

DILLENiaceae

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A pantropical family of 11 genera and ~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 clambering shrubs. These are represented by five genera, four 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 sandpapery 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 subcylindrical, 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 (Figure 101B) or in rectangular plates; cross sections show wide vessel lumens; *Doliocarpus* and *Pinzona* have successive cambia that produce continuous concentric rings of xylem and phloem with wide rays (Figure 100A), while *Davilla* and *Tetracera* have stems with regular vascular anatomy with wide rays (Figure 100B–F).
2. **EXUDATES.** Many species produce copious drinkable water when cut, e.g., *Doliocarpus* sp. and *Pinzona coriacea* Mart. & Zucc., while others only produce scanty watery exudate.

3. **CLIMBING MECHANISMS.** Dilleniaceae are either twiners (Figure 101C, D) 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, commonly with abaxially prominent secondary veins, tertiary veins clathrate or less often reticulate (Figure 102A–D); 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.

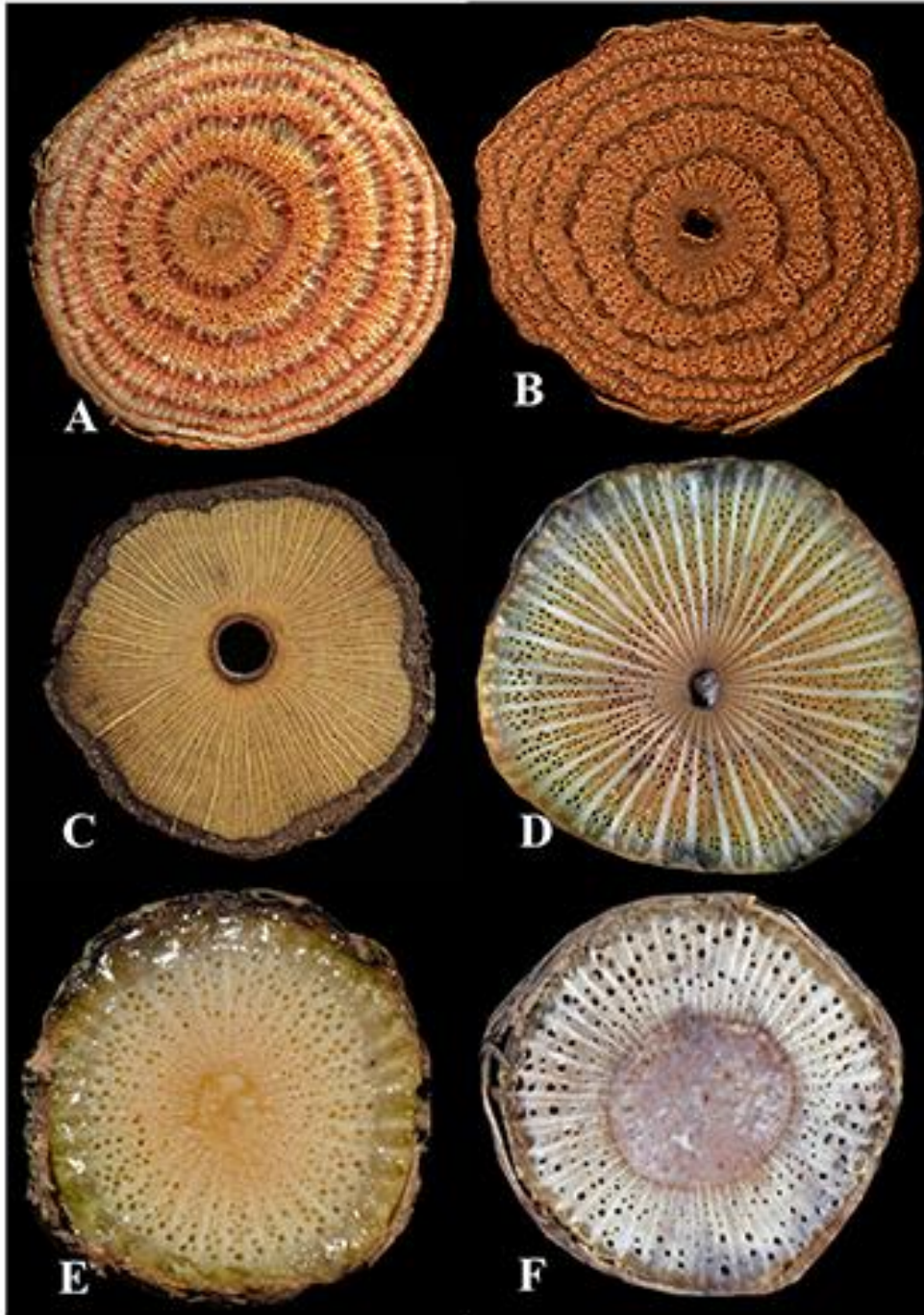


Figure 100. Cross sections of stems in Dilleniaceae. **A.** Cylindrical stem with successive bands of xylem and phloem and wide rays in *Doliocarpus dentatus*. **B.** Subcylindrical stem with successive bands of xylem and phloem and wide rays in *Pinzona coriacea*. **C.** Subcylindrical, regular stem with numerous wide rays in *Davilla elliptica*. **D.** Cylindrical, regular stem with wide rays in *Davilla nitida*. **E.** Cylindrical, regular stem with wide rays in *Tetracera oblongata*. **F.** Subcylindrical, regular stem with numerous wide rays in *Davilla sp.* Photos by P. Acevedo.



Figure 101. A–B. Barks in Dilleniaceae lianas. C–D. Climbing mechanisms. **A.** *Davilla nitida*, reddish bark peeling off in thin rectangular plates. **B.** *Davilla elliptica*, with papery flaky bark. **C.** *Doliocarpus* sp. with twining stems. **D.** *Tetracera* sp., with verticillate leaves. Photos by P. Acevedo.

