

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

## MARCGRAVIACEAE

By Stefan Dressler (Nov. 2017)



*Marcgravia rectiflora* Tr. & Pl. (photo: P. Acevedo)

A Neotropical family of lianas, climbing or scandent shrubs, or rarely small trees. Nearly all of the ca. 160 species in the family are climbers or have a tendency to climb or ramble. Predominantly in rain or cloud forests, from sea level to ca. 1500 m elevation, with few species reaching 2600 m, rarely found in open and dryer vegetation such as *cerrados*, *campos rupestres*, *inselbergs*, and *restingas*).

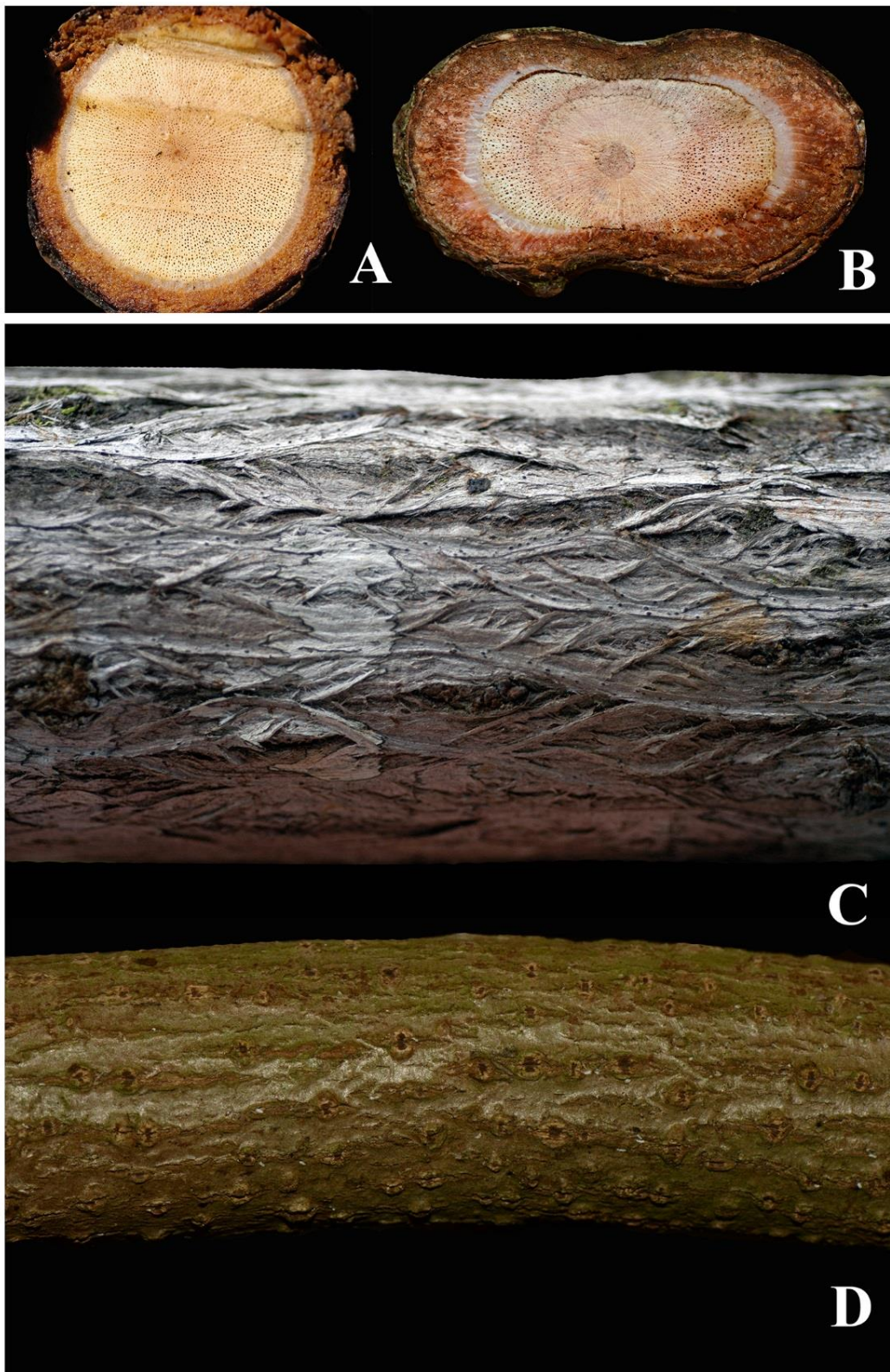
**Diagnosics:** Marcgraviaceae is distinguished vegetatively from other families of climbers with simple, alternate leaves by: 1) coriaceous leaves with entire margins (rarely slightly crenate) and usually inconspicuous secondary venation, with

