

to form the 4-lobed involucre; calyx-lobes 6, awl-shaped; ovary 3-celled with 2 ovules in each cell; styles 3, thread-like, stigmatic along the inner side. Nuts sharply 3-sided, usually 2 in each urn-shaped and soft-prickly coriaceous involucre, which divides to below the middle into 4 valves. Cotyledons thick, folded and somewhat united; but rising and expanding in germination. — Trees, with a close and smooth ash-gray bark, a light horizontal spray, and undivided strongly straight-veined leaves, which are open and convex in the tapering bud and plaited on the veins. Flowers appearing with the leaves, the yellowish staminate flowers from the lower, the pistillate from the upper axils of the leaves of the season. (The classical Latin name, from *pháγω*, to eat, in allusion to the esculent nuts.)

1. *F. ferruginea*, Ait. (AMERICAN BEECH.) Tree 75–100° high; leaves oblong-ovate, taper-pointed, distinctly and often coarsely toothed; petioles and midrib soon nearly naked; prickles of the fruit mostly recurved or spreading. — N. Scotia to Fla., west to Wisc., E. Ill., Mo., and Tex.

ORDER 104. SALICACEÆ. (WILLOW FAMILY.)

Diœcious trees or shrubs, with both kinds of flowers in catkins, one to each bract, without perianth; the fruit a 1-celled and 2–4-valved pod, with 2–4 parietal or basal placenta, bearing numerous seeds furnished with long silky down. — Style usually short or none; stigmas 2, often 2-lobed. Seeds ascending, anatropous, without albumen. Cotyledons flattened. — Leaves alternate, undivided, with scale-like and deciduous, or else leaf-like and persistent, stipules. Wood soft and light; bark bitter.

1. *Salix*. Bracts entire. Flowers with small glands; disks none. Stamens few. Stigmas short. Buds with a single scale.
2. *Populus*. Bracts lacerate. Flowers with a broad or cup-shaped disk. Stamens numerous. Stigmas elongated. Buds scaly.

1. *SALIX*, Tourn. WILLOW. OSIER. (By M. S. BEBB, Esq.)

Bracts (scales) of the catkins entire. Sterile flowers of 3–10, mostly 2, distinct or united stamens, accompanied by 1 or 2 small glands. Fertile flowers also with a small flat gland at the base of the ovary; stigmas short. — Trees or shrubs, generally growing along streams, with terete and lithe branches. Leaves mostly long and pointed, entire or glandularly toothed. Buds covered by a single scale, with an inner adherent membrane (separating in n. 14). Catkins appearing before or with the leaves. (The classical Latin name.)

§ 1. *Aments borne on short lateral leafy branchlets; scales yellowish, falling before the capsules mature; filaments hairy below, all free; style very short or obsolete; stigmas thick, notched.* Trees or large shrubs; leaves taper-pointed.

* *Leaves closely serrate with inflexed teeth; capsules glabrous.*

— *Stamens 3–5 or more.*

++ *Trees 15–50° high, with rough bark and slender twigs; no petiolar glands; sterile aments elongated, narrowly cylindrical; flowers somewhat remotely subverticillate; scales entire, short and rounded, crisp-villous on the inside.*

1. *S. nigra*, Marsh. (BLACK WILLOW.) Leaves narrowly lanceolate, very long-attenuate from near the roundish or acute base to the usually curved tip,

often downy when young, at length green and glabrous except the petiole and midrib; stipules large, semicordate, pointed and persistent, or small, ovoid and deciduous; fruiting aments (1½–3' long) more or less dense; capsules ovate-conical, shortly pedicelled. — Banks of streams and lakes, bending over the water; common. — Var. *FALCATA*, Torr. Leaves narrower and scythe-shaped. — Var. *WARDI*, Bebb. Leaves broader, often 1' wide, glaucous and veined beneath; stipules large, round-reniform; aments long, loosely flowered; capsules globose-conical, long-pedicelled. Rocky islands of the Potomac (*Ward*); Falls of the Ohio (*Short*); Mo. The leaves alone are easily mistaken for those of n. 14. — A hybrid of this species with *S. alba*, var. *vitellina*, is found in Wayne Co., N. Y. (*E. L. Hankenson*).