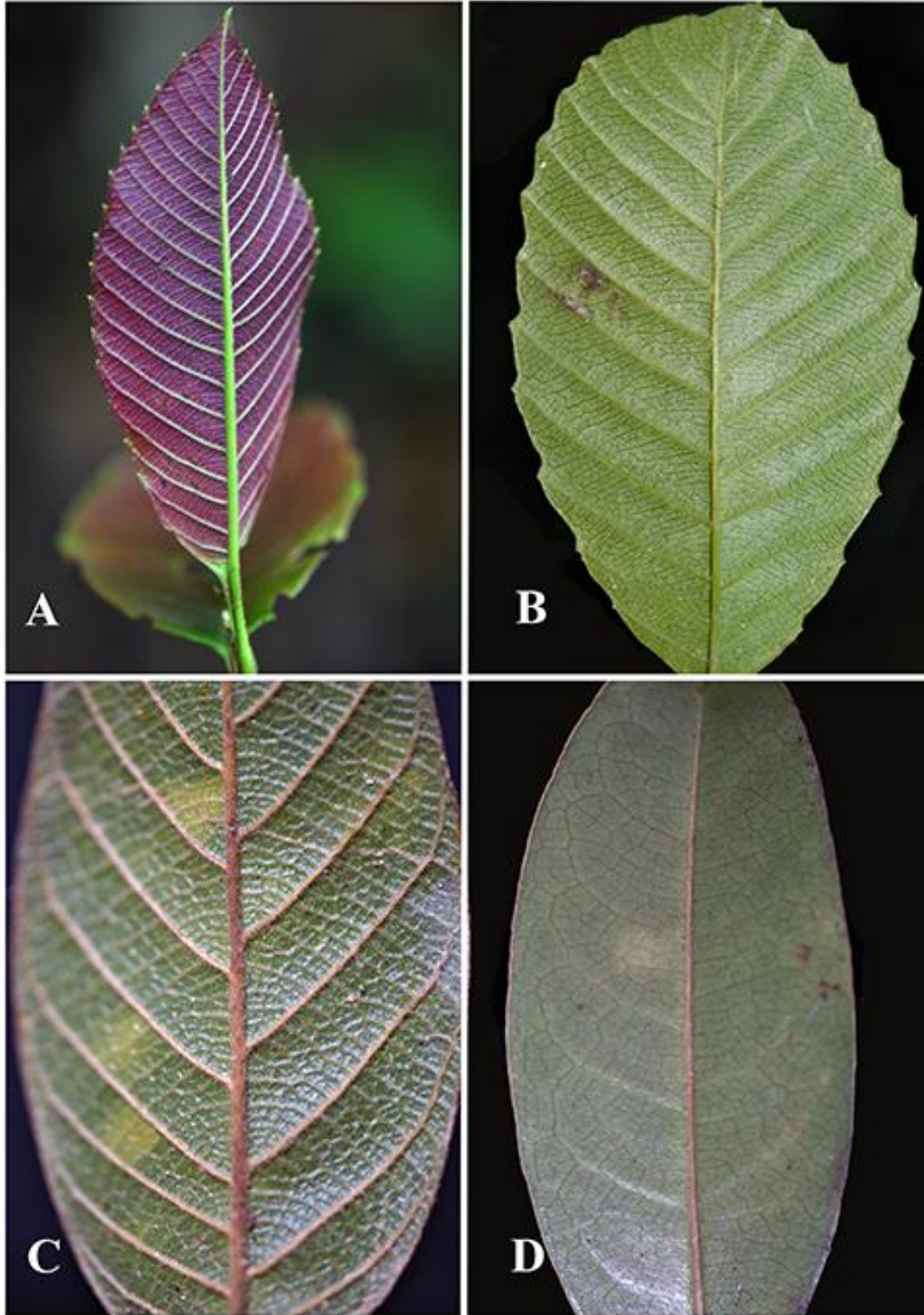


Figure 102. Leaves in Dilleniaceae. **A.** Young leaf with reddish coloration and prominent veins of *Doliocarpus* sp. **B.** Leaf with subclathrate tertiary venation of *Tetracera oblongata*. **C.** Leaf prominent venation and clathrate tertiary veins of *Davilla nitida*. **D.** Leaf with entire margins and reticulate venation of *Davilla* sp. Photos by P. Acevedo.

7. FLOWERS. Bisexual or rarely unisexual (the plant then dioecious) in *Tetracera*, actinomorphic; calyx of 3–5 distinct unequal sepals, the inner two accrescent and indurate in *Davilla*; corolla of 3–5 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–numerous per carpel, basal, the style 1 with a peltate or punctiform stigma.
8. FRUIT. A capsule, sometimes covered by persistent, accrescent sepals; seeds 1 or more per carpel, arillate.

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 sandpaper.

Key to the genera of climbing Dilleniaceae

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*

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

Twining lianas or scrambling shrubs. Stems more or less cylindrical; bark reddish papery flaky (Figure 101B) or in rectangular plates (Figure 101A); cross sections with regular vascular anatomy, vessel lumens conspicuously large, rays abundant and several cells wide, the medulla relatively large in young stems (Figure 100C, D, F). 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 subglobose structure; petals 3–6, free, yellow, obovate, caducous; stamens 50–450; ovary superior, of 1–2 free carpels with 2 ovules per carpel; style sublateral with peltate stigma. Capsules orange or yellow with 1–2 arillate seeds.