abaxial glandular spots or pores dispersed along the blade, the revolute margins, and/or near the base of the lamina; 2) in-rolled youngest leaves covering the apical meristems. In addition, Marcgraviaceae is easily identified by the inflorescences that contain bracts that are modified into variously shaped extra floral nectaries (see Fig. 6 + generic descriptions).

The genus *Marcgravia* shows a pronounced heterophylly: small-leaved juvenile shoots climb with adventitious roots at the substrate (trunk, rock) and larger leaved adult shoots without roots hang from the phorophyte and may ultimately form inflorescences. All other genera may show a faint tendency towards heterophylly: sprawling or climbing shoots with aerial roots may have leaves shaped differently from mature and generative shoots, but not very obvious.

## General Characters:

1. **STEMS.** Stems are woody, cylindrical (fig. 1a) or bilobed in *Marcgravia* (fig. 1b), sometimes quadrangular or flat in juvenile plants (fig. 2a &b). In tangential section, stems are simple and usually present visible rays (fig. 1a). Barks are reticulate (fig. 1c) or nearly smooth and lenticellate (fig 1d).
2. **EXUDATES.** Exudates are odourless, clear and watery, sometimes copious.
3. **CLIMBING MECHANISMS.** Most Marcgraviaceae are scandent with no active climbing mechanism (fig. 3) with the exception of *Marcgravia*, which climbs through the aid of adventitious roots (fig. 2a) that adhere to the bark of host trees. *Marcgravia* contains two dimorphic growing phases, a juvenile phase with flattened or quadrangular stems and small leaves (fig. 4b), and an adult phase with virgate branches, bearing fully developed leaves (fig. 2b). Only juvenile shoots have abundant adventitious roots and therefore a climbing behaviour. In other genera, the young shoots sometimes produce solitary, elongated, cylindrical aerial roots (fig. 5), but these do hardly facilitate climbing. Some *Marcgravia* spp. may become epiphytic after losing contact with the soil, but they often show long ascending branches. Sometimes the seeds germinate in the canopy but generally the plants are not epiphytic, but might become hemiepiphytic.
4. **LEAVES.** Exstipulate, simple, alternate, and coriaceous with obscure secondary veins, distichous in *Marcgravia*, and spiral in all other genera, subsessile or petiolate; margins entire, often with dark glandular dots along the margin, blades with a pair of glands at base on the abaxial surface, sometimes further glands present on abaxial surface (in a row or a band-like zone) or dark glandular spots present all over (fig. 4c). The genus *Marcgravia* shows pronounced **heterophylly** where juvenile shoots bear small cordiform leaves that are appressed to the substrate (fig. 4b). Mature shoots bear larger leaves that are morphologically different from the juvenile ones. In early stages, mature shoots also show transitional leaves between juveniles and adults (fig. 4a); adult branches are known to revert to the juvenile phase and producing small leaves and adventitious roots (Heald et al. 2002). All other genera may show a slight tendency toward heterophylly where sprawling or climbing shoots with aerial roots may have leaves that slightly differ from those of mature and generative shoots.



