

2. **L. trachyspermum**, Gray. Leaves larger (2-6' broad) and rounder, thicker, often wavy-margined or crenate, roughish and dark-punctate or pitted underneath; petioles stouter; seeds glandular-roughened. — Ponds and streams, Md. and Va. to Fla. and Tex.

ORDER 70. POLEMONIACEÆ. (POLEMONIUM FAMILY.)

Herbs, with alternate or opposite leaves, regular 5-merous and 5-androus flowers, the lobes of the corolla convolute in the bud, a 3-celled ovary and 3-lobed style; capsule 3-celled, 3-valved, loculicidal, few-many-seeded; the valves usually breaking away from the triangular central column. — Seeds amphitropous, the coat frequently mucilaginous when moistened and emitting spiral threads. Embryo straight in the axis of copious albumen. Calyx persistent, imbricated. Corolla with a 5-parted border. Anthers introrse. (Insidious and innocent plants; many are ornamental in cultivation.)

1. **Phlox**. Corolla salver-form. Calyx narrow. Leaves opposite, entire.
2. **Gilia**. Corolla tubular-funnel-form or salver-form. Calyx narrow, partly scarious. Leaves mostly alternate, entire.
3. **Polemonium**. Corolla open-bell-shaped. Calyx herbaceous, bell-shaped. Filaments slender, equal. Leaves alternate, pinnate or pinnately parted.

1. PHLOX, L.

Calyx narrow, somewhat prismatic, or plaited and angled. Corolla salver-form, with a long tube. Stamens very unequally inserted in the tube of the corolla, included. Capsule ovoid, with sometimes 2 ovules but ripening only a single seed in each cell. — Perennials (except a few southern species, such as *P. Drummondii* of the gardens), with opposite and sessile perfectly entire leaves, the floral often alternate. Flowers cymose, mostly bracted; the open clusters terminal or crowded in the upper axils. (*Φλόξ*, flame, an ancient name of *Lychnis*, transferred to this North American genus.) Most of our species are cultivated in gardens.

§ 1. *Herbaceous, with flat (broad or narrow) leaves.*

* Stem strictly erect; panicle pyramidal or oblong, many-flowered; peduncles and pedicels very short; corolla-lobes entire. (Very common in gardens.)

1. **P. paniculata**, L. Stem stout (2-4° high), smooth; leaves oblong-lanceolate and ovate-lanceolate, pointed, large, tapering at the base, the upper often heart-shaped at the base; panicle ample, pyramidal-corymbed; calyx-teeth awn-pointed; corolla pink-purple varying to white. — Open woods, Penn. to Ill., south to Fla. and La. June, July.

2. **P. maculata**, L. (WILD SWEET-WILLIAM.) Smooth, or barely roughish; stem spotted with purple, rather slender (1-2° high); lower leaves lanceolate, the upper nearly ovate-lanceolate, tapering to the apex from the broad and rounded or somewhat heart-shaped base; panicle narrow, oblong, leafy below; calyx-teeth triangular-lanceolate, short, scarcely pointed; corolla pink-purple. — Rich woodlands and along streams, N. J. and N. Penn. to Minn., south to Fla. and Ark. — Var. *CÁNDIDA*, Michx., is a white-flowered form, commonly with spotless stem. With the ordinary form.

* * Stems, at least the flowering ones, ascending or erect; flowers in corymbed or simple cymes; corolla-lobes obovate or obcordate.

+ Calyx-teeth triangular-subulate; corolla-lobes rounded, entire; glabrous or nearly so.

3. **P. ovata**, L. Stems ascending ($\frac{1}{2}$ -2° high), often from a prostrate base; leaves oblong-lanceolate, or the upper ovate-lanceolate, and sometimes heart-shaped at the base, acute or pointed; flowers pink or rose-red, crowded, short-peduncled; calyx-teeth short and broad, acute. (P. Carolina, L.) — Open woods, in the mountain region from Penn. to Ala. June, July.

4. **P. glaberrima**, L. Stems slender, erect (1-3° high); leaves linear-lanceolate or rarely oblong-lanceolate, very smooth (except the rough and sometimes revolute margins), tapering gradually to a point (3-4' long); cymes few-flowered and loosely corymbed; flowers peduncled (pink or whitish); calyx-teeth narrower and very sharp-pointed. — Prairies and open woods, N. Va. to Ohio and Minn., south to Fla. and Mo. July.

+ + Calyx-teeth long and slender; more or less hairy or glandular-pubescent.

+ + No runners or prostrate sterile shoots.

5. **P. pilosa**, L. Stems slender, nearly erect (1-1½° high), usually hairy, as are the lanceolate or linear leaves (1-4' long), which commonly taper to a sharp point; cymes at length open; calyx-teeth slender awl-shaped and awn-like, longer than the tube, loose or spreading; lobes of the pink-purple or rose-red (rarely white) corolla obovate, entire. — Dry or sandy woods, prairies, etc., N. J. to Minn., south to Fla. and Tex. May, June.

6. **P. amœna**, Sims. Stems ascending ($\frac{1}{2}$ -1½° high), mostly simple; leaves broadly linear, lanceolate or ovate-oblong, abruptly acute or blunt ($\frac{1}{2}$ -1½' long), on sterile shoots often ovate; cyme mostly compact and sessile, leafy-bracted; calyx-teeth awl-shaped or linear, sharp-pointed, but seldom awned, rather longer than the tube, straight; lobes of the corolla obovate and entire (or rarely notched), purple, pink, or sometimes white. (P. procumbens, Gray; not *Lehm.*) — Dry hills and barrens, Va. to Ky., south to Fla.

+ + Sterile shoots from the base creeping or decumbent; leaves rather broad.

7. **P. réptans**, Michx. Runners creeping, bearing roundish-obovate smoothish and thickish leaves; flowering stems (4-8' high) and their oblong or ovate obtuse leaves ($\frac{1}{2}$ ' long) pubescent, often clammy; cyme close, few-flowered, calyx-teeth linear-awl-shaped, about the length of the tube; lobes of the reddish-purple corolla round-obovate, mostly entire. — Damp woods, in the Alleghany region, Penn. to Ky. and Ga. May, June.

8. **P. divaricata**, L. Stems spreading or ascending from a decumbent base (9-18' high); leaves oblong- or lance-ovate or the lower oblong-lanceolate (1½' long), acutish; cyme corymbose-panicled, spreading, loosely-flowered, calyx-teeth slender awl-shaped, longer than the tube; lobes of the pale lilac or bluish corolla obcordate or wedge-obovate and notched at the end, or often entire, $\frac{1}{2}$ -¾' long, equalling or longer than the tube, with rather wide sinuses between them. — Rocky damp woods, W. Canada and N. Y. to Minn., south to Fla. and Ark. May. — A form occurs near Crawfordsville, Ind., with reduced flowers, the narrow entire acuminate corolla-lobes scarcely half as long as the tube.

*** Stems low, diffuse and branching; flowers scattered or barely cymulose; corolla-lobes narrowly cuneate, bifid; calyx-lobes subulate-lanceolate.

9. *P. bifida*, Beck. Minutely pubescent; stems ascending, branched (5-8' high); leaves linear, becoming nearly glabrous ($\frac{1}{2}$ -1 $\frac{1}{2}$ ' long, $\frac{1}{4}$ " wide); flowers few, on slender peduncles; calyx-teeth awl-shaped, about as long as the tube; lobes of the pale purple corolla 2-cleft to or below the middle (4" long), equaling the tube, the divisions linear-oblong. — Prairies of Ind. to Iowa and Mo.

10. *P. Stellaria*, Gray. Very glabrous; leaves barely somewhat ciliate at base, linear (1-2' long, 1" wide or more), acute, rather rigid; flowers scattered, mostly long-peduncled; lobes of the pale blue or almost white corolla bifid at the apex into barely oblong lobes. — Cliffs of Ky. River (Short), S. Ill., and Tenn. (Gattinger). May.

§ 2. Suffruticulate and creeping-cespitose, evergreen, with mostly crowded and fascicled subulate and rigid leaves.

11. *P. subulata*, L. (GROUND OR MOSS PINK.) Depressed, in broad mats, pubescent (glabrate when old); leaves awl-shaped, lanceolate, or narrowly linear (3-6" long); cymes few-flowered; calyx-teeth awl-shaped, rigid; corolla pink-purple or rose-color with a darker centre (sometimes white); lobes wedge-shaped, notched, rarely entire. — Dry rocky hills and sandy banks, southern N. Y. to Mich., south to Fla. and Ky.

2. GÍLIA, Ruiz & Pav.

Calyx-lobes narrow and acute, the tube scarious below the sinuses. Corolla tubular-funnel-form or salver-form. Stamens equally or unequally inserted. Capsule with solitary to numerous seeds. — Mostly herbs with alternate leaves. Our species belongs to the § *Collomia*, in which the flowers are capitate-glomerate and foliose-bracted or scattered, stamens unequally inserted in the narrow tube of the salver-form corolla, ovules solitary, and leaves sessile and entire; annuals. (Dedicated to Philip Gil, a Spanish botanist.)

1. *G. linearis*, Gray. Branching and in age spreading, 6-18' high; leaves linear- or oblong-lanceolate; calyx-lobes triangular-lanceolate, acute; corolla 6" long, from lilac-purple to nearly white, very slender, with small limb. (*Collomia linearis*, Nutt.) — From Minn. west to the Pacific.

3. POLEMONIUM, Tourn. GREEK VALERIAN.

Calyx bell-shaped, herbaceous. Stamens equally inserted at the summit of the very short tube of the open-bell-shaped or short funnel-form corolla; filaments slender, declined, hairy-appendaged at the base. Capsule few-several-seeded. — Perennials, with alternate pinnate leaves, the upper leaflets sometimes confluent; the (blue or white) corymbose flowers nearly bractless. (An ancient name, from πόλεμος, war, of doubtful application.)

1. *P. réptans*, L. Smooth throughout or slightly pubescent; stems weak and spreading (6-10' high, never creeping as the name denotes); leaflets 5-15, ovate-lanceolate or oblong; corymbs few-flowered; flowers nodding; calyx-lobes ovate, shorter than the tube; stamens and style included; corolla light blue, about $\frac{1}{2}$ " wide; capsules about 3-seeded. — Woods, N. Y. to Minn., south to Ala. and Mo. May, June.

2. *P. cæruleum*, L. (JACOB'S LADDER.) Stem erect (1-3° high); leaflets 9-21, linear-lanceolate, oblong- or ovate-lanceolate, mostly crowded; flowers numerous, in a thyrsus or contracted panicle; lobes of the calyx longer than the tube; stamens and style mostly exerted beyond the bright blue corolla, which is nearly 1' broad; capsule several-seeded. — Rare in our range, occurring in swamps and on mountains in N. H., N. Y., N. J., and Md., but common in the western mountains and far northward.

ORDER 71. HYDROPHYLLACEÆ. (WATERLEAF FAMILY.)

Herbs, commonly hairy, with mostly alternate leaves, regular 5-merous and 5-androus flowers, in aspect between the foregoing and the next order; but the ovary entire and 1-celled with 2 parietal 4-many-ovuled placentæ, or rarely 2-celled by the union of the placentæ in the axis; style 2-cleft, or 2 separate styles; fruit a 2-valved 4-many-seeded capsule. — Seeds mostly reticulated or pitted. Embryo small in copious albumen. — Flowers chiefly blue or white, in one-sided cymes or false racemes, which are mostly bractless and coiled from the apex when young, as in the Borage Family. A small order of plants of no marked properties; some cultivated for ornament.

Tribe I. **HYDROPHYLLÆ.** Ovary and capsule 1-celled. Seeds pitted or reticulated; albumen cartilaginous. Leaves cut-toothed, lobed or pinnate. Style 2-cleft.

* Ovary lined with the dilated and fleshy placentæ, which enclose the ovules and seeds (in our plants only 4) like an inner pericarp.

1. **Hydrophyllum.** Stamens exerted; anthers linear. Calyx unchanged in fruit.

2. **Nemophila.** Stamens included; anthers short. Calyx with appendages at the sinuses.

3. **Ellisia.** Stamens included. Calyx destitute of appendages, enlarged in fruit.

* * Ovary with narrow parietal placentæ, in fruit projecting inward more or less.

4. **Phacelia.** Corolla-lobes imbricated in the bud. Calyx destitute of appendages.

Tribe II. **HYDROLEÆ.** Ovary and capsule 2-celled, the placentæ often projecting from the axis far into the cells. Albumen fleshy. Leaves entire. Styles 2.

5. **Hydrolea.** Corolla between wheel-shaped and bell shaped.

1. HYDROPHYLLUM, Tourn. WATERLEAF.

Calyx 5-parted, sometimes with a small appendage in each sinus, early open in the bud. Corolla bell-shaped, 5-cleft; the lobes convolute in the bud; the tube furnished with 5 longitudinal linear appendages opposite the lobes, which cohere by their middle, while their edges are folded inward, forming a nectariferous groove. Stamens and style mostly exerted; filaments more or less bearded; anthers linear. Ovary bristly-hairy (as is usual in the family); the 2 fleshy placentæ expanded so as to line the cell and nearly fill the cavity, soon free from the walls except at the top and bottom, each bearing a pair of ovules on the inner face. Capsule ripening 1-4 seeds, spherical. — Perennials, with petioled ample leaves, and white or pale blue cymose-clustered flowers. (Name formed of ὕδωρ, water, and φύλλον, leaf; of no obvious application.)

* Calyx with minute if any appendages; rootstocks creeping, scaly-toothed.

1. **H. macrophyllum**, Nutt. Rough-hairy; leaves oblong, pinnate and pinnatifid; the divisions 9-13, ovate, obtuse, coarsely cut-toothed; root-leaves

1° long; peduncle shorter than the petiole; calyx-lobes lanceolate-pointed from a broad base, very hairy; flowers (6" long) crowded in a globular cluster; anthers short-oblong. — Rich woods, Ohio to Va. and Ala., west to the Mississippi. July.

2. *H. Virginicum*, L. Smoothish (1–2° high); leaves pinnately divided; the divisions 5–7, ovate-lanceolate or oblong, pointed, sharply cut-toothed, the lowest mostly 2-parted, the uppermost confluent; peduncles longer than the petioles of the upper leaves, forked; calyx-lobes narrowly linear, bristly-ciliate; flowers 3" long; anthers oblong-linear. — Rich woods. June–Aug.

3. *H. Canadense*, L. Nearly smooth (1° high); leaves (3–5' broad) palmately 5–7-lobed, rounded, heart-shaped at base, unequally toothed, those from the root sometimes with 2–3 small and scattered lateral leaflets; peduncles mostly shorter than the petioles, forked, the nearly white flowers on very short pedicels; calyx-lobes linear-awl-shaped, nearly smooth, often with minute teeth in the sinuses. — Damp rich woods, N. Eng. to the mountains of Va., and west to the Mississippi. June–Aug. — Rootstocks thickened and very strongly toothed in 2 rows by the persistent bases of the stout petioles.

* * Calyx with a small reflexed lobe in each sinus; stamens little exerted.

4. *H. appendiculatum*, Michx. Hairy; stem-leaves palmately 5-lobed, rounded, the lobes toothed and pointed, the lowest pinnately divided; cymes rather loosely flowered; filiform pedicels and calyx bristly-hairy. — Damp woods, Ont. to mountains of N. C., west to Minn., Iowa, and Mo. June, July.

2. NEMÓPHILA, Nutt.

Calyx 5-parted, with a reflexed appendage in each sinus, more or less enlarged in fruit. Corolla bell-shaped or almost wheel-shaped; the lobes convolute in the bud; the tube mostly with 10 small folds or scales inside. Stamens included; anthers ovoid or heart-shaped. Placentæ (bearing each 2–12 ovules), capsule and seeds as in *Hydrophyllum*. — Diffuse and fragile annuals, with opposite or partly alternate pinnatifid or lobed leaves, and one-flowered peduncles; the corolla white, blue, or marked with purple. (Name composed of *νέμος*, a grove, and *φιλέω*, to love.) Some handsome species are garden annuals.

1. *N. microcalyx*, Fisch. & Meyer. Small, roughish-pubescent; stems diffusely spreading (2–8' long); leaves parted or deeply cleft into 3–5 roundish or wedge-obovate sparingly cut-lobed divisions, the upper leaves all alternate; peduncles opposite the leaves, shorter than the long petioles; flowers minute; corolla white, longer than the calyx; placentæ each 2-ovuled; capsule 1–2-seeded. — Moist woods, Va. to Fla., west to Ark. and Tex. April–June.

3. ELLÍSIA, L.

Calyx 5-parted, without appendages, enlarged and foliaceous in fruit. Corolla bell-shaped or cylindraceous, not longer than the calyx, 5-lobed above; the lobes imbricated or convolute in the bud, the tube with 5 minute appendages within. Stamens included. Placentæ (each 2-ovuled), fruit, and seeds much as in *Hydrophyllum*. — Delicate and branching annuals, with lobed or divided leaves, the lower opposite, and small whitish flowers. (Named for John Ellis, a distinguished naturalist, an English correspondent of Linnæus.)

1. *E. Nyctèlea*, L. Minutely or sparingly roughish-hairy, divergently branched (6–12' high); leaves pinnately parted into 7–13 lanceolate or linear-oblong sparingly cut-toothed divisions; peduncles solitary in the forks or opposite the leaves, 1-flowered; calyx-lobes lanceolate, pointed, about the length of the cylindraceous (whitish) corolla (in fruit ovate-lanceolate, nearly $\frac{1}{2}$ ' long); capsule pendulous. (*E. ambigua*, Nutt.; merely a slender form.) — Shady damp places, N. J. to Va., west to Minn. and Mo. May–July.

4. PHACÈLIA, Juss.

Calyx 5-parted; the sinuses naked. Corolla open-bell-shaped, 5-lobed; the lobes imbricated in the bud. Filaments slender, often (with the 2-cleft style) exerted; anthers ovoid or oblong. Ovary with 2 narrow linear placentæ adherent to the walls, in fruit usually projecting inward more or less, the two often forming an imperfect partition in the ovoid 4-many-seeded capsule. (Ovules 2–30 on each placenta.) — Perennial or mostly annual herbs, with simple, lobed, or divided leaves, and often handsome (blue, purple, or white) flowers in scorpioid raceme-like cymes. (Name from *φάκελος*, a fascicle.)

§ 1. PHACELIA proper. Seeds and ovules only 4 (two on each placenta); corolla campanulate, with narrow folds or appendages within, the lobes entire.

1. *P. bipinnatifida*, Michx. Biennial; stem upright, hairy (1–2° high), leaves long-petioled, pinnately 3–5-divided, the divisions or leaflets ovate or oblong-ovate, acute, coarsely and often sparingly cut-lobed or pinnatifid; racemes elongated, loosely many-flowered, glandular-pubescent; pedicels about the length of the calyx, spreading or recurved. — Shaded banks, in rich soil, Ohio to Ill. and southward. May, June. — Corolla bright blue, 6" broad, with 5 pairs of longitudinal ciliate folds, covering as many externally keeled deep grooves. Stamens bearded below and with the style exerted.

§ 2. COSMANTHUS. Ovules and seeds as in § 1; corolla almost rotate, with fimbriate lobes, and no appendages within; filaments villous-bearded, rarely exerted; leaves pinnatifid, the upper clasping.

2. *P. Purshii*, Buckley. Sparsely hairy; stem erect or ascending, branched (8–12' high); lobes of the stem-leaves 5–9, oblong or lanceolate, acute; raceme many-flowered; calyx-lobes lance-linear; corolla light blue, varying to white (about $\frac{1}{2}$ ' in diameter). — Moist wooded banks, W. Penn. to Minn., and southward. April–June.

3. *P. fimbriata*, Michx. Slightly hairy, slender; stems spreading or ascending (5–8' long), few-leaved; lowest leaves 3–5-divided into roundish leaflets; the upper 5–7-cleft or cut-toothed, the lobes obtuse; raceme 3–10-flowered; calyx-lobes linear-oblong, obtuse, becoming spatulate; corolla white (3–4" broad). — Woods, high mountains of Va. to Ala. May.

§ 3. COSMANTHOIDES. Ovules and seeds 2–8 on each placenta; corolla rotate or campanulate, with entire lobes and no appendages.

4. *P. parviflora*, Pursh. Somewhat hairy, slender, diffusely spreading (3–8' high); leaves pinnately cleft or the lower divided into 3–5 short lobes; racemes solitary, loosely 5–15-flowered; pedicels filiform, at length several times longer than the oblong calyx-lobes; corolla open-campanulate, bluish-

white (4-6" broad); filaments hairy; capsule globular, 6-12-seeded, a half shorter than the calyx.—Shaded banks, Penn. and Ohio to Mo., south to S. C. and Tex. April-June.

Var. *hirsuta*, Gray. More hirsute and the stems less slender, apparently growing in more open dry soil; corolla larger, 5-7" in diameter; seeds 4-8.—Prairies and barrens, S. W. Mo. to E. Tex.; also Va. and Ga.

5. *P. Covillei*, Watson. Like the last; racemes 2-5-flowered; calyx-lobes linear, in fruit 3" long or more; corolla tubular-campanulate with erect limb; filaments glabrous; capsule depressed-globose; seeds 4, large.—Larkspur Island in the Potomac, five miles above Washington. (F. V. Coville.)

§ 4. *EUTOCA*. Ovules and seeds numerous on each placenta; corolla rotate-campanulate, with 10 vertical lamellæ within.

6. *P. Franklinii*, Gray. Soft-hairy; stem erect (6-15' high), rather stout; leaves pinnately parted into many lanceolate or oblong-linear lobes, which are crowded and often cut-toothed or pinnatifid; racemes short, dense, crowded into an oblong spike; calyx-lobes linear; corolla blue.—Shores of L. Superior, thence north and westward.

5. HYDRØLEA, L.

Calyx 5-parted. Corolla short-campanulate or almost wheel-shaped, 5-cleft. Filaments dilated at base. Styles 2, distinct. Capsule globular, 2-celled, with very large and fleshy many-seeded placenta, thin-walled, 2-4-valved or bursting irregularly. Seeds minute, striate-ribbed.—Herbs or scarcely shrubby, growing in water or wet places (whence the name, from *ὕδωρ*, water), with entire leaves, often having spines in their axils, and clustered blue flowers.

1. *H. affinis*, Gray. Glabrous throughout; stem ascending from a creeping base, armed with small axillary spines; leaves lanceolate, tapering to a very short petiole; flowers in small axillary leafy-bracted clusters; divisions of the calyx lance-ovate, equalling the corolla and the irregularly-bursting globose capsule.—Banks of streams, S. Ill. to Tex.

ORDER 72. BORRAGINACEÆ. (BORAGE FAMILY.)

Chiefly rough-hairy herbs, with alternate entire leaves, and symmetrical flowers with a 5-parted calyx, a regular 5-lobed corolla (except in *Echium*), 5 stamens inserted on its tube, a single style and a usually deeply 4-lobed ovary (as in Labiatae), forming in fruit 4 seed-like 1-seeded nutlets, or separating into two 2-seeded or four 1-seeded nutlets.—Albumen none. Cotyledons plano-convex; radicle pointing to the apex of the fruit. Stigmas 1 or 2. Calyx valvate, the corolla imbricated (in *Myosotis* convolute) in the bud. Flowers mostly on one side of the branches of a reduced cyme, imitating a spike or raceme, which is rolled up from the end, and straightens as the blossoms expand (circinate or scorpioid), often bractless. (A rather large family of innocent, mucilaginous, and slightly bitter plants; the roots of some species yielding a red dye.)

Tribe I. *HELIOTROPIEÆ*. Ovary not lobed; fruit separating into 2-4 nutlets.

