess specimens which have been obligingly communicated by John Carey, Esq. of New York", etc. John Carey was not properly edified. On one of his labels of Georgia material he wrote: "I always supposed this to be *S. nigra* of Lin [who had no such species]: (no doubt it is of Ell.) but Dr. Barratt who calls himself the great authority for our willows names it a new species". "Authorities" beware!

111 (1943).—Southeastern Labrador Peninsula to James Bay, Ontario, south to Newfoundland, Nova Scotia, northern Maine, eastern Cape Cod, northern New York, Simcoe and Bruce Cos., Ontario, and northern Michigan. PLATES 997–1000.

Salix cordata Michx. has been wrongly guessed, ever since Willdenow, to be identical with the later *S. cordata* Muhl. (see pp. 14 and 28 and plates 995 and 996). In his *Species Plantarum*, iv². 666 (1806), Willdenow took up the later *S. cordata* Muhl., expanding Muhlenberg's original description to read "*ramis glabris viridibus. Folia tripollicaria oblongo-lanceolata acuminata basi cordata, margine argute serrata, serraturis cartilagineis, utrinque glabra*", etc.; and at the same time he maintained *S. rigida* Muhl. as a distinct species, although others have not been able to do so. *S. rigida* was thought to be distinguished by "*ramis viridibus superne purpurascens, junioribus pubescentibus. Folia tripollicaria rigida oblongo-lanceolata acuminata basi subcordata, margine argute serrata, serratura infime elongata apice glandulosa*" etc., not very convincing differences, especially when Muhlenberg's original figures (our PLATE 995, FIG. 1 and 996, FIG. 1) are compared. However, in *S. rigida*, with glabrous oblong-lanceolate subcordate leaves, Willdenow doubtfully included "*S. (cordata) ramulis foliisque villosis, foliis cordato-ovalibus acuminatis argute serrulatis, stipulis foliaceis maximis. Mich. amer. 225?*". There he had a really different species, which has positively cordate and narrowly oval or ovate leaves densely villous when young, and often to maturity, and coming originally from Lake St. John, which is more than 600 miles north of Muhlenberg's region (Lancaster County, Pennsylvania) and with a Hudsonian or Hudsonio-Canadian (instead of Alleghenian-Carolinian) flora. As stated on a previous page (28) the type of *S. cordata* Michx. from Lake St. John is surely of the northern species with densely pubescent branchlets and young foliage, which is common from southeastern Labrador Peninsula to James Bay, a species (PLATES 997–1000) of which many sheets from Lake St. John are before me. In its smallest-leaved developments it is quite identical with the type of *S. adenophylla* Hook. (PLATE 997, FIGS. 1 and 2) from "Labrador. Dr. Morrison", the latter region being presumably the Côte Nord of the eastern part of Saguenay County, Quebec, which in Hooker's (and Morrison's) time was included in "Labrador". At least the type of *S. adeno-*



Fernald, Merritt Lyndon. 1946. "CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLX. TECHNICAL STUDIES ON NORTH AMERICAN PLANTS (Continued)." *Rhodora* 48, 27–40.

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