

PIPERACEAE

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A pantropical family of five genera and ~3,500 species of herbs, shrubs, small trees, vines and lianas. In the Neotropics, the family is represented by four genera and ~2,950 species, with ~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 lowland moist to wet, primary or disturbed, flooded and non-flooded forests.

Diagnosics: Branches with swollen nodes; leaves alternate, 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 ~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 section with regular anatomy and conspicuous rays (Figure 17A), sometimes the vascular axial elements divided in radial segments (Figure 17B), some species with scattered vascular bundles in the center of stem (Figure 17C); the genus *Manekia* is characterized by the presence of external vascular cylinders that result from the secondary growth of external primary cortical vascular bundles (Figure 17D; Angyalossy et al. 2015); vessel elements are very wide and visible to the naked eye (Figure 17A–D).
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 (Figure 18).
4. LEAVES. Alternate, membranaceous to coriaceous, gland-less, often with a spicy aroma, margins entire, venation pinnate, palmate or acrodromous (basal or suprabasal) with 5–9 main veins; short- to long-petioled; stipules fused to the petiole forming a sheath.
5. INFLORESCENCE. Commonly solitary spikes; leaf-opposed, axillary or terminal in *Piper* and *Peperomia*; axillary (sympodial axes), solitary or paired in *Manekia*; 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.

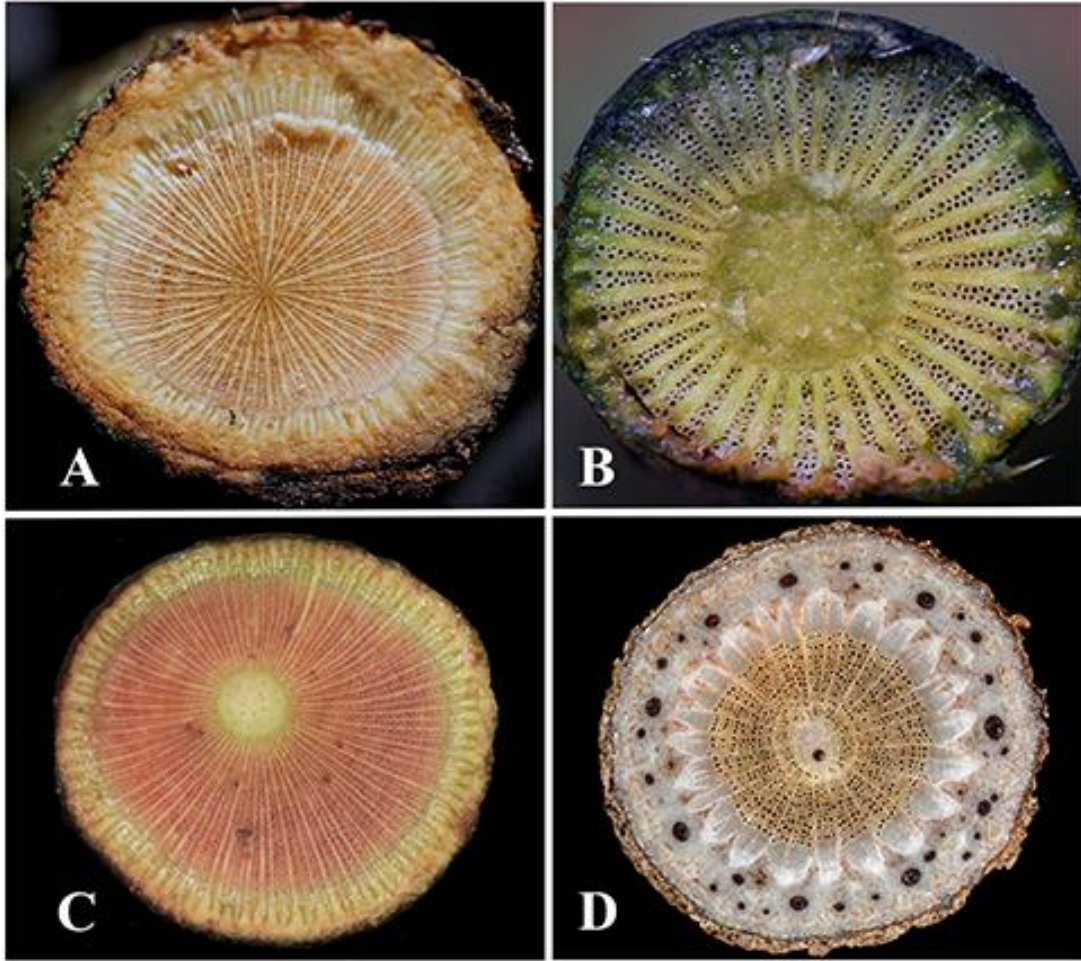


Figure 17. Cross sections of stems in Piperaceae. **A.** Numerous conspicuous rays of *Piper multiplinervium*. **B.** Vascular axial elements divided in radial segments of *Piper* sp. **C.** *Piper* sp. center of stem with discrete vascular bundles, secondary xylem cylindrical dissected by numerous narrow rays. **D.** Conspicuous rays, large vessels and external vascular cylinders in the cortex of *Manekia obtusa*. Photos by: A–C by P. Acevedo; D by M.R. Pace.



Figure 18. 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.

Key to the genera of climbing Piperaceae

- 1. Plants twiners, scramblers or root-climbers; leaves membranaceous or coriaceous or rarely fleshy; spikes leaf-opposed*Piper*
- 1. Plants root-climbers; leaves fleshy; spikes axillary or terminal2
- 2. Stipules not forming a sheath with the petiole; spike axillary or terminal*Peperomia*
- 2. Stipules large, united at the base with the petiole, forming a sheath; spikes axillary.....*Manekia*

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

Sarcorrhachis Trel. (1927).

Herbaceous, fleshy, root-climbing vines. Stems cylindrical, slightly fleshy 2–3 m long,



Manekia obtusa, photo by P. Acevedo.

and ~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 (or paired), 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-climbing vines; stems fleshy; leaves cordiform, fleshy.

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

PEPEROMIA Ruiz & Pavón, Prodr. 8. 1794.

Terrestrial, epiphytic or epilithic, herbs, erect, prostrate, decumbent, pendulous or



Peperomia urocarpa, photo by P. Acevedo.

climbing through the aid of adventitious roots. Climbers: stems slender, succulent, sometimes fragile, cylindrical. Leaves succulent, alternate (or opposite or whorled in non-climbing species), with palmate or less often pinnate venation; petioles short or

elongated, not forming a sheath;

stipules absent. Spikes axillary or terminal, solitary or paired, short to long-pedunculate. Flowers actinomorphic, subtended by a minute, peltate bract; stamens 2, lateral; ovary sessile or stipitate, the stigma simple, terminal or lateral. Drupe minute, ellipsoid or globose, sessile or stipitate.

Distinctive features: Herbaceous, short, fleshy, root-climbing or epiphytic vines; stems and leaves fