

Laboratory 17: Asteridae – Part 2

Today we begin with the core Asteridae, with members of both Euasterid I and II. Solanales (Solanaceae, Convolvulaceae, and Boraginaceae), Gentianales (Rubiaceae, Apocynaceae), Apiales (Apiaceae, Araliaceae), and Dipsacales (Caprifoliaceae, Adoxaceae). The Core Asterids have **sympetalous corollas** (fused petals), **epipetalous stamens**, and **equal numbers of stamens and petals** (features which are also present in some members of the Ericales); but in some families, 1 or (rarely) more stamens may be sterile or lost.

Core Asterids:

Euasterids I

Solanaceae – Nightshade Family; 147 genera, 2,930 spp.

Herbs, shrubs, trees and vines. **Hairs often stellate or branched**. Leaves usually simple; usually alternate and spiral, sometimes with paired leaves on same side of stem. Stipules absent. Inflorescence determinate, terminal but appearing axillary. Flowers regular, bisexual. **Sepals 5, fused**. Petals 5 (rarely more), fused; **corolla distinctly plicate (folded), wheel-like to funnel-shaped to tubular**. Stamens 5 (rarely 4–8), epipetalous; filaments often short; anthers opening by slits or pores, sometimes connate, typically bright yellow. Ovary superior, slightly offset from median axis; carpels 2 with **numerous ovules**. Fruit a **berry** or capsule.

Solanum

Nicotiana

Brugmansia

Vestia

Iochroma

Convolvulaceae – Morning Glory Family; 55 genera, 1,930 spp.

Herbaceous or woody **vines**, occasionally parasitic and lacking chlorophyll; **sap usually milky**. Leaves alternate, simple, sometimes lobed; stipules generally absent. Inflorescence determinate, terminal or axillary. Flowers bisexual and regular. **Sepals 5, distinct or only slightly fused**. Petals 5, fused; **corolla distinctly plicate (folded) and often twisted in bud, funnel-shaped to salverform**. Stamens 5, epipetalous at the base; **anthers often twisted**. Ovary superior; carpels 2. Nectar disc usually lobed. Fruit a 4-seeded capsule.

Ipomoea

Convolvulus

Boraginaceae – Borage Family; includes Hydrophyllaceae (Waterleaf Family); 134 genera, 2,650 spp.

Mostly herbs, also shrubs, trees, and lianas; **vegetative parts generally covered with rough hairs**. Leaves usually simple, alternate; stipules absent. **Inflorescences generally coiled (helicoïd or scorpioid cyme), terminal**. Flowers radial, generally bisexual. Sepals 5, distinct to fused. Petals 5, fused; **corolla usually wheel-like, sometimes funnel-shaped or tubular, distinctly plicate (folded)**. Stamens 5, epipetalous. Ovary superior, **usually deeply 4-lobed (sometimes spherical)**; style often bifid, generally **gynobasic** (or terminal when ovary spherical); carpels 2; locules 4. Nectar disk present at base of ovary. Fruit a dry or +- fleshy drupe (with 1--4 seeds each forming a **nutlet**) or 2-valved capsule.

Borago

Echium

Anchusa

Omphalodes

Pulmonaria

Phacelia

Nemophila

Apocynaceae – Dog-Bane Family; includes Asclepiadaceae (Milkweed Family); 355 genera, 3,700 spp.

Herbs, shrubs, trees, and vines (sometimes succulent); **with milky sap**. Leaves opposite or whorled, simple; stipules generally absent, **colleters (sticky hairs) usually at base of petiole**. Inflorescence determinate. Flowers radial, bisexual. Sepals 5, usually fused, sometimes reflexed, often with colleters at base of adaxial surface. Petals 5, fused; corolla wheel-like to tubular, **often with coronal appendages inside corolla**. Stamens 5, short, epipetalous or fused to the style column by sheath; **anthers sometimes fused to stigma or appearing so**. Ovary generally superior; carpels 2, **usually separate below, fused above**; styles connate, with expanded heads. **Pollen often united into larger pollinia**. Fruit variable.

Vinca

Apocynum

Asclepias

Carallum

Euasterids II

Adoxaceae – Elderberry Family; 5 genera, 245 spp. (genera in this family have previously been included within Caprifoliaceae)

Small trees, shrubs, or perennial herbs. Leaves **opposite; simple, trifoliate, to pinnately compound**. Flowers bisexual, **radially symmetric**. Sepals 2-5, connate, reduced with only a single vascular trace. **Petals 4-5, connate**, usually with **short tube and well-developed lobes**. Stamens 5, adnate to base of corolla. Carpels 3-5, connate, inferior or partially inferior. **Style short; stigma capitate**. Fruit a drupe.

