

VIOLACEAE

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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 ~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 three 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 (Figure 238A) or sometimes slightly flattened (Figure 238B) in cross section with moderate secondary growth in *Calyptrion* and some species of *Anchietea* (e.g., *A. pyrifolia* (Mart.) G. Don) 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 (Figure 238A, B); phloem in *Anchietea pyrifolia* has a reddish or purplish coloration (Figure 238A).

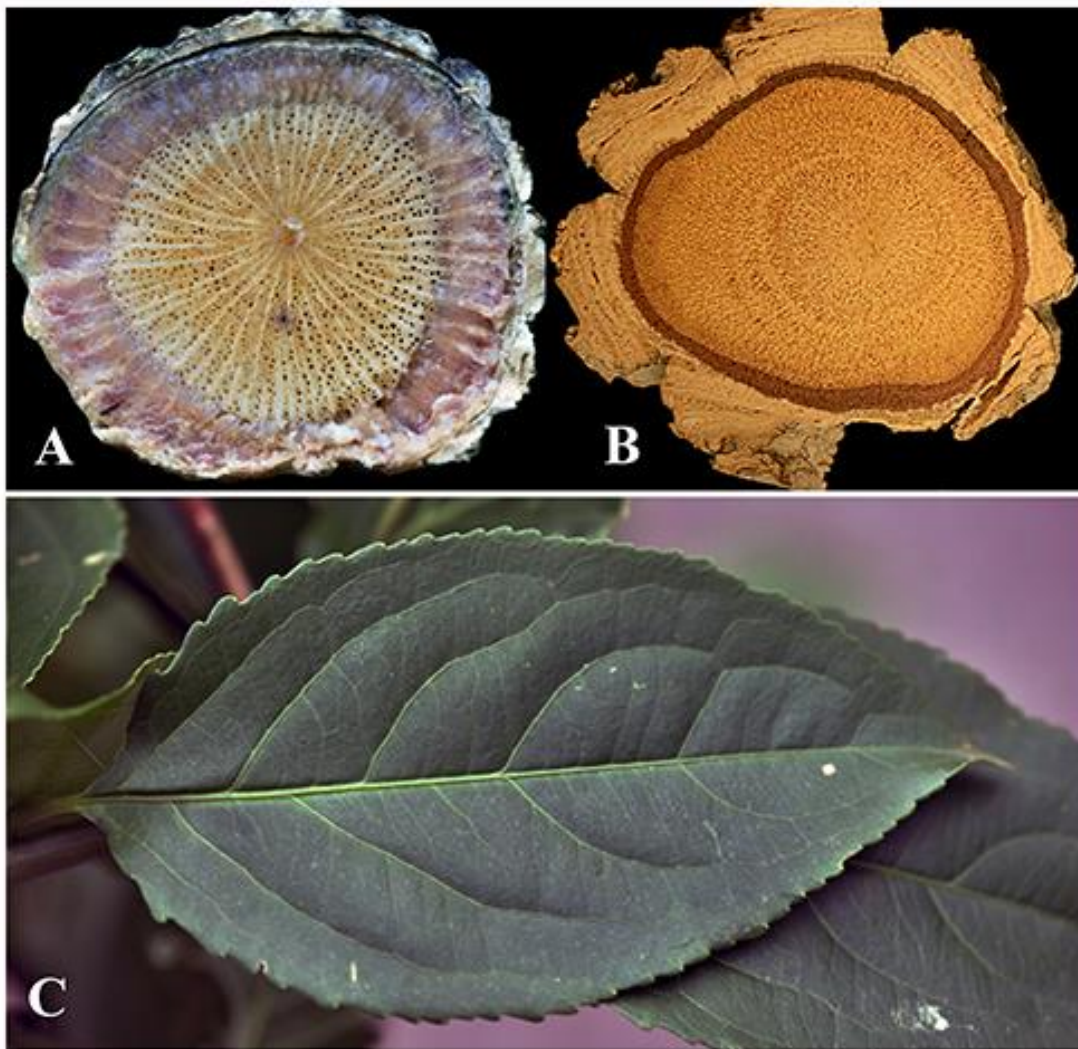


Figure 238. **A.** Mature, fresh stem cross section in *Anchieta pyrifolia*, showing a pinkish phloem area. **B.** Mature, dry stem cross section in *Calytrion arboreum* with thick corky bark. **C.** Leaf in *Anchieta pyrifolia* with serrate margins. Photos by P. Acevedo.

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 (Figure 238C).
5. INFLORESCENCES. Solitary, axillary flowers ranging from poorly defined to well-defined axillary or terminal racemes (Figure 239C, 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 gibbose (in *Hybanthopsis*, Figure 239H) or bearing a prominent spur at the base which is usually twisted in *Calyptrion* (Figure 239F), the blade of the anterior petal slightly asymmetrical (Figure 239A, B); stamens 5, all tipped with membranous connective scales, the filaments of the anterior pair bearing an elongated nectary gland enclosed by the spur (Figure 239E, G), or a knob-shaped gland enclosed by the gibba (in *Hybanthopsis*); ovary superior, syncarpous, tricarpellate, multiovulate in each parietal placenta.
7. FRUITS. Woody/firmly coriaceous (Figure 241) or a membranous-inflated loculicidal capsule (Figure 240), 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*, Figure 241C, 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 (Figure 242B).



Figure 239. Floral diversity in lianescent Violaceae **A.** *Anchieta pyrifolia*. **B.** *Anchieta exalata*, frontal (B₁) and lateral (B₂) views **C.** *Calyptrium arboreum*, detail of inflorescence. **D.** *Calyptrium* 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.

Key to the genera of climbing Violaceae

A. Flowering specimens

- 1. Flowers gibbose, 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*

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

Twining lianas, scrambling herbs, subshrubs or shrubs. Stems terete, reaching more than 20 m in length and ~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 (Figure 238A). Leaves alternate, glandular-serrate (Figure 238C); stipules minute. Flowers creamy, yellowish, or greenish, solitary or arranged in short

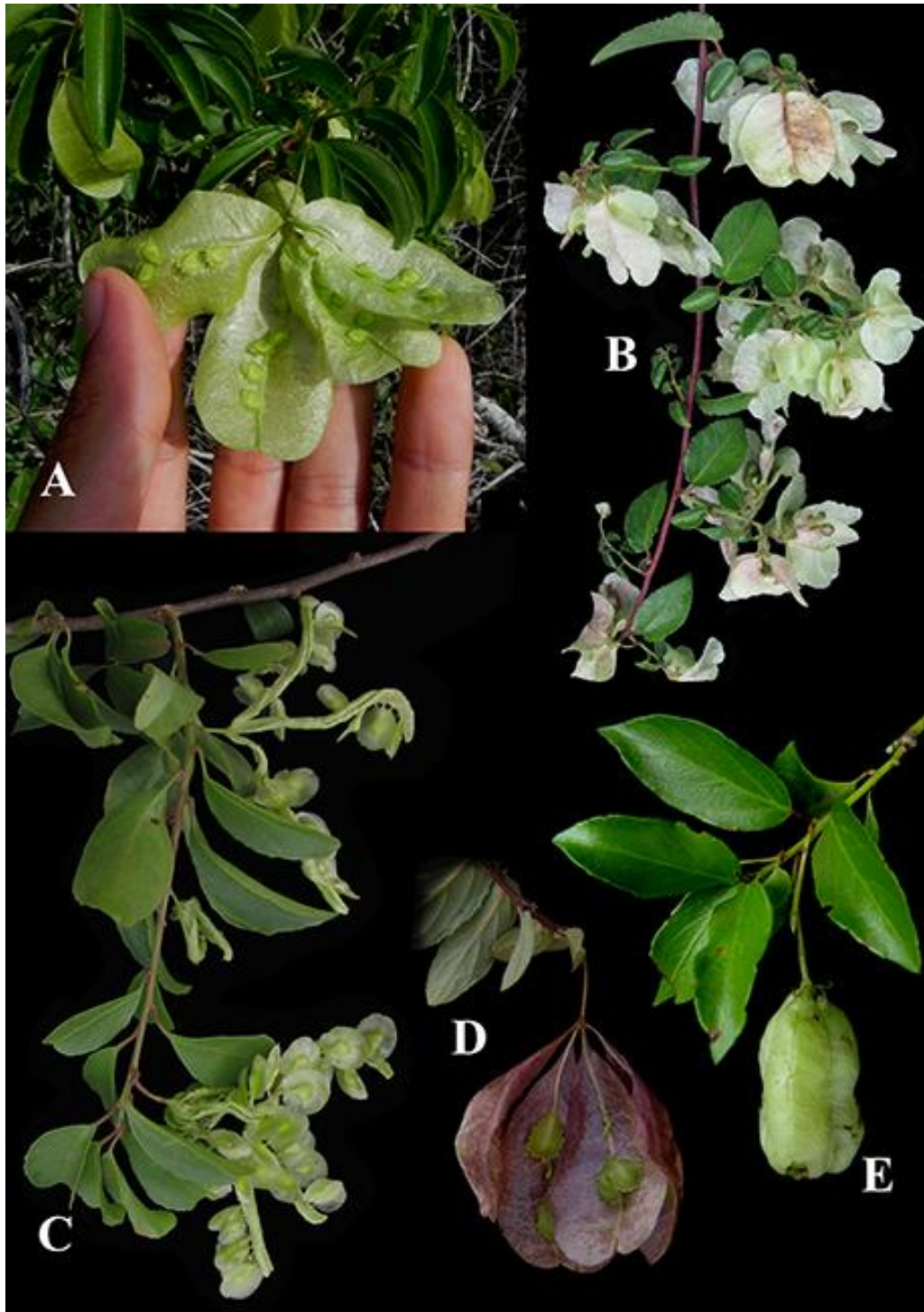


Figure 240. *Anchieta*, diversity of fruits. **A.** *A. selloviana*. **B.** *A. ballardii*. **C.** *A. pyrifolia*. **D.** *A. ferrucciae*. **E.** *A. exalata*. Photos: A by J. Carvalho Sobrinho; B–E by J. Paula-Souza.