**Figure 1.** Stems in Marcgraviaceae. **A.** Tangential section in *Souroubea guianensis* Aubl. **B.** Tangential section in *Marcgravia sintenisii* Urb. **C.** Bark in *Souroubea guianensis*. **D.** Bark in *Marcgravia sintenisii*. Photos by P. Acevedo.





**Figure 2.** *Marcgravia sintenisii*. **A.** Stem of juvenile phase with flat stem and adventitious roots. **B.** Juvenile phase with adult branches, showing transitional and regular leaves, and young leaves covering shoot tip. Photos by P. Acevedo.





**Figure 3.** *Souroubea guianensis*, showing scandent habit. Photo by P. Acevedo.



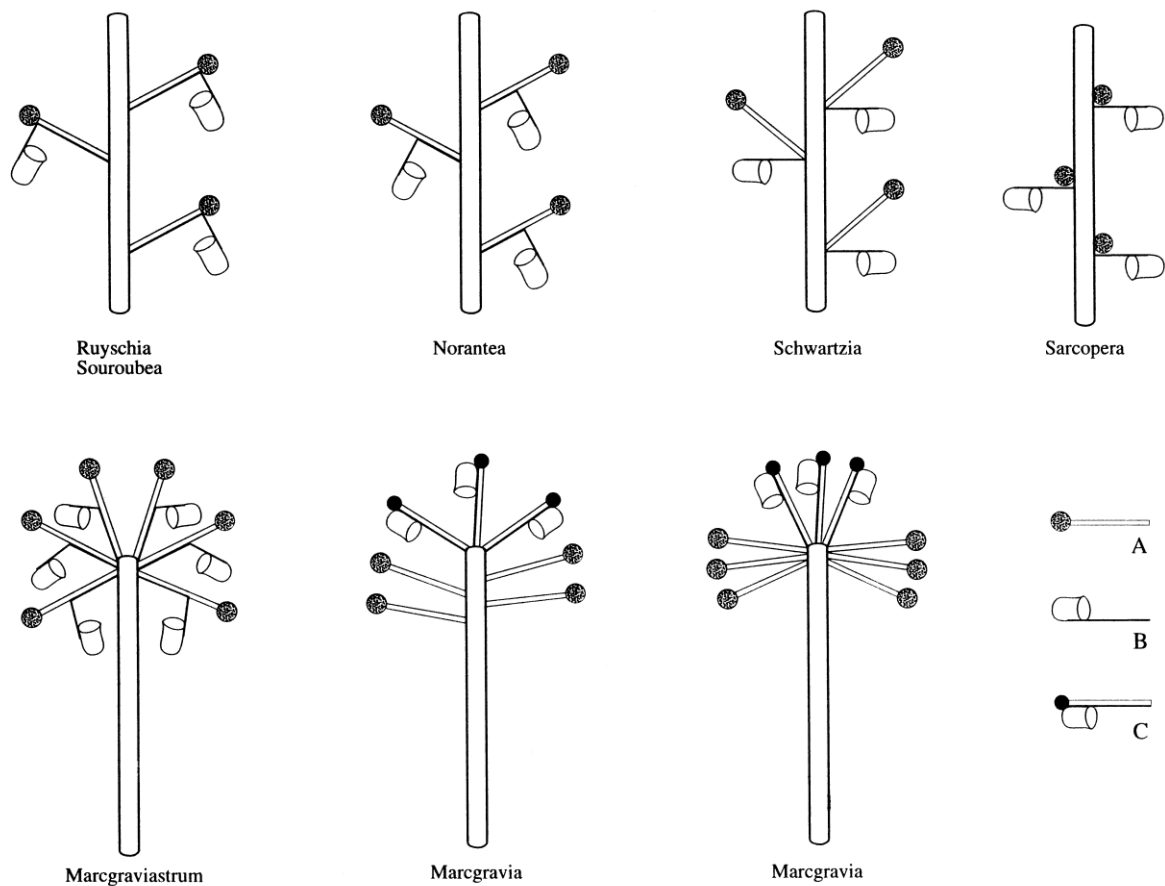


**Figure 4.** Foliage in *Marcgravia sintensis*. **A.** Newly developed adult phase branch with transitional and adult leaves. **B.** Root-climbing juvenile plant. **C.** Abaxial leaf epidermis showing scattered dark glandular dots. Photos by P. Acevedo.



