GESNERIACEAE

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A pantropical family that extends into temperate zones, with 150 genera and 3,700+ species of herbs, subshrubs, shrubs, lianas, or rarely trees, these are terrestrial, epilithic or epiphytic, with erect, decumbent, hanging or climbing stems (Weber et al. 2020).

In the Neotropics, the family is represented by 77 genera and ~1,200 species of which six genera and 86 species are characterized as climbers that reach at least 2 m in length (Clark et al. 2020). These all belong to the tribe Gesnerieae, subtribe Columneinae (Weber et al. 2013). Gesneriaceae is mostly found in moist to wet forests at mid to high elevations, with centers of diversity in the northern Andes, Central America, the West Indies and in the Brazilian Atlantic Forest (Perret et al. 2012).

Diagnostics: Mostly epiphytic vines, root-climbers or less often scramblers, usually facultative epiphytes (rarely obligate), with quadrangular or terete, herbaceous, plagiotropic or pendent stems; fleshy, opposite leaves; and brightly colored large gamopetalous corollas, often subtended by bright bracts.

General Characters

1. STEMS. Herbaceous or woody with moderate secondary growth, quadrangular or cylindrical in cross section, mostly a few m long, but some reaching 15 m in length and 2–3 cm in diam. Cross sections show regular vascular anatomy where xylem forms a continuous cylinder, with narrow to wide vessels and inconspicuous to wide rays (Figure 123B).

Figure 123. *Drymonia serrulata.* **A.** Root-climbing vine with abundant adventitious roots along the nodes. **B**. Cross section of stem, showing regular anatomy with xylem in a continuous cylinder, large vessels, and wide rays. Photos by P. Acevedo.