2. *S. amygdaloides*, Anders. Leaves lanceolate or ovate-lanceolate, 2–4' long, attenuate-cuspidate, pale or glaucous beneath; petioles long and slender; stipules minute, very early deciduous; fertile aments becoming very loose in fruit from the lengthening of the slender pedicels. — Central N. Y. (*Dudley*) to Mo.; common westward.

++ *A shrub or small bushy tree, 6–15° high, with smooth bark and rather stout polished twigs; petioles glandular; sterile aments thick, oblong-cylindrical, densely flowered; stamens commonly 5; scales dentate, hairy at base, smooth above.*

3. *S. lucida*, Muhl. (SHINING W.) Leaves ovate-lanceolate or narrower, tapering to a very long acuminate point, at length coriaceous, smooth and shining both sides; stipules small, oblong; fruiting aments often persistent, the capsules becoming rigid and polished, as in the nearly allied *S. pentandra* of Europe. — Banks of streams, N. Eng. to Penn., west and northward. A beautiful species on account of its showy staminate aments and large glossy leaves.

— *Stamens mostly 2; capsules subsessile or very shortly pedicelled; leaves lanceolate, long-acuminate.*

S. FRAGILIS, L. (CRACK WILLOW.) Leaves green and glabrous, pale or glaucous beneath, 3–6' long; stipules when present half-cordate; stamens rarely 3–4; capsule long-conical, shortly pedicelled. — A tall and handsome tree, which was planted at an early day about Boston and elsewhere. — The var. *DECFIENS*, Smith, with yellowish-white or crimson twigs, buds black in winter, and smaller and brighter green leaves, ought perhaps to be excluded, the plant so named by Barratt, etc., being one of the hybrids mentioned below. (Adv. from Eu.)

S. ALBA, L. (WHITE W.) Leaves ashy-gray or silky-white on both sides, except when old, 2–4' long; stipules ovate-lanceolate, deciduous; capsules ovate-conical, sessile or nearly so. — Var. *CÆRULEA*, Koch; twigs olive; old leaves smooth, glaucous beneath, dull bluish green. — Var. *VITELLINA*, Koch; twigs yellow or reddish; old leaves glabrous above. — A familiar tree of rapid growth, attaining a height of 50–80°. The typical form, with olive twigs and old leaves silky on both sides, is rarely found with us, but the var. *VITELLINA* is common. Pure *S. FRAGILIS* is also scarce, but a host of hybrids between the two, representing *S. viridis*, *Fries*, *S. Russelliana*, *Smith*, etc., are the commonest of introduced willows. These forms are rendered almost inextricable by a further cross, by no means rare, with our native *S. lucida*. (Adv. from Eu.)

S. BABYLÓNICA, Tourn. (WEEPING W.) Extensively planted for ornament, and in some places widely spread along river-banks and lake-shores by the drifting of detached limbs. (Adv. from Eu.)

* * Leaves remotely denticulate with projecting teeth; stamens 2; capsule glabrous or silky.

4. *S. longifolia*, Muhl. Leaves linear-lanceolate, 2-4' long, tapering at each end, nearly sessile, more or less silky when young, at length smooth and green both sides; stipules small, lanceolate, deciduous; aments linear-cylindric, often clustered at the ends of the branchlets; capsule shortly pedicelled; stigmas large, sessile. — Found sparingly along the Atlantic coast from Maine to the Potomac; common westward. A shrub, rooting extensively in alluvial deposits and forming dense clumps. This species is a peculiar American type, and exceedingly variable; the earliest leaves after germination pinnately lobed.

§ 2. Aments lateral or terminal, with or without bracts; scales persistent, colored at the tip; stamens 2 (usually 1 in n. 19), with glabrous filaments (united and hairy in *S. purpurea*); shrubs or small trees.

* Capsules tomentose.

+ Pedicels 3-6 times the length of the gland; style medium or none.

++ Large shrubs or small trees (8-15° high); leaves obovate or elliptic-lanceolate, 2-4' long, acute or acuminate, more or less obscurely and irregularly serrate, thin becoming rigid, glaucous beneath; fertile aments oblong-cylindric, 2-3' long, loosely flowered.