1. *Heliotropium*. Corolla salver-form. Stamens included. Nutlets 1-2-celled.

Tribe II. *BORRAGINEÆ*. Ovary deeply 4-parted, forming as many separate 1-seeded nutlets in fruit; style rising from the centre between them.

* Corolla and stamens regular.

+ Nutlets armed, attached laterally: corolla short, closed by 5 scales.

2. *Cynoglossum*. Nutlets horizontally radiate, much produced downward, covered with barbed prickles.

3. *Echinosperrum*. Nutlets erect or ascending, the margin or back armed with barbed prickles.

+ + Nutlets not armed, attached more or less laterally.

4. *Krynitzkia*. Corolla short, white, with closed throat. Nutlets attached along the inner angle.

5. *Mertensia*. Corolla trumpet-shaped with open throat, usually blue. Nutlets fleshy, attached just above the base.

+ + + Nutlets unarmed, attached by the very base, ovoid, mostly smooth and shining.

+ + Scar flat, small. Racemes leafy-bracteate, except in n. 6.

6. *Myosotis*. Corolla short salver-form, its lobes rounded, and throat crested.

7. *Lithospermum*. Corolla salver-form to funnel-form, its rounded lobes spreading; the throat either naked or with low crests.

8. *Onosmodium*. Corolla tubular, unappendaged, its erect lobes acute.

+ + Scar large and excavated.

9. *Symphytum*. Corolla oblong-tubular, enlarged above and closed by 5 scales.

* * Corolla irregular, limb and throat oblique and lobes unequal.

10. *Lycopsis*. Corolla-tube curved, closed with hispid scales. Stamens included.

11. *Echium*. Dilated throat of corolla unappendaged. Stamens unequal, exserted.

ASPERUGO PROCUMBENS, L., a European annual, well marked by its much enlarged membranaceous and veiny fructiferous calyx, has sparingly appeared in waste grounds about New York and Philadelphia, and at Pipestone, Minn.

1. HELIOTRØPIUM, Tourn. TOURNSOLE, HELIOTROPE.

Corolla salver-form or funnel-form, unappendaged, more or less plaited in the bud. Anthers nearly sessile. Style short; stigma conical or capitate. Fruit 2-4-lobed, separating into 2 indurated 2-celled and 2-seeded closed carpels, or more commonly into 4 one-seeded nutlets.—Herbs or low shrubby plants; leaves entire; fl. in summer, white (in our species). (The ancient name, from *ἥλιος*, the sun, and *τροπή*, a turn, with reference to its flowering at the summer solstice.)

§ 1. *HELIOTROPIUM* proper. Fruit 4-lobed, separating into four 1-celled 1-seeded nutlets. Style short.

* Flowers in bractless one-sided scorpioid spikes.

H. EUROPEUM, L. Erect annual (6-18' high), hoary-pubescent; leaves oval, long-petioled; lateral spikes single, the terminal in pairs; calyx spreading in fruit, hairy.—Waste places, southward; scarce. (Adv. from Eu.)

1. *H. Curassavicum*, L. Apparently annual, glabrous; stems ascending; leaves lance-linear or spatulate, thickish, pale, almost veinless; spikes in pairs.—Sandy seashore, Va.; saline soils, S. Ill., and south and westward.

* * Inflorescence not at all scorpioid; flowers scattered.

2. *H. tenellum*, Torr. A span to a foot high, paniculately branched, slender, strigose-canescens; leaves narrowly linear, with revolute margins; flowers often bractless.—Open dry ground, Ky. to Mo. and Kan., south to Ala. and Tex.

§ 2. *EÜPLOCA*. Fruit didymous, the 2 carpels each splitting into two 1-seeded nutlets; style elongated; flowers scattered, large.

3. *H. convolvulaceum*, Gray. Low annual, strigose-hirsute and hoary, much branched; leaves lanceolate, or ovate or even linear, short-petioled; flowers opposite the leaves and terminal; corolla 6' broad, the strigose-hirsute tube about twice as long as the linear sepals. — Sandy plains, Neb. to W. Tex. A showy plant, with sweet-scented flowers.

§ 3. *TIARÍDIUM*. Fruit 2-lobed, separating into two 2-celled 2-seeded carpels, with sometimes a pair of empty false cells; style very short; flowers in bractless scorpioid spikes.

H. ÍNDICUM, L. Erect and hairy annual; leaves petioled, ovate or oval and somewhat heart-shaped; spikes single; fruit 2-cleft, mitre-shaped, with an empty false cell before each seed-bearing cell. (*Heliophyllum indicum*, DC.) — Waste places, along the great rivers, from S. Ind. to Mo., and southward. (Adv. from India.)

2. CYNÓGLÓSSUM, Tournef. HOUND'S-TONGUE.

Corolla funnel-form, the tube about equalling the 5-parted calyx, and throat closed with 5 obtuse scales; lobes rounded. Stamens included. Nutlets depressed or convex, oblique, fixed near the apex to the base of the style, roughened all over with short barbed or hooked prickles. — Coarse herbs, with a strong scent and petioled lower leaves; the mostly panicled (so-called) racemes naked above, usually bracted at base. Fl. all summer. (Name from *κύων*, a dog, and *γλῶσσα*, tongue; from the shape and texture of the leaves.)

C. OFFICINÁLE, L. (COMMON HOUND'S-TONGUE.) Biennial; clothed with short soft hairs, leafy, panicled above; upper leaves lanceolate, closely sessile by a rounded or slightly heart-shaped base; racemes nearly bractless; corolla reddish-purple (rarely white); nutlets flat on the broad upper face, somewhat margined. — Waste ground and pastures; a familiar and troublesome weed; the large nutlets adhering to the fleece of sheep, etc. (Nat. from Eu.)

1. *C. Virginicum*, L. (WILD COMFREY.) Perennial; roughish with spreading bristly hairs; stem simple, few-leaved (2-3° high); stem-leaves lanceolate-oblong, clasping by a deep heart-shaped base; racemes few and corymbed, raised on long naked peduncles, bractless; corolla pale blue; nutlets strongly convex. — Open woods, Ont. and Sask. to Fla. and La.

3. ECHINOSPÉRMUM, Lehm. STICKSEED.

Corolla salver-form, short, imbricated in the bud, the throat closed with 5 short scales. Stamens included. Nutlets erect, fixed laterally to the base of the style or central column, triangular or compressed, the back armed all over or with 1-3 marginal rows of prickles which are barbed at the apex, otherwise naked. — Rough-hairy and grayish herbs, with small blue to whitish flowers in racemes or spikes; ours annuals or biennials, flowering all summer. (Name compounded of *ἐχίνος*, a hedgehog, and *σπέρμα*, seed.)

* Racemes panicled, leafy-bracteate at base; slender pedicels recurved or deflexed in fruit; calyx-lobes short, at length reflexed; biennial, not hispid.

1. *E. Virginicum*, Lehm. (BEGGAR'S LICE.) Stem 2-4° high; radical leaves round-ovate or cordate, slender-petioled; cauline (3-8' long) ovate-

oblong to oblong-lanceolate, acuminate at both ends; loosely paniculate racemes divaricate; pedicel and flower each a line long; nutlets of the globose fruit equally short-glochidiate over the whole back. (*Cynoglossum Morisoni*, DC.) — Borders of woods and thickets, N. Eng. to Minn., south to Va. and La.

2. *E. deflexum*, Lehm., var. *Americanum*, Gray. Diffusely branched, about 1° high, leaves oblong to lanceolate; racemes lax, loosely paniculate; flowers small; nutlets of the globular-pyramidal fruit only marginally glochidiate. — Iowa, Minn., and northward.

3. *E. floribundum*, Lehm. Rather strict, 2° high or more; leaves oblong- to linear-lanceolate, the lowest tapering into margined petioles; racemes numerous, commonly geminate and in fruit rather strict; corolla larger (blue, sometimes white), 2-3' in diameter; nutlets scabrous and margined with a close row of flat subulate prickles. — Minn. and Sask., and westward.

* * Racemes leafy-bracteate, stout pedicels not deflexed; calyx becoming foliaceous; leaves linear, lanceolate, or the lower spatulate; hispid annuals.

E. LÁPPULA, Lehm. Erect, 1-2° high, nutlets rough-granulate or tuberculate on the back, the margins with a double row of slender distinct prickles, or these irregular over most of the back. — Waste and cultivated grounds, from Canada to the Middle Atlantic States. (Nat. from Eu.)

4. *E. Redówsii*, Lehm., var. *occidentale*, Watson. Erect, 1-2° high, at length diffuse; nutlets irregularly and minutely sharp-tuberculate, the margins armed with a single row of stout flattened prickles sometimes confluent at base. — Minn. to Tex., and westward.

4. KRYNÍTZKIA, Fisch. & Meyer.

Calyx 5-parted or deeply cleft, erect or little spreading in fruit. Corolla short, usually with more or less fornicate throat. Nutlets erect and straight, unarmed, attached to the axis either at inner edge of base or ventrally from the base upward. — Ours are very hispid annuals or biennials, with small white flowers in scorpioid spikes. A large western genus. (Dedicated to Prof. J. Krynitzki, of Cracow.)

1. *K. crassisépala*, Gray. Annual, diffusely much branched, a span high, very rough-hispid; leaves oblanceolate and linear-spatulate; flowers very small, short-pedicelled, mostly bracteate; lobes of the persistent calyx closed over the fruit, the midrib below becoming much thickened and indurated; nutlets ovate, acute, dissimilar, 3 of them muricate-granulate and 1 larger and smooth, attached from the base to the middle. — Plains, Sask. to Kan., Tex. and N. Mex.

5. MERTÉNSIA, Roth. LUNGWORT.

Corolla trumpet-shaped or bell-funnel-shaped, longer than the deeply 5-cleft or 5-parted calyx, naked, or with 5 small glandular folds or appendages in the open throat. Anthers oblong or arrow-shaped. Style long and thread-form. Nutlets ovoid, fleshy when fresh, smooth or wrinkled, obliquely attached next the base by a prominent internal angle; the scar small. — Smooth or soft-hairy perennial herbs, with pale and entire leaves, and handsome purplish-blue (rarely white) flowers, in loose and short panicled or corymbed raceme-like clusters, only the lower one leafy-bracted; pedicels slender. (Named for Prof. Francis Charles Mertens, a German botanist.)

* *Corolla trumpet-shaped, with spreading nearly entire limb and naked throat; filaments slender, exerted; hypogynous disk 2-lobed.*

1. *M. Virginica*, DC. (VIRGINIAN COWSLIP. LUNGWORT. BLUE BELLS.) Very smooth, pale, erect (1-2° high); leaves obovate, veiny, those at the root (4-6' long) petioled; corolla trumpet-shaped, 1' long, many times exceeding the calyx, rich purple-blue, rarely white; nutlets dull and roughish. — Alluvial banks, N. Y. to Minn., S. C., and Ark. May. Cultivated for ornament.

* * *Corolla with conspicuously 5-lobed limb, and crested throat.*

+ *Filaments broad and short; nutlets dull, wrinkled or roughish when dry.*

2. *M. paniculata*, Don. Roughish and more or less hairy, erect (1-2° high), loosely branched, leaves ovate and ovate-lanceolate, taper-pointed, ribbed, thin; corolla (6" long) somewhat funnel-form, 3-4 times the length of the lance-linear acute divisions of the calyx, filaments broader and shorter than the anthers. — Shore of L. Superior and north and westward. July and Aug.

3. *M. lanceolata*, DC. Glabrous or hirsute, pale, 1° high or less, simple or branched, leaves spatulate-oblong to lanceolate-linear, smaller (1-2' long), nearly veinless, obtuse or acute; corolla-tube somewhat longer than the lanceolate calyx-lobes; filaments generally longer than the anthers. — The Dakotas to N. Mex. and westward.