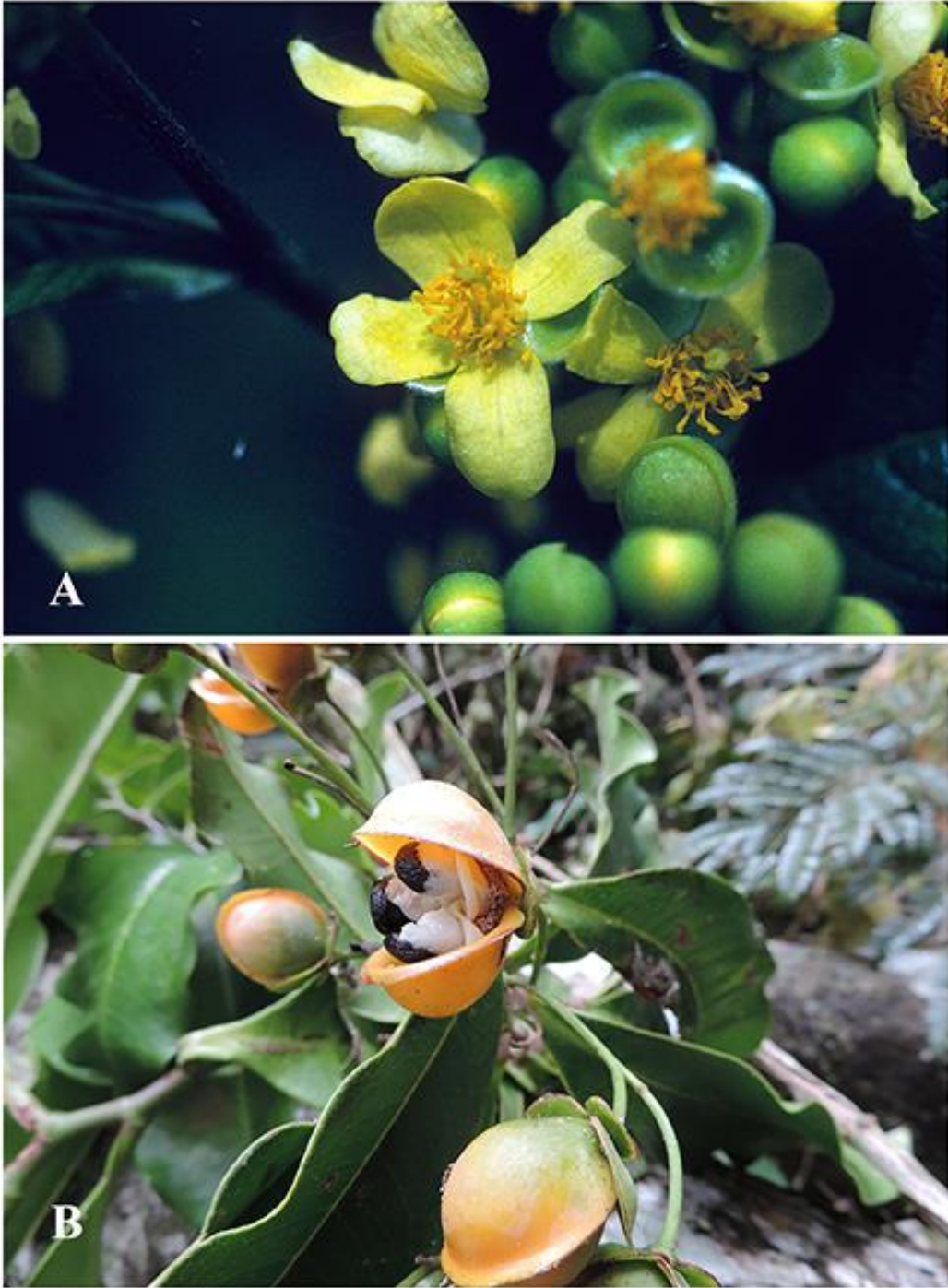


Figure 103. *Davilla*. **A.** Flowers of *D. kunthii*. **B.** Dehiscent capsules, showing partly arillate seeds, enclosed by two indurate sepals in *D. undulata*. Photos: A. by P. Acevedo; B by Renata Udulutsch.

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 ~34 species, 25 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.

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

Twining vines reaching 15–25 m in length, or less often erect shrubs (Figure 105); stems cylindrical, in some species reaching up to 30 cm in diam.; 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 subcylindrical (Figure 100A, B); many species producing abundant drinkable water. Leaves alternate, simple, entire or serrate, often with rough (sandpaper-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, unilocular, 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 unilocular flowers.



Figure 104. *Doliocarpus major*. **A.** Fruit clusters. **B.** Flower fascicle. Photos by J. Amith.