5. *S. rostrata*, Richardson. Leaves dull green and downy above, stoutly veined and soft-hairy beneath, serrate, crenate or subentire; stipules when present semi-cordate, toothed, acute; aments appearing with the leaves, the sterile narrowed at base, pale yellow; capsules tapering to a very long slender beak; pedicels thread-like, much exceeding the pale, rose-tipped, linear, thinly villous scales; style scarcely any; stigma-lobes entire or deeply parted. (*S. livida*, var. *occidentalis*, Gray.) — Moist or dry ground, N. Eng. to Penn., and far west and northward. Not spreading from the root but having rather the habit of a small tree, with a distinct trunk.

6. *S. discolor*, Muhl. (GLAUCOUS W.) Leaves smooth and bright green above, soon smooth beneath, irregularly crenate-serrate, the serratures remote at base, closer, finer and becoming obsolete toward the point; stipules $\frac{1}{2}$ long or more, and sharply toothed, or small and nearly entire; aments closely sessile, thick, oblong-cylindrical, 1' long or more, appearing before the leaves in earliest spring; scales dark red or brown, becoming black, copiously clothed with long glossy hairs; style short but distinct. — Var. *ERICÉPHALA*, Anders. Aments more densely flowered and more silvery silky; leaves sometimes retaining a ferruginous pubescence beneath even when fully grown. — Var. *PRINOIDES*, Anders. Aments more loosely flowered, less silky; capsules more thinly tomentose; style longer; stigma-lobes lacinate; leaves narrower. (*S. prinoides*, Pursh.) Includes narrow-leaved forms of the type, and others which are probably hybrids with *S. cordata*. — Low meadows and river-banks, common. The just expanding leaves are often overspread with evanescent ferruginous hairs.

++ Upland grayish shrubs, 1-8° high; leaves oblanceolate, pointed, the lowest obtuse, downy above becoming glabrate, beneath glaucous, rugose-veined and softly tomentose, the margin revolute, undulate-entire; aments ovoid or

oblong, closely sessile, appearing before the leaves, naked at base; capsules rather shortly pedicelled, greenish or reddish, spreading; scales dark red or brownish; style distinct; stigmas bifid.

7. *S. humilis*, Marsh. (PRAIRIE W.) Leaves oblanceolate or oblong-lanceolate, the lowest obovate; stipules medium-sized, semi-ovate, entire or oftener toothed; petioles distinct; aments often recurved, about 1' long. — Dry plains and barrens, common. A shrub, 3-8° high, varying much in the size and shape of the leaves. Hybrids with n. 6 have equally broad and large but duller green leaves, softly tomentose beneath and with shorter petioles, the aments equally thick but usually recurved, and the capsules on shorter pedicels. Small forms apparently pass into the next.

8. *S. tristis*, Ait. (DWARF GRAY W.) Leaves small (1-2' long), crowded, linear-oblanceolate, tapering to a very short petiole; stipules minute, deciduous; aments very small, globular or oval, about $\frac{1}{4}$ long in fruit. — Sandy plains or on the borders of hillside thickets, common. A tufted shrub, 1-1 $\frac{1}{2}$ ° high, rising from a strong large root.

++ Low shrubs, 3-10° high, of cold swamps, with slender yellowish or reddish twigs; leaves lanceolate, smooth above, glaucous beneath and covered when young with appressed silvery-silky hairs; aments (especially the fertile) with a few leafy bracts at base; capsule pedicelled, silvery-silky; stigmas bifid.

= Shrubs of lowland swamps; leaves narrowly lanceolate, 2-3' long, taper-pointed, finely and evenly serrate; stipules linear or semi-cordate, deciduous; aments sessile or in fruit slightly peduncled; style very short.

9. *S. sericea*, Marsh. (SILKY W.) Leaves at first (principally beneath) very silky, turning black in drying; aments narrowly cylindrical, the fertile densely flowered; capsule short-pedicelled, ovate-oblong, rather obtuse. — Common, but more prevalent from the region of the Great Lakes eastward.

