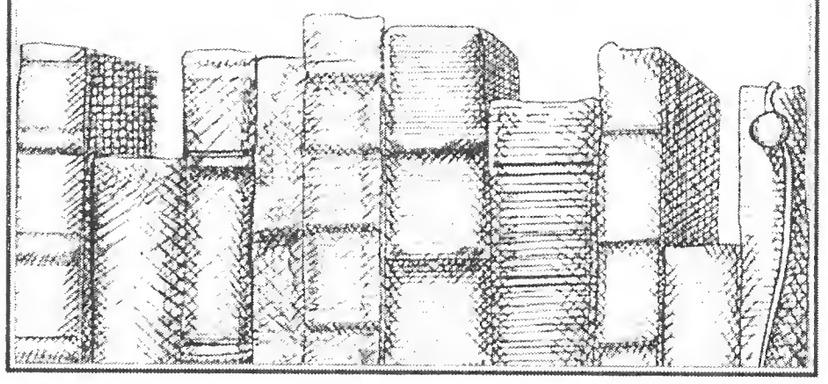

SALICES AMERICANÆ;

NORTH AMERICAN

WILLOWS.

BY

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MIDDLETOWN, CONN.

1834: REVISED 1840.

GENUS SALIX. LINN.

SECT. I. CINEREÆ.

AMENTA ovalia vel ovalia cylindracea, præcocia; Stamina 2, ex apice amenti prorumpentia; squamæ rubræ, deinde nigricantes.—Amenta fœm. juniora recurvata. Germina pedicellata. Stigmata juniora plerumque rubra vel pallida-flava, demum virescentia. Folia obovata, lanceoalata plerumque integerrima, canescentia, rugosa, piloso-alba vel cinerea; marginibus sæpe revolutis. Frutices.

Barratt, (rev.) in Hooker Fl. Bor-Am., Vol. 2, p. 144.

This revised section is adapted to the Sallows of the Northern States. Several new species of this group, found on the North West Coast, and vallies of the Rocky Mountains, have been described in the Flora Boreali-Americana. Some of these last are remarkable for the dense white, or yellowish white tomentum investing their leaves and young branches; as well as for the uncommon beauty of their large and glossy catkins.

No. 1. SALIX MUHLENBERGIANA *Willd. sp. pl.* IV, 692, (*Excl. Syn. et descript.*) = S. conifera. *Muhl. Mag. Naturf. Fr. Berlin,*‡ IV, *p.* 240, *t.* vi. *f.* 9. *et. Muhl. Fl. Lancast.* MSS. II. *p.* 776, *nec Wangenheim. Pursh Fl. Am.* II. *p.* 612, *n.* 17, (*excl. Syn. Michx. et Wangh.*)

‡ The title of this Work is Der Gesellschaft, naturforschender Freunde, zu Berlin, 1803. Table 6, in this Work, exhibits figures of the leaves only, of nine American Willows. The same essay was translated and inserted in the Annals of Botany with the figures.

HAB.—Grows in dry woods. Flowers April 4–10. Capsules ripe May 5–10. The latitude of Middletown, 41° N.

ENG. Muhlenberg's Willow or Sallow. Height 4–8 or 10 feet.

This Willow frequently bears small cones at the ends of the branches.

This species has occasioned much perplexity to Botanists, misled by the cone in the first instance. Our specimens and synonymes will serve to clear up the difficulty. Muhlenberg remarks, "occurrunt in hac specie ut in aliis, coni ovati—foliis lanceolatis subserratis, acutis subtus, rugosa villosis. Folia varia in uno ramo inferiora sunt obovata integra canata et lanceolata serrata. Flor. Lancast. MSS. vol. II, p. 776.

The S. conifera of Wangenheim, is altogether a different Willow, belonging to Sect. II, and is closely allied to S. discolor Muhl. I have met with it agreeing exactly with Wangenheim's description and figure, in the State of New-York, where, according to this author it attains to a height of from 12 to 15 feet! and a thickness of 5 or 6 inches. It is somewhat surprising that Willdenow should have confounded this large species with the diminutive S. longirostris of Michaux, as he has done, sp. pl. 4, p. 705, n. 105. Pursh has copied this error from Willdenow, and most succeeding authors have followed them.

Mr. Ray as far back as 1660, corrected the error of old authors, in supposing the rose-like excrescences at the ends of the twigs, were distinct species.

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1. SALIX MUHLENBERGIANA *Willd.*
   Var. α angustifolia. *Barratt.*
   = S. recurvata? *Pursh. Fl.* 2, *p.* 609. *n.* 5.

Flowers April 4–6. Capsules ripe May 6.

ENG. Narrow-leaved Muhlenberg's Sallow.

The Willows of this section have the young fertile aments mostly recurved. I apprehend the S. recurvata of Pursh, is one of the narrow-leaved varieties of this group, to the habits of which he appears to have paid but little attention.

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1. SALIX MUHLENBERGIANA.
   Var. β longifolia. *Barratt.*

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1. SALIX MUHLENBERGIANA.
   Var. γ retusa. *Barratt.*

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1. SALIX MUHLENBERGIANA.
   Var. δ grandifolia. *Barratt.*

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1. SALIX MUHLENBERGIANA.
   Var. ε brevifolia. *Barratt.*

NOTE TO SALIX MUHLENBERGIANA.

I have transferred the name Salix Muhlenbergiana, which Willdenow has given to Salix tristis, Aiton, hort. Kew. 3, p. 393., to another Willow described and named by Muhlenberg himself, as S. conifera. It appears that these Botanists had imposed names upon Willows to which in both instances prior names had been given; the first by Aiton, the other by Wangenheim Willdenow in his Species Plantarum, vol. 4, p. 693, n. 79, has inserted Aiton's description of S. tristis. This proves to be the same Willow he has again at p. 692, n. 78, named and described as Salix Muhlenbergiana. He has further increased the confusion, by inserting with it as a synonyme, S. incana, Mich. 2, p. 225. This last, (fide Herb. Michaux,) is identical with Salix candida, which Willdenow himself has described, n. 113. I find on refering to the mss. Flora of Lancaster, by Dr. Muhlenberg under S. tristis, vol. 2, p. 777, that S. longirostris, Michaux, is there correctly assigned as a synonyme, and Muhlenberg cites S. Muhlenbergiana, Willd. 4, p. 692, as = S. tristis. Another instance of the confusion which Willdenow has occasioned among the willows, occurs under S. conifera, p. 705, n. 105. He there unites S. conifera, Wangenheim Amer. 123, t. 31, f. 72, with the S. conifera, Muhlenberg, and the S. longirostris, Michx. 2, p. 226. This is copied by Sir J. E. Smith, in Rees Cyclopedia, vol. 32, n. 130. without correction. Salix conifera, Wangenheim, differs widely from the plant of Muhlenberg: hence the necessity of following the established rule regarding priority of names in works of science.

As respects figures of Willows, if I may judge from my own specimens, I have seen none giving a correct representation of S. Muhlenbergiana. The figure representing one leaf only in Salictum Wob. f. 145, is S. tristis, Aiton, from one of Pursh's specimens? obtained from the Herbarium of A. B. Lambert, Esq.; and S. villosa, Forbes, Salict. Wob. t. 92, it is also = S. tristis, Aiton. The latter figure represents a rather luxuriant plant, wanting flowers and fructification. Without pursuing Synonymes further at this time for want of space, I would remark that nothing less than figures, or uniform sets of specimens of North American Willows, can make this intricate genus readily known to Botanists. The confusion thus detected in the references of so great and learned a Professor as Willdenow, arose not from negligence on his part, but from the difficulties of the subject, and the want of authentic specimens. I have myself experienced all these difficulties; and if I have been able to remove any of them, it has been owing to the advantage of possessing the plants themselves in their living state, and comparing them, by my own observation, with the labors of my predecessors.

2. Salix tristis *Aiton, Hort. Kew.* 3, *p.* 393: *Rees Cyc. n.* 97: *Muhl. Fl. Lancast.* II, *p.* 777: *Persoon Syn.* II, *p.* 602, *n.* 79: *Pursh* 609: *Elliott*, II, *p* 668. =S. longirostris, *Michaux fl.* II, *p.* 226; (*fide ejus Herb.*) =S. Muhlenbergiana, *Pursh?* II, *p.* 609. = S. villosa, *Salictum Wob. p.* 183, *t.* 92!

Fl. April 14; capsules ripe May 12. Eng.—Dwarf downy Sallow.

This small downy Sallow is covered in spring with a profusion of flowers. The anthers are red, changing when burst to yellow. It grows in sandy places on the skirts of woods and neglected fields, and like S. Muhlenbergiana, frequently bears small cones. Height 18 inches to 2 feet. It has much the habit of a heath before leafing time. It grows abundantly on the Pine plains of Middletown where there is a profusion of these Willows, or more properly Sallows, as those belonging to this section should be called.

I have received copious specimens of Salix tristis from Illinois, collected by my highly valued friend and former pupil, Mr. S. B. Buckley. These specimens agree, in all respects, with the plant as it grows here.

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2. Salix tristis. Staminate flowers.

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2. Salix tristis. Capsules.

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2. Salix tristis. *Ait.*

Var. β Monadelphia. *Barratt.* Flowers April.

Grows on the Pine plains, Middletown. In this variety the two filaments are united below about half their length.

Sect. II. DISCOLORES.

Amenta ovalia vel cylindracea præcocia, glabra, sericea vel piloso-lanata. Squamæ nigricantes; Stamina 2, filamenta libera vel monadelpha; ex apice amenti prorumpentia. Germina stipitata subpubescentia. Folia subcoriacea decidua serrata vel denticulata, subtus glauca pubescentia, supra glabra nitida. Arbores aut Frutices.

Barratt in Hooker, Flora Bor-Amer. II, *p.* 147.

The stamens in this section begin to expand at the apex of the ament, and proceed symmetrically downwards, as in Sect. 1. The aments are destitute of floral leaves at the base. The Willows of Sect II. are the first to put forth their large and handsome catkins in Spring. With us they begin to flower in an early season, about April 1st, and continue in flower 8 or 10 days. The capsules ripen as a general rule, in about a calendar month, on pendent stalks, 4 inches long, and produce cotton. The flowers are the first resort of bees. These Willows might be advantageously planted near Apiaries, where they are extensive, as is done in some of the northern countries of Europe. Who that loves nature will not look on these first flowers of Spring with the purest delight?

3. Salix discolor *Muhl. Mag. Nat. fr. Ber. vol.* IV, *p.* 234, *t.* 6, *f.* 1: *et Annals Bot. t.* 5, *f.* 1: *Muhl. Fl. Lancastr. MSS.* II, *p.* 768: *Pursh* 613: *Ell.* II, *p.* 669; *Salict. Wob. p.* 279, *f.* 147: *Hooker Fl. Bor-Am.* II, *p.* 147.

Flowers April 4–10; capsules ripe, May 4–10.

Eng. Glaucous Willow.

The young leaves of this Willow, are at first obovate, and clothed with soft hairs; these soon fall, and the leaves become in autumn of a thick texture, and deep green color. The white and glossy catkins of this Willow, add much to the beauty of the woods in the spring season. The Northern States produce many handsome varieties of Salix discolor. The present series of specimens will exhibit some of the more prominent varieties found in this vicinity.

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3. Salix discolor.

Var. α gracilis. *Barratt.*

Flowers April 4–10; capsules ripe May 4–10.

Eng. Narrow-leaved glaucous Willow.

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3. Salix discolor.

Var. α gracilis. Capsules.

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3. Salix discolor.

Var β obovata. *Barratt.*

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3. Salix discolor.

Var. γ minima. *Barratt.*

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3. Salix discolor.

Var. δ attenuata. *Barratt.*

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4. Salix Discolor Monadelphia.* *Barratt.*

Flowers April 1–10. Eng. Monadelphous glaucous Willow.

A small tree 10–15 feet high. The catkins of this Willow are monadelphous, or have the filaments 3 or 4 united below, half their length. I discovered this Willow in the Middletown meadows, in the spring of 1837. There are two thriving trees from cuttings of it in the garden of the Rev. Professor Holdich of this city. This Willow is greatly superior in beauty, in foliage, and size of its catkins, to the celebrated *Salix Croweana*: for which, see an interesting account, Rees' Cyclopedia, vol. 32, n. 51; it is figured in the Salictum Woburnense, t. 52. Another remarkable Willow, having stamens intermixed, (in the same ament,) or assuming the appearance of germens, similar to figure 5, table 52, Salictum Woburnense, I found near the residence of the Hon. Ebenezer Jackson, of this City. This last, in height and foliage, very nearly agrees with the monadelphous Willow.

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5. Salix conformis *Forbes, Salictum Woburnense, p.* 47, *t.* 24!

The figure of this Willow in the work cited, represents the adult leaves 5 or 6 inches long, and one inch broad.

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6. Salix eriocephala, *Michaux? Flor. Bor-Am.* II, p. 225.

Flowers April 1–10 Capsules ripe May 6–10.

Eng. Wooly-flowered Willow.

Hab. Grows in moist sandy soil on the Pine Plains, Middletown. When cultivated, the flowers become rather more luxuriant, than in their natural soil. The staminate and pistillate trees of this Willow, are at present growing in the garden of N. Starr, Esq. of this City. From the excellence of their location in this fine garden the catkins appear very early in spring.

7. Salix crassa* *Barratt;* leaves elliptic-lanceolate, rather distantly serrate; towards the base entire—3½ inches long, 1 inch broad, above glabrous dull green, beneath veined and clothed with short ferruginous hairs; adult leaves subcoriaceous. The under surface in autumn is glaucous and partially divested of its pubescence. Stipules small lanceolate serrate or frequently wanting—mas. ament ovate sessile ¾ to 1 inch long; after flowering 2 inches long, densely clothed with yellowish white silky hairs; scales obovate. Capsules pedicellate, ovate-lanceolate.

Flowers April 1–10; capsules ripe May 4–6.

Eng. Dense flowered early Willow.

A small tree about 15 feet high; bark on the caudex rough and ash colored; branches irregular and knotty; twigs thick, and densely flowered. The ends of the young branches protected by a soft pubescence.

This is a very hardy species, and one of the handsomest early Willows we possess, and highly ornamental in plantations. A few sunny days in spring will cause its rich yellowish white catkins to expand or open. It is so admirably adapted to withstand cold by its dense soft hairs, that the frosts of spring retard, but do not injure or kill its expanded catkins. The clothing or wool of the aments, is not sensibly changed in color by the solar ray. This species is rather rare with us, and may possibly be found more plentifully in higher northern latitudes. It seems indeed to possess all the fitting requisites for enduring a severe climate; and affords a beautiful exemplification of nature's economy, in the structure of the catkins of the Willow, providing those exposed during flowering time to severe cold, with a vesture which outvies the imperial ermine.

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8. Salix sensitiva* *Barratt;* leaves ovate-lanceolate acuminate; cuneate and entire at the base, finely serrate at the point; and more distantly and strongly serrated towards the base: leaves 3–5 inches long, 1½–2 inches wide; glabrous; above deep green, beneath smooth and pale green, and of a thinish texture. Stipules subfalcate serrate. Mas. aments rather lax, 1½ inch long; scales lanceolate black, lightly clothed with grayish black hairs. Aments and flowering branches frequently destroyed by frost.

Flowers April 1–10.

Eng. Frost or tender Willow.

A small tree about 15 feet high. This species has not hitherto been described. It bears large smooth leaves with greenish branches. The aments and twigs are frequently destroyed by frost in flowering time. I have attentively observed this remarkable Willow for ten years, and have found the same tree in full flower and uninjured but once in that period; this was April 2, 1832. It again flowered partially in 1838; this being a late spring, it then began to flower April 8; all the early aments were killed by frost, and its further flowering was retarded till April 29, when it flowered somewhat freely. In 1839, the aments opened March 25. This was an early spring. The following night the frost killed all the flowers with the branches 2 or 3 feet long. The spring of 1840, another early season, has again demonstrated the liability of this Sensitive Willow to be destroyed by frost. When it has been thus killed, the aments and branches blacken; afterwards some scattering flowers appear, but these are generally of inferior size.

The twigs of S. sensitiva at their extremities have but a slight velvety pubescence to protect them; and the aments are sparingly clothed with hairs. It offers a striking contrast to S. crassa, with its dense, woolly catkins, which are uninjured by the frosts to which they are exposed during the period of flowering. When the catkins of S. sensitiva begin to expand, on the approach of the flowering season, the large scales of the buds, or shields, covering the aments, fall, or when these are purposely removed for observation, the aments present a lively red color. The direct solar ray soon changes the scales of the aments black, (very similar to the action of nitrate of silver, when exposed to light, but less rapid.) The hairs of the ament are, also, changed to a blackish gray. An attentive observance of this and some other Willows, has satisfied me, that the hairs or clothing of the scales of the catkins, besides protecting them from frost, perform in this and other groups, a function similar to the scales of the ament; and the scales are manifestly only modified leaves. This subject I have treated at length in my mss. Essay on the Willows, and can here only briefly advert to these interesting facts.

Sect. III. GRISEÆ.

Amenta cylindracea sub-brevia, præcocia, stamina 2, medio amenti plerumque prorumpentia. Germina sessilia vel stipitata griseo-sericea. Folia lanceolata serrata, subtus griseo-sericea; siccitata nigricantia. Frutices, ramis basi fragilibus, cortice intense amara.

Barratt in Hooker Flor Bor-Amer., II, *p.* 148.

Salix petiolaris, the first on the list in this section, has its aments frequently recurved, and of a ferruginous red color. The anthers mostly begin to expand about the middle of the ament. With this species, as well as with the rest of the *Griseae*, there are two or three small leaves at the base of the ament, not more than a line long. These being so small do not exert an influence to change the order of flowering, so conspicuously exemplified in the *Fragiles*, with their large floral leaves. Sometimes the mas. aments have the black coloring matter in the floral leaves, like the scales of the ament. This coloring matter in the tips of the scales, is intensely black. The capsules are ripe before the leaves are full grown.

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9. Salix petiolaris *Smith Trans. Linn. Soc.* VI, *p.* 122: *Eng. Bot.* XVI, *t.* 1147. *Smith Flor. Brit.* 1048. *Pursh Flor. Am.* II, *p.* 616. *Salict. Wob. p.* 45, *t.* 23! *Hooker Brit. Flor.* 3*d*, *Ed. p.* 423.

Flowers April 15.

Eng. Long-stalked green osier.

This is undoubtedly a native Willow, since both sexes are found here plentifully. The staminate plant was unknown in Great Britain till transmitted by me, in the living state. There are several varieties of it; some with narrow leaves. Mr. Hopkins, an experienced basket maker of this place, assures me that the green osier, from a locality he named, and which I purposely examined, proves to be this species, and furnishes the best twigs of any Willow he knows when properly cultivated and headed. The twigs are hard, tough, and elastic, and twist well for handles: but for the finest kinds of work, he uses the twigs of S. nigra, or the Wicker Willow, and for the stronger kinds of work S. rigida and S. cordata. S. petiolaris abounds most in low grounds on the road to Haddam. Many varieties with green, yellowish green, and purple twigs, might there be selected for cultivation as an osier. I have also found S petiolaris in the vicinity of Newburg, New York. It furnishes long, smooth twigs with small buds; the twigs are less tapering than is usual, which enhances their value to the basket-maker.

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9. Salix petiolaris. Mas. aments.

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9. Salix petiolaris. Fœm.

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9. Salix petiolaris,
Var β angustata. *Barratt*

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10. Salix grisea *Willd. sp. pl.* IV, *p.* 699. *Pursh* 616. *Darlington Fl. Cæst. p.* 516. = S. pennsylvanica. *Forbes Sal. Wob.* (var maxima.) *p.* 189, *t.* 95. = S. sericea *Muhl. l. c. Mag. Nat. Fr. Ber. p.* 239, *et Flor. Lancast. MSS.* II, 775. *Marshall Arb.* 140.

Flowers, April 18; capsules ripe, May 20.

Eng. Gray brittle Willow.

This species appears to be of little value except in embankments and filling up stagnant swamps. The leaves blacken in drying. The branches and twigs are very brittle at the base, and frequently are subject to be attacked by insects, which occasion oval enlargements on the branches. When headed, this species furnishes long slender twigs; but of their actual value to the basket-maker, I have no satisfactory information.

11. Salix myricoides *Muhl. Mag. Ber. p.* 235, *t.* 6, *f.* 2: *et Ann. Bot.* II, *t.* 5 *f.* 2: *et Flor. Lancast. MSS.* II, *p.* 769: *Willd. sp. pl.* IV, *p.* 666: *Pursh, p.* 613: *Hort. Kew.* V, *p.* 355: *Muhl. Cat. p.* 95, *n.* 3.

Flowers April 18. Eng. Gale-leaved Willow.

Grows in swamps and wet places. The leaves are nearly the size of S. prinoides, to which it approaches in general appearance, but the leaves blacken in drying, which is not the case with S. prinoides. In the figure of Muhlenberg cited, the two prominent glands represented are rarely so found. The figure is indifferent. The largest leaves in autumn are thick and coriaceous, and have their serratures tipped with glands.

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11. Salix myricoides.
Leaves. September.

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12. Salix fuscata *Pursh, Fl. Am.* II, *p.* 612 *!*

Flowers, April 15. Eng.—Leaden-flowered Willow.

Hab.—Grows in pools and swamps and on wet banks. It furnishes excellent twigs suitable for fine basket work. This Willow is peculiarly adapted for embankments and mill-dams, where its low growth would render it less objectionable than larger kinds, which are so indiscriminately planted. The bitterness of the bark will also serve to protect it from being gnawed by muskrats. It seldom grows above 3 or 4 feet high, and is somewhat disposed to spread. When the twigs have lain in water, they are blackened mostly at their extremities. The Aments may be distinguished in flowering time by their leaden hue. The specimens blacken in drying, as is the case with the rest of the Willows in Section III. The twigs in autumn are of a brownish red.

Sect. IV. VIMINALES. *Borrer.*

13. Salix viminalis *Linn. sp. pl.* 1448, *n.* 29: *Pursh Fl.* 608: *Seringe Ex Dess. Sal. n.* 15, (1824): *Salictum Wob. p.* 265 *t.* 133! *Hooker Brit. Fl. 3d Ed. p.* 427.

Flowers April 12: Eng. Basket osier.

An introduced species extensively cultivated in Europe for basket work. According to Loudon's Arb. Brit., the fertile plant yields the stoutest twigs, and is therefore preferred in Holland.

Sect. V. FRAGILES.

Amenta pedunculata cylindrica, laxa, acuminata, coætanea, vel serotina. Squamae viridi-flavae, pubescentes vel glabrae. Stam. 2–5, e basi amenti prorumpentia. Germinibus glabris. Folia lanceolata, vel lanceolata-falcata serrata, denticulata vel integerrima. Arbores.

Barratt in Hooker, Flor. Bor-Am. II, *p.* 148.

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14. Salix fragilis *Linn. sp. pl.* 1443: *Salictum Wob. p.* 53, *t.* 27! *Hooker Brit. Fl. 3d Ed p.* 421: *et Fl. Bor-Am.* 2, *p.* 148. = S. ambigua? *Pursh* II, *p.* 617, *n.* 34.

Flowers, May 17; Eng. Crack Willow.

Hab.—Middletown; on Islands, and on the banks of Connecticut river, where several interesting varieties of this Willow of rapid growth occur, that might probably be cultivated to advantage, and apparently nearly allied to the Russell or Bedford Willow that has been so successfully and profitably cultivated in England, and elsewhere.

14. Salix fragilis.
Mas. aments.

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14. Salix fragilis. Fœm.

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14. Salix fragilis.
Var. β pendula.

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14. Salix fragilis.
Var. γ Ambigua. Flowers.

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14. Salix fragilis.
Var. ambigua. Adult leaves.

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15. Salix decipiens *Hoffman Sal.* 2, *t.* 31,; *Pursh, p.* 617: *Smith, Eng. Flora,* IV, *p.* 183: *Salict. Wob. p.* 57, *t.* 29!

Flowers, May 11; capsules ripe June 12.

Eng. Varnished Willow.

This species is sometimes, by mistake, planted for the Yellow Willow, to which it is greatly inferior. I have seen an extended row so planted; and when in full flower it presented a handsome sight, thronged with bees and other insects. The female plant only of the yellow willow, S. vitellina, has to my knowledge been introduced in this country. The staminate as well as the pistillate trees of S. decipiens are found here.

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15. Salix decipiens, Mas. aments.

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15. Salix decipiens, Capsules.

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16. Salix pameachiana* *Barratt;* leaves long-lanceolate acuminate; 4–6 inches long, ½ to 1 inch broad, with fine cartilaginous serratures; above, deep green, beneath, glaucous, stipules small lanceolate; frequently wanting. Mas. aments cylindrical, lax and somewhat recurved; scales obtuse yellowish, stamens 2, bark of the twigs smooth, yellowish and variegated; ends of the twigs red in flowering time.

Flowers April 20—May. Eng. Pameacha Willow.

A tree of the size of S. decipiens, and may be best described by saying it is the intermediate of S. vitellina and the former, but certainly disinct from either. I have only met with the staminate tree, growing about the Pameacha stream in this town. It flowers somewhat earlier than S. decipiens. The aments are also more lax and slender, and frequently recurved. The bark of the preceding years twigs are beautifully speckled in flowering time.

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17. Salix lucida *Muhl. Mag. Nat. fr. Ber.* IV, *p.* 239, *t.* 6, *f.* 7: *Willd. sp. pl.* IV, *p.* 667: *Michx. Sylv. Am.* III, *t.* 125, *f.* 3! *Pursh,* II, *p.* 615: *Hooker, Fl. Bor-Am.* II, *p.* 148.

Flowers May Capsules ripe June.

Eng. Glossy broad-leaved Willow.

This is an ornamental species. Its rich broad and glossy leaves, contrast finely with the narrow leaves of S. nigra and others, among a profusion of Willows, on the verdant banks and islands of the Connecticut. It is nearly allied to the European S. pentandra. Buds, yellow.

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17. Salix lucida, Mas. aments.

17. Salix lucida Fœm.

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17. Salix lucida. Adult leaves.

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18. Salix babylonica *Linn. sp. pl.* 1443 : *Willd. sp. pl.* IV, *p.* 671 : *Pursh, p.* 614 : *Salict. Wob. p.* 43, *t.* 22 ! *Rees Cyc. n.* 42.

Flowers, April 18.

Eng. Weeping Willow.

Cultivated. The pistillate or female tree only, is known in this country, as well as in Europe. It is an ornamental Willow: with us it retains the verdure of its foliage longer in the fall of the year than any other Willow; and long after the deciduous forest trees have their leaves seared or fallen. "It thrives best in a dry gravelly soil where it is less apt to split or decay." *Sir J. E. Smith.*

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19. Salix annularis *Forbes, Salictum Woburnense, p.* 41, *t.* 21.

Cultivated. Eng. Ring-leaved Willow.

This curious leaved Willow is cultivated for its novelty. It is figured in the Salictum Woburnense. The drawings in that noble work on the Willows, are unrivalled for exactness of delineation, as well as for fidelity and beauty of coloring.

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20. Salix nigra *Marshall, Arb. p.* 293 ! *Muhl. Mag. Nat. Fr. Ber* IV, *p.* 237, *t.* 6, *f.* 5 . *et Flor. Lancast. MSS.* II, *p.* 772 : *Willd. sp. pl.* IV. *p.* 657 : *Pursh, p.* 614 : *Elliott* II, *p.* 670 : *Darlington Fl. Caestrica 2d Ed. p.* 559. = S. caroliniana, *Mich. fl.* II, *p.* 226. et S. ligustrina ? *Michx. Sylv.* II, *p.* 212, *t.* 125 *f.* 2

Flowers May 18 ; Capsules ripe June 18.

Eng. Black or brittle willow, and wicker-willow.

The young leaves of this species in flowering time, are often subcordate at the base, and distinguishable by the white pubescence along the midrib, and on the young leaves. In autumn the leaves are glabrous, narrow and mostly falcate.

The fine twigs of this species are exceedingly brittle at the base. It is known to basket-makers as the "Wicker Willow," and is much esteemed for its great elasticity in fine kinds of wicker work. It approaches the nearest of any of the native Willows to S. triandra of Europe. This is the last of the Willows to flower. The capsules ripen in about a calendar month; and this as a general rule will apply to the rest of the Willows, varying but little in ordinary seasons.

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20. Salix nigra, Marshall.

Specimens of adult leaves gathered in September, when they are glabrous and mostly falcate.

NOTE RESPECTING THE PRESERVATION OF SPECIMENS OF WILLOWS.

There is much difficulty in preserving specimens of Willows from the ravages of Insects. This is particularly the case with the specimens of S. nigra, and some other species. The following poisonous liquid should be carefully applied with a feather over every portion of the specimens, and enough to saturate them :—Corrosive sublimate 2 drachms; Alcohol 1 pint, mix. It is best to submit the specimens to this process before they are fastened or glued on paper. The specimens should be examined several times a year, and the poison renewed if Insects are found preying upon them, especially about the flowers and capsules. A small brown beetle lays its eggs about the specimens of willows, which become grubs. These rapidly prey on the pith of the aments, and also eat their way along the pith in the twigs. If the directions here recommended are not attended to, collections of willows are soon ruined. In some instances it will be best to keep the specimens in a close fitting box with camphor. When the above directions are strictly attended to, the preservation of the specimens may be ensured. I would recommend collectors of specimens to submit their newly dried willows to this process without delay. This will also secure the flowers, and especially the filaments from the depredations of the Ptinus fur, L. so troublesome in Herbariums

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21. Salix Purshiana *Spreng. Syst.* 608 : *Beck. Bot. p.* 320 : = S. falcata, *Pursh Flora Americæ, Septr.* II, *p.* 614 : *Salictum Wob. p.* 279, *f.* 148 : *Darlington Flor. Caestrica, 2d ed. p.* 561.

A small Tree—Flowers, May 18. Capsules ripe June 18.

Eng. Sickle-leaved Willow.

In my specimens of what I consider S. falcata of Pursh, the leaves are narrow in flowering time, and attenuate at the base, as well as more serrate; the capsules glabrous, and more turgid than S. nigra. The tree is also smaller and its twigs finer. These twigs are equally valuable for fine wicker work with S. nigra. The leaves of this species are not readily distinguished in autumn from S. nigra.

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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. This Willow is killed by the winters of the Northern States.

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23. Salix longifolia *Muhl. Mag. Nat. Fr. Berlin*, IV, *p.* 238, *t.* VI, *f.* 6 ! *et Ann. Bot.* II, *t.* V, *f.* 6. *Muhl. Flor. Lancast. MSS* II, *p.* 773. *Willd. sp. pl.* IV, *p.* 670. *Pursh Fl. Am.* 613. *Torrey Ann. Lyc. N. Y.* II, *p.* 248, (excl. Syn. S. angustata, Ph.) *Hooker. Fl. Bor-Am.* II, *p.* 148. = S. rubra. *Richardson, App. p.* 37, *n.* 40, (non Hudson.)

Eng. Long-leaved sand Willow.

Flowers May 1–20. It flowers again sparingly at the ends of the twigs in August and September. It is frequently Androgynous. The mature capsules, however, have not been met with by me; and the pistillate plants growing here, are all abortive! From these facts, I am led to believe, this Willow has been spread along the Banks of the Connecticut by its floods, or by drifting slips; and has diffused itself by its extraordinary power of Rooting. See note.

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23. Salix longifolia. Shows its peculiar manner of Rooting in the sand. These fibrous Roots extend to great lengths.

Hab. On the Banks of the Connecticut—Chatham shifting sands opposite the City of Middletown.—Along the banks of the River between this place and Hartford.—Plentiful at Wethersfield. It answers well for fine basket work, and the work continues firm; but in working, the twigs are not as elastic as some other kinds; and they are apt to crack, in bending over the upright rods or twigs. The ends of the twigs of S. longifolia are here killed by the frosts of winter. The staminate plant, (properly,) has not been found by me growing about Middletown, notwithstanding its abundance; although staminate flowers appear at the extremities of some of the twigs sparingly in autumn! I possess specimens of the staminate aments, collected by the late Mr. Drummond in the Rocky Mountains, where he found it growing in the drifting sands; and the lamented Douglass, in his MSS. note accompanying his specimen before me, says "common near mountain springs, and streams on the Columbia River, and its tributaries near the mountains." Dr. Richardson, also, collected the staminate and pistillate flowers in the North West Territory, York House, July 20. Dr. Houghton has, also, collected both kinds of flowers and ripe capsules! of this Willow, near the Falls of the Peckagama on the Mississippi.

This Willow is found along the course of all, or most of the great Rivers of North America, to the North West Coast; as well as in the Rocky Mountains. It promises to be of especial value to protect sandy embankments and shifting sands, where no other species will grow. In dry situations it seldom rises above two feet, but in a rich alluvial soil, it will occasionally rise to eight, ten or twelve feet! I have been surprised in tracing the length to which this Willow sends its long fibrous Roots in the sand. These Roots produce a succession of stolons, and these in turn other new plants. This Willow accomplishes in the interior, what is done on the sands of the sea coast, by the Ammophila arundinacea, Host, sea-reed, "extensively employed in Norfolk and Holland for preserving the banks of sand, which protect those countries from the inroads of the sea."—Hooker's Brit. Flora.

This note has been added with the view of calling the attention of Engineers to the facts above stated. To show how little the operations of nature are at times understood, I have seen with regret, attempts to destroy this Willow, where it was making every exertion to cover a dreary surface of sand. It does not appear to spread in meadows or pastures, although it is found to run when introduced in gardens and plantations.

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23. Salix longifolia. Fœm. May.

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23. Salix longifolia. Androgynous, 10–12 feet high.

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23. Salix longifolia. Adult leaves.

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23. Salix longifolia. Flowers at the ends of the branches collected in August and September!

Sect. VI. ALBÆ. *Borrer.*

24. Salix vitellina *Linn. sp. pl.* 1442: *Willd. sp. pl.* IV, *p.* 668: *Smith Fl. Brit.* 1050: *Pursh, Fl. Am.* II, *p.* 616: *Salict. Wob. p.* 39, *t.* 20! *Hooker Brit. fl. 3d ed. p.* 423.

Cultivated. Flowers, May 12. Eng. Yellow willow.

I have only met with the pistillate tree of this ornamental Willow in the United States. It is a general favorite, and has been extensively planted. The charcoal made from its wood is greatly esteemed in the manufacture of gun-powder. If the staminate tree of the Yellow Willow were introduced into this country, and planted with the pistillate tree, it would take care of itself, and find its way to places occupied with plants and Willows that yield little or no profit to the proprietors of such lands. According to Professor Pallas, the Yellow Willow is common all over Russia, and is used for Palms at Easter in the Greek Churches. Mr. Borrer, a gentleman who has greatly distinguished himself for his knowledge and classification of the British Willows, has sent me specimens of the male flowers of S. vitellina. I am also indebted to him for a fine set of British Willows; these have been of essential service to me in my researches on this intricate Genus; and I ought here also to state that I have derived much valuable aid in studying European Willows, from the British Flora of Sir W. J. Hooker. I am also indebted to Dr. Boott of London for a set of the Swiss Willows of Seringe, and to M. N. C. Seringe himself for his Essay and revised label sheets of 1824.

Sect. VII. FULVÆ.

Amenta Mas. breviuscula cylindrica, coætanea fulva; Squamæ flavæ; Stamina 2, elongata divergentia; e basi amenti prorumpentia. Am. Fœm. laxa demum elongata; Germinibus longe pedicellatis, sericeis anguste lanceolatis. Frutex ramis dichotomis; viminibus tenacibus.

The ochry yellowness of the Ament, and long diverging stamens which expand first at the base, together with the general structure of the ament, its fructification and time of flowering, indicate n. 25 being nearer allied to some of the European, than any of the American Willows, known to me, or that I have had an opportunity to observe, in the living state.

25. Salix rostrata *Richardson, App. Fr. J. p.* 37, (excl. Syn.) *Hooker Flor. Bor-Am.* II, *p.* 147!

Flowers April 20–27. Eng. Ochre-flowered Willow.

In my arrangement of the North American Willows adopted in the Flora Boreali-Americana of Sir W. J. Hooker, I had placed S. rostrata the last in Sect I. CINEREÆ, but further observations have induced me to rank it next to the CORDATÆ. In adverting to the Flora of Sir W. J. Hooker, I would here very respectfully take occasion to correct a slip of the pen in its Geography, as respects myself. In Vol. 2, page 147, Sir William says, "Dr. Barratt finds the same species about Middletown, Pennsylvania."—It should read Middletown, Connecticut, both here and at page 146.

This species of willow though less abundant than several other kinds, is nevertheless found from Hudson's Bay to the prairies of the Rocky Mountains, and at the head waters of the Columbia. With us it attains a height of 10 to 15 feet. While in northern latitudes it becomes a small shrub. The branches of this willow are dichotomously divided like the Hornbeam tree, Ostrya Virginica, Willd. The bark is ash colored, rough and furrowed—on the young twigs reddish brown. The largest individual of this species I have met with, is on the grounds of Joseph W. Alsop, Esq. of this city. It is about sixteen feet high! Besides this, several interesting willows grow at the same locality. I am under many obligations to this Gentleman for his kindness to me in protecting several rare species of willow found on his grounds. I would here also in general terms, present my thanks to several of the citizens of Middletown, for their kindness to me in preserving many rare willows for my examination. Without their liberality, I should have been unable to complete my course of observations during the last nine years; besides enabling me to secure the required number of specimens, for the completion of this Work.

25 Salix rostrata, *Richardson.*

Adult leaves.

Sect. VIII. CORDATÆ.

Amenta sub-pedunculata, ovata cylindracea, coætanea. Squamæ subciliatæ rubræ vel fuscæ. Stam. 2–3. Germinibus pedicellatis glabris. Folia cordata vel basi-attenuata, glabra. Stipulæ semi-cordatæ serratæ. Frutices majusculæ ramis dichotomis, flexilibus glabris.