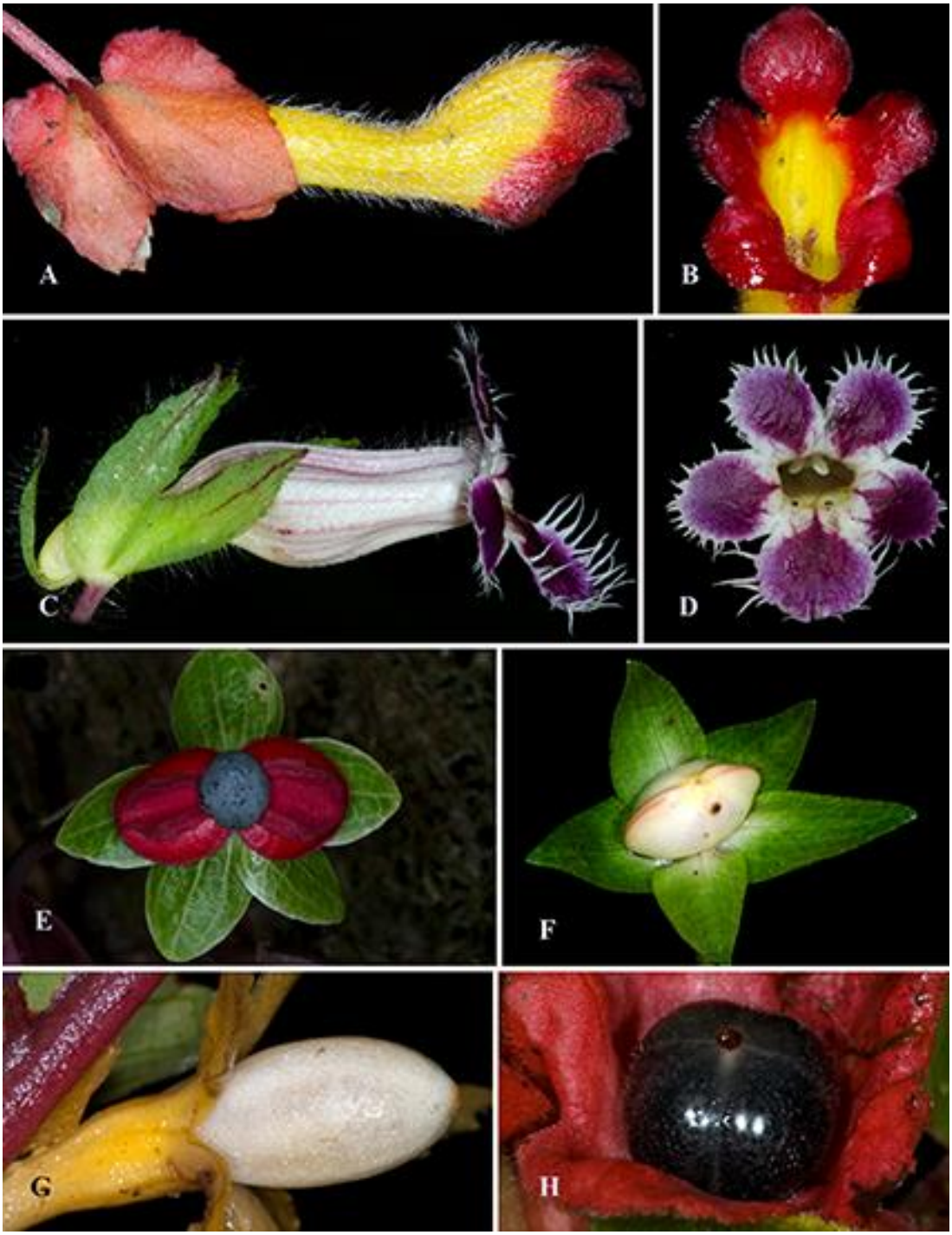


Figure 124. Flowers and fruits in Gesneriaceae. **A, B**. Resupinate flower of *Glossoloma tetragonoides* (ampliate on upper surface and medial lobe upward). **C, D**. Non-resupinate flower of *Drymonia croatii* (ampliate on lower surface and medial lobe downward). **E, F**. Dehisced (left) and immature (right) fruits featuring a display capsule in *Drymonia brochidodroma*. **G.** Mature berry in *Columnea tecta*. **H.** Mature berry featuring black seeds and translucent outer fruit wall in *Corytoplectus speciosus.* Photos by J.L. Clark.

2. EXUDATES. Watery or otherwise inconspicuous.

3. CLIMBING MECHANISMS. Most epiphytic species are root-climbers by means of adventitious roots (Figure 123A) as most climbing species are also epiphytes or climbing epiphytes; scramblers have been reported in a few species, e.g., *Alloplectus*.

4. INDUMENT. Glandular and non-glandular hairs are commonly present in all parts.

5. LEAVES. Opposite, rarely whorled, isophyllous or anisophyllous pairs, simple, usually unlobed, coriaceous to fleshy, short to long-petioled, with glandless blades, the margins entire, serrate or dentate; stipules absent.

6. INFLORESCENCE. An axillary cyme, often reduced, erect to pendent thyrses with dichasial cymes where each "dichasium" bears only two flowers, or flowers solitary; bracts small to foliaceous, sometimes colored.

7. PEDICELS. Of variable lengths but usually exceeding the length of the petioles.

8. FLOWERS. Bisexual, protandrous, often large and showy, 5-merous; calyx fused at base and sometimes appearing free; corolla sympetalous, zygomorphic, bilabiate, often spurred with nectar chamber at base, rarely actinomorphic, funnel-shaped, campanulate, urceolate, salverform, white, yellow, red, orange, purple, blueish, brown or combined colors, sometimes with markings (Figure 124A–D); stamens 4, inserted on the corolla tube and alternate to the corolla lobes, often didynamous and forming filament curtain, 1 stamen modified into a staminode, filaments connate at base, anthers connivent in pairs, opening by longitudinal slits or by 2–4 pores; nectary usually a dorsal gland, bilobed, rarely 5-lobed, rarely ring-shaped; ovary superior, syncarpous, 2-carpellate, commonly unilocular, placentation parietal, bifurcate with numerous ovules, the style 1 with stomatomorphic, bilabiate or capitate stigma.

9. FRUIT. Fleshy, bivalved, capsule with loculicidal dehiscence (rarely septicidal) or fleshy berries (Figure 124E–H); seeds many, minute, longitudinally striate, with fleshy funicle.

USES

Gesneriaceae is mostly known for its horticultural value, where numerous species and hybrids are commercially or locally cultivated for their beautiful flowers and foliage. In the Neotropics, a few climbing species are used in traditional medicines for the treatment of various ailments, e.g., *Codonanthopsis dissimulata* (H.E. Moore) Wiehler and *Drymonia coriacea* (Oerst. ex Hanst.) Wiehler are used to alleviate toothaches within Amazonian tribes (Vicker & Plowman 1984). *Drymonia serrulata* (Jacq.) Mart. and *Columnea rubriacuta* (Wiehler) L.P. Kvist & L.E. Skog are used for the treatment of eczemas and several species of *Columnea* are used to treat burns (Kvist 1989). The leaves of *Columnea sanguinea* (Pers.) Hanst. (as *Columnea picta*) are smoked by Indian tribes in lowland Ecuador as a stimulant (Kvist and Holm-Nielsen 1987). Several species of *Columnea* and *Drymonia* have been reported for the treatment of snake bites (Kvist 1986; Kvist & Holm-Nielsen 1987).

Key to the genera of climbing Gesneriaceae

1. Fruit a berry.....2

1. Fruit a fleshy bivalved capsule 3

2. Secondary venation suppressed or inconspicuous, foliage forming ant-nests....***Codonanthopsis***

2. Secondary venation conspicuous, foliage not forming ant-nests..... ***Columnea***

3. Flowers resupinate ..... ***Glossoloma***

3. Flowers not resupinate 4

4. Epiphytes with anthers dehiscing via basal pores (some terrestrial species with longitudinal dehiscence not included here).....***Drymonia***

4. Epiphytes with anthers dehiscing via longitudinal slits.....5

5. Anthers bearded with an apical tuft of elongate trichomes.....***Paradrymonia***

5. Anthers not bearded.....***Alloplectus***

ALLOPLECTUS Martius, Nova Gen. Sp. 3: 53. 1829 (nom. cons.).

Epiphytic subshrubs with plagiotropic branches, usually climbing or vine-like with

Alloplectus. A–B. *Alloplectus hispidus*. C. *Alloplectus weirii*, photos by J.L. Clark.

adventitious roots at the nodes, reaching up to 5 m in length; pubescence of simple hairs. Leaves opposite, with isophyllous or slightly anisophyllous pairs, petiolate, with entire to serrate margins. Flowers 5-merous, axillary, solitary or in reduced inflorescence and appearing in fascicles; pedicels elongated. Calyx reddish, yellow, orange or green, lobes nearly free, subequal, entire, serrate or fimbriate; corolla tubular and inflated on lower surface, constricted apically, yellow or red, glabrous internally, gibbous at base, lobes small; stamens 4, included, anthers coherent or later separating, dehiscing by longitudinal slits; staminode (when present) on dorsal surface; nectar bilobed; ovary superior, pilose, style stout, included. Fruit a fleshy, display

capsule with persistent sepals, valves 2, fully reflexed when mature. Seeds minute, numerous, irregular and longitudinally striate.

Distinctive features: Epiphytic vines, elongate and clambering, sometimes exceeding 4 m long, leaves isophyllous, flowers non-resupinate, solitary or fasciculate, usually with large, serrate or fimbriate sepals; corolla tubular, constricted apically, externally pilose and internally glabrous.

Distribution: A neotropical genus of five species, four of which, in addition to being epiphytic subshrubs, also grow as epiphytic or root-climbing vines; distributed in the northern Andes in Colombia, Venezuela, Ecuador and Peru; moist to wet forests; 500–3,800 m.

CODONANTHOPSIS Mansfeld, Repert. Spec. Nov. Regni Veg. 36: 120. 1934.

Epiphytic herbs or subshrubs, branches pendent, dorsiventral, or occasionally scandent with terete stems. Often forming a mutualistic association with arboreal tropical ants, where the plants fibrous roots reinforce nests and provide nutrients via extra-floral nectar, fruit pulp, and seeds arils. The ants facilitate seed dispersal (Wheeler 1921, Kleinfeldt 1978, Madison 1979, Marini 1999, Chautems & Perret 2013). Leaves opposite, in strongly anisophyllous pairs, shortly petiolate, lamina fleshy with prominent midvein, the smaller leaf of the pair reduced or vestigial, early caducous. Flowers in small, axillary fascicles, pedicellate. Calyx lobes nearly free,

Codonanthopsis macradenia, photo by Krzysztof Ziarnek.

elongated, unequal, 2 ventral lobes much longer than the other lobes, the dorsal lobe smaller, curved and appressed against the corolla spur. Corolla nearly campanulate, apically ampliate on lower surface, spurred (nectar chamber) at the base, white with purple maculation or lilac, lobes short; stamens included, inserted at base of tube, filaments short, flattened and basally connate, anthers coherent, with a narrow connective, dehiscing by apical slits; staminode absent; nectary a bilobed dorsal gland at the base of ovary; ovary superior, style stout, stigma club-shaped. Capsule berry-like, tardily dehiscent, fleshy, with 2 recurved valves.