Viburnum

Sambucus

Apiaceae (Umbelliferae) – Carrot Family; 430 genera, 3,800 spp.

Herbs, rarely shrubs, small trees, vines. **Plant tissues and fruits often strongly aromatic.** Stems usually hollow; stipules absent. Leaves generally alternate, **generally compound and/or deeply lobed, usually with sheathing petioles.** **Inflorescence an umbel, simple or compound, sometimes a head or head-like, often subtended by bracts.** Flowers generally bisexual. Sepals 5, distinct, very reduced or 0. Petals generally 5, usually distinct, but developing fused. Stamens 5, distinct, borne on epigynous disc (*i.e.* a stylopodium that produces nectar). **Ovary inferior;** carpels 2. **Fruit a dry schizocarp.**

Foeniculum

Zizia

Heracleum

Pimpinella

Sanicula

Araliaceae – Ginseng Family; 45 genera, 1,450 spp.

Woody, mostly shrubs; some herbaceous perennials. **Plants tissues strongly aromatic** (triterpenoid ethereal oils). **Leaves pinnately to palmately compound,** infrequently simple; **stipules generally present; large scars left on stem when leaves fall.** **Inflorescence, an umbel or head; simple to paniced.** Flowers generally bisexual. Sepals 5, reduced or 0. Petals generally 5. Stamens 5, distinct, borne on epigynous nectar disc. **Ovary inferior; carpels generally 1--5. Fruit usually a berry or drupe.**

Aralia

Cussonia

Hedera

Caprifoliaceae – Honeysuckle Family; 5 genera, 220 spp.

Primarily **trees or shrubs,** some vines. Leaves generally **opposite** and simple; stipules absent. Flowers bisexual, usually bilaterally symmetric, sometimes radial. **Sepals usually 5, fused; calyx constricted below the lobes. Petals 4--5, fused into a tube with 2 upper lobes and 3 lower.** Stamens 4--5; introrse dehiscence. **Ovary inferior;** carpels 3--5; style 1, elongate. Nectar produced by glandular hairs inside corolla tube. Fruit generally a berry.

Lonicera

Symphoricarpos

Rubiaceae – Coffee Family; 650 genera, 11,000 spp.

Herbs, trees and shrubs. **Leaves opposite** or whorled, simple; **stipules prominent, interpetiolar (between the petioles of opposite leaves), sometimes leaf-like, with colleters (sticky hairs) on adaxial surface.** Flowers generally bisexual and regular, often heterostylous, and frequently aggregated. Sepals 4--5. Petals 4--5, fused, often with colleters; corolla wheel- or funnel-shaped. Stamens 4--5, epipetalous. **Ovary inferior;** carpels usually 2. Nectar disc usually present, epigynous. Fruit a berry, drupe, or capsule.

Coffea

Gardenia

Psychotria

Galium

SOLANACEAE.²⁰⁸ NIGHTSHADE FAMILY

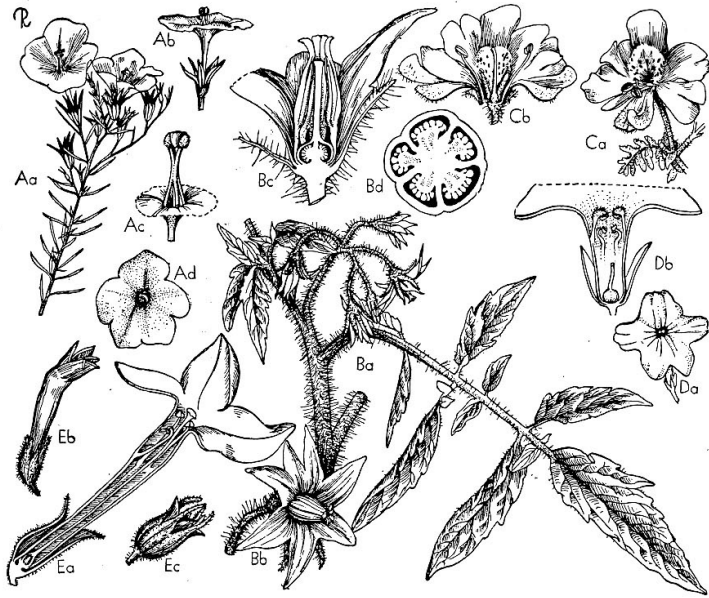


Fig. 275. SOLANACEAE. A, *Nierembergia hippomanica* var. *violacea*: Aa, flowering branch, $\times \frac{1}{2}$; Ab, flower, $\times \frac{1}{2}$; Ac, same, perianth partly excised, $\times 2$; Ad, flower, face view, $\times \frac{1}{2}$. B, *Lycopersicon esculentum*: Ba, flowering branch, $\times \frac{1}{2}$; Bb, flower, $\times 1$; Bc, flower, vertical section, corolla partly excised, $\times 2$; Bd, ovary, cross-section, $\times 5$. C, *Schizanthus pinnatus*: Ca, flower, $\times 1$; Cb, same, perianth expanded, $\times 1$. D, *Browallia viscosa*: Da, flower, face view, $\times \frac{1}{2}$; Db, flower, perianth excised in vertical section, $\times 1$. E, *Nicotiana glauca* var. *grandiflora*: Ea, flower, vertical section, $\times \frac{1}{2}$; Eb, bud, partially expanded, $\times \frac{1}{2}$; Ec, capsule, $\times \frac{1}{2}$. (From L. H. Bailey, *Manual of cultivated plants*, The Macmillan Company, 1949. Copyright 1924 and 1949 by Liberty H. Bailey.)

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CONVOLVULACEAE.²⁰¹ MORNING-GLORY FAMILY

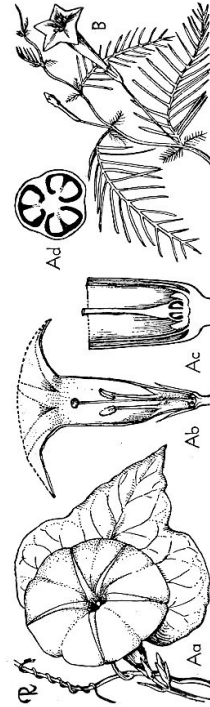


Fig. 266. CONVOLVULACEAE. A, *Ipomoea lewisii*: Aa, flowering branch, $\times \frac{1}{4}$; Ab, flower, vertical section, $\times \frac{1}{2}$; Ac, ovary, vertical section, $\times 4$; Ad, ovary, cross-section, $\times 20$. B, *Quamoclit pennata*: flowering branch, $\times \frac{1}{2}$. (From L. H. Bailey, *Manual of cultivated plants*, The Macmillan Company, 1949. Copyright 1924 and 1949 by Liberty H. Bailey.)

BORAGINACEAE.²⁰⁴ BORAGE FAMILY



Fig. 271. BORAGINACEAE. A, *Symphytum asperum*: Aa, flowering branch, $\times \frac{1}{4}$; Ab, cymule, $\times 1$; Ac, flower, $\times 1$; Ad, same, vertical section, $\times 2$; Ae, corolla expanded, $\times 1$; Af, ovary, habit, $\times 4$; Ag, same, vertical section, $\times 4$. B, *Anchusa azurea*: Ba, portion of flowering branch, $\times \frac{1}{2}$; Bb, flower, $\times 1$; Bc, nutlet, $\times 5$. C, *Echium plantagineum*: flowers, $\times \frac{1}{2}$. D, *Heliotropium arborescens*: Da, flowering branch, $\times \frac{1}{2}$; Db, flower, $\times 1$; Dc, pistil, $\times 3$; Dd, same, vertical section, $\times 3$. (From L. H. Bailey, *Manual of cultivated plants*, The Macmillan Company, 1949. Copyright 1924 and 1949 by Liberty H. Bailey.)

(HYDROPHYLLACEAE.²⁰³ WATERLEAF FAMILY) included in Boraginaceae

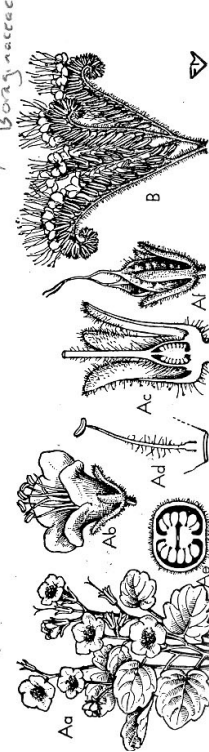


Fig. 270. HYDROPHYLLACEAE. *Phacelia campanularia*: Aa, flowering branches, $\times \frac{1}{2}$; Ab, flower, $\times 1$; Ac, same, vertical section, $\times 3$; Ad, stamen, $\times 1\frac{1}{2}$; Ae, ovary, cross-section, $\times 6$; Af, capsule, $\times 1$. B, *Phacelia tanacetifolia*: inflorescence, $\times \frac{1}{2}$. (From L. H. Bailey, *Manual of cultivated plants*, The Macmillan Company, 1949. Copyright 1924 and 1949 by Liberty H. Bailey.)

RUBIACEAE.²²³ MADDER FAMILY

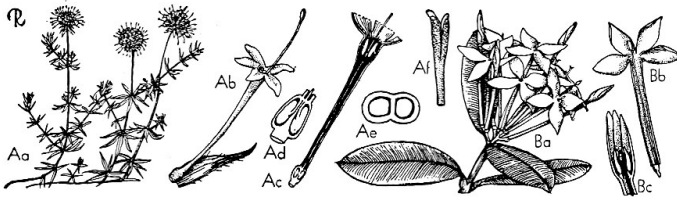


Fig. 288. RUBIACEAE. A, *Crucianella stylosa*: Aa, flowering stems, $\times \frac{1}{4}$; Ab, flower with subtending bract, $\times 1\frac{1}{2}$; Ac, same, vertical section (corolla-lobes excised), $\times 2$; Ad, ovary, vertical section, $\times 5$; Ae, ovary, cross-section, $\times 8$; Af, stigma, $\times 4$. B, *Ixora coccinea*: Ba, flowering twig, $\times \frac{1}{2}$; Bb, flower, perianth expanded, $\times \frac{1}{2}$; Bc, opening bud tip, vertical section, showing stamens, $\times 1$. (From L. H. Bailey, *Manual of cultivated plants*, The Macmillan Company, 1949. Copyright 1924 and 1949 by Liberty H. Bailey.)

APOCYNACEAE.¹⁹⁵ DOGBANE FAMILY

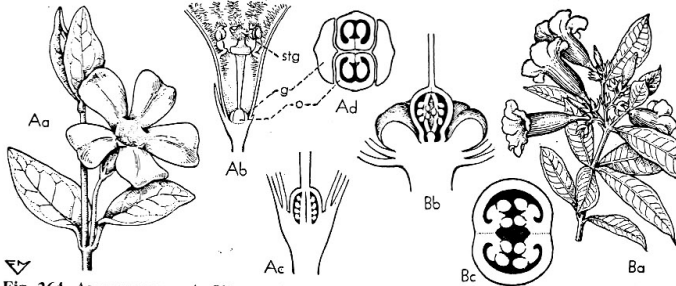


Fig. 264. APOCYNACEAE. A, *Vinca minor*: Aa, flowering branch, $\times 1$; Ab, flower, perianth in vertical section, $\times 2$; Ac, ovaries, vertical section, $\times 4$; Ad, same, cross-section, $\times 10$. B, *Allamanda nerifolia*: Ba, flowering branch, $\times \frac{1}{4}$; Bb, ovary, vertical section, $\times 3$; Bc, same, cross-section, $\times 10$. (g gland, o ovary, stig stigma.) (From L. H. Bailey, *Manual of cultivated plants*, The Macmillan Company, 1949. Copyright 1924 and 1949 by Liberty H. Bailey.)