**Figure 5.** *Souroubea exauriculata* Delp. showing aerial roots. Photo by S. Dressler.

5. INFLORESCENCES. Usually a raceme in *Ruyschia*, *Souroubea*, *Schwartzia*, and *Norantea*, but umbelliferous in *Marcgraviastrum* and *Marcgravia*, or spicate in *Sarcopera* (fig. 6). These usually are ascending (fig 7b &d), hanging in some *Marcgravia* and *Norantea* (fig. 7a), or spreading in *Norantea*, *Marcgravia* or *Sarcopera*, usually terminal, sometimes cauliflorous or flagelliflorous in some *Marcgravia*, *Schwartzia*, or *Sarcopera* (fig. 7c). Flowers are subtended by a bract that is modified into a nectary of various shape (fig. 8 a-d), but these sometimes are lacking in basal flowers of the inflorescence, e.g., *Sarcopera*; in *Marcgravia*, the central flowers of the inflorescence are sterile and fused to a nectary, while the outer flowers are fertile and lack nectaries (fig. 8b & d). These nectaries produced abundant nectar that attracts a wide range of visitors including insects (bees, butterflies, and moths), birds (hovering and perching), bats, arboreal mammals (opossums), and even lizards.



**Figure 6.** Inflorescences in Marcgraviaceae. A. fertile flower B. nectarial bract/nectary C. sterile flower with nectary.