Barratt in Hooker Flora Boreali-Amer. Vol. II, *p* 149.

The aments in this section are invested with a double covering; the outer being a hard scale or shield; the inner a thin Membranous Envelope. This last is generally ruptured transversly, and is elevated like a Cap or Calyptra on the summit of the expanding ament. This Membrane is sometimes found adhering to the inner surface of the hard scale or shield. It is most perfectly formed in S. Torreyana, and next with S. cordata. Both these species of willow begin to expand their filaments at the apex of the aments. The floral leaves (4 or 5) are from half to three quarters of an inch long. The fertile aments of S. rigida the largest of this section, when ripe form a densly fruited raceme 3 to 4 inches long. The mature Germens are sub-rhomboidal at the base, and somewhat flattened, varying in color from green to a reddish brown.

26. Salix cordata *Muhl. Ber.* IV, *p.* 236, *t.* 6, *f*, 3: *Willd. sp. pl.* IV, *p.* 666: *Muhl. Fl. Lanc, MSS.* II, *p.* 770: *Pursh,* II, *p.* 615: *Salict. Wob. p.* 277, *f.* 142! *Hooker Flor. Bor-Am.* II, *p.* 149.

Flowers April 17; Capsules ripe May 18–20.

Eng. Heart-leaved Willow.

This handsome Willow abounds on the alluvial banks of the Connecticut River. It furnishes excellent twigs suitable for basket work. This species has a wide range on this continent, and presents some interesting varieties in its leaves, color of bark etc.

26. Salix cordata. Mas. flowers.

26. Salix cordata. Capsules.

27. Salix rigida *Muhl. Ber.* IV, *p*, 237, *t.* 6 *f*, 4: *Willd. sp. pl.* IV, *p.* 667: *Muhl. Fl. Lanc. MSS.* II, *p.* 771: *Pursh,* II, *p.* 615: *Loudon Cyc. pl. p.* 822, *f.* 13718! *Hooker, Fl. Bor-Am.* II, *p.* 149. = S. cordata *Michx. Fl.* II. *p.* 225.

Flowers April 15—Capsules ripe May 20.

Eng. Rigid heart-leaved Willow. Height, 10 to 15 feet.

This strong and handsome species furnishes excellent twigs and rods for the heaviest kinds of basket work. This Willow and S. cordata are very ornamental in groves and plantations. There are several varieties of S. rigida, and of the aments I have met with great diversity. The largest of these catkins are $1\frac{1}{2}$—2 inches long, and when the flowering season is fine and the catkins have escaped being drenched with rain, I have found these flowers of great beauty, exhibiting a play of colors from violet or purple to yellow; as the stamens rise over the tips of the scales from their downy bed, they yield the resplendent colors of the Rainbow, and this zone is carried symmetrically onward, by the successive elongation of the filaments.

27. Salix rigida.

Capsules.

27. Salix rigida.

Adult Leaves.

27. Salix rigida.

Var. α Leaves.

27. Salix rigida.

Var. β Leaves.

28. Salix angustata *Pursh, Flor. Am.* II, *p.* 613.

Flowers April 15. Eng. Narrow-leaved heart Willow.

This is an excellent osier though less abundant than the preceding species. There are several varieties of this, and S. cordata, which might be selected for cultivation, found on Willow Island, opposite Chatham, where a profusion of these Willows grow.

29. Salix torreyana* *Barratt*, leaves heart-ovate, sharply pointed; $1\frac{1}{2}$ inch wide, 4 inches long; margin wavy and finely serrate; above smooth deep green, beneath paler; stipules large, $\frac{1}{2}$ to $\frac{3}{4}$ of an inch broad, half heart-shaped. Mas. ament slender, when expanded $1\frac{1}{2}$ to 2 inches long; scales imbricate lanceolate blackish and ciliate; stamens 2, filiments rather short. Fœm. ament, rachis slender, clothed with soft, dull white hairs. Germens on short pedicels, smooth deltoid-lanceolate; stigma four parted; in flowering time flesh-colored, mature capsules green, somewhat compressed; twigs tough, smooth, greenish purple. Adult leaves coriaceous.

Flowers April 12–18.

Eng. Torrey's heart-leaved Willow.

I have named this hitherto undescribed species, in compliment to my highly valued friend, Professor J. Torrey, of New-York. The pistillate plant of this handsome Willow grows plentifully in the Middletown Meadows, on the Banks of Little River. The staminate plant is here rare. I have cultivated and observed it in its different stages for a number of years. I have also planted it with other interesting Willows in the gardens of N. Starr, Esq., and Samuel Russell, Esq., of this city This ornamental Willow seldom exceeds 8 or 10 feet in height; and will be readily recognized in Autumn from the other Willows of this fine Group, by its broad heart shaped, glossy, deep-green leaves, wavy margin, and sharp point; also by its large stipules. The staminate plant, in flowering time, may also be distinguished by its long and slender catkins, and the absence of the irised ring or zone, exhibited by S. rigida and S. cordata in flowering time, when the anthers are elevated above their respective scales and short fine hairs. The pistillate plant may also be distinguished early in spring by its delicate flesh-colored four parted stigma. The leaves do not blacken in drying like those of S myricoides, to which there is some resemblance; although this Willow differs in other respects essentially from the last named species, and is very distinct from S. rigida and S. cordata. This is probably one of the best native Willows we possess, for protecting the banks of rivers with rapid currents. It does not grow as high, and is more disposed to spread in these situations than its congeners, S. cordata and S. rigida. It furnishes abundance of stout twigs or rods.