

1. *T. occidentalis*, L. (ARBOR VITÆ. WHITE CEDAR.) Leaves appressed-imbricated in 4 rows on the 2-edged branchlets; scales of the cones pointless; seeds broadly winged all round. — Swamps and cool rocky banks, N. Brunswick to Penn., along the mountains to N. C., west to Minn. A tree 20–50° high, with pale shreddy bark, and light, soft, but very durable wood.

9. JUNÍPERUS, L. JUNIPER.

Flowers diœcious, or occasionally monœcious, in very small lateral catkins. Anther-cells 3–6, attached to the lower edge of the shield-shaped scale. Fertile catkins ovoid, of 3–6 fleshy coalescent scales, each 1-ovuled, in fruit forming a sort of berry, which is scaly-bracted underneath, bluish-black with white bloom. Seeds 1–3, ovate, wingless, bony. Cotyledons 2. — Evergreen trees or shrubs, with awl-shaped or scale-like rigid leaves, often of two shapes in § 2. (The classical name.)

§ 1. *OXYCÉDRUS*. Aments axillary; leaves in whorls of 3, free and jointed at base, linear-subulate, prickly-pointed, channelled and white glaucous above.

1. *J. communis*, L. (COMMON JUNIPER.) Shrub or small tree, with spreading or pendulous branches; leaves rigid, more or less spreading (5–9" long); berry dark blue (3" or more in diameter). — Dry sterile hills, common.

Var. *alpina*, Gaud., is a decumbent or prostrate form, with shorter (2–4" long) less spreading leaves. — Maine to Minn., and northward.

§ 2. *SABINA*. Aments terminal; leaves mostly opposite, of two forms, i. e., awl-shaped and loose, and scale-shaped, appressed-imbricated and crowded, the latter with a resiniferous gland on the back.

2. *J. Sabina*, L., var. *procumbens*, Pursh. A procumbent, prostrate or sometimes creeping shrub; scale-like leaves acute; berry on short recurved peduncles, 3–5" in diameter. — Rocky banks, borders of swamps, etc., N. Eng. to N. Minn., and northward.

3. *J. Virginiana*, L. (RED CEDAR OF SAVIN.) From a shrub to a tree 60–90° high, pyramidal in form; scale-like leaves obtuse or acutish, entire; berries on straight peduncles, about 3" in diameter. — Dry hills or deep swamps, common. Bark shreddy, and heart-wood red and aromatic.

10. TÁXUS, Tourn. YEW.

Flowers mostly diœcious, or sometimes monœcious, axillary from scaly buds; the sterile small and globular, formed of a few naked stamens; anther-cells 3–8 under a shield-like somewhat lobed connective. Fertile flowers solitary, scaly-bracted at base, consisting merely of an erect sessile ovule, with an annular disk, which becomes cup-shaped around its base and at length pulpy and berry-like, globular and red, nearly enclosing the nut-like seed. Cotyledons 2. — Leaves evergreen, flat, mucronate, rigid, scattered, 2-ranked. (The classical name, probably from *τόξον*, a bow; the wood anciently used for bows.)

1. *T. Canadensis*, Willd. (AMERICAN YEW. GROUND HEMLOCK.) A low straggling bush, the stems diffusely spreading; leaves linear, green both sides. (*T. baccata*, var. *Canadensis*, Willd.) — Moist banks and hills, especially under evergreens; Newf. to N. J., Iowa, Minn., and northward.

CLASS II. MONOCOTYLEDONOUS OR ENDOGENOUS PLANTS.

Stems with no manifest distinction into bark, wood, and pith, but the woody fibre and vessels in bundles or threads which are irregularly imbedded in the cellular tissue; perennial trunks destitute of annual layers. Leaves mostly parallel-veined (nerved) and sheathing at the base, seldom separating by an articulation, almost always alternate or scattered and not toothed. Parts of the flower commonly in threes. Embryo with a single cotyledon, and the leaves of the plumule alternate.

ORDER 108. HYDROCHARIDACEÆ. (FROG'S-BIT FAMILY.)

Aquatic herbs, with diœcious or polygamous regular flowers, sessile or on scape-like peduncles from a spathe, and simple or double floral envelopes, which in the fertile flowers are united into a tube and coherent with the 1–3-celled ovary. Stamens 3–12, distinct or monadelphous; anthers 2-celled. Stigmas 3 or 6. Fruit ripening under water, indehiscent, many-seeded. Seeds ascending, without albumen; embryo straight.