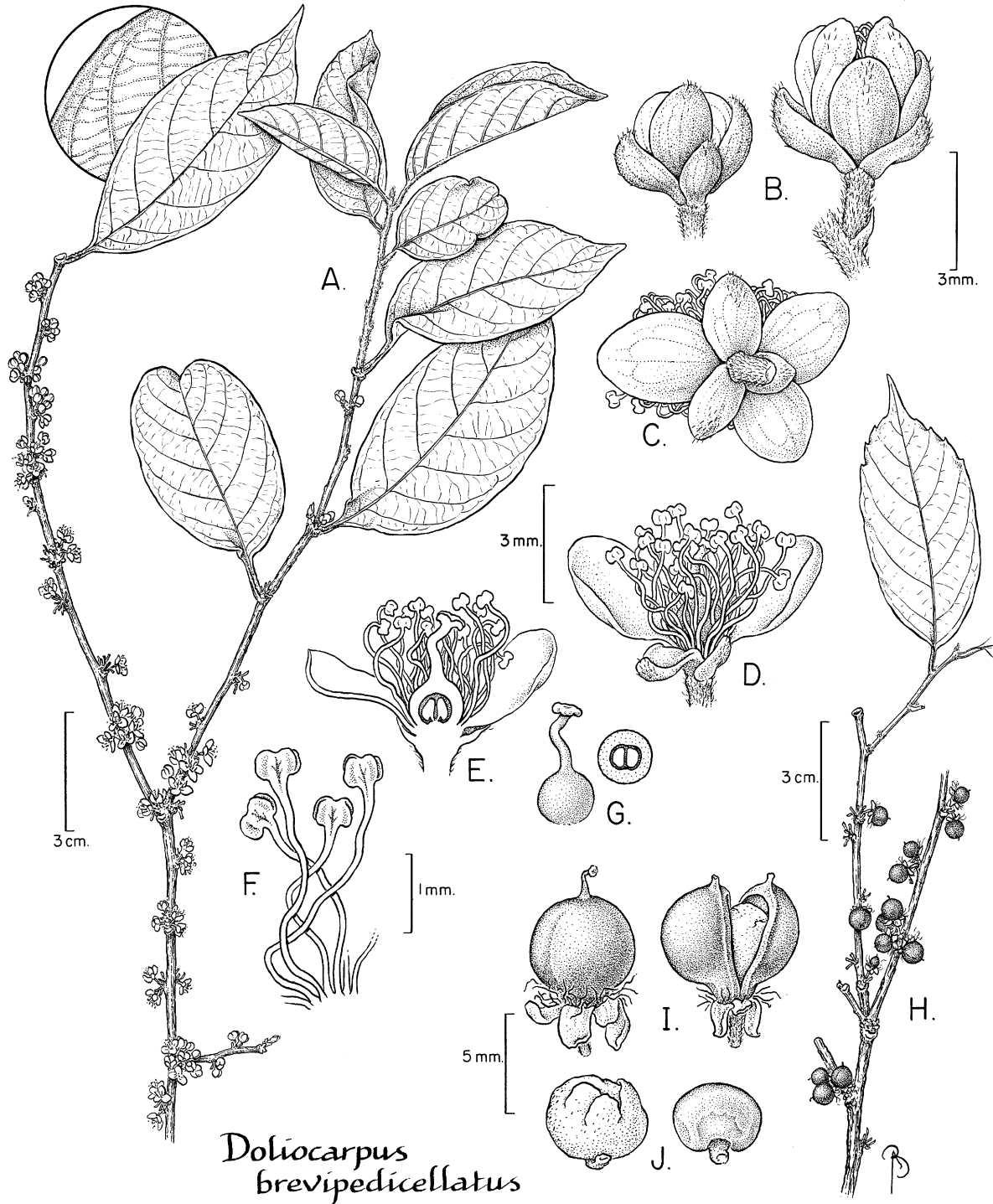


Figure 105. *Doliocarpus brevipedicellatus*. A. Flowering branch. B. Flower lateral views. C. Flower bottom view. D. Flower, lateral view. E. Flower longitudinal section. F. Stamens. G. Gynoecium, lateral view and cross section of ovary. I. Fruit, indehiscent and dehiscent. J. Seed enclosed by aril, naked seed. Drawing courtesy of Bobbi Angell.

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

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

Twining lianas (G. Aymard, pers. comm.); stems cylindrical; bark reddish brown, papery



Neodillenia peruviana, photo by B.R. Chambi (Atrium).

flaky or peeling off in rectangular plates; 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: Twining lianas with large, thick-coriaceous leaves with clathrate venation, and globose flower buds with coriaceous overlapping sepals enclosing the fruits.

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

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

Twining lianas reaching 30 m in length (Figure 106); stems cylindrical, up to 20 cm in



Pinzonia coriacea, photo by R. Aguilar.

diam. producing abundant drinkable 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, ~2 mm long; petals 3, obovate, longer than the sepals; stamens 25–30, the filaments sinuate; ovary superior, bicarpellate, biglobose, glabrous. Fruit

