

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

PIPERACEAE

By Pedro Acevedo-Rodríguez (Jun 2020)



Piper brachypodon, photo by P. Acevedo

A pantropical family of 5 genera and about 3,500 species of herbs, shrubs, small trees, vines and lianas. In the Neotropics, the family is represented by 4 genera and about 2,950 species, with about 52 species of climbers, two of which belong in the genus *Manekia* and the remaining 50 to the genus *Piper*. With the exception of *Manekia incurva* (Schult.) T. Arias et al. and *Piper multiplinervium* C.DC. which have a wide distribution within the Neotropics, the species of climbing Piperaceae in the Neotropics are narrow endemics, restricted to part of the continent. These are found in moist to wet, primary or disturbed, flooded and non-flooded forests of the lowlands.

Diagnosics: Branches with swollen nodes; leaves alternate with a stipular sheath, often aromatic and asymmetrical at base; inflorescences leaf-opposed, dense spikes or racemes.

General Characters

1. STEMS. Cylindrical, generally reaching 3-6 m in length and about 1 cm in diam., some species surpassing 15 m in length and up to 10 cm in diam.; nodes swollen, with a large stipular scar; bark usually lenticellate in *Piper*; cross sections with regular anatomy and conspicuous rays (fig. 1a) or the vascular axial elements divided in *radial segments* (fig. 1b); the genus *Manekia* is characterized by the presence of external vascular cylinders that result from the secondary growth of external primary vascular bundles in the cortex (fig. 1c; Angyalossy et al. 2015) ; vessel elements are very wide and visible to the naked eye (fig. 1a &b).
2. EXUDATES. Watery or no visible exudate.
3. CLIMBING MECHANISMS. Climbing Piperaceae are either *scramblers*, *twiners* or *root-climbers*, and often have short plagiotropic or hanging, lateral branches; some species may exhibit more than one climbing mechanism, e.g., *Piper brachypodon* (Benth.) C. DC where some collections are twiners or root-climbers.
4. LEAVES. Alternate, membranaceous to coriaceous, gland-less, often with a spicy aroma, margins entire, venation pinnate or with several main arcuate, parallel veins from base; commonly short-petioled; stipules fused to the petiole forming a sheath.
5. INFLORESCENCE. Leaf-opposed in *Piper* or axillary in *Manekia*, solitary spikes with minute flowers; bracts triangular or rounded, peltate or cucullate.
6. PEDICELS. Short or the flowers sessile.
7. FLOWERS. Bisexual, actinomorphic, without perianth; stamens 2-5, minute, the anthers opening along longitudinal slits; ovary superior, sessile or stipitate, unilocular, with a single, basal ovule, the stigma 1-4.
8. FRUIT. Small, one-seeded drupes, with fleshy pericarp.

KEY TO THE GENERA

1. Plants root-climbers; leaves fleshy; spikes axillary*Manekia*
1. Plants twiners, scramblers or root-climbers; leaves membranaceous or coriaceous or rarely fleshy; spikes leaf-opposed*Piper*

