

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

DILLENiaceae

By Pedro Acevedo-Rodríguez (May 2020)



Davilla kunthii A. St.-Hil., photo by P. Acevedo

A pantropical family of 11 genera and about 590 species of shrubs, lianas and less often trees or herbs. In the Neotropics, there are 177 species of Dilleniaceae, of which 99 are reported as lianas or scrambling shrubs. These are represented by 5 genera, 4 of which are endemic to the Neotropics, and one (*Tetracera*) is shared with the Paleotropics. For the most part, they are found in moist to seasonal evergreen lowland forests, in woodlands and savanna-like formations, such as *campos rupestres*, *cerrados*, or *restinga* woodlands of eastern Brazil.

Diagnosics: Predominantly twining lianas, scrambling shrubs or facultative scrambling shrubs; papery flaky, reddish bark; cylindrical woody stems, with copious (drinkable) watery exudate; leaves simple, exstipulate, often rigid-coriaceous with sand-papery texture and dentate or serrate margins; venation pinnate; flowers actinomorphic, usually small and bisexual, with numerous stamens.

General Characters

1. **STEMS.** Young stems cylindrical or angled, sometimes scabrous; mature stems woody with substantial secondary growth, cylindrical or slightly asymmetrical, some species known to reach up to 20 m in length and up to 30 cm in diam.; bark for the most part reddish, papery flaky (fig. 2b) or in rectangular plate (fig. 2 a, c, d); cross sections show wide vessel lumens; *Doliocarpus* and *Pinzona* have **successive cambia** that produce continuous concentric rings of xylem and phloem with wide rays (fig. 1a), while *Davilla* and *Tetracera* have simple stems with regular vascular anatomy provided by conspicuously wide rays (fig. 1 b-f).
2. **EXUDATES.** Many species produce copious drinkable water when cut, e.g., *Doliocarpus* sp. and *Pinzona coriacea* Mart. & Zucc., while others a scanty watery exudate.
3. **CLIMBING MECHANISMS.** Dilleniaceae are either **twiners** or **scramblers** that have short lateral scandent branches. Some species are sometimes reported as shrubs or climbing shrubs.
4. **LEAVES.** Alternate, simple, coriaceous to rigid-coriaceous, often scabrous and with serrate margins; veins pinnate (fig. 4 a-d), commonly with abaxially prominent secondary veins (fig. 4 a-c), tertiary veins clathrate or less often reticulate; petioles short to long, stout, commonly adaxially furrowed, glandless; stipules absent or if present early caducous.
5. **INFLORESCENCE.** Axillary or terminal, short, few- to many-flowered panicles, racemes, fascicles, thyrses, or flowers sometimes solitary; bracts and bracteoles minute.
6. **PEDICELS.** Of variable lengths, flowers sometimes sessile.
7. **FLOWERS.** Bisexual or rarely unisexual (the plant then dioecious) in *Tetracera*, actinomorphic; calyx of 3-5 distinct unequal sepals, the inner two acrescent and indurate in *Davilla*; corolla of 3 to 5 distinct petals; stamens numerous, unequal, the filaments free, often twisted, the anthers short, opening along longitudinal slits; ovary superior, of 1-5 distinct carpels, or 2 connate carpels in *Pinzona*; ovules 1 to numerous per carpel, basal, the style 1 with a peltate or punctiform stigma.
8. **FRUIT.** A capsule, sometimes covered by persistent, acrescent sepals; seeds 1 or more per carpel, arillate.