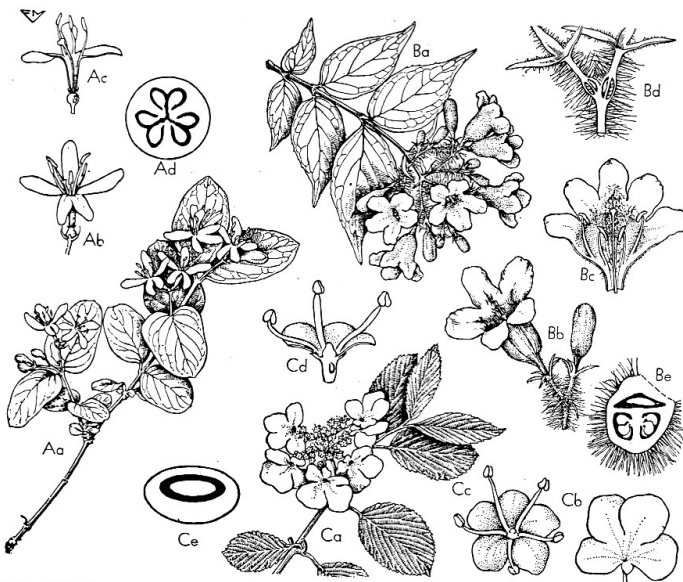


Fig. 289. CAPRIFOLIACEAE. A, *Lonicera tatarica*: Aa, flowering branch, $\times \frac{1}{2}$; Ab, flower, $\times 1$; Ac, same, vertical section, $\times 1$; Ad, ovary, cross-section, $\times 10$. B, *Kolkwitzia amabilis*: Ba, flowering branch, $\times \frac{1}{2}$; Bb, flower and bud, $\times 1$; Bc, corolla expanded, $\times 1$; Bd, ovaries, vertical section, $\times 2$; Be, same, cross-section, $\times 10$. C, *Viburnum tomentosum*: Ca, flowering branch, $\times \frac{1}{4}$; Cb, sterile flower, $\times \frac{1}{2}$; Cc, perfect flower, $\times 3$; Cd, same, vertical section, $\times 3$; Ce, ovary, cross-section. (From L. H. Bailey, *Manual of cultivated plants*, The Macmillan Company, 1949. Copyright 1924 and 1949 by Liberty H. Bailey.)

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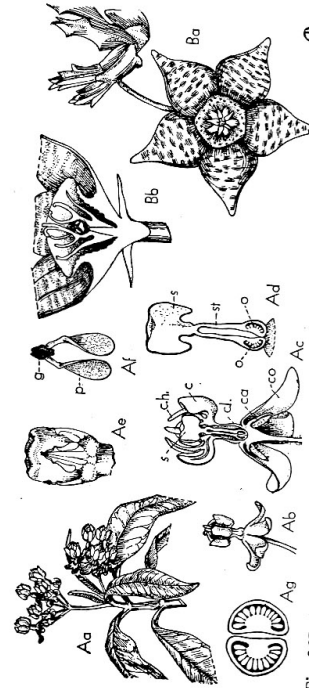


Fig. 265. ASCLEPIADACEAE. A, *Asclepias curassavica*: Aa, habit in flower, $\times \frac{1}{2}$; Ab, flower, vertical section, $\times 2$; Ad, gynostemium, vertical section, $\times 4$; Ae, stigma and anthers, $\times 4$; Af, anther, $\times 10$; Ag, ovaries, cross-section, $\times 10$. B, *Siapelia variegata*: Ba, branch in flower, $\times \frac{1}{4}$; Bb, flower, vertical section, perianth excised, $\times \frac{1}{2}$. (c column, hood, cl column, ch, corona horn, ca calyx, co corolla, g, gland, o ovary, p pollinium, s stigma, st style.) (From L. H. Bailey, *Manual of cultivated plants*, The Macmillan Company, 1949. Copyright 1924 and 1949 by Liberty H. Bailey.)

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Fig. 246. UMBELLIFERAE. A, *Apium graveolens*: Aa, inflorescence and leaf-blade, $\times \frac{1}{2}$; Ab, fruit, side and face view, $\times 10$. B, *Eryngium planum*: Ba, flowering branch, $\times \frac{1}{2}$; Bb, flower, $\times 3$. C, *Trachymene caerulea*: Ca, flowering branch, $\times \frac{1}{2}$; Cb, flower, $\times 3$; Cc, same, vertical section, $\times 3$; Cd, ovary, cross-section, $\times 10$. D, *Foeniculum vulgare*: Da, fruit, $\times 3$; Db, same, cross-section, $\times 6$. E, *Levisticum officinale*: Ea, inflorescence and leaf-blade, $\times \frac{1}{2}$; Eb, fruit, face view, $\times 3$; Ec, same, side view, $\times 3$. F, *Daucus Carota*: Fa, inflorescence and leaf-blade, $\times \frac{1}{2}$; Fb, umbel, $\times 4$; Fc, fruit, side and face view, $\times 4$. (From L. H. Bailey, *Manual of cultivated plants*, The Macmillan Company, 1949. Copyright 1924 and 1929 by Liberty H. Bailey.)

figure from Lawrence 1951 *Taxonomy of Vascular Plants*