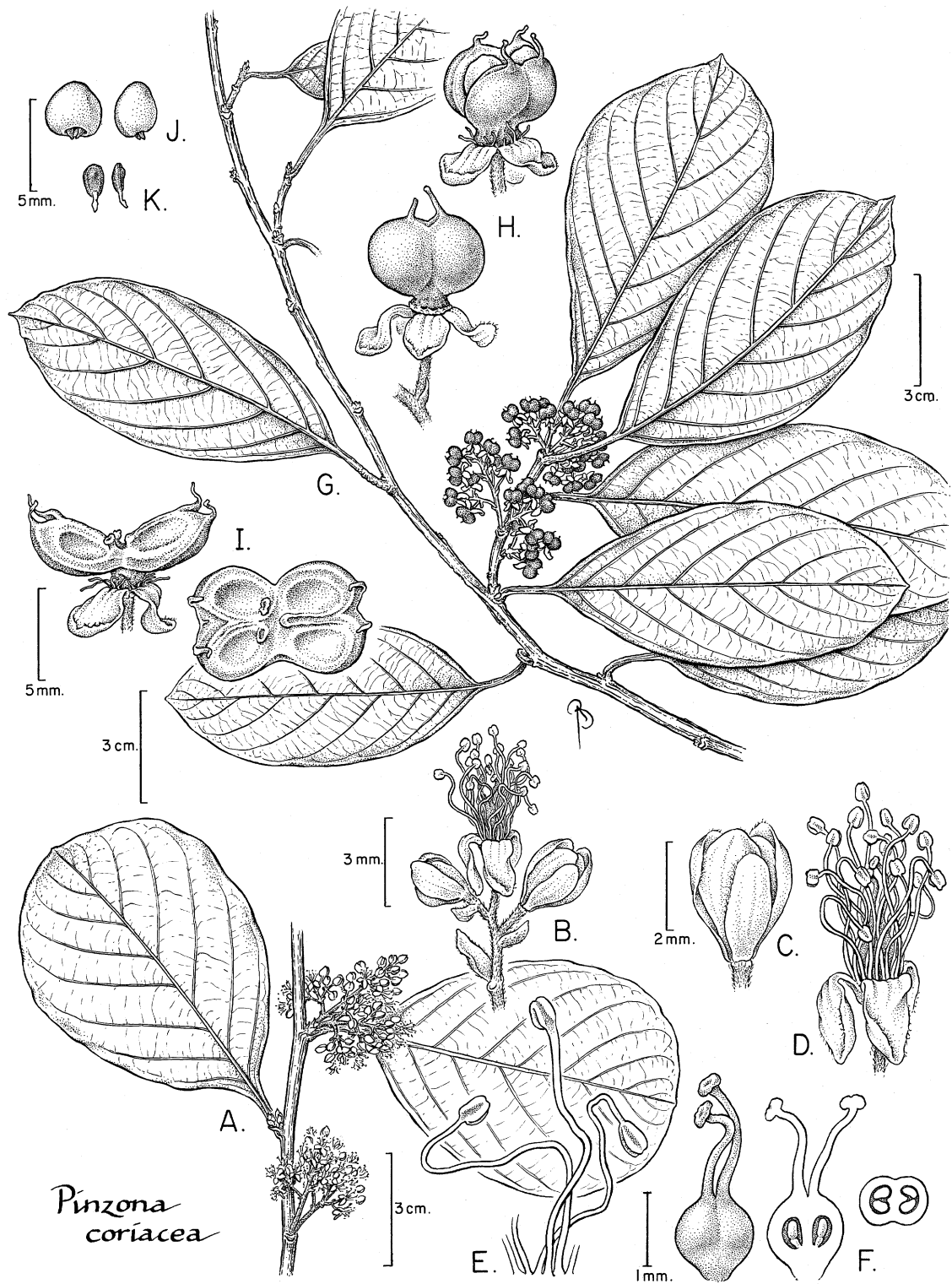


Figure 80. *Pinzona coriacea*. **A.** Flowering branch. **B.** Detail of inflorescence. **C.** Pre-anthesis flower lateral view. **D.** Flower at anthesis, lateral view. **E.** Stamens. **F.** Gynoecium, lateral view & longitudinal section. **G.** Fruiting branch. **H.** Fruit, un-dehiscent & dehiscent. **I.** Wall of dehiscent fruit, lateral and top views. **J.** Arillate seed, frontal & lateral views. **K.** Naked seed, frontal & lateral views. Drawing courtesy of Bobbi Angell.

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 neotropical genus of a single species, *P. coriacea* Mart. & Zucc, distributed in Belize, and from Honduras south to Bolivia and north central Brazil; lowland wet forests. the West Indies (Dominican Republic, Puerto Rico, Dominica, and St. Lucia),

TETRACERA Linnaeus, Sp. Pl. 533. 1753.

Androdioecious (in our region) subshrubs, erect or climbing shrubs or twining lianas



Tetracera oblongata, photo by P. Acevedo.

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 (Figure 100E).

Leaves simple, alternate, in some species discoloured and scabrous, venation pinnate, the secondary prominent abaxially, the tertiary clathrate (Figure 102B), 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: A pantropical genus with ~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.