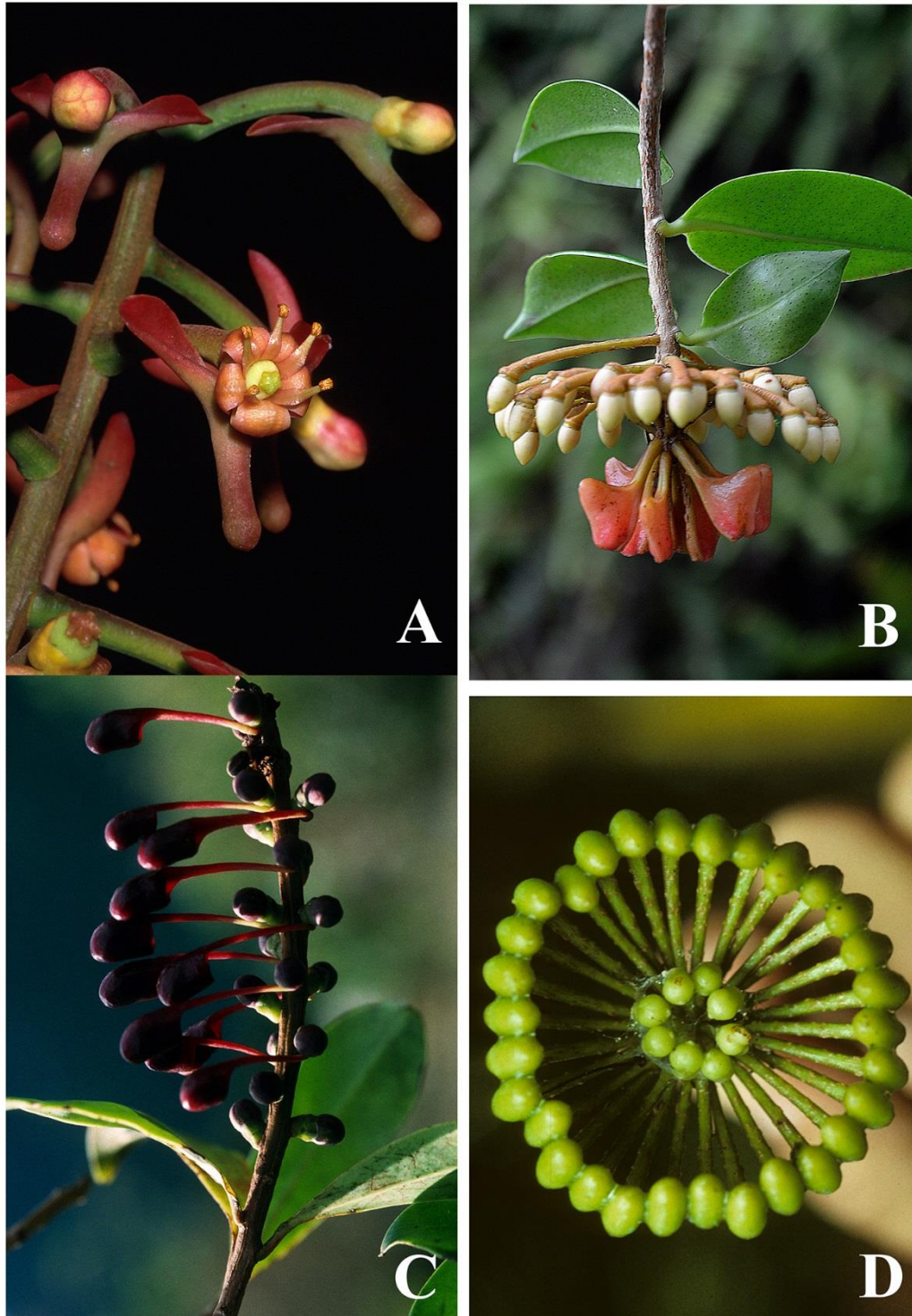
6. **PEDICELS.** Terete, of various length, sometimes flowers angled on pedicels (fig. 7c, 8b & d).
7. **FLOWERS.** Actinomorphic, bisexual; calyx persistent, sepals 4 in *Marcgravia*, 5 in all other genera, thick, imbricate, quincuncial or decussate (*Marcgravia*); petals 4 (*Marcgravia*) or 5, rarely 3 or 6 in *Souroubea* (fig. 9a), distinct to somewhat connate, or completely fused into a calyptra in *Marcgravia* (fig. 9b), imbricate and reflexed or caducous at anthesis (*Marcgravia*); androecium with stamens in 1 or 2 series, the stamens 3 or 5 (*Ruyschia* and *Souroubea*), 6-12(25) in *Sarcopera*, 20-35 in *Norantea*, (5)7- ca. 100 in *Marcgraviastrum*, *Marcgravia*, and *Schwartzia*, the filaments distinct or basally connate; gynoecium syncarpous, the ovary superior, the carpels 2-20, completely or incompletely 2-20-locular, the style short or lacking, the stigma lobed or umbonate; placentation axile, the placentae intruding into the locules, the ovules anatropous, 10-20 to numerous (*Marcgravia*).





**Figure 7.** Inflorescences in Marcgraviaceae. **A.** *Norantea guianensis* Aubl. with pendent inflorescence. **B.** *Souroubea guianensis* with erect inflorescence. **C.** *Marcgravia pedunculosa* Tria. & Planch. with flagilliform inflorescence. **D.** *Marcgraviastrum mixtum* (Tria. & Planch.) Bedell with erect infructescence. Photos by P. Acevedo.





**Figure 8.** Extrafloral nectaries in Marcgraviaceae. **A.** *Souroubea guianensis*, nectary hollow, spur-like and auriculate. **B.** *Marcgravia sintenisii*, nectaries large, boat-shaped. **C.** *Sarcopera oxystilis* (Baill) Gir.-Cañas, nectaries saccate, inserted on inflorescence axis. **D.** *Marcgravia pedunculosa*, nectaries small, sac- or cup-shaped. Photos by G. Gerlach (A), P. Acevedo (B-D).