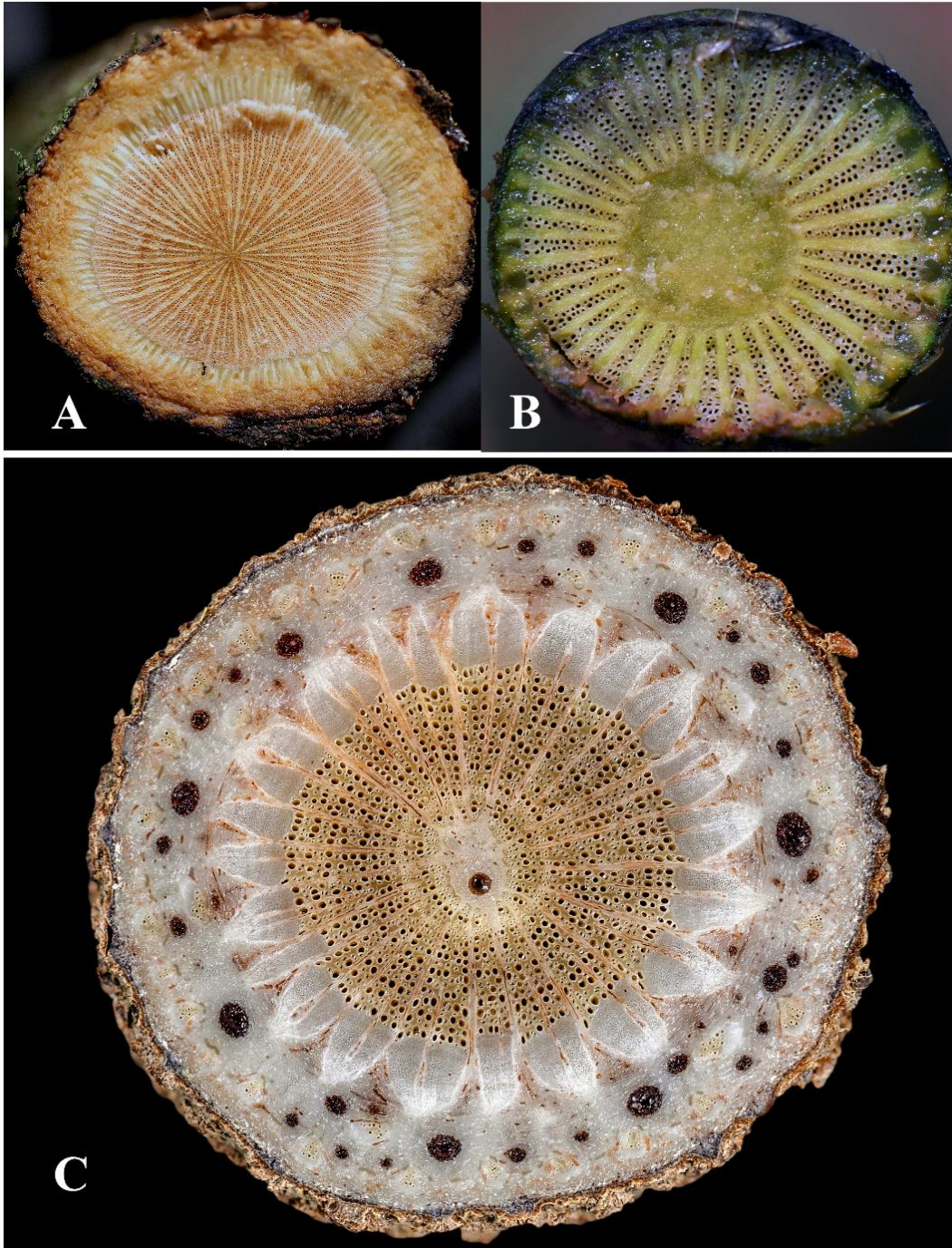


Figure 1. Cross sections of stems in Piperaceae. **A.** Numerous conspicuous rays of *Piper multiplinervium*. **B.** Vascular axial elements divided in radial segments of *Piper sp.* (16993) **C.** Conspicuous rays, large vessels and external vascular cylinders of *Manekia obtusa*. Photos by: A-B by P. Acevedo; C by M.R. Pace.

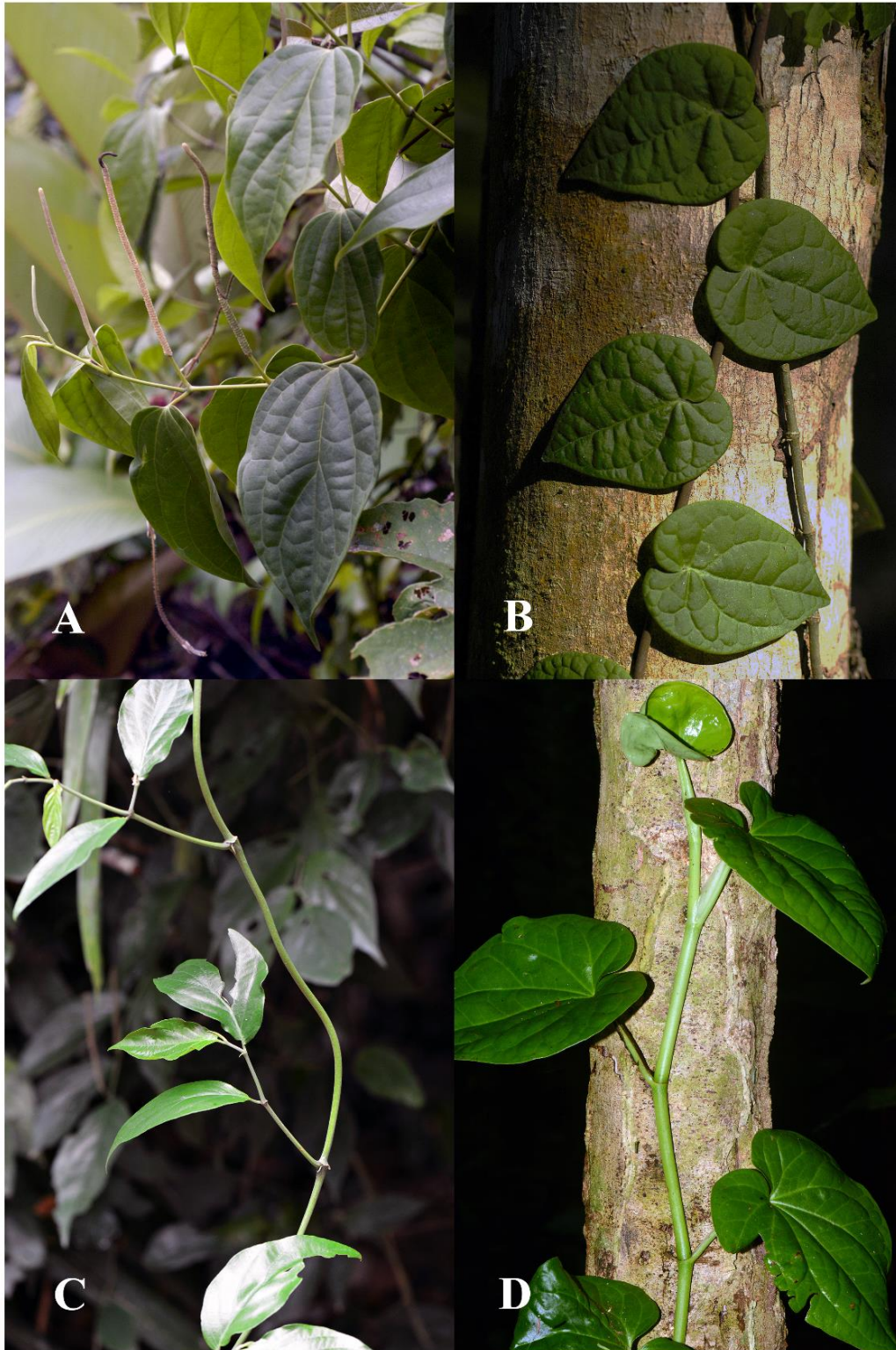


Figure 2. Climbing mechanisms in Piperaceae. **A.** *Piper multiplinervium*, a scrambler with short plagiotropic branches. **B.** *Piper sp.* a root-climber. **C.** *Piper sp.* a twiner with short, lateral, branches. **D.** *Manekia obtusa* a root-climber. Photos by P. Acevedo.



Figure 3. Inflorescences in Piperaceae. **A.** Axillary spike of *Manekia obtusa*. **B.** Leaf-opposed spike of *Piper brachypodon*. Photos by P. Acevedo.

GENERIC DESCRIPTIONS

MANEKIA Trelease, Repert. Spec. Nov. Regni Veg. 23: 313. 1927.

Sarcorrhachis Trel.