Distinctive features: Epiphytic root-climbing vines, leaves strongly anisophyllous with smaller leaf of the pair stipule-like, corolla white or lilac with a spur at base, capsule fleshy, brightly colored.

Distribution: A neotropical genus of 13 species, four of which, in addition to being epiphytic subshrubs, are reported as climbers, sometimes reaching two or more m in length; moist and riparian vegetation, from southern Mexico to Bolivia and east to Bahia, Brazil; 70–1,200 m.

COLUMNEA Linnaeus, Sp. Pl. 638 ['938']. 1753.

Epiphytic herbs or subshrubs with spreading, dorsiventral, plagiotropic or pendent branches, sometimes climbing by means of adventitious roots, some species reported as lianas reaching a few m in length. Leaves opposite, in isophyllous or strongly anisophyllous pairs. Flowers axillary, solitary or in

Columnea ambigua, photo by P. Acevedo.

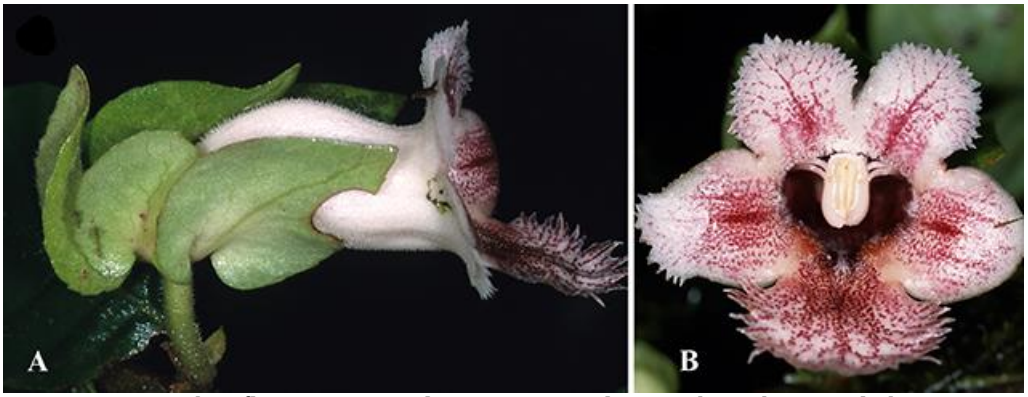
few-flowered cymes. Calyx with subequal lobes; corolla large, strongly or shallowly bilabiate, the tube funnel-shaped, gibbous at base, dorsal and lateral lobes forming a “galea” when strongly bilabiate, ventral lobe (lowermost) narrow and reflexed, yellow, red or orange, sometimes the tube yellow; stamens 4, longer than the tube, anthers cohering in pairs, staminodia absent; nectary ranging from a single dorsal lobe at base of ovary to five lobes surrounding ovary; stigma exserted usually bilobed. Fruit a globose or subglobose, fleshy berry with persistent sepals, usually white.

Distinctive features: Root-climbing lianas with large, pendent flowers. Often facultative epiphytes and many species dorsiventral with strongly anisophyllous leaves.

Distribution: A neotropical genus with over 200 species, distributed from southern Mexico to Bolivia and east to Bahia, Brazil, including the West Indies. Most species of *Columnea* are reported as facultative epiphytes with dorsiventral shoots, but rarely with a climbing habit. Often described as epiphytic herbs or shrubs; 41 species reported as climbers; moist forests; 700–5,400 m.

DRYMONIA Martius, Nova Gen. Sp. 3: 57. 1829.