+ + *Filaments longer and narrower than the anthers; nutlets shining, utricular.*

4. *M. maritima*, Don. (SEA LUNGWORT.) Spreading or decumbent, smooth, glaucous; leaves fleshy, ovate or obovate or spatulate, the upper surface becoming papillose; corolla white, bell-funnel-form (3" long), twice the length of the calyx. — Sea-coast, on rocks and sand, Cape Cod to Maine and northward; scarce. June-Aug.

6. MYOSOTIS, Dill. SCORPION-GRASS. FORGET-ME-NOT.

Corolla salver-form, the tube about the length of the 5-toothed or 5-cleft calyx, the throat with 5 small and blunt arching appendages opposite the rounded lobes; the latter convolute in the bud! Stamens included, on very short filaments. Nutlets smooth, compressed, fixed at the base; the scar minute. — Low and mostly soft-hairy herbs, with entire leaves, those of the stem sessile, and with small flowers in naked racemes, which are entirely bractless, or occasionally with one or two small leaves next the base, prolonged and straightened in fruit. Flowering through the season. (Name composed of *μῦς*, mouse, and *ὅτος*, ear, in allusion to the aspect of the short and soft leaves in some species; one popular name is MOUSE-EAR.)

* *Calyx open in fruit, its hairs appressed, none of them hooked or glandular.*

M. palustris, Withering. (TRUE FORGET-ME-NOT.) Perennial; stems ascending from an oblique creeping base (9-20' high), loosely branched, smoothish; leaves rough-pubescent, oblong-lanceolate or linear-oblong; calyx-lobes much shorter than its tube; limb of corolla 3 or 4 lines broad, sky-blue with a yellow eye. — In wet ground, probably only escaped from cultivation. (Nat. from Eu.)

1. *M. laxa*, Lehm. Perennial from filiform subterranean shoots; stems very slender, decumbent; pubescence all appressed; leaves lanceolate-oblong

or somewhat spatulate; calyx-lobes as long as its tube; limb of corolla 2 or 3" broad, paler blue. (*M. palustris*, var. *laxa*, Gray.) — In water and wet ground, Newf. to N. Y. (Eu.)

* * *Calyx closing or the lobes erect in fruit, clothed with spreading hairs, some minutely hooked or gland-tipped; corolla small; annual or biennial.*

2. *M. arvensis*, Hoffm. Hirsute with spreading hairs, erect or ascending (6-15' high); leaves oblong-lanceolate, acutish; racemes naked at the base and stalked; corolla blue, rarely white; pedicels spreading in fruit and longer than the 5-cleft equal calyx. — Fields, etc.; not very common. (Eu.)

3. *M. verna*, Nutt. Bristly-hirsute, branched from the base, erect (4-12' high); leaves obtuse, linear-oblong, or the lower spatulate-oblong; racemes leafy at the base; corolla very small, white, with a short limb; pedicels in fruit erect and appressed at the base, usually abruptly bent outward near the apex, rather shorter than the deeply 5-cleft unequal (somewhat 2-lipped) very hispid calyx. — Dry ground, rather common. May-July.

M. versicolor, Pers. More slender than the last, simple at base; racemes loose, mostly naked at base; flowers almost sessile; corolla pale yellow changing to blue or violet; calyx deeply and equally 5-cleft. — Fields, Del. (Nat. from Eu.)

7. LITHOSPÉRMUM, Tourn. GROMWELL. PUCCOON.

Corolla funnel-form, or sometimes salver-shaped; the open throat naked, or with a more or less evident transverse fold or scale-like appendage opposite each lobe; the spreading limb 5-cleft, its lobes rounded. Anthers oblong, almost sessile, included. Nutlets ovate, smooth or roughened, mostly bony or stony, fixed by the base; scar nearly flat. — Herbs, with thickish and commonly red roots and sessile leaves; flowers solitary and as if axillary, or spiked and leafy-bracted, sometimes dimorphous as to insertion of stamens and length of style. (Name formed of *λίθος*, stone, and *σπέρμα*, seed, from the hard nutlets.)

§ 1. *Nutlets tubercled or rough-wrinkled and pitted, gray and dull; throat of the (nearly white) corolla destitute of any evident folds or appendages.*

L. arvense, L. (CORN GROMWELL.) Minutely rough-hoary, annual or biennial; stems erect (6-12' high); leaves lanceolate or linear, veinless; corolla scarcely longer than the calyx. — Sandy banks and roadsides. May-Aug. (Nat. from Eu.)

§ 2. *Nutlets smooth and shining, white like ivory; corolla greenish-white or pale-yellow, small, with 5 distinct pubescent scales in the throat; perennial.*

L. officinale, L. (COMMON GROMWELL.) Much branched above, erect (1-2° high); leaves thinnish, broadly lanceolate, acute, with a few distinct veins, rough above, soft-pubescent beneath; corolla exceeding the calyx. — Roadsides, N. Eng. to Minn. (Nat. from Eu.)

1. *L. latifolium*, Michx. Stem loosely branched, erect (2-3° high), rough; leaves ovate and ovate-lanceolate, mostly taper-pointed (even the floral ones 2-4' long), ribbed-veined, roughish above, finely soft-pubescent beneath, the root-leaves large and rounded; corolla shorter than the calyx. — Open ground and borders of woods, W. New York to Minn., south to Va. and Ark.

§ 3. *BÁTSCHIA*. Nutlets white, smooth and shining; corolla large, salver-form or nearly so, deep orange-yellow, somewhat pubescent, the tube much

exceeding the calyx, and the throat appendaged. (Roots perennial, long and deep, yielding a red dye.)

* Corolla-tube one half to twice longer than the calyx, not much longer than the ample limb, the lobes entire; appendages little if at all projecting.

2. *L. hirtum*, Lehm. Hispid with bristly hairs (1-2° high); stem-leaves lanceolate or linear, those of the flowering branches ovate-oblong, bristly-ciliate; corolla woolly-bearded at the base inside (limb 8-12" broad); flowers distinctly peduncled, crowded, showy; fruiting calyx (½ long) 3-4 times longer than the nutlets. — Pine barrens, etc., N. Y. to Minn., south and westward. April-June.