Tribe I. *HYDRILLEÆ*. Stem elongated, submerged, leafy. Spathes small, sessile.

1. *Elodea*. Leaves verticillate (rarely opposite). Perianth-tube long-filiform.

Tribe II. *VALLISNERIÆ*. Stemless. Leaves elongated. Spathes pedunculate.

2. *Vallisneria*. Submerged; grass-like. Fertile flower solitary on a very long scape.

Tribe III. *STRATIOTÆÆ*. Stem very short, with crowded leaves. Spathes pedunculate. Ovary 6–9-celled.

3. *Limnobium*. Stemless, floating; broad leaves long-petioled.

1. ELODÆA, Michx. WATER-WEED.

Flowers polygamo-diœcious, solitary and sessile from a sessile tubular 2-cleft axillary spathe. Sterile flowers small or minute, with 3 sepals barely united at base, and usually 3 similar or narrower petals; filaments short and united at base, or none; anthers 3–9, oval. Fertile flowers pistillate or apparently perfect; perianth extended into an extremely long capillary tube; the limb 6-parted; the small lobes obovate, spreading. Stamens 3–9, often with imperfect anthers or none. Ovary 1-celled, with 3 parietal placentæ, each bearing a few orthotropous ovules; the capillary style coherent with the tube of the perianth; stigmas 3, large, 2-lobed or notched, exserted. Fruit oblong, coriaceous, few-seeded. — Perennial slender submerged herbs, with elongated branching stems, thickly beset with pellucid and veinless, 1-nerved, sessile, whorled or opposite leaves. The staminate flowers (rarely seen) commonly break off, as in *Vallisneria*, and float on the surface, where they expand and shed their pollen around the stigmas of the fertile flowers, raised to the surface.

by the prolonged calyx-tube, which varies in length according to the depth of the water. (Name from *ἐλαδής*, marshy.)

1. **E. Canadensis**, Michx. Leaves in 3's or 4's, or the lower opposite, varying from linear to oval-oblong, minutely serrulate; stamens 9 in the sterile flowers, 3 or 6 almost sessile anthers in the fertile. (*Anacharis Canadensis* Planchon.) — Slow streams and ponds, common. July.

2. VALLISNERIA, L. TAPE-GRASS. EEL-GRASS.

Flowers strictly dioecious; the sterile numerous and crowded in a head on a conical receptacle, enclosed in an ovate at length 3-valved spathe which is borne on a very short scape; stamens mostly 3. Fertile flowers solitary and sessile in a tubular spathe upon an exceedingly lengthened scape. Perianth (calyx) 3-parted in the sterile flowers; in the fertile with a linear tube coherent with the 1-celled ovary, but not extended beyond it, 3-lobed (the lobes obovate); also 3 linear small petals. Stigmas 3, large, nearly sessile, 2-lobed. Ovules very numerous, scattered over the walls, orthotropous. Fruit elongated, cylindrical, berry-like. — Stemless plants, with long linear grass-like leaves, wholly submerged. The staminate clusters being confined to the bottom by the shortness of the scape, the flower-buds themselves break from their short pedicels and float on the surface, where they shed their pollen around the fertile flowers, which are raised to the surface by sudden growth at the same time; afterwards the thread-form scapes (2–4 feet long) coil up spirally, drawing the fruit under water to ripen. (Named for *Ant. Vallisneri*, an early Italian botanist.)

1. **V. spiralis**, L. Leaves linear, thin, long and ribbon-like (1–6° long), obscurely serrulate, obtuse, somewhat nerved and netted-veined. — Common in slow waters, N. Eng. to Fla., west to Minn. and Tex.