10. *S. petiolaris*, Smith. Leaves only slightly silky when young, soon smooth, with less tendency to blacken in drying; fertile aments ovoid-cylindric, in fruit broad and loose from the lengthening of the pedicels; capsule rostrate from an ovate base, rather acute. — Var. *GRACILIS*, Anders., has extremely loose aments, and very long-pedicelled attenuate-rostrate capsules. — Common, but more prevalent from the Great Lakes westward. This species, like the preceding, hybridizes freely with *S. cordata*.

= Alpine shrub; leaves 1-2' long, repand-crenate; stipules minute, fugacious; aments leafy-peduncled; style distinct.

11. *S. argyrocarpa*, Anders. Leaves tapering evenly to both ends, acute, or the earliest obovate and obtuse, at length rigid, the margin slightly revolute; petiole short; fruiting ament short (about 1' long), loosely flowered; capsule tapering, densely silky-silvery; gland of the staminate flower variously doubled. — Moist alpine ravines in a few limited localities on or near Mt. Washington, N. H.; also in Lower Canada and Lab. A bushy branched shrub, erect or depressed at base, 1-2° high, growing in wide dense patches. A hybrid with n. 13 was detected by Mr. E. Faxon in Tuckerman's ravine (its leaves collected by Dr. Gray as early as 1842!), appearing like a large form of the species with the aments of *S. phylicifolia*.

+- Pedicels twice the length of the gland; style elongated.

12. *S. cándida*, Willd. (SAGE W. HOARY W.) Leaves lanceolate or linear-lanceolate, 2-4' long, taper-pointed or the lowest obtuse, rather rigid, downy above, becoming glabrate, beneath covered with a dense white tomentum, the revolute margin subentire; stipules lanceolate, about as long as the petioles; aments cylindrical, densely flowered, 2' long in fruit; anthers red; the dark gland elongated; capsule densely white-woolly; style dark red; stigmas short, spreading, notched. — Cold bogs, N. Eng. and N. J. to Iowa, and northward. — A hoary shrub 2-5° high; young shoots white-woolly, the older red. Two beautiful hybrids, with n. 10 and n. 14, have been found near Flint, Mich. (Dr. Clarke).

13. *S. phyllicifolia*, L. Leaves lanceolate, ovate-lanceolate or elliptic, somewhat equally pointed or obtuse at both ends, remotely and minutely repand-toothed, 2-3' long, very smooth on both sides, dark green and shining above, glaucous beneath, at length coriaceous; stipules obsolete; aments sessile with a few small bracts at base, 1' long, rather densely flowered, oblong-cylindric, the fertile somewhat stipitate, becoming 2' long in fruit; scales dark, silky-villous; capsule conic-rostrate from an ovoid base; stigmas bifid or entire, yellow drying black. (S. chlorophylla, of Man.; S. chlorophylla, var. denu-data, Anders.) — Moist ravines on alpine summits of the White Mountains, and of Mt. Mansfield, Vt. — A divaricately much branched shrub 1-10° high; twigs glabrous, sometimes covered with a glaucous bloom. (Eu.)

S. viminális, L., the OSIER WILLOW of Europe, is occasionally planted, but soon dies out. Some of its hybrids, as *S. SMITHIANA*, Willd., etc., stand our climate better, but cannot be regarded as adventive.

+++ Capsules sessile; filaments and often the reddish anthers united so as to appear as one.

S. PURPURA, L. (PURPLE W.) Leaves oblanceolate or tongue-shaped, slightly serrulate, very smooth, glaucous, subopposite; stipules obsolete; aments densely flowered, narrow-cylindrical, the sterile at least closely sessile, with only very small bracts at base; scale small, round, crisp-villous, tipped with dark purple; capsules grayish-tomentose, ovate-conical, obtuse. — Low grounds; commonly cultivated for basket-rods. (Adv. from Eu.)

* * Capsules glabrous.

+- Tall shrubs, 4-10° high; leaves lanceolate or ovate-lanceolate, 2-4' long, acute or acuminate (on vigorous shoots rounded, truncate or cordate at base), serrate; sterile aments very silky, with a few bracts at base, 1' long or more, the fertile leafy-peduncled, in fruit 2' long or more; capsules tapering, pointed.

++ Leaves soon smooth; capsules long-pedicelled; style medium.

14. *S. cordata*, Muhl. (HEART-LEAVED W.) Leaves oblong-lanceolate or narrower, on the flowering branches often tapering at base, sharply serrate, finely denticulate or subentire, green both sides or scarcely paler beneath, the young often silky or downy, especially on the midrib, not turning black in drying; stipules reniform or ovate, serrate, usually large and conspicuous; aments rather slender; capsules greenish or rufescent, 2-3" long. (S. rigida, Muhl.) — Var. *ANGUSTATA*, Anders. Leaves narrower, gradually acuminate, finely serrate. — In wet places and along streams, etc.; our most widely distributed and variable species. — *S. MYRICOIDES*, Muhl. (S. cordata, var. myri-

coides, Darl., Fl. Cestr., 3 ed.), is a hybrid between this species and *S. sericea*, having the leaves, even those of the most vigorous shoots, tapering and rather acute at base, glaucous or glaucescent beneath and sparsely appressed-hairy; stipules small, ovate, pointed; capsules more or less silky when young, becoming glabrate, shortly pedicelled; twigs brittle at base. A hybrid with the European *S. incana* (surprising on account of the rarity of the cultivated parent) is found at Ithaca, N. Y. (Dudley).

15. *S. glaucophylla*, Bebb. Leaves varying from ovate with a broadly rounded base to oblong-lanceolate and equally pointed at both ends (3-4' long; nearly 2' wide), glandular-serrate, subcoriaceous, glabrous throughout, dark green and shining above, glaucous beneath, the young drying black; stipules large, ear-shaped, dentate; aments thick, oblong-cylindrical, in size and silkiness resembling n. 6; capsules attenuate-rostrate, 3-5' long, greenish, drying brown. — Var. *ANGUSTIFOLIA*, Bebb; leaves narrower (3' long, $\frac{1}{2}$ ' wide), pointed at both ends. (S. angustata, of ed. 2, in part.) — Var. *BREVIFOLIA*, Bebb; leaves obovate, about 1' long, strongly veined. — Common on the sand dunes of Lake Michigan, and occasionally found away from the lake shore in N. Ill. and Wisc.

16. *S. balsamifera*, Barratt. Leaves broadly rounded and usually subcordate at base, at first very thin, subpellucid and of a rich reddish color, at length rigid, dark green above, paler or glaucous and prominently reticulate-veined beneath, slightly glandular-serrulate; petioles long and slender; stipules obsolete; fertile aments becoming very lax in fruit, the long slender pedicels 6-8 times the length of the gland; style short. (S. pyrifolia, Anders.) — In open swamps along our northern boundary, Maine to Minn., and northward; White Mountains of N. H. (Little, 1823; rediscovered by Pringle, and C. E. and E. Faxon). A much branched shrub, growing in clumps; recent twigs shining-chestnut on the sunny side.

++ Leaves clothed, even when fully grown, with a long silky tomentum on both sides, which is finally deciduous; capsule subsessile; style elongated.

17. *S. adenophylla*, Hook. Leaves ovate or very broadly lanceolate, cuspidate-acuminate (1-2' long), dull green both sides, very closely serrate with fine projecting gland-tipped teeth; stipules conspicuous, ovate-cordate, glandular-serrate, exceeding the short stout petioles, which are dilated at base and embrace the obtuse silky buds; aments leafy-peduncled, the fertile not rarely becoming 4' long, densely flowered. — Shores of the Great Lakes, rooting extensively in the sand-dunes. A large straggling shrub, with stout tomentose twigs and crowded leaves. Hybridizes with *S. cordata*.

+- Low erect shrub, 1-3° high; leaves small, entire; capsules oblong-cylindric; stigmas sessile or nearly so.

18. *S. myrtilloides*, L. Leaves elliptic-obovate, about 1' long, obtuse or somewhat pointed, entire, smooth on both sides, somewhat coriaceous when mature, revolute, reticulated, pale or glaucous beneath; fertile aments oblong, loosely few-flowered, borne on long leafy peduncles; capsules reddish green; pedicels slender, twice the length of the nearly smooth greenish yellow scale. — Var. *PEDICELLARIS*, Anders.; leaves oblong-linear or oblanceolate, 1-2 $\frac{1}{2}$ ' long. — Cold peat-bogs, N. Eng. and N. J. to Iowa, and northward. (Eu.)