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 (Figure 240). 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. pyrifolia*) 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 seven species (*A. ballardii* Paula-Souza, *A. exalata* Eichler, *A. ferrucciae* Paula-Souza & Zmarzty, *A. frangulifolia* (Kunth) Melch., *A. peruviana* Melch., *A. pyrifolia* (Mart.) G. Don & *A. selloviana* Cham. & Schltld.) occurring in dry to mesic areas of extra-Amazonian South America (Colombia, Peru, Bolivia, Brazil, Paraguay, northern Argentina); 60–600 (–3,000) m.

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

Corynostylis Mart. (late 1823).

Twinning lianas or scrambling shrubs; stems reaching 5–15 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 (Figure

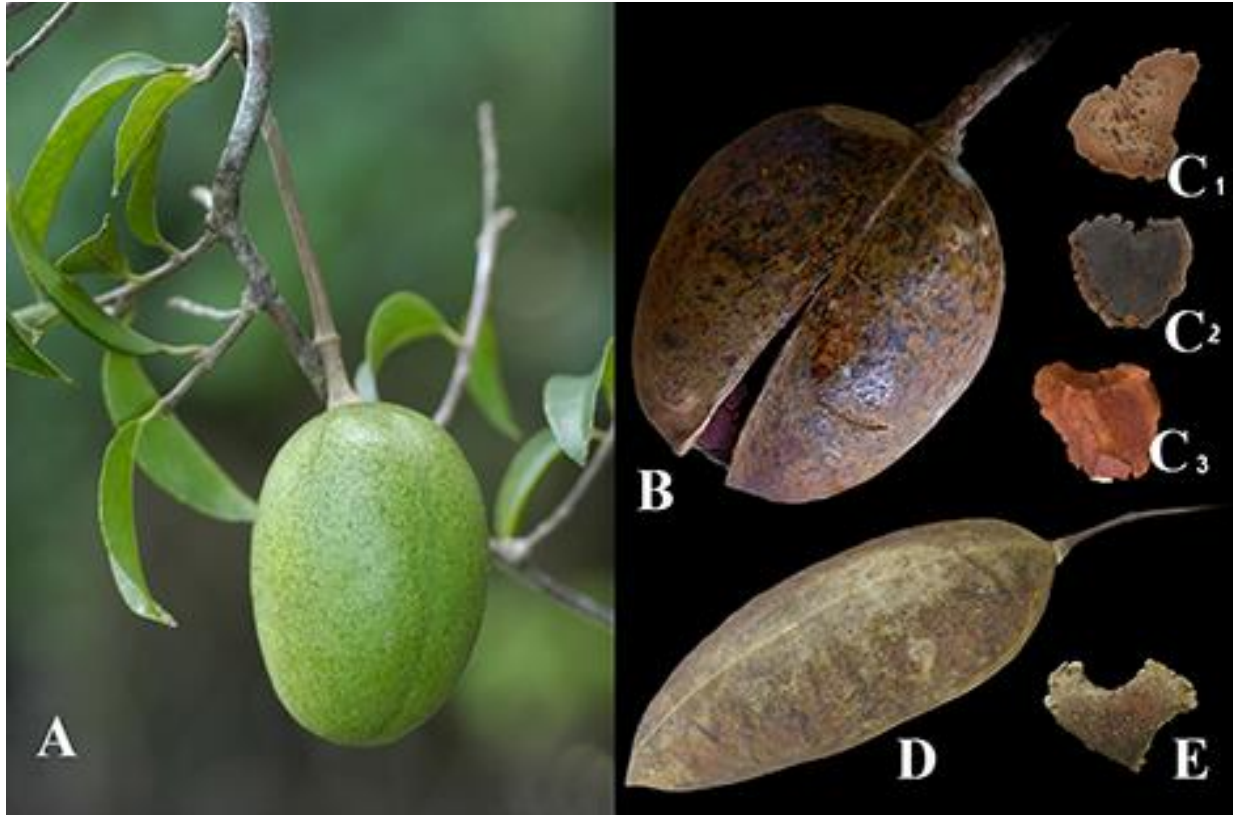


Figure 241. A–C. *Calyptrion arboreum*. A. Immature fruit. B. Mature fruit from herbarium specimen. C₁–C₃. Seeds. D–E. *C. pubescens*. D. Mature fruit from herbarium specimen. E. Seed. Photos: A by P. Acevedo; B–E by J. Paula-Souza.

238B). 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 (Figure 241A, 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 (Figure 241C, E).

Distinctive features: Twining or scrambling lianas, flowers white or creamy, large and showy (Figure 239C–G), with the anterior petals modified into an elongated spur; fruit firmly coriaceous to woody and long-peduncled, splitting into three naviculate valves (Figure 241B).

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 Dominican Republic, and *C. pubescens* south to the Brazilian Pantanal; 0–260 m.

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 gibbose at the base; connective scales of the stamens elongate, forming a tube around the style; nectary glands conical or knob-shaped, 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 gibbose (Figure 239H); fruit inflated, membranous (Figure 242A); seeds in dorsal view obovate with two lateral projections at the base (Figure 242B).

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