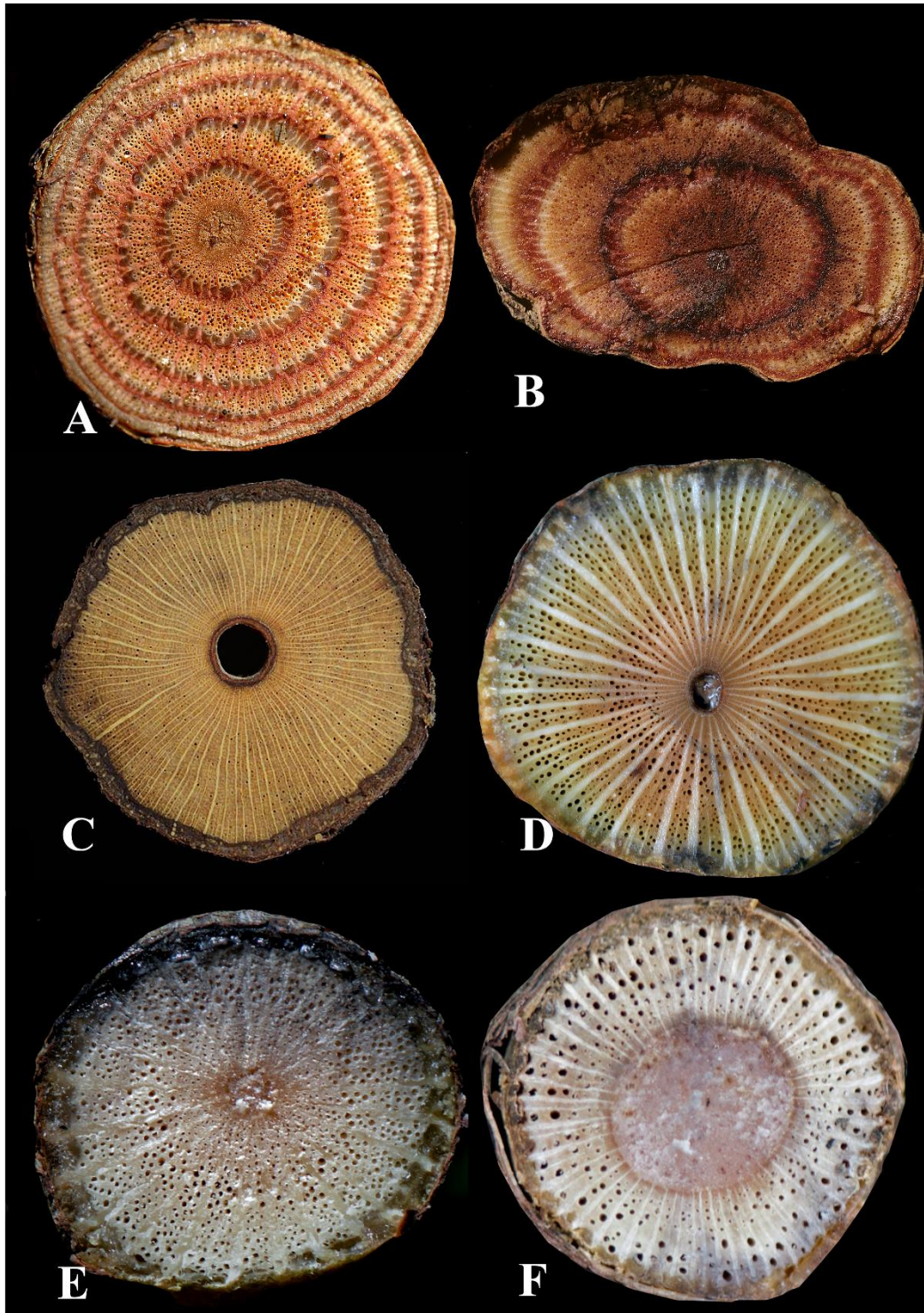


Figure 1. Cross sections of stems in Dilleniaceae. **A.** Cylindrical stem with successive bands of xylem and phloem and wide rays in *Doliocarpus dentatus*. **B.** Cylindrical, simple stem with wide rays of *Doliocarpus sp.* **C.** Sub-cylindrical, simple stem with numerous wide rays of *Davilla elliptica*. **D.** Cylindrical, simple stem with wide rays of *Davilla nitida*. **E.** Cylindrical, simple stem with wide rays of *Tetracera sp.* **F.** Sub-cylindrical, simple stem with numerous wide rays of *Davilla sp.* Photos by P. Acevedo.



Figure 2. Barks in Dilleniaceae lianas. **A.** *Doliocarpus dentatus*, bark in rectangular plates. **B.** *Doliocarpus* sp. with papery flaky bark. **C.** *Davilla nitida*, reddish bark peeling off in thin rectangular plates. **D.** *Davilla elliptica*, with papery flaky bark. Photos by P. Acevedo.



Figure 3. **A.** *Doliocarpus* sp. with distichous leaves. **B.** *Tetracera* sp., with verticillate leaves. **C.** *Doliocarpus* sp. with twining stems. **D.** *Doliocarpus* sp. stem with young shoots. Photo by P. Acevedo.