— — — Prostrate or creeping and matted alpine shrubs.

19. *S. Uva-ursi*, Pursh. (BEARBERRY W.) Leaves elliptical and pointed, or obovate and obtuse, less than 1' long, 3-4" wide, tapering at base, slightly toothed, strongly veined, smooth and shining above, pale and rather glaucous beneath; aments borne on slender lateral leafy peduncles, oblong-cylindric, 6-9" long, the fertile lengthening to 2' and narrowly cylindric, densely flowered above, often loose below; scales obovate, rose-red at the tip, covered with long silky hairs; stamens rarely 2; capsule ovate-conical, brownish at maturity; pedicel scarcely exceeding the gland; style distinct. (S. Cutleri, Tuckerm.)—Abundant over all the alpine summits of N. New Eng. and N. Y. Closely prostrate, spreading from a stout central root over an area 1-2° in diameter.

20. *S. herbacea*, L. Leaves roundish oval, heart-shaped, obtuse or retuse, less than 1' long, serrate, smooth and shining, reticulately veined; aments terminating 2-leaved branchlets, small, ovoid, 4-10-flowered; scales concave, obovate, obtuse, glabrous or slightly pubescent; capsule subsessile.—Alpine summits of the White Mountains, and far northward. A very small herb-like species, the half-underground stems creeping and rooting to a considerable extent, the branches seldom rising above 1-2' from the ground. (Eu.)

2. PÓPULUS, Tourn. POPLAR. ASPEN.

Bracts (scales) of the catkins irregularly cut-lobed at the apex. Flowers from a cup-shaped disk which is obliquely lengthened in front. Stamens 8-30, or more; filaments distinct. Stigmas 2-4, elongated. Capsules 2-4-valved.—Trees, with broad and more or less heart-shaped or ovate toothed leaves, and often angular branches. Buds scaly, covered with resinous varnish. Catkins long and drooping, appearing before the leaves. (The classical Latin name, of uncertain origin.)

§ 1. Styles 2, with 2-3 narrow or filiform lobes; capsules thin, oblong-conical, 2-valved; seeds very small; leaves ovate.

* Petioles laterally flattened; bracts silky; stamens 6-20; capsules numerous, small, on very short pedicels.

P. ALBA, L. (WHITE POPLAR. ABELE.) The younger branches and the under surface of the rhombic-oval sinuate-toothed acute leaves white-tomentose; scales crenate, fringed.—Frequently cultivated for shade, spreading widely by the root, and occasionally spontaneous. (Adv. from Eu.)

1. *P. tremuloides*, Michx. (AMERICAN ASPEN.) Small tree 20-50° high, with smooth greenish-white bark; leaves roundish-heart-shaped, with a short sharp point, and small somewhat regular teeth, smooth on both sides, with downy margins, on long slender petioles; scales cut into 3-4 deep linear divisions, fringed with long hairs.—Maine to the mountains of Penn., N. Ky., Minn., and far north and westward.

2. *P. grandidentata*, Michx. (LARGE-TOOTHED ASPEN.) Tree 60-75° high, with smoothish gray bark; leaves roundish-ovate, with large and irregular sinuate teeth, when young densely covered with white silky wool, at length smooth both sides; scales cut into 5-6 unequal small divisions, slightly fringed.—Rich woods and borders of streams, N. Scotia to the mountains of N. C., west to N. Minn. and Tenn.

* * Petioles terete; bracts not silky; stamens 12-60.

3. *P. heterophylla*, L. (DOWNY POPLAR.) Tree 40-80° high; leaves ovate with a somewhat truncate or cordate base, obtuse, crenate, white-woolly when young, at length nearly smooth, except on the elevated veins beneath; fertile catkins few-flowered; capsules $\frac{1}{2}$ ' long, equalling the pedicels.—Borders of river swamps, Conn. to Ga., and in the west from S. Ind. and Ill. to Ark. and W. La.

§ 2. Styles 2-4, with dilated lobes; capsules large, often thick, subglobose to ovate-oblong, 2-4-valved; bracts mostly glabrous; seeds 1-2" long.