Terrestrial or epiphytic subshrubs or root-climbing lianas. Stems quadrangular or terete, lianas commonly 2–3 m long, but some species reaching 8 or up to 15 m in



Drymonia serrulata flower. A. Lateral view. B. Frontal view, photos by J.L. Clark.

length (e.g., *D. serrulata* (Jacq.) Mart. & *D. variegata* L. Uribe), and ~3 cm in diam., often with adventitious roots (Figure 123A); cross section with xylem forming a continuous cylinder, with numerous wide rays (Figure 123B). Leaves opposite, in isophyllous pairs, petiolate, membranous, serrate. Flowers axillary, solitary or in few-flowered condensed, cymes; bracteoles often large, foliaceous, green or colored. Calyx lobes often large, green or colored, free or shortly connate, unequal with dorsal lobe shortest; corolla tubular or funnel-shaped, yellow, light yellow, white, purple, or combined colors, spurred at base, lobes usually spreading, rounded, and fimbriate, ventral lobes usually larger; stamens included, didynamous, filaments adnate to the tube base, occasionally contorted; anthers sagittate, coherent, dehiscing by 2–4 pores when epiphytic or rarely longitudinal slits when terrestrial, the filaments coiling and the anthers separating after anthesis; nectary a single dorsal lobe at the base of the ovary. Fruit usually a display capsule and rarely a berry, with orange, red, pink or purple valves, with reflexed spreading valves which, after opening, display a conical mass of seeds with fleshy funicles.

Distinctive features: Root-climbing lianas, leaves of a pair isophyllous, bracteoles foliaceous, green or colored, fruit a display capsule, with adaxially orange, red, pink or purple valves, reflexed and spreading when mature.

Distribution: A neotropical genus of ~78 species, distributed from southern Mexico to Bolivia and east to Bahia, Brazil. At least 31 species have been reported as climbing epiphytes or vines, most of which also grow as non-climbing epiphytes; evergreen moist forests, rainforests; 150–800 (1,725) m.

GLOSSOLOMA Hanstein, Linnaea 26: 191, 208, 209. 1854 ['1853'].

Terrestrial, epiphytic, or rarely lithophytic herbs or shrubs, sometimes climbing; stems quadrangular, often densely pubescent. Leaves opposite, in isophyllous pairs, long-petiolate, chartaceous, serrate. Flowers resupinate, axillary, solitary or in sessile fascicles; bracteoles small; pedicels elongate. Calyx lobes fused at base and appearing free, often large, green or colored, subequal, entire or serrate; corolla tubular, terminally ampliate on upper surface, yellow, orange, red or pink, spurred at base, lobes short, rounded and entire; stamens included, filaments adnate to the tube base, contorted, anthers coherent, dehiscing by longitudinal slits; nectary a bilobed gland at the base of ovary, style included, stigma subcapitate. Fruit a fleshy bivalved capsule, with persistent sepals at base, valves reflexed when mature.

Glossoloma A. *G. penduliflorum*. B. *Glossoloma* sp., photos by J.L. Clark.

Distinctive features: Root-climbing vines, flowers resupinate, calyx and pedicels reddish, fruit a fleshy bivalved capsule with persistent sepals, valves reflexed when mature.

Distribution: A neotropical genus of 30 species, distributed from southern Mexico to NW South America; five species reported as climbers; moist or wet forests; 1,200–1,700 m.

PARADRYMONIA Hanstein, Linnaea 26: 207. 1854 ['1853'].

Terrestrial herbs or subshrubs, or rarely root-climbing vines; stems terete, slender, reaching 5–6 m in length. Leaves petiolate, opposite, in isophyllous pairs, chartaceous to fleshy, with finely serrate margins. Flowers axillary, solitary, medium-sized. Calyx green, lobes free, lanceolate, unequal with dorsal lobe smaller; corolla fleshy, funnel-shaped, white with yellow and pink inside tube, spurred at base, lobes rounded, ventral lobe slightly wider; stamens included, anthers coherent; nectary bilobed, at the base of ovary. Fruit a bivalve fleshy capsule.

Paradrymonia campostyla, photo by Leslie Brothers.

Distinctive features: Root-climbing vine with cylindrical stems, leaves fleshy in isophyllous pairs, flowers solitary axillary, white with yellow and pink markings inside the tube; anthers often with barbate trichomes.

Distribution: A neotropical genus of 10 species, distributed from Honduras south to the NW half of South America, with only *P. campostyla* (Leeuwenb.) Wiehler recorded as a vine, 5–6 m long; distributed in Venezuela, Suriname and French Guiana; moist forest; 200–350 m.