**Figure 9.** Flowers in Marcgraviaceae. **A.** *Souroubea sympetala* Gilg pentandrous with 5 reflexed petals. **B.** *Marcgravia polyantha* Delp. polyandrous with calyprate corolla. Photos by R. Simon (A), R. Mangelsdorff (B).

8. FRUITS. Leathery capsules, tardily dehiscent (baccate-like) to reveal few to numerous small seeds, sometimes on a pulpy colourful placenta (fig. 10).
9. SEEDS. Small to minute, few to numerous, testa reticulate, shining. Embryo straight, endosperm scanty or lacking.



**Figure 10.** Dehiscent capsules in *Marcgravia crenata*. Wittm. Photo by P. Acevedo.

## USES

Occasionally, members of this family are cultivated as ornamentals due to their showy inflorescences, e.g., *Norantea guianensis* Aubl. or the wall-covering *Marcgravia* spp.

Sometimes shoots are used for waving baskets etc.

The fruits of some *Marcgravia* spp. are reported to be eaten like strawberries.

The use as medicine by local tribes is rarely reported by some collectors to treat head- or toothaches, wounds, diarrhoea, syphilis etc. and the fluid from cut stems is drunk in the field against thirst. Bark decoctions are sometimes used for dyeing.



## Key to the genera of Marcgraviaceae

1. Leaves distichous; apical flowers of inflorescence abortive, where only the nectaries develop; fertile flowers without nectaries; sepals 4; petals united into a deciduous calyptra; sterile (juvenile) and fertile (adult) branches with differently shaped leaves (Neotropics) ..... *Marcgravia*
1. Leaves spirally arranged; all flowers fertile and provided with nectaries; sepals 5; petals 5, ± free or connate, reflexed at anthesis; sterile and fertile branches with similarly shaped leaves ..... 2 (subfam. Noranteoideae)
2. Inflorescence umbellate or subumbellate (Nicaragua to Bolivia and Brazil) ..... *Marcgraviastrum*
2. Inflorescence spicate or racemose ..... 3
3. Inflorescence spicate; nectaries inserted on the rachis next to the flowers (Honduras to Bolivia and Brazil) ..... *Sarcopera*
3. Inflorescence racemose; nectaries inserted on the pedicel ..... 4
4. Nectaries inserted at the base of the calyx; stamens < 8, generally 3 or 5 ..... 5
4. Nectaries inserted at various distances from the calyx, but never at its base, their limbs never auriculate; stamens numerous (> 8) ..... 6
5. Ovary 3--5-locular; bracts spur-like, tubular, hollow, often auriculate; stamens usually 5 (Mexico to Brazil) ..... *Souroubea*
5. Ovary 2-locular; bracts gibbose or somewhat leaf-like, solid or nearly so; stamens usually 3 (Mexico to Bolivia, Lesser Antilles) ..... *Ruyschia*
6. Nectaries inserted at the base or lower third of the pedicel; inflorescence a short raceme, 4--25(-40) cm long; pedicels elongate (20--30--70) mm long (Costa Rica to Bolivia and Brazil, Lesser Antilles) ..... *Schwartzia*

6. Nectaries inserted at around the middle of the pedicel; inflorescence an elongated raceme, (20--35-65 cm long; pedicels short (2--5(--7) mm long) (Colombia to Brazil, Trinidad, Tobago)..... *Norantea*

## GENERIC DESCRIPTIONS

**MARCGRAVIA** Linnaeus, Sp. pl. 1: 503. 1753.



*M. domingensis* Urb. (photo: P. Acevedo)

Climbing shrubs or vines with dimorphic juvenile and adult stages. Plants with juvenile morphology are sterile and have flattened often-quadrangular, creeping or root-climbing branches; leaves appressed, distichous, small, thin, sessile, and commonly asymmetrically cordate. Plants with adult morphology are fertile, and can reach 5 to 15 m in length. Many species have short lateral branches that are pendulous or virgate.