4. *P. balsamifera*, L. (BALSAM POPLAR. TACAMAHAC.) Tree 50-75° high, the large buds varnished with a copious fragrant resin; leaves ovate-lanceolate, gradually tapering and pointed, finely crenate, smooth on both sides, whitish and reticulately veined beneath, on terete petioles $\frac{1}{2}$ -2' long; scales dilated, slightly hairy; stamens 20-30; capsule ovate, 2-valved.—Borders of rivers and swamps, N. New Eng. to Mich. and Minn., and far north and westward.—Var. *CÁNDICANS*, Gray. (BALM OF GILEAD.) Leaves broader and more or less heart-shaped; petiole commonly hairy. Common in cultivation, but rare or unknown in a wild state.

5. *P. monilifera*, Ait. (COTTON-WOOD. NECKLACE POPLAR.) Tree 75-150° high; leaves broadly deltoid, with numerous crenate serratures and narrow very acute acumination, sometimes ovate, rarely cordate, on elongated flattened petioles; scales lacerate-fringed, not hairy; stamens 60 or more; capsules on slender pedicels (4-5" long) in long catkins, oblong-ovate, 3-4-valved. (Incl. *P. angulata*, Ait.)—Borders of streams, western N. Eng. to Fla., west to the Rocky Mts.

ORDER 105. EMPETRACEÆ. (CROWBERRY FAMILY.)

Low shrubby evergreens, with the foliage, aspect, and compound pollen of Heaths, and the drupaceous fruit of *Arctostaphylos*, but the divided or lacinate stigmas, etc., of some *Euphorbiaceæ*;—probably only an apetalous and polygamous or diœcious degenerate form of *Ericaceæ*,—comprising three genera, two of which occur within the limits of this work, and the third farther south.

1. *Empetrum*. Flowers scattered and solitary in the axils. Sepals 3, somewhat petal-like.

2. *Corema*. Flowers collected in terminal heads. Calyx none.

1. ÉMPETRUM, Tourn. CROWBERRY.

Flowers polygamous, scattered and solitary in the axils of the leaves (inconspicuous), scaly-bracted. Calyx of 3 spreading and somewhat petal-like sepals. Stamens 3. Style very short; stigma 6-9-rayed. Fruit a berry-like drupe, with 6-9 seed-like nutlets, each containing an erect anatropous seed. Embryo terete, in the axis of copious albumen, with a slender inferior radicle and very small cotyledons. (An ancient name, from *ἐν*, upon, and *πέτρος*, a rock.)

1. *E. nigrum*, L. (BLACK CROWBERRY.) Procnubent and spreading; leaves linear-oblong, scattered; fruit black.—Newf., Mount Desert and

adjacent coast of Maine, alpine summits in N. Eng. and N. Y., L. Superior, and northward. (Eu.)

2. CORĒMA, Don. BROOM-CROWBERRY.

Flowers diœcious or polygamous, collected in terminal heads, each in the axil of a scaly bract, and with 5 or 6 thin and scarious imbricated bractlets, but no proper calyx. Stamens 3, rarely 4, with long filaments. Style slender, 3- (or rarely 4-5-) cleft; stigmas narrow, often toothed. Drupe small, with 3 (rarely 4-5) nutlets. Seed, etc., as in the last. — Diffusely much-branched little shrubs, with scattered or nearly whorled narrowly linear heath-like leaves. (Name *κόρημα*, a broom, from the bushy aspect.)

1. *C. Conrădii*, Torr. Shrub 6'-2° high, diffusely branched, nearly smooth; drupe very small, dry and juiceless when ripe. — Sandy pine barrens and dry rocky places, N. J. and L. Island (?), Shawangunk Mts., N. Y., coast of S. E. Mass. and Maine, to Newf. The sterile plant is handsome in flower, on account of the tufted purple filaments and brown-purple anthers.

ORDER 106. CERATOPHYLLACEÆ. (HORNWORT FAMILY.)