3. LIMNÖBIUM, Richard. AMERICAN FROG'S-BIT.

Flowers dioecious, (or monœcious?) from sessile or somewhat peduncled spathes; the sterile spathe 1-leaved, producing about 3 long-pedicelled flowers; the fertile 2-leaved, with a single short-pedicelled flower. Calyx 3-parted or cleft; sepals oblong-oval. Petals 3, oblong-linear. Filaments entirely united in a central solid column, bearing 6–12 linear anthers at unequal heights; there are 3–6 awl-shaped rudiments of stamens in the fertile flowers. Ovary 6–9-celled, with as many placentæ in the axis, forming an ovoid many-seeded berry in fruit; stigmas as many as the cells, but 2-parted, awl-shaped. — A stemless perennial herb, floating in stagnant water, proliferous by runners, with long-petioled and round-heart-shaped leaves, which are spongy-reticulated and purplish underneath; rootlets slender, hairy. Sterile flowers rather small; the fertile larger; peduncle nodding in fruit. Petals white? (Name from *λιμνόβιος*, living in pools.)

1. **L. Spóngia**, Richard. Leaves 1–2' long, faintly 5-nerved; peduncle of sterile flower about 3' long and filiform, of the fertile only 1' long and stout. — Stagnant water, N. J. to Fla.; also L. Ontario, Ill., and Mo.

ORDER 109. BURMANNIACEÆ. (BURMANNIA FAMILY.)

Small annual herbs, often with minute and scale-like leaves, or those at the root grass-like; the flowers perfect, with a 6-cleft corolla-like perianth, the

tube of which adheres to the 1-celled or 3-celled ovary; stamens 3 and distinct, opposite the inner divisions of the perianth; capsule many-seeded, the seeds very minute. — A small, chiefly tropical family.

1. BURMANNIA, L.

Ovary 3-celled, with the thick placentæ in the axis. Filaments 3, very short. Style slender; stigma capitate-3-lobed. Capsule often 3 winged. (Named for *J. Burmann*, an early Dutch botanist.)

1. **B. biflora**, L. Stem low and slender (2–4' high), 2-flowered at the summit, or soon several-flowered; perianth (2–3" long) bright blue, 3-winged. — Peaty bogs, Va. to Fla.

ORDER 110. ORCHIDACEÆ. (ORCHIS FAMILY.)

Herbs, clearly distinguished by their perfect irregular flowers, with 6-merous perianth adnate to the 1-celled ovary, with innumerable ovules on 3 parietal placentæ, and with either one or two gynandrous stamens, the pollen cohering in masses. Fruit a 1-celled 3-valved capsule, with innumerable minute seeds, appearing like fine saw-dust. Perianth of 6 divisions in 2 sets; the 3 outer (sepals) mostly of the same petal-like texture and appearance as the 3 inner (petals). One of the inner set differs more or less in figure, direction, etc., from the rest, and is called the *lip*; only the other two taking the name of *petals* in the following descriptions. The lip is really the upper petal, i. e. the one next to the axis, but by a twist of the ovary of half a turn it is more commonly directed forward and brought next the bract. Before the lip, in the axis of the flower, is the *column*, composed of a single stamen, or in *Cypripedium* of two stamens and a rudiment of a third, variously coherent with or borne on the style or thick fleshy stigma; anther 2-celled; each cell containing one or more masses of pollen (*pollinia*) or the pollen granular (in *Cypripedium*). Stigma a broad glutinous surface, except in *Cypripedium*. — Perennials, often tuber-bearing or tuberous-rooted; some epiphytes. Leaves parallel-nerved, all alternate. Flowers often showy, commonly singular in shape, solitary, racemed, or spiked, each subtended by a bract, — in all arranged for fertilization by the aid of insects, very few capable of unaided self-fertilization.

Tribe I. EPIDENDREÆ. Anther terminal, erect or inclined, operculate. Pollinia smooth and waxy, 4 or 8 (2 or 4 in each cell), distinct, or those in each cell (or all in n. 2 and 7) united at base. (Pollinia 8 only in n. 7 of our genera.)

* Green-foliaged plants, from solid bulbs, with 1 or 2 leaves.

+ Column very short; leaf solitary.

1. **Microstylis**. Flowers racemose, minute, greenish. Petals filiform.

+ + Column elongated; leaves radical.

+ + Whole plant (except the flowers) green.

2. **Liparis**. Leaves 2. Raceme few-flowered. Lip flat, entire.

3. **Calypso**. Leaf solitary. Flower large, solitary. Lip saccate.

+ + A single green autumnal leaf; otherwise mainly brownish or purplish.

4. **Tipularia**. Raceme many-flowered; flowers small, greenish; lip 3-lobed.

5. **Aplectrum**. Raceme loose; flowers rather large; lip 3-ridged, not spurred or saccate.