Stems woody, cylindrical or bilobed (fig. 1b), 2-5 cm wide, simple, and often with conspicuous rays; bark usually provided with wart-like lenticels. Leaves distichous, much larger than those of the juvenile form, usually coriaceous, with inconspicuous secondary venation, and abaxial surface with glandular dots distributed at the base, the margins, along the central vein or all over the blade. Inflorescences terminal, sometimes cauliflorous or



flagelliflorous, umbelliform with central flowers usually abortive with well-developed tubular-saccate or boat-shaped nectaries (modified bracts) providing a cavity or pocket where nectar accumulates; peripheral flowers fertile, long pedicellate and lacking extrafloral nectaries. Sepals 4, decussate. Petals 4, connate into a deciduous calyptra. Stamens 6--many, free. Ovary 3--20-locular with numerous ovules per locule; stigma capitate to umbonate. Fruit a tardily dehiscent, leathery capsule with numerous, tiny seeds surrounded by a fleshy pulp.

**Unique features:** Distichous leaves; heterophyllous: juvenile and adult stages; umbelliform inflorescences with extrafloral nectaries in central position; sepals 4, decussate; petals connate to deciduous calyptra.

**Distribution:** About 60 spp. in Central and South America and the West Indies.

Two subgenera currently recognized: Subgenus *Marcgravia* (= subgen. *Plagiothalamium* Wittm.) distinguished by the geniculate pedicels and petiolate leaves; and subgenus *Orthothalamium* Delpino with straight pedicels and mostly (sub)sessile leaves.

**MARCGRAVIATRUM** (Wittm. ex Szyszyl.) de Roon & S. Dressler, Bot. Jahrb. Syst. 119: 332. 1997.



*M. sodiroi* (Gilg) S. Dressler

Sprawling or scandent shrubs, often epiphytic and climbing by means of adventitious roots. Stems reaching 7-8 m in length. Leaves sessile to petiolate, spirally arranged. Inflorescences of umbelliform racemes with (2-)5-

-14(--22) flowers; pedicels straight. Flowers subtended by a sessile or rarely stalked,

pendulous, saccate to tubular nectary attached to the lower part of the pedicel. Sepals 5. Petals 5, free to variously connate. Stamens 12--many; filaments mostly free with the outer whorl basally adnate to corolla. Ovary partly or entirely 5--9-locular with numerous ovules per locule.

**Unique features:** Umbelliform inflorescences with flowers subtended by a +/- saccate nectary.

**Distribution:** Fifteen species; From Nicaragua along Andean Cordillera to Peru, Surinam, two species on eastern Brazil (Espírito Santo, Minas Gerais, Rio de Janeiro).

**NORANTEA** Aublet, Hist. pl. Guiane 1: 554. 1775.



*N. guianensis* (photo: P. Acevedo)

Lianas or sprawling shrubs, often epiphytic. Stems cylindrical, up to 10 m long or longer; bark slightly rough, reticulate. Leaves petiolate. Inflorescences elongated, densely flowered racemes with 100--300 flowers; pedicels straight. Flowers shortly pedicellate. Nectaries on the upper half of the pedicel, stipitate, saccate, conspicuously colored (orange, red, purple, or maroon). Sepals 5. Petals 5, free to slightly connate at base. Stamens 20--35; sometimes biseriate, filaments basally adnate to corolla. Ovary 5-locular with 10--20 ovules per locule.

**Distribution:** Two species, Trinidad/Tobago, N South America to S Brazil, and Bolivia.

**RUYSCHIA** Jacquin, Enum. Syst. Pl. 2: 17. 1760.

*Caracasia* Szyszyl. in Engl., Natürl. Pflanzenfamilien 3(6a): 162, 164. 1894.