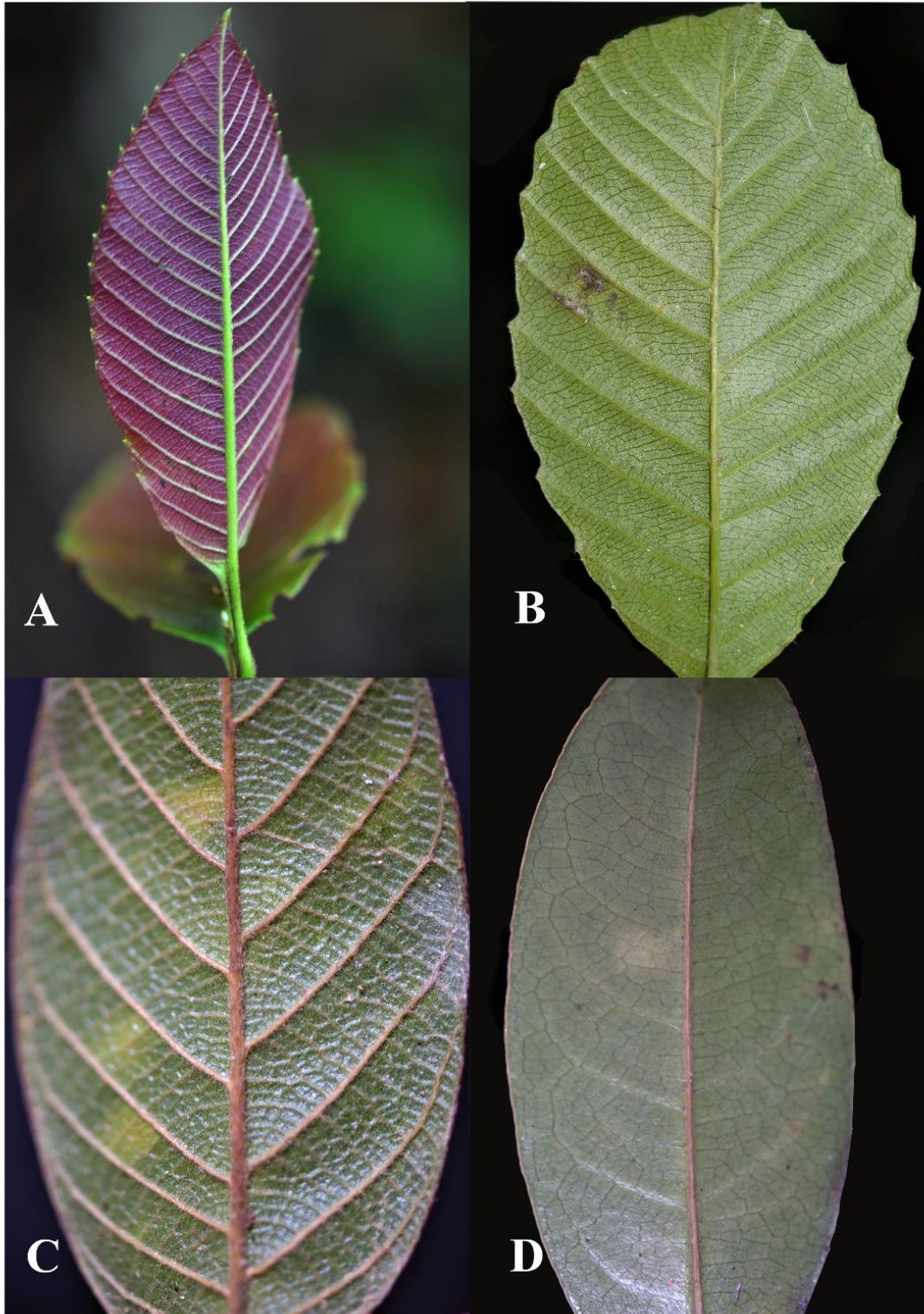


Figure 4. Leaves in Dilleniaceae. **A.** Young leaf with reddish coloration and prominent veins of *Doliocarpus* sp. **B.** Leaf with sub-clathrate tertiary venation of *Tetracera* sp. **C.** Leaf prominent venation and clathrate tertiary veins of *Davilla nitida*. **D.** Leaf with entire margins and reticulate venation of *Davilla* sp. Photos by P. Acevedo.

USES

The stems of large individuals of *Doliocarpus*, *Davilla* and *Pinzona* are often used as a source of drinkable water, a 1 m long stem section carries enough water to quench the thirst of a person. Rough leaves in many Dilleniaceae are used locally as sand-paper.