Aquatic herbs, with whorled finely dissected leaves, and minute axillary and sessile monœcious flowers without floral envelopes, but with an 8-12-cleft involucre in place of a calyx, the fertile a simple 1-celled ovary, with a suspended orthotropous ovule; seed filled by a highly developed embryo with a very short radicle, thick oval cotyledons, and a plumule consisting of several nodes and leaves. — Consists only of the genus

1. CERATOPHYLLUM, L. HORNWORT.

Sterile flowers of 10-20 stamens, with large sessile anthers. Fruit an achene, beaked with the slender persistent style. — Herbs growing under water, in ponds or slow-flowing streams; the sessile leaves cut into thrice-forked thread-like rigid divisions (whence the name from *κέρας*, a horn, and *φύλλον*, leaf).

1. *C. demersum*, L. Fruit smooth, marginless, beaked with a long persistent style, and with a short spine or tubercle at the base on each side. — Var. *echinatum*, Gray, has the fruit mostly larger (3" long), rough-pimpled on the sides, the narrowly winged margin spiny-toothed. — Slow streams and ponds, across the continent. (Eu., etc.)

SUBCLASS II. GYMNASPERMÆ.

Pistil represented by an open scale or leaf, or else entirely wanting; the ovules and seeds therefore naked (without a pericarp), and fertilized by the direct application of the pollen. Cotyledons often more than two.

ORDER 107. CONIFERÆ. (PINE FAMILY.)

Trees or shrubs, with resinous juice, mostly awl-shaped or needle-shaped entire leaves, and monœcious or rarely diœcious flowers in catkins or solitary, destitute of calyx or corolla. Ovules orthotropous or inverted. Embryo in the axis of the albumen, nearly its length. (Wood destitute of ducts, composed chiefly of a homogeneous large woody fibre which is marked with circular disks on two sides.)

SUBORDER I. *Pinaceæ*. Fertile flowers in scaly aments becoming cones or berry-like. Ovules 2 or more at the base of each scale. Mostly monœcious and evergreen.

Tribe I. *ABIETINEÆ*. (PINE FAMILY proper.) Fertile flowers in catkins, consisting of numerous open spirally imbricated carpels in the form of scales, each scale in the axil of a thin persistent bract; in fruit forming a strobile or cone. Ovules 2, adherent to the base of each scale, inverted. Seeds winged. Cotyledons 3-16. Anthers spirally arranged upon the staminal column, which is subtended by involucral scales. Buds scaly. Leaves scattered (or fascicled in n. 1 and 5), linear to needle-shaped.

* Cones maturing the second year, their scales becoming thickened and corky.

1. *Pinus*. Leaves 2-5 in a cluster, surrounded by a sheath of scarious bud-scales.

* * Cones maturing the first year, their scales remaining thin.

+ Cones pendulous, their scales persistent; bracts smaller than the scales; leaves jointed upon a prominent persistent base, solitary.

2. *Picea*. Leaves sessile, keeled on both sides (tetragonal).

3. *Tsuga*. Leaves petioled, flat.

+ — Cones erect; bracts longer than the scales; leaf-scars not prominent.

4. *Abies*. Scales of the large cone deciduous. Leaves persistent, solitary, keeled beneath.

5. *Larix*. Scales of the small cone persistent. Leaves mostly fascicled, flat, deciduous.

Tribe II. *TAXODIÆ*. Fertile aments of several spirally arranged imbricated scales, without bracts, becoming a globular woody cone. Ovules 2 or more at the base of each scale, erect. Leaves linear, alternate; leaf-buds not scaly.

6. *Taxodium*. Seeds 2 to each scale. Leaves 2-ranked, deciduous.

Tribe III. *CUPRESSINEÆ*. Scales of the fertile ament few, decussately opposite or ternate, becoming a small closed cone or sort of drupe. Ovules 2 or more in their axils, erect. Cotyledons 2 (rarely more). Leaves decussately opposite or ternate, usually scale-like and adnate, the earlier free and subulate; leaf-buds not scaly.

* Monœcious; fruit a small cone; leaves opposite and foliage more or less 2-ranked.

7. *Chamæcyparis*. Cone globose; scales peltate. Seeds 1 or 2, narrowly winged.

8. *Thuya*. Cone pendulous, oblong, of 8-12 imbricated scales. Seeds 2, 2-winged.

* * Diœcious. Fruit berry-like, with bony ovate seeds.

9. *Juniperus*. Fruit-scales 3-6, coalescent. Foliage not 2-ranked.