

GUIDE TO THE GENERA OF LIANAS AND CLIMBING PLANTS IN THE NEOTROPICS

VIOLACEAE

By Juliana de Paula-Souza (Aug 2021)



Hybanthopsis bahiensis Paula-Souza, photo by J. Paula-Souza)

A cosmopolitan family of trees, shrubs, herbs and lianas, with woody members occurring predominantly in the tropics. Lianas in the Violaceae form a small group of ca. 25 species strongly supported in a “lianescent clade” that is disjunctly distributed in the Neotropics, *Anchietea* A.St.-Hil., *Calyptrion* Ging. and *Hybanthopsis* Paula-Souza, and the South Pacific islands, *Agatea* A. Gray (Paula-Souza & Pirani, 2014). The Neotropics therefore holds the highest generic diversity of this clade, with a total of 3 genera and 11 described species of lianas distributed in the Amazon lowlands and Atlantic moist forests, savannas and xerophytic vegetation (*carrascos* of the Brazilian Caatinga, *matorrales* of the inter-Andean dry valleys and inselbergs of the Brazilian Atlantic forest).

Diagnosics: Vegetative climbing Violaceae is recognized by the simple, alternate leaves, bearing a pair of minute (sometimes deciduous) stipules. The leaves are always glandular-serrate (though sometimes not evidently).

General Characters

1. **STEMS.** Cylindrical (fig. 1a) or sometimes asymmetrical (fig. 1b) in cross section with moderate secondary growth in *Calyptrion* and some species of *Anchietea* (e.g., *A. pyrifolia*) sometimes growing over 10 cm diam. and up to 20 m in length. *Hybanthopsis* and some *Anchietea* are rather delicate climbers or creepers with little lignified stems. Bark for the most part is smooth, becoming thick and corky in *Calyptrion arboreum* (L.) Paula-Souza. All examined genera have **regular** wood anatomy, where the xylem forms a continuous cylinder with numerous conspicuous narrow to wide rays (fig. 1a & b); phloem in *Anchietea pyrifolia* (Mart.) G. Don has a reddish or purplish coloration (fig. 1a).
2. **EXUDATES.** Scanty, clear, odorless or inconspicuous.
3. **CLIMBING MECHANISM.** All species of the lianescent clade have twinning stems with no further specialized fixation structures, in some species the upper branches sometimes are straight and scrambling.
4. **LEAVES.** Leaves simple, alternate, minutely stipulate, serrate or subentire, the teeth gland-tipped that are usually caducous with age (fig. 1c).
5. **INFLORESCENCES.** Solitary, axillary flowers ranging from poorly defined to well-defined axillary or terminal racemes (fig. 2c, d), or sometimes the rachis gradually reduced to form fasciculate inflorescences.
6. **FLOWERS.** White, creamy, yellowish, greenish, lilac or purplish, strongly zygomorphic, bisexual (except some *Anchietea*), 5-merous; sepals free, slightly unequal; petals free, the posterior pair smaller than the lateral pair, the anterior petal gibbous (in *Hybanthopsis*, fig. 2h) or bearing a prominent spur at the base which is usually twisted in *Calyptrion* (fig. 2f), the blade of the anterior petal slightly asymmetrical (fig. 2a, b); stamens 5, all tipped with membranous connective scales, the filaments of the anterior pair bearing an elongated nectary gland enclosed by the spur (fig. 2e, g), or a noduliform gland enclosed by the gibba (in *Hybanthopsis*); ovary superior, syncarpous, tricarpellate, multiovulate in each parietal placenta.
7. **FRUITS.** Woody/firmly coriaceous (fig. 4) or a membranous-inflated loculicidal capsule (fig. 3), splitting into 3-4 valves (usually before the maturation of seeds in *Anchietea*), or a membranous-inflated capsule opening by a single longitudinal slit.
8. **SEEDS.** Strongly flattened in *Calyptrion* and *Anchietea*, irregular and rather corky suggesting water dispersion (*Calyptrion*, fig. 4c & e), round or obovate, usually winged with entire or toothed margin, sometimes papery and evidently wind-dispersed (*Anchietea*; see

Paula-Souza & Pirani 2016); slightly flattened in *Hybanthopsis*, obovate with a pair of lateral projections at the base (fig. 5b).



Figure 1. Stem cross sections & leaf. **A.** Mature, fresh stem in *Anchietea pyrifolia*, showing a pinkish phloem area. **B.** Mature, dry stem in *Calyptrion arboreum* with thick corky bark. **C.** Leaf in *Anchietea pyrifolia* with serrate margins. Photos by P. Acevedo.

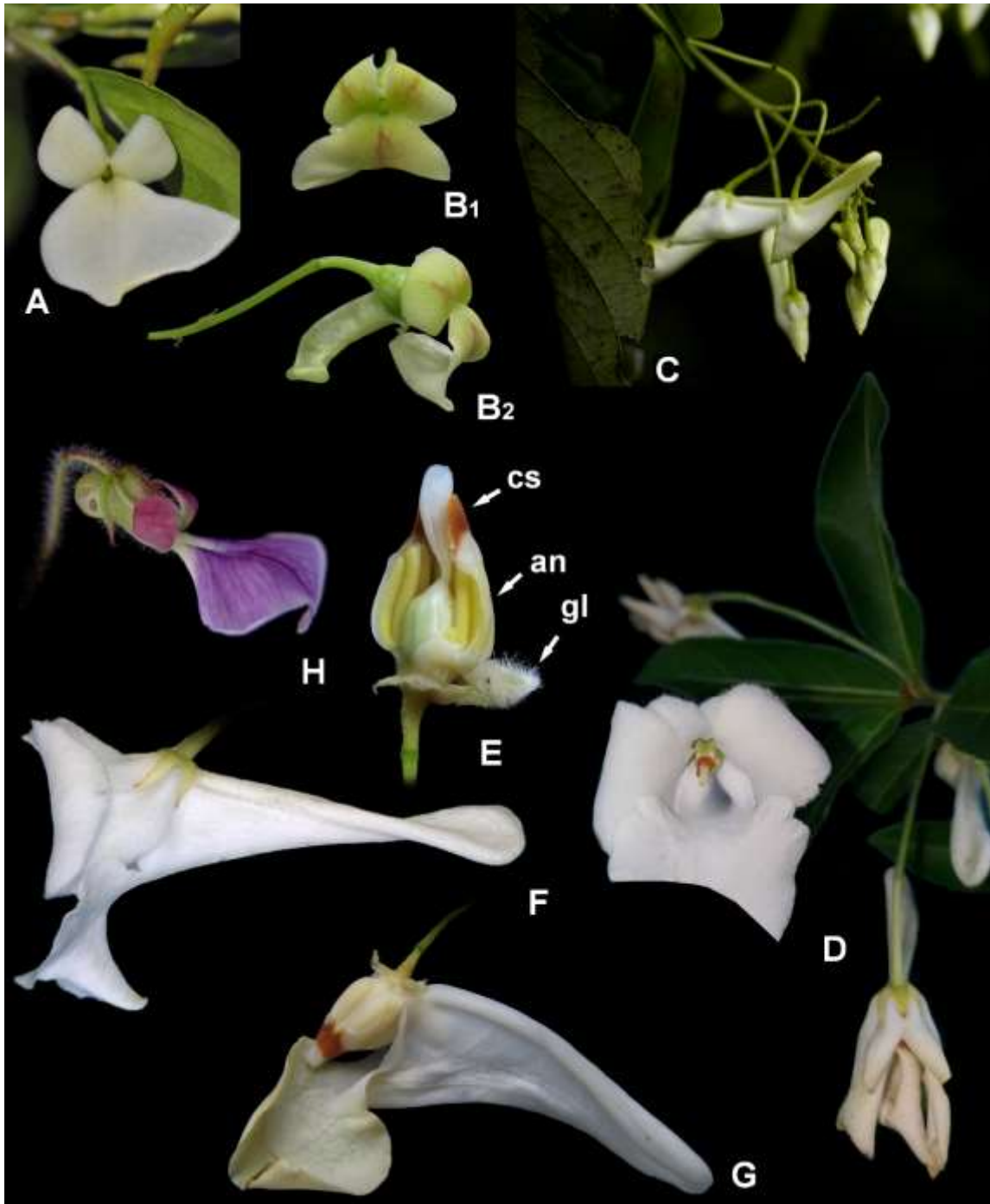


Figure 2. Floral diversity in lianescent Violaceae **A.** *Anchieta pyrifolia*. **B.** *Anchieta exalata*, frontal (B₁) and lateral (B₂) views **C.** *Calyptrion arboreum*, detail of inflorescence. **D.** *Calyptrion* cf. *pubescens*, flowering branch. **E.** *C. arboreum*, androecium with two stamens removed to expose the gynoecium (cs = connective scale; an = anther; gl = gland). **F.** *C.* cf. *pubescens*, flower in lateral view. **G.** *C. arboreum*, flower with posterior and lateral petals removed to expose the androecium and gynoecium. **H.** *Hybanthopsis bahiensis*. Photos: **A** by J.O.R. Franco; **B, E, G, H** by J. Paula-Souza; **C** by P. Acevedo; **D, F** by M. Engels.

USES

Anchietea pyrifolia is a very frequent vine in forest borders in Argentina, Bolivia, Paraguay and Brazil, popularly known in the latter as *cipó-suma* or *piriguaia*. The species has a long history of applications in traditional medicine as emetic, depurative, anti-inflammatory, and to treat rheumatism, whooping cough and adenoiditis (Saint-Hilaire, 1824; Tolouei et al. 2019). The Amazonian *Calyptrion arboreum* is reported as an effective vermifuge and emetic by some indigenous communities, but the utility of this or other species of the genus is largely unknown (Schultes, 1977). This species has very large and showy flowers, giving it an interesting ornamental potential (fig. 2c).

KEY TO THE GENERA

A. Flowering specimens

1. Flowers gibbous, bracteoles absent *Hybanthopsis*
1. Flowers distinctly spurred; bracteoles present 2
2. Flowers not showy, up to 1.5 cm long *Anchietea*
2. Flowers showy, over 3cm long *Calyptrion*

B. Fruiting specimens

1. Capsule woody or firmly coriaceous *Calyptrion*
1. Capsule membranous, inflated 2
2. Seeds strongly flattened, without lateral projections at the base, surface smooth or slightly rugose, glabrous or rarely pubescent-tomentose (some Andean specimens); capsule opening by 3-4 longitudinal slits *Anchietea*
2. Seeds (in dorsal view) obovoid with two lateral projections at the base, surface foveolate, puberulous; capsule opening by a single longitudinal slit *Hybanthopsis*

GENERIC DESCRIPTIONS

ANCHIETEA A. Saint-Hilaire, Ann. Sci. nat. (Paris) 2: 252. 1824.

Twining lianas, scandent herbs, subshrubs or shrubs. Stems terete, reaching more than 20



Figure 3. Diversity of fruits in *Anchietaea*. **A.** *A. selloviana*. **B.** *A. ballardii*. **C.** *A. pyrifolia*. **D.** *A. ferrucciae*. **E.** *A. exalata*. Photos: **A** by J. Carvalho Sobrinho; **B-E** by J. Paula-Souza.

m in length and ca. 10 cm in diam. (e.g., *A. pyrifolia*); cross section with regular anatomy, the xylem forming a continuous cylinder with numerous multilayer rays, the phloem conspicuously reddish or purplish with whitish rays (fig. 1a-b). Leaves alternate, glandular-serrate (fig. 1c); stipules minute. Flowers creamy, yellowish, or greenish, solitary or arranged in short axillary racemes, sometimes very reduced resembling a fascicle, bisexual (or functionally unisexual?), pedicels 2-bracteolate; sepals usually persistent in the fruit; posterior petals two, smaller, lateral petals two, intermediate, anterior petal shortly clawed and long-spurred; connective scales of stamens short; nectary glands elongate

and filiform; gynoecium 3-4 carpellate, ovules 5-48 in each placenta. Fruit a loculicidal capsule, 3-4 valvate, membranous, inflated, opening by 3-4 longitudinal slits sometimes before the full maturation of seeds (fig. 3). Seeds flat, discoid, bearing a membranous wing of variable width or reduced to a thickening around the seminiferous nucleus, pinkish when immature, drying beige or brown.

Distinctive features: Fruit inflated, membranous, the valves sometimes opening and exposing the pinkish seeds before it has fully matured; seeds discoid, in the most common species (*A. pyriformia*) bearing a broad, subentire wing, or in the remaining species the wing narrow and toothed or thickened (see Paula-Souza & Pirani, 2016).

Distribution: An exclusively neotropical genus with 6 species (*A. ballardii* Paula-Souza, *A. exalata* Eichler, *A. ferrucciae* Paula-Souza & Zmarzty, *A. frangulifolia* (Kunth) Melch., *A. pyriformia* (Mart.) G. Don & *A. selloviana* Cham. & Schltdl.) occurring in dry to mesic areas of extra-Amazonian South America.

CALYPTRION Gingins, Mém. Soc. Phys. Genève 2(1): 28. 1823.

Corynostylis Mart. (late 1823).

Twinning lianas or scandent shrubs; stems reaching 5 to 15 m in length and up to 10 cm in diam.; bark moderately to strongly corky; cross section terete or slightly asymmetrical with regular anatomy, the xylem forming a continuous cylinder with numerous narrow rays (fig. 1b).

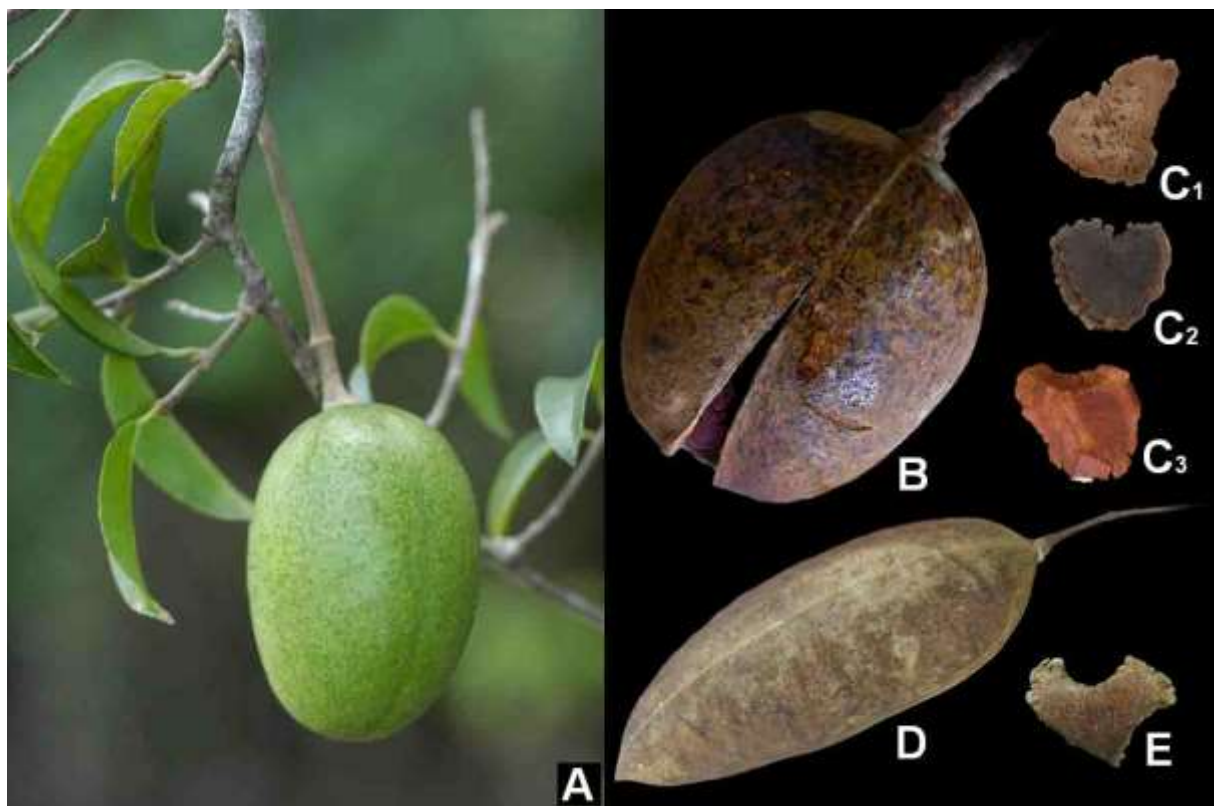


Figure 4. A-C. *Calyptrion arboreum*. A. Immature fruit; B. Mature fruit from dried herbarium specimen; C₁-C₃. Seeds. D-E. *C. pubescens*. D. Mature fruit from dried herbarium specimen; E. Seed. Photos: A by P. Acevedo; B-E by J. Paula-Souza.

Leaves alternate, glandular-serrate or subentire; stipules minute, caducous. Flowers white or creamy, solitary or arranged in short axillary racemes, sometimes very reduced resembling a fascicle, bisexual; pedicels 2-bracteolate; Sepals caducous; corolla of two posterior smaller petals, two lateral intermediate ones and a shortly clawed anterior petal modified into an elongated and usually twisted spur; connective scales of the stamens elongate, forming a tube around the style; nectary glands narrowly conical; gynoecium 3-carpellate with many ovules in each placenta. Fruit a loculicidal, firmly coriaceous to woody capsule (fig. 4a, b & d), opening by 3 longitudinal slits into three naviculate valves. Seeds flat, thick and rather fibrous, irregular in shape, drying brown or greyish, sometimes with darker marmorate markings (fig. 4c & e).

Distinctive features: Twining or scrambling lianas, flowers white or creamy, large and showy (fig. 2c-g), with the anterior petals modified into an elongated spur; fruit firmly coriaceous to woody and long-peduncled, splitting into three naviculate valves (fig. 4b).

Distribution: Four described species (*C. arboreum* (L.) Paula-Souza, *C. carthagenense* (H. Karst.) Paula-Souza, *C. pubescens* (S. Moore) Paula-Souza & *C. volubile* (L.B. Sm. & A. Fernández) Paula-Souza), predominantly Amazonian with *C. arboreum* extending north to southern Mexico and *C. pubescens* south to the Brazilian Pantanal.

HYBANTHOPSIS Paula-Souza, *Brittonia* 55(3): 210. 2003.

Twining herbaceous vines or subshrubs, generally creeping and low-climbing. Leaves alternate, glandular-serrate; stipules reddish to vinaceous, subulate, conspicuous, caducous. Flowers lilac or purplish, bisexual, solitary, axillary or arranged in poorly defined terminal racemes; bracteoles absent. Corolla with two posterior smaller petals, two lateral intermediate ones, and a distinctly clawed anterior petal that is gibbous at the base; connective scales of the stamens elongate, forming a tube around the style; nectary glands conical or noduliform, glabrous; gynoecium 3-carpellate with 10 ovules in each placenta. Fruit a loculicidal membranous capsule, opening by one longitudinal slit. Seeds obovate in dorsal view, with two lateral projections at the base, minutely pubescent, foveolate.

Distinctive features: Twining herbaceous vine; stipules and young stems reddish to vinaceous; flowers lilac or purplish, distinctively gibbous (fig. 2h); fruit inflated, membranous (fig. 5a); seeds in dorsal view obovate with two lateral projections at the base (fig. 5b).

Distribution: A Brazilian genus with a single species, *H. bahiensis* Paula-Souza, endemic to the Caatinga of Bahia and Sergipe, frequently found in disturbed places such as roadsides.



Figure 5. *H. bahiensis*. **A.** Habit. **B.** Seeds dorsal (B₁) and lateral (B₂) views. Photos by J. Paula-Souza.

RELEVANT LITERATURE

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