M. obtusa, photo by P. Acevedo

Herbaceous, fleshy, root-climbing vines. Stems cylindrical, slightly fleshy 2-3 m long, and ca. 1 cm in diam. when old; cross section with numerous rays and large vessels, medulla and cortex with neoformed vascular cylinders. Leaves alternate, fleshy, simple, with entire margins, cordate at base, venation with 7 main arcuate, parallel veins

from base; petioles 2-3 cm long, invaginate; stipules large, united at the base with the petiole, forming a sheath. Spikes axillary, solitary, long-peduncled, as long as the subtending leaf. Flowers actinomorphic, subtended by a minute, concave bract; stamens 4, the filaments free, the anthers rounded; stigmas 4. Drupe partly immersed on the inflorescence rachis.

Distinctive features: Fleshy, root-climber vine; stems fleshy; leaves cordiform, fleshy.

Distribution: A genus of 3 species distributed from Costa Rica to southern Brazil, and Haiti; absent in the Amazon basin. Found in moist or wet forests.

PIPER Linnaeus, Sp. Pl. 28. 1753.



Piper sp. photo by P. Acevedo

Small trees, shrubs, scrambling, twining or root-climbing vines or lianas. Stems cylindrical, reaching 3 to 16 m in length and up to 10 cm in diam. (e.g., *P. multiplinervium*), bark relatively smooth beige, lenticellate; cross sections with regular anatomy and conspicuous rays or the vascular axial elements divided in *radial segments* due to the wide rays. Leaves alternate, membranaceous to coriaceous, simple, with entire margins, venation pinnate or with a few main arcuate, parallel veins from base; petioles short to long. Inflorescences leaf-opposed, solitary spikes or racemes, shorter to longer than the opposite leaf. Flowers minute, subtended by a minute, peltate or cucullate bract; stamens 2-5; ovary superior, sessile to stipitate, unicarpellate; style absent or short, with 3-4 stigmata. Drupes small, often green or greenish yellow, one-seeded.

Distinctive features: Branches with swollen nodes; leaves often aromatic, inflorescences spicate, leaf-opposed, and often fleshy; stem cross sections with conspicuous rays.

Distribution: A large pantropical genus of about 2,150 species, represented in the Neotropics by 1,817 known species of which only 50 are reported as vines or lianas; common in moist or wet, lowland forests; distributed from Mexico, northern South America and Bolivia, but most diverse in Colombia and Ecuador.

RELEVANT LITERATURE

Angyalossy, V. M.R. Pace and A.C. Lima. 2015. Liana anatomy a broad perspective on structural evolution of the vascular system, pages 253-287. In: S. A. Schnitzer, F. Bongers, R.J. Burnham and F.E. Putz (eds.) Ecology of Lianas. Wiley Blackwell.

Burger, W.C. 1971. Piperaceae, Flora Costaricensis. Fieldiana, Bot. 35: 5–227.

Görtz-van Rijn, A. 2002. Piperaceae. In: S.A. Mori et al. (eds.). Guide to the vascular plants of Central French Guiana. Memoirs of the New York Botanical Garden 76 (2): 574-583.

Schubert, H.K, M.S. Taylor, J.F. Smith and A.J. Bornstein. 2012. A Systematic Revision of the Genus *Manekia* (Piperaceae). Syst. Bot. 37: 587-598.

Tebbs M.C. (1993) Piperaceae. In: Kubitzki K., Rohwer J.G., Bittrich V. (eds.) Flowering Plants. Dicotyledons. The Families and Genera of Vascular Plants, vol 2. Springer, Berlin, Heidelberg.

PICTURE VOUCHERS

Figure 1.

A. *Piper multiplinervium* C.DC. (Acevedo 14284).

B. *Piper* sp. (Acevedo 16993)

C. *Manekia obtusa* (Miq.) T. Arias, Callejas & Bornst. (Pace s.n.)

Figure 2.

A. *Piper multiplinervium* C.DC. (Acevedo 15246).

B. *Piper sp.* (no voucher).

C. *Piper sp.* (Acevedo 16993).

D. *Manekia obtusa* (Miq.) T. Arias, Callejas & Bornst. (no voucher)

Figure 3.

A. *Manekia obtusa* (Miq.) T. Arias, Callejas & Bornst. (no voucher).

B. *Piper brachypodon* (Benth.) C.DC. (Romero 4548).