KEY TO THE GENERA

1. Mature stems with successive cambia producing successive concentric rings of xylem and phloem2
1. Mature stems with a single cambium (regular vascular anatomy)4
2. Flowers with a single carpel; seeds covered by a white aril *Doliocarpus*
2. Flowers with 2 or more carpels; seeds covered by a red or orange aril3
3. Capsules covered by persistent overlapping sepals; aril red..... *Neodillenia*
3. Capsules not covered by the sepals (these reflexed); aril orange *Pinzona*
4. Two inner sepals becoming indurate, enveloping the fruits; aril white, fimbriate *Davilla*
4. Two inner sepals not indurate, nor covering other flower parts or fruits; arils red or orange, lacinate *Tetracera*

GENERIC DESCRIPTIONS

DAVILLA Vandelli, Fl. Lusit. Bras. 35. 1788.

Twining lianas or scrambling shrubs. Stems more or less cylindrical; bark reddish papery



D. floribunda, photo by H. Medeiros

flaky (fig. 2d) or in rectangular plates (fig. 2c); cross sections with regular vascular anatomy, vessel lumens conspicuously large, rays abundant and several cells wide, the medulla relatively large in young stems. Leaves alternate, chartaceous to coriaceous (sometimes rigidly so), simple, with entire, crenate or serrulate margins; petioles winged or nearly so, without glands. Inflorescences axillary or terminal, panicles. Flowers actinomorphic, bisexual, calyx of 5, free, unequal, imbricate, sepals, the inner two sepals rigid coriaceous when mature, sometimes tightly enclosing the fruit into a sub-globose structure; petals 3-6, free, yellow, obovate, caducous; stamens 50-450; ovary superior, of 1-2 free carpels with 2 ovules per carpel; style sub-lateral with peltate stigma. Capsules orange or yellow with 1-2 arillate seeds.

Distinctive features: Climbing shrubs or twining lianas, often with reddish bark peeling off in papery flakes or rectangular plates; leaves glandless, commonly with sunken veins.

Distribution: A neotropical genus of about 34 species, 24 of which are reported as lianas or climbing shrubs; distributed from Mexico, Central America, Venezuela, Colombia, Peru, Bolivia, the Guianas, Brazil, Paraguay, Cuba and Jamaica; often in wet or moist lowland forests.



A



B

Figure 5. A. Flowers of *Davilla kunthii*. B. Dehiscent capsules, showing partly arillate seeds, enclosed by two indurate sepals of *Davilla undulata*. Photos: A. by P. Acevedo; B by Renata Udulutsch.

DOLIOCARPUS Rolander, Kongl. Svenska Vetensk. Acad. Handl. 17: 260. 1756.



D. major, photo by E.S. Leão

Twining vines reaching 15-25 m in length; stems cylindrical, in some species reaching up to 30 cm in diameter; bark reddish brown, papery flaky or peeling off in rectangular plates; cross section with successive cambia producing alternating concentric rings of xylem and phloem, either cylindrical or slightly asymmetrical; many

species producing abundant drinkable water. Leaves alternate, simple, entire or serrate, often with rough (sand-paper-like) surface, with tertiary venation clathrate or reticulate, petiolate; stipules absent. Inflorescences of fascicles or glomerules. Flowers bisexual, actinomorphic. Calyx of 3-6 free sepals, subequal, generally the inner ones larger, imbricate, persistent; petals 2-6, free, white, early caducous; stamens numerous, the filaments unequal, flexuose or reflexed, the anthers dehiscent by longitudinal sutures; ovary superior, unicarpellate, with two basal ovules, the style terminal, filiform, the stigma punctiform to peltate. Fruit a berry or capsule with irregular dehiscence; seeds usually 2, reniform, black, covered by a white arillode, membranaceous or fleshy.

Distinctive features: Vegetatively like other Dilleniaceae but distinguished by flowers and fruits in fascicles, and uni-carpellate flowers.

Distribution: A neotropical genus of about 58 species, 52 of which are commonly reported as climbing shrubs or lianas; in lowland, wet, moist, semideciduous or secondary forest, savannas, and scrubs.

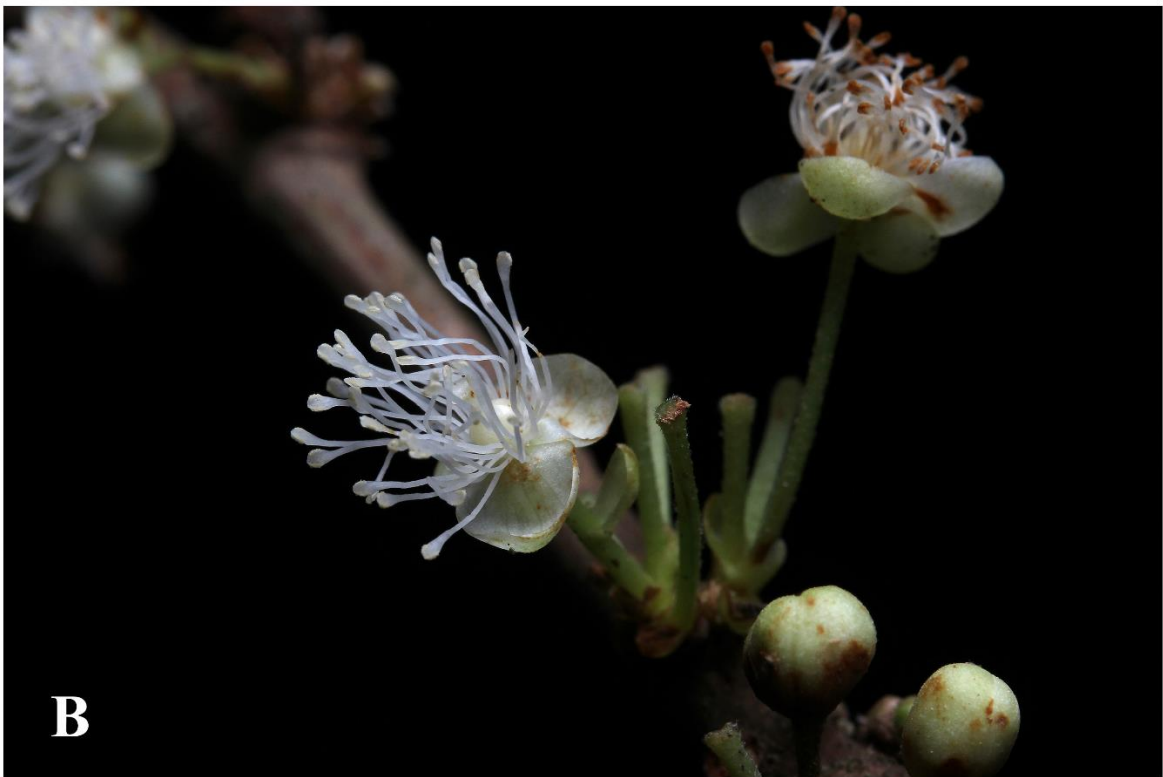


Figure 6. **A.** Fruit clusters of *Doliocarpus major*. **B.** Flower fascicle of *Doliocarpus major*. Photos by J. Amith.

NEODILLENIA Aymard, Harvard Pap. Bot. 10: 121. 1997.



N. peruviana Aymard, photo by B.R. Chambi (Atrium)

Twining lianas¹; stems cylindrical; bark reddish brown, papery flaky or peeling off in rectangular plates¹; cross sections with successive cambia producing alternating concentric rings of xylem and phloem. Leaves glabrous, thick coriaceous, elliptic to orbicular, obovate, rounded or obtuse at the base, with entire, sinuate or dentate margins; secondary veins abaxially prominent, 6-18 pairs; tertiary

venation clathrate; petioles canaliculate; stipules caducous. Inflorescence axillary, few-flowered fascicles, racemose or reduced to a single flower; bracts orbicular. Flowers bisexual, pedicellate or sessile; sepals 3-6, free, unequal, imbricate, cuculate, orbicular, wide ovate or obovate, enclosing the young fruits; petals early caducous; stamens 100-300, forming a rim around the carpels, the filaments free, the anthers opening along longitudinal slits; ovary superior, of 1-5, free, connivent carpels, containing 1 or 2 basal ovules, the style terminal, with a peltate stigma. Fruits capsular, with 1 or 2 black seeds, entirely covered by a red aril.

Distinctive features: A twining liana with large, thick-coriaceous leaves with clathrate venation, and globose flower buds with coriaceous overlapping sepals enclosing the fruits.

Distribution: A neotropical genus of six species; distributed throughout the Amazon basin including Colombia, Venezuela, Ecuador, Peru, Brazil, and French Guiana, in moist to wet low to middle elevation forests.

¹ G. Aymard, pers. comments.

PINZONA Martius & Zuccarini, Abh. Math. Phys. Cl. Königl. Bayer Akad. Wiss. 1: 371. 1832.



P. coriacea Mart. & Zucc., photo by R. Aguilar

Twining liana reaching 30 m in length; stems cylindrical, up to 20 cm in diameter, producing abundant potable water when cut; bark reddish brown, peeling in a scaly manner; cross section with successive cambia producing successive concentric rings of xylem and phloem. Branches puberulent, angular, scabrous, glabrescent, and cylindrical when mature. Leaves alternate, broadly elliptical, ovate to obovate,

coriaceous, the apex rounded, sometimes short-apiculate, the base rounded to subcordiform, the margins revolute, sinuate, or dentate-mucronate; upper surface scabrid, sometimes with the veins appressed-pubescent; lower surface with prominent venation, papillose; petioles thick, 13.5 cm long, winged, with the base decurrent to half the diameter of the branch. Inflorescences of axillary panicles, 3-7 cm long, pilose; bracts oblong to ovate, 1-2 mm long. Calyx of 3-4 subequal sepals, ca. 2 mm long; petals 3, obovate, longer than the sepals; stamens 25-30, the filaments sinuate; ovary superior, bicarpellate, biglobose, glabrous. Fruit capsular, bilobate, bilocular, crustose, tardily dehiscent. Seeds 2 per fruit, with an orange arillode.

Distinctive features: Twining lianas similar to other Dilleniaceae but distinguished by the bicarpellate, syncarpous capsules with reflexed sepals.

Distribution: A monotypic genus widely distributed in lowland wet forests throughout the Neotropics.

TETRACERA Linnaeus, Sp. Pl. 1: 533. 1753.



Tetracera sp., photo by P. Acevedo



T. boomii, photo by Alex Popovkin

Androdioecious (in our region) subshrubs, erect or climbing shrubs or twining lianas reaching 15 or more m long; stems cylindrical some species reaching up to 30 cm in diam., producing copious watery exudate; bark shaggy, reddish brown; cross sections with regular vascular anatomy, vessel lumens conspicuously large, rays abundant and several cells wide. Leaves simple, alternate, in some species discoloured and scabrous, venation pinnate, the secondary prominent abaxially, the tertiary clathrate (fig. 4b), margins glandular, dentate; stipules absent. Inflorescence terminal or lateral racemose thyrses; bracts lanceolate. Flowers

actinomorphic, either staminate or bisexual; calyx of sepals 4-7(-12) free, imbricate, orbicular sepals; petals 3-5, free, white, usually obovate; stamens 50-200; filaments filiform, free, slightly unequal, anthers small; pistillode absent; ovary superior, of 1-5, free carpels with a single, distal style, the stigma peltate or punctiform. Capsules slightly divaricate. Seeds 1-4, black, with a lacinate, red or orange aril.

Distinctive features: Twining lianas or scrambling shrubs with reddish brown shaggy bark; fruits apocarpous, slightly symmetrical, not enclosed by the sepals.

Distribution: Pantropical genus with about 53 species, 19 of which are distributed throughout the Neotropics, in Mexico, Central America, Colombia, Venezuela, the Guianas, Ecuador, Peru, Brazil, Bolivia, Paraguay, Cuba, and Jamaica.

RELEVANT LITERATURE

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PICTURE VOUCHERS

Figure 1.

- A. *Doliocarpus dentatus* (Aubl.) Standl. (Acevedo 14287).
- B. *Doliocarpus sp.* (Acevedo 6628)
- C. *Davilla elliptica* A. St. Hil. (Acevedo 16086)
- D. *Davilla nitida* (Vahl) Kubitzki (Acevedo 17012)
- E. *Tetracera sp.* (no voucher)
- F. *Davilla sp.* (Guedes 31008)

Figure 2.

- A. *Doliocarpus dentatus* (Aubl.) Standl. (Acevedo 14287).
- B. *Doliocarpus sp.* (no voucher)
- C. *Davilla nitida* (Vahl) Kubitzki (Acevedo 17012)
- E. *Davilla elliptica* A. St. Hil. (Acevedo 16800)

Figure 3.

- A. *Doliocarpus sp.* (no voucher).
- B. *Tetracera sp.* (no voucher).
- C-D. *Doliocarpus sp.* (no voucher).

Figure 4.

- A. *Doliocarpus sp.* (no voucher)
- B. *Tetracera sp.* (Acevedo 16863).
- C. *Davilla nitida*. (Guedes 31009).
- D. *Davilla sp.* (Guedes 31010).

Figure 5.

A. *Davilla kunthii* A. St. Hil. (Acevedo 8191).

B. *Davilla undulata*. (no voucher).

Figure 6.

A. *Doliocarpus major* J.F. Gmel. (Amith 2505).

B. *Doliocarpus major* (Amith 31119).