3. *L. canescens*, Lehm. (Puccoon of the Indians.) Softly hairy and more or less hoary (6-15' high); leaves obtuse, linear-oblong, or the upper ovate-oblong, more or less downy beneath and roughish with close appressed hairs above; flowers sessile; corolla naked at the base within; fruiting calyx (3" long) barely twice the length of the nutlets. — Plains and open woods, in sandy soil, Ont. to Va., Ala., and westward. May.

** Corolla-tube in well-developed flowers 2-4 times the length of the calyx and of its erose-toothed lobes, and the appendages conspicuous and arching; later flowers small, cleistogenous.

4. *L. angustifolium*, Michx. Erect or diffusely branched from the base, 6-18' high, minutely rough-strigose and hoary; leaves linear; flowers pedicelled, leafy-bracted, of two sorts; the earlier large and showy (corolla-tube 8-18" long), the later and those of more diffusely branching plants, with inconspicuous or small and pale corollas, without crests, and the pedicels commonly recurved in fruit; nutlets usually punctate. (*L. longiflorum*, Spreng.; the long-flowered form.) — Dry and sterile or sandy soil, Ind. and Mich. to the Dakotas and Tex., and westward.

8. ONOSMODIUM, Michx. FALSE GROMWELL.

Calyx 5-parted; the divisions linear and erect. Corolla tubular, or tubular-funnel-form, not crested (the sinuses minutely hooded-inflexed), the 5 acute lobes converging or barely spreading. Anthers oblong-linear or arrow-shaped, mucronate, inserted in the throat. Style thread-form, much exerted. Nutlets bony, ovoid, smooth, erect, fixed by the base; the scar minute, not hollowed out. — Chiefly perennial herbs, coarse and hispid, with oblong and sessile ribbed-veined leaves, and white, greenish, or yellowish flowers, in at length elongated and erect leafy raceme-like clusters; in summer. — Our species belong to true *ONOSMODIUM*, with smooth included anthers on very short filaments; the corolla rarely twice the length of the calyx. (Named from the likeness to the genus *Onosma*, which name means ass-smell.)

1. *O. Virginianum*, DC. Clothed all over with harsh and rigid appressed short bristles; stems rather slender (1-2° high); leaves narrowly oblong, or oblong-lanceolate (1-2½ long), the lower narrowed at base; lobes of the narrow corolla lance-awl-shaped, sparingly bearded outside with long bristles. — Banks and hillsides, N. Eng. to Fla., Mo., and La.

2. *O. Carolinianum*, DC. Shaggy all over with long and spreading bristly hairs; stem stout, upright (2-4° high); leaves ovate-lanceolate or

oblong-lanceolate, acute; lobes of the rather broad corolla ovate-triangular or triangular-lanceolate, thickly hirsute outside. — Alluvial grounds, W. New York to Minn., south to Ga. and Tex.

Var. *molle*, Gray. Pubescence shorter and less spreading or appressed, 1-2° high; leaves mostly smaller (2' long), when young softly strigose-canescens beneath. (*O. molle*, Michx.) — Ill. to Minn., Tex., and westward.

9. SÝMPHYTUM, Tourne. COMFREY.

Corolla oblong-tubular, inflated above, 5-toothed; the short teeth spreading; the throat closed with 5 converging linear-awl-shaped scales. Stamens included; anthers elongated. Style thread-form. Nutlets smooth, ovate, erect, fixed by the large hollowed base, which is finely toothed on its margin. — Coarse perennial herbs, with thickened bitterish mucilaginous roots; the nodding raceme-like clusters either single or in pairs. (Ancient Greek name from *συμφεῖν*, to grow together, probably for its reputed healing virtues.)

S. OFFICINALE, L. (COMMON COMFREY.) Hairy, branched, winged above by the decurrent leaves; the lower leaves ovate-lanceolate, tapering into a petiole, the upper narrower; corolla yellowish-white, rarely purplish. — Moist places; escaped from gardens. June. (Adv. from Eu.)

10. LYCÓPSIS, L. BUGLOSS.

Corolla funnel-shaped, with curved tube and slightly unequal limb; the throat closed with 5 convex obtuse bristly scales opposite the lobes. Stamens and style included. Nutlets rough-wrinkled, erect, fixed by a hollowed-out base. — Annuals. (Name from *λύκος*, a wolf, and *ὄψις*, face.)

L. ARVENSIS, L. (SMALL BUGLOSS.) Very rough-bristly (1° high); leaves lanceolate; flowers in leafy raceme-like clusters; calyx as long as the tube of the small blue corolla. — Dry or sandy fields, New Eng. to Va.; scarce. (Adv. from Eu.)

11. ÉCHIUUM, Tourne. VIPER'S BUGLOSS.

Corolla with a cylindraceous or funnel-form tube, and a more or less unequal spreading 5-lobed border; lobes rounded, the expanded throat naked. Stamens mostly exerted, unequal. Style thread-form. Nutlets roughened or wrinkled, fixed by a flat base. (A name of Dioscorides, from *ἔχis*, a viper.)

E. VULGARE, L. (BLUE-WEED.) Rough-bristly biennial; stem erect (2° high), mostly simple; stem-leaves linear-lanceolate, sessile; flowers showy, in short lateral clusters, disposed in a long and narrow thyrsus; corolla reddish-purple changing to brilliant blue (rarely pale). — Roadsides and meadows of the Middle Atlantic States. June. (Nat. from Eu.)

ORDER 73. CONVULVULACEÆ. (CONVOLVULUS FAMILY.)

Chiefly twining or trailing herbs, often with some milky juice, with alternate leaves (or scales) and regular 5-androus flowers; a calyx of 5 imbricated sepals; a 5-plaited or 5-lobed corolla convolute or twisted in the bud (imbricate in n. 6); a 2-celled (rarely 3-celled) ovary (or in one tribe 2 separate pistils), with a pair of erect ovules in each cell, the cells sometimes doubled by a false partition between the seeds, so becoming 4-celled; the embryo large, curved or coiled in mucilaginous albumen. — Fruit a globular 2-6-seeded capsule. Flowers mostly showy, on axillary peduncles; pedicels articulated, often 2-bracted. (Many are culti-