*R. moralesii* Hammel

Scandent shrubs. Stems up to 10 m long. Leaves spirally arranged, shortly petiolate. Inflorescences of densely flowered racemes with 20--30(-50) flowers; pedicels straight, short; nectaries small, sessile, inserted at the top or on upper half of pedicel, gibbose to semi- or subglobose, mostly solid. Sepals 5. Petals 5, free or slightly connate at base. Stamens 3 to 5; filaments  $\pm$  connate with the base of petals. Ovary 2-locular, ovules few to up to 20, stigma capitate.

**Unique features:** Inflorescence a raceme; extrafloral nectaries gibbose, globose or slightly invaginated and foliaceous, inserted below the calyx; ovary 2-locular.

**Distribution:** Nine spp., mostly from higher altitudes (500--2800 m) of Central America (4 spp.), northern Andes (4 spp.), and Lesser Antilles (1 sp.).



**SARCOPERA** Bedell in de Roon & S. Dressler, Bot. Jahrb. Syst. 119: 328. 1997.

*Pseudosarcopera* Gir.-Cañas, Caldasia 29(2): 205. 2007.

Sprawling or scandent shrubs or rarely small trees, often epiphytic. Stems usually to 10 m long. Leaves sessile to petiolate, occasionally asymmetrical. Inflorescences spicate with (35--100--450) flowers; pedicels absent (rarely short). Nectaries long stipitate, inserted on the inflorescence axis at the base of the flowers (at least flowers of the upper portion of inflorescence), cup- or sac-shaped, conspicuously coloured (red, purple). Sepals 5. Petals 5, free or slightly connate at base. Stamens (6--8--25); filaments free or variously connate or adnate to the corolla. Ovary 2-, 3- (5-) locular with 4--8(--12) ovules per locule, stigma (sub)sessile.



*S. oxystilis* (photo: P. Acevedo)

**Unique features:** Inflorescences usually spicate; flowers subtended by a cup-shaped or saccate nectary.

**Distribution:** About eight species, from Honduras through the Andean Cordillera to N Bolivia, and the Guianas Highlands.

**SCHWARTZIA** Vellozo, Fl. flumin.: 221. 1829.



*S. magnifica* (Gilg) Bedell

Sprawling shrubs, occasionally small trees. Stems up to 25 m long. Leaves sessile to petiolate. Inflorescences of short racemes with 8--60 flowers (only *S. brasiliensis* (Choisy) Gir.-Cañas with long racemes of 60--300 flowers); pedicels straight, elongate; nectaries adnate to the lower third of the pedicel, mostly stipitate, cup-, sac- or boat-shaped. Sepals 5. Petals 5, free to variously connate. Stamens (5--12--27 or 50--80 in one or several whorls; filaments free or basally connate or adnate to the corolla. Ovary partly or entirely 3--5-locular.

**Unique features:** Racemes short with +/- long-pedicelled flowers with a nectary on the lower half of the pedicel.

**Distribution:** About 20 species, from Costa Rica along the Andes to Bolivia, E Brazil, and the Lesser Antilles (1 sp.).



**SOUROUBEA** Aublet, Hist. pl. Guiane 1: 244. 1775.



*S. guianensis* (photo: P. Acevedo)

Scandent shrubs or root-climbing lianas with short, lateral hanging branches, often epiphytic. Stems cylindrical, up to 6 cm diam., and 10-15 m in length, wood simple, with narrow rays; bark partly rough, reticulate. Leaves shortly petiolate. Inflorescences lax or dense racemes with 15--60(--100) flowers. Nectaries on the upper part of the pedicel, mostly below calyx, sessile or sometimes stipitate, hollow, mostly spur-like and auriculate. Flowers 5-merous (rarely 3- to 6-merous). Petals free or connate up to 2/3 of their length.

Filaments free or basally adnate to corolla. Ovary (3--5)-locular, often pentagonal, stigma with (3--5) radiating lobes. Seeds rather few.

**Unique features:** racemes; flowers with tubular or sac-like nectaries directly below calyx, nectaries sometimes auriculate; usually five stamens.

**Distribution:** About 20 spp., Mexico to Bolivia, not in the West Indies.

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