

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

NYCTAGINACEAE

By Pedro Acevedo-Rodríguez (March 2023)



Bougainvillea glabra Choisy, photo by P. Acevedo.

A tropical to warm temperate family of about 32 genera and 400 species of herbs, shrubs, trees and lianas. In the Neotropics, the family is represented by 28 genera and about 292 species, of which only 8 genera and 25 species are lianas or vines. For the most part, they are found in dry or semi-deciduous lowland forest. The most widespread species, *Pisonia aculeata* L. is pantropical and found throughout the lowlands of the Neotropics.

Diagnosics: Scrambling vines or lianas, stem cross-section with dispersed islands of interxylary phloem or with successive rings or bands of xylem and phloem; leaves simple, opposite or alternate, and entire, lacking stipules; flowers with gamosepalous, corolla-like calyx, corolla absent; fruit commonly an anthocarp.

General Characters

1. **STEMS.** Smooth, glabrous, to variously pubescent; herbaceous to woody, cylindrical, some genera with substantial secondary growth, some species reaching > 25 m in length and about 20 cm in diam., e.g., *Pisonia aculeata* L. Cross-sections show different

patterns of interxylary phloem strands imbedded within the secondary xylem, that is the result of differential production of phloem and conjunctive tissues (Neto et al. in prep.). There are two interxylary phloem patterns found in Nyctaginaceae lianas, i.e., **phloem islands** found in *Commicarpus* (fig. 1c), *Bougainvillea* (fig. 1d), *Pisonia* (fig. 1a & b) and *Pisoniella*, characterized by the presence of dispersed phloem strands within the xylem; and **concentric bands** found in *Bougainvillea* (fig. 2a & b), *Leucaster* (fig. 2c) and *Pisoniella* (fig. 2d), within the secondary xylem. Nyctaginaceae xylem is commonly dissected by numerous narrow rays. Bark smooth (e.g., *Pisonia*) to corky (e.g., *Commicarpus*, *Bougainvillea*).

2. EXUDATES. Clear, no visible exudate.
3. CLIMBING MECHANISMS. Most neotropical climbing Nyctaginaceae climb by **scrambling** over other plants, sometimes (e.g., *Pisonia*) holding on to host plants by short **cirri**-like branches that possess short axillary, recurved spines. The petioles in *Belemia fucsoides* Pires are reported as **prehensile** (Flora do Brasil 2020).
4. LEAVES. Alternate, opposite or verticillate, coriaceous to chartaceous, simple, short- to long-petioled, with gland-less blades and commonly entire margins; stipules absent.
5. INFLORESCENCE. Axillary dichasial or umbellate cymes, sometimes accompanied by brilliantly colored foliaceous bracteoles or bracts.
6. PEDICELS. Of variable lengths but usually >1 cm long (except in *Pisonia* where flowers are nearly sessile).
7. FLOWERS. Bisexual or rarely unisexual, actinomorphic, minute to large; calyx gamosepalous, of (3–)5(–8) sepals, resembling a corolla, funnel-shaped, campanulate or nearly hypocrateriform with the tube sometimes constricted near the middle; corolla wanting; stamens as many as the sepals, or less often fewer or more numerous, the filaments of equal or unequal lengths, shortly connate at base or less often distinct, the anthers opening by longitudinal slits; ovary superior, sessile or stipitate, often with an annular disc at base, 1-carpellate, with a single basal ovule, the style terminal, elongate.
8. FRUIT. Achene or nut enclosed by a hardened, persistent calyx (an anthocarp), sometimes with sticky glands (fig. 4a & b).

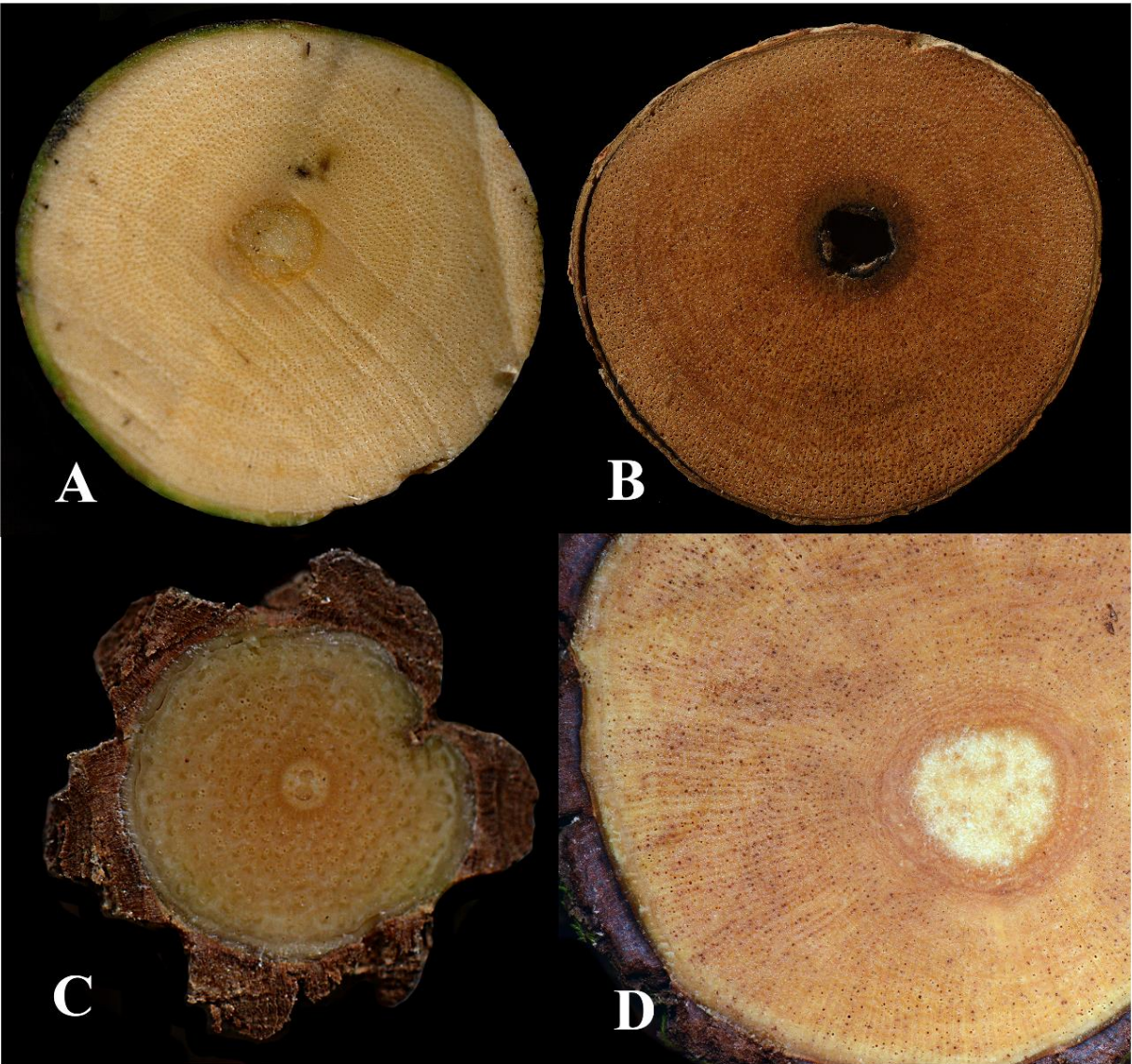


Figure 1. Cross-sections of Nyctaginaceae stems. **A.** *Pisonia aculeata*, fresh stem showing islands of interxylary phloem. **B.** *Pisonia aculeata*, dried stem showing islands of interxylary phloem. **C.** *Commicarpus scandens*, fresh stem showing islands of interxylary phloem. **D.** *Bougainvillea sp.* fresh stem, with interxylary phloem islands, xylem with numerous narrow rays. Photos by P. Acevedo.

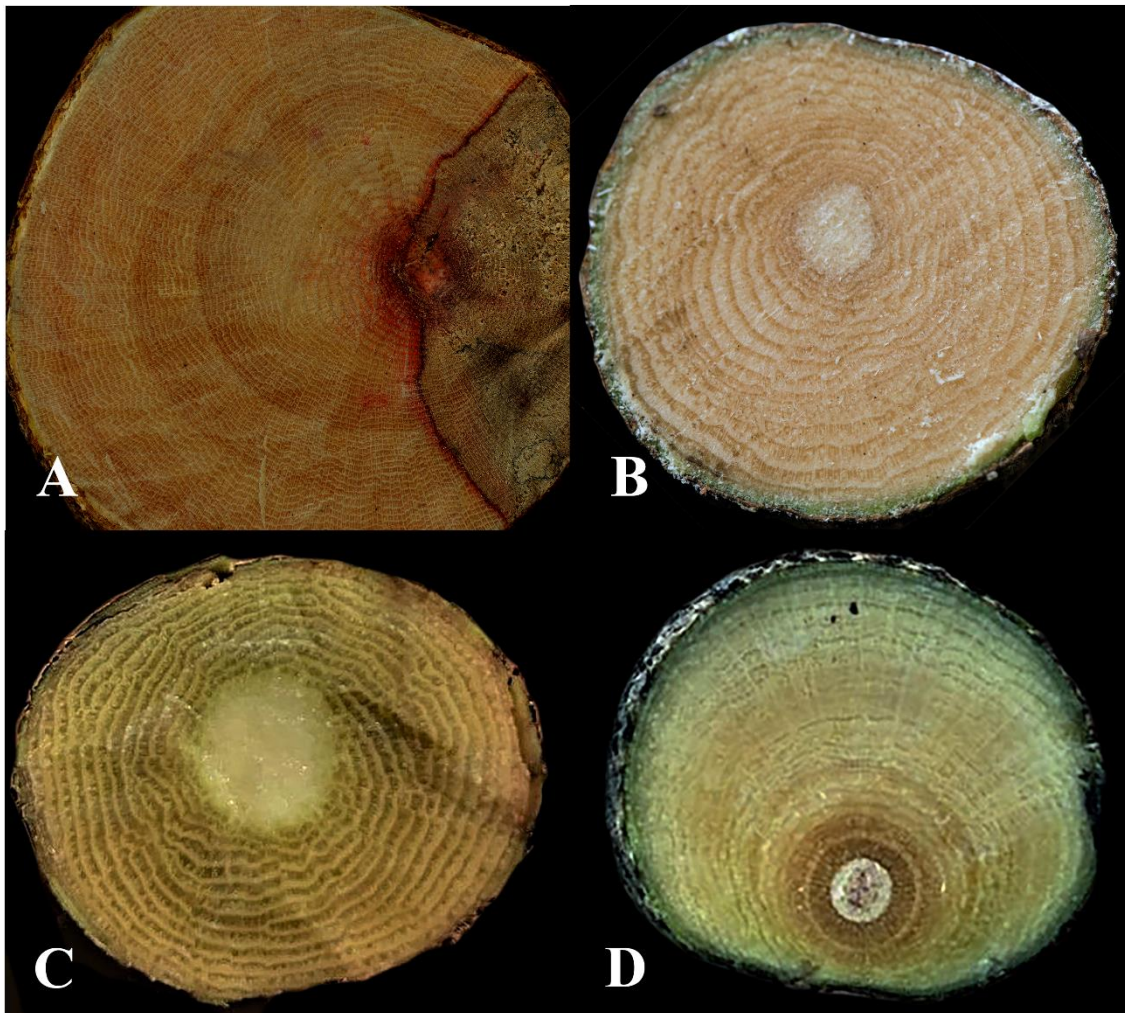


Figure 2. Cross-sections of Nyctaginaceae stems. **A.** *Bougainvillea campanulata*, fresh stem with successive bands of interxylary phloem. **B.** *Bougainvillea sp.*, fresh stem with successive interxylary phloem. **C.** *Leucaster caniflorus*, fresh stem with successive bands of interxylary phloem. **D.** *Pisonella arborescens*, fresh stem with successive bands of interxylary phloem. Photos by: A–B by P. Acevedo; C by Israel Neto; D by Marcelo R. Pace.



Figure 3. **A.** *Commicarpus scandens* a suffrutescent scrambling vine. **B.** *Leucaster caniflorus* a woody scrambling liana. Photos: A by P. Acevedo; B by Israel Neto.



Figure 4. Anthocarps in Nyctaginaceae. **A.** *Commicarpus scandens*, immature anthocarps with knobby, sticky glands distally on lower part of perianth. **B.** *Pisonia aculeata*, clavate anthocarps with 5 rows of sticky stipitate glands. Photos by P. Acevedo.

Key to the genera of climbing Nyctaginaceae

1. Plant herbaceous, the base becoming woody with age, reaching 2–2.5 m in length;
 inflorescence umbellate *Commicarpus*

1. Plant woody throughout, reaching 3 + m in length; inflorescence not umbellate2
2. Plants bearing axillary spines3
2. Plants unarmed.....4
3. Plant with short axillary cirri-like branches; axillary spines opposite or subopposite, short (ca.
 1 cm long) and recurved; bracteoles inconspicuous *Pisonia*
3. Plant without cirri-like branches; axillary spines alternate, straight, 2–5 cm long; bracteoles
 large, foliaceous, often bright colored *Bougainvillea*
4. Flowers pink or magenta.....5
4. Flowers greenish, yellowish or white6
5. Flowers magenta, > 2 cm long, glabrous, the tube constricted near the middle, *Belemia*
5. Flowers pink, ca. 1 cm long, with stipitate glands on lower half, the tube not constricted,
 *Pisoniella*
6. Inflorescence frondo-bracteate with cymes subtended by white leaf-like bracts *Colignonia*
6. Inflorescence distinctly differentiated from leafy branches, with inconspicuous bracts7
7. Pubescence of stellate hairs; flowers wide infundibuliform-plicate; stamens 2, included
 *Leucaster*
7. Pubescence of simple hairs; flowers campanulate or nearly so; stamens 4–8, exerted.....8
8. Scrambling shrubs to 5 m long; leaves fleshy-coriaceous; flowers bisexual; fruits not forming
 an anthocarp..... *Cryptocarpus*
8. Scrambling lianas > 10 m long; leaves chartaceous; flowers unisexual; fruit an anthocarp with
 5 rows of sticky, stipitate glands..... *Pisonia*

GENERIC DESCRIPTIONS

BELEMIA Pires, Bol. Mus. Paraense Emilio Goeldi, N.S. Bot. 52: 1. 1981.



Belemia fucsioides Pires, photo by Cyl Farney (RB).

Scrambling lianas, several m long, clinging through the aid of prehensile petioles; roots tuberous. Stems terete, herbaceous to slightly woody, fistulose. Leaves alternate, lanceolate, chartaceous, pinnately veined, with entire margins; petioles about half as long as the blades. Flowers bisexual, solitary or in 2–25-flowered racemose cymes, axillary or subterminal, long

pedicellate, without involucre; perianth deep pink, tubular, constricted below the middle, upper portion infundibuliform, with 5 plicate lobes; stamens 10–12, unequal, as long as the perianth, connate at the very base; ovary sessile, asymmetrical at base, style nearly as long as the perianth, stigma peltate. Fruits an ellipsoid or ovoid anthocarp.

Distinctive features: Herbaceous vines with prehensile petioles; leaves simple, alternate; flowers tubular, deep pink, large (> 2 cm long), constricted below the middle, lacking an involucre.

Distribution: A Brazilian endemic genus of two species distributed in central (Tocantins) and southeastern (Minas Gerais and Espírito Santo) regions; thickets (*cerrado*), and semideciduous forests.

BOUGANVILLEA Commerson ex A. L. Jussieu, Gen. 91. 1789.



Bougainvillea campanulata Heimerl, photo by P. Acevedo.

Scrambling lianas or less frequently erect shrubs or small trees, usually with axillary spines. Stems terete; bark rough, usually in rectangular plates; cross-sections with concentric rings of interxylary phloem (fig. 2a & b) or with phloem islands (fig. 1d). Leaves alternate or subopposite, simple; petioles slender; stipules absent. Flowers bisexual, in axillary dichasial cymes, with 3 flowers, each of which is subtended by 1 brilliantly colored foliaceous bracteole. Perianth salverform, consisting only of the calyx, with small imbricate lobes; stamens 5–8(10), included; ovary superior, stipitate, fusiform, the stigma unilateral. Fruit a fusiform anthocarp with 5 longitudinal ribs, not glandular.

Distinctive features: Scrambling lianas with axillary, simple, straight or curved spines, inflorescence a 3-flowered cyme, each flower subtended by a foliaceous, often bright colored bracteole; stem cross-section with concentric rings of interxylary phloem.

Distribution: A genus of about 16 species, native to South America (Ecuador, Peru, Bolivia, southern Brazil and northern Argentina), six species are reported as scrambling lianas; dry forest, savannas and scrubs; 0–1,350 m. Some species widely cultivated throughout the tropics and subtropics as garden plants.

COLIGNONIA Endlicher, Gen. 311. 1837.



Colignonia scandens Benth., photo by Eric Hunt.

partial inflorescences, subtended by foliaceous, white bracts. Flowers bisexual; long pedicelled; perianth campanulate or nearly free spreading tepals, 3- or 5- merous; stamens 5 of equal length, spreading; ovary superior, style clavate, stigma penicillate. Fruit an anthocarp 3- or 5-angled or 5-winged.

Distinctive features: Scrambling vines, partial inflorescences umbellate with white, foliaceous bracts not forming an involucre.

Distribution: A South American genus of six species with diverse habit varying from erect herbs or subshrubs to vines several m long, distributed in the Andean region of Colombia, Ecuador, Peru, Bolivia and Argentina; montane rain forests and cloud forests, often in disturbed areas; 3,000–3,800 m.

COMMICARPUS Standley, Contr. U.S. Natl. Herb. 12: 373. 1909.

Erect or trailing subshrubs or clambering suffrutescent vines reaching 1 to 4 m long; stems terete, up to 1 cm in diam.; cross-sections with islands of interxylary phloem (fig. 1c); bark

Erect herbs, subshrubs or clambering vines 1–15 m long; some species with tuberous roots. Stem cylindrical, slender. Leaves opposite, ovate or deltoid, with pinnate venation, cuneate or truncate at base, acute at apex, with entire margins; petioles nearly as long as the blade. Inflorescence axillary cymes with umbellate, long pedunculate



Commicarpus scandens (L.) Standl., photo by P. Acevedo.

corky, beige in old stems. Leaves opposite, deltoid, ovate, or broadly ovate, the apex obtuse or acute, cordiform or truncate at base, with undulate and ciliate margins; petioles canaliculate. Inflorescence umbelliform, axillary, long pedunculate; bracts minute, caducous; pedicels as long as or longer than the flowers. Flowers bisexual;

perianth white or yellowish green, constricted and with knobby glands below the middle, lower part claviform, upper part infundibuliform, 2–2.5 mm long; stamens 2, with curled filaments, exerted; ovary superior, white, style as long as the stamens, stigma capitate. Fruit a claviform anthocarp, 10-striate, with a ring of sticky knobby glands on distal portion, long-pedicellate.

Distinctive features: Scrambling herbaceous vines with forked, brittle branches, opposite leaves, flowers white or yellowish green, anthocarp claviform with sticky knobby glands at the apex, and stem cross-section with islands of interxylary phloem.

Distribution: A pantropical genus of 25 species, five of which are endemic to the Neotropics, only *C. scandens* (L.) Standl. grows as a vine; distributed from southern United States to Guatemala, the West Indies and NW South America (Venezuela, Colombia, Ecuador and Peru); dry forests and scrubs; 0–800 m.

CRYPTOCARPUS Kunth in Humboldt, Bonpland & Kunth, Nova Gen. Sp. 2: 187. 1817.

[quarto]



Cryptocarpus pyriformis Kunth, photo by Paloma.

Spreading to scrambling shrubs, 1–5 m long. Stems terete, slightly flexuose. Leaves alternate, succulent-coriaceous, involute, ovate, cordate at base, with lighter margins; petioles much shorter than the blade. Inflorescence axillary, congested, paniculate cymes; involucre absent. Flowers bisexual; perianth campanulate, ca. 3 mm long, yellowish green,

whitish adaxially, with (4) 5 deltoid lobes; stamens 4–5, unequal, long-exserted; ovary superior, green with short style and penicellate stigma. Fruits covered by the persistent pubescent perianth.

Distinctive features: Spreading-arched or scrambling shrubs with succulent leaves, inflorescence of congested paniculate cymes with yellowish-green and white flowers.

Distribution: A neotropical genus of a single species, *C. pyriformis* Kunth distributed in Ecuador including the Galapagos, Peru and Bolivia; mostly coastal vegetation, mangrove thickets and saltwater marshes, recorded from the Yungas in Bolivia; 0–200 (2,000) m.

LEUCASTER Choisy in A. de Candolle, Prodr. 13(2): 457. 1849.

Scrambling lianas reaching > 20 m long, with long dangling branches or less often small trees; indumentum of stellate scurvy scales on young parts. Stems terete, reaching 12–15 cm in diam.; cross-sections with concentric, slightly discontinuous bands of interxylary phloem (fig. 2c). Leaves alternate, simple, with entire margins, short-petioled. Inflorescence axillary or frondo



Leucaster caniflorus (Mart.) Choisy, photo Israel Neto.

bracteate thyrses on short axillary branches, with flowers grouped in dichasia; bracts and bracteoles, green, conspicuous, not forming an involucre; pedicels long, ferruginous stellate pubescent. Flowers bisexual; perianth yellowish green, wide infundibuliform-plicate, 5-lobed; stamens 2, free, included, filaments short, anthers introrse; ovary

superior, sessile, style absent, stigma forming a crest. Fruit covered by the persistent perianth but not forming an anthocarp.

Distinctive features: Long scrambling lianas, with long dangling branches; cross-sections with concentric rings of interxylary phloem; indument of stellate, scurvy scales; flowers yellowish green nearly rotate, 5-lobed.

Distribution: A Brazilian endemic genus with a single species *L. caniflorus* Choisy, found in the states of Minas Gerais, Espirito Santo and Rio de Janeiro; semi deciduous forests, rain forests and coastal forests (*restinga*); 0–500 m.

PISONIA Linnaeus, Sp. Pl. 1026. 1753.

Grajalesia Miranda (1951).

Dioecious or monoecious trees, shrubs or scrambling lianas to 20 m + long. Stems terete, reaching 15 cm + diam.; bark grayish, smooth, lenticellate; cross-section with islands of interxylary phloem (fig. 1a & b). Some species of lianas with short or elongate branches, short branches opposite, divaricate, with recurved spines (fig. 4), *P. proctori* Lundell, from Belize, is an unarmed liana with laxly pendent branches. Leaves opposite or subopposite on the elongate branches, whorled on the short lateral branches, chartaceous, penninerved, elliptic to



Pisonia aculeata L., staminate flowers, photo by P. Acevedo.

suborbicular, with entire or crenulate margins; petioles short.

Inflorescences axillary or terminal, paniculate or corymbose cymes; bracts and bracteoles minute, persistent, not forming an involucre. Flowers unisexual, small, light-colored, sessile or shortly pedicellate; staminate perianth bell-shaped to obconical, stamens 6–8, long exserted, the filaments unequal,

connate at base; pistillate perianth tubular, 5-toothed, ovary ovoid, sessile, the style exserted, the stigma many-branched. Anthocarp long-pedunculate, dry, club-shaped to ellipsoid, 5-ribbed, with 1 or 2 rows of stipitate, viscid glands along each angle (fig. 4b), or 5-winged without glands in *P. fasciculata* Standl.

Distinctive features: Scrambling lianas, often armed with axillary recurved spines and lateral, short, spiny, cirrus-like shoots; leaves alternate, simple, exstipulate; anthocarps with rows of sticky stipitate glands.

Distribution: A pantropical genus of about 30 species, 23 of which are distributed throughout the Neotropics. Three to five species reported in the Neotropics as lianas, including the pantropical and widely distributed *P. aculeata* L., these are distributed from Mexico to SE Brazil, including the West Indies; seasonally dry and moist forests; 0–650 m.



Figure 5. *Pisonia aculeata*. **A.** Verticillate leaves on lateral braches. **B.** Trunk with cirri-like short branches. **C.** Foliose branches, with opposite, decussate lateral branches at a 90° with main branch. Photos by P. Acevedo.

PISONIELLA (Heimerl) Standley, Contrib. U. S. Natl. Herb. 13: 385. 1911.



Pisoniella arborescens photo by M. Pace.

Erect shrubs or scrambling lianas > 10 m long, with divaricate, forked, unarmed branches. Stems terete, reaching 3 cm or more in diam.; cross-section in *P. glabrata* with phloem islands (Neto et al. in prep.) and in *P. arborescens* (Lag. & Rodr.) Standl. concentric bands of interxylary phloem (fig. 2d).

Leaves opposite, ovate,

chartaceous with pinnate venation and entire margins, long petioled. Inflorescences axillary or terminal, congested head-like glomerules; bracts minute, not forming an involucre; long-pedunculate. Flowers bisexual, short pedicellate; perianth tubular-campanulate, lower half green with rows of stipitate glands, upper half pink, 5-lobed; stamens 6–11, long exerted, slightly unequal, connate at base; ovary stipitate, style exerted, stigma capitate, finely papillose. Fruit a clavate anthocarp, obscurely 5 ribbed, with a row of stipitate, viscid glands along each angle.

Distinctive features: Scrambling vines with divaricate, forked branching; flowers in long-pedunculate head-like glomerules; perianth pink with rows of stipitate glands on lower half; anthocarps green, with 5 rows of viscid stipitate glands.

Distribution: A neotropical genus of 2 species with disjunct distribution, with *P. arborescens* in central Mexico and *P. glabrata* (Heimerl) Standl. in Bolivia and NW Argentina; deciduous forests; 1,200–1,700 m.

RELEVANT LITERATURE

Bittrich, V. and U. Kuhn. 1993. Nyctaginaceae, pages 473–486 in: K. Kubitzki, G. Rohwer and V. Bittrich (eds.). The Families and Genera of Vascular Plants. Vol. 2. Springer-Verlag, Berlin.

Bohlin, J.E. 1988. A monograph of the genus *Colignonia* (Nyctaginaceae). *Nordic Journal of Botany* 8: 231–252.

Flora do Brasil 2020, under construction. Jardim Botânico do Rio de Janeiro. Available at: < <http://floradobrasil.jbrj.gov.br/> >. Accessed on: 11 Dec. 2020.

Harriman, N. A. 1999. Synopsis of the New World *Commicarpus* (Nyctaginaceae). *Sida* 18: 679–684.

Kellogg, E. A. 1988. Nyctaginaceae. *Flora of the Lesser Antilles, Leeward and Windward Islands* 4: 173–186.

Neto, I. da Cunha, M.R. Pace and V. Angyalossy (in prep.). A new interpretation to the successive cambia of some Nyctaginaceae as interxylary phloem.

Rossetto, E.F.S., A.D. de Faria, P.M. Ruas, C.D.F. Ruas, N.A. Douglas and J.E.L.S. Ribeiro. 2019. Clarifying generic delimitation in Nyctaginaceae tribe Pisonieae after more than a century of taxonomic confusion. *Botanical Journal of the Linnean Society*. 189: 378–396.

Sandoval-Ortega, M.H., M.E. Siqueiros-Delgado, R. Cerros-Tlatilpa and G. Ocampo. 2020. La familia Nyctaginaceae (Caryophyllales) en Aguascalientes, México. *Acta Bot. Mexicana* 127: 1–40.

ACKNOWLEDGMENTS

Many thanks to Marcelo R. Pace for the valuable discussion on wood anatomy characters, Israel Neto for making available his unpublished manuscript on interxylary phloem in Nyctaginaceae, and Mark T. Strong for proofreading the manuscript.

PICTURE VOUCHERS

Figure 1.

A–B. *Pisonia aculeata* L. (Acevedo 14251)

C. *Commicarpus scandens* (L.) Standl. (Acevedo 16250)

D. *Bougainvillea* sp. (no voucher)

Figure 2.

A. *Bougainvillea campanulata* Heimerl (Acevedo 16772)

B. *Bougainvillea* sp. (no voucher)

C. *Leucaster caniflorus* (Mart.) Choisy (E.F.S. Rossetto 447)

D. *Pisoniella arborescens* (Lag. & Rodr.) Standl. (Pace 738)

Figure 3.

A. *Commicarpus scandens* (L.) Standl. (Acevedo 16250)

B. *Leucaster caniflorus* (Mart.) Choisy (E.F.S. Rossetto 447)

Figure 4.

A. *Commicarpus scandens* (L.) Standl. (Acevedo 16250)

B. *Pisonia aculeata* L. (Acevedo 16204)

Figure 5.

A–C. *Pisonia aculeata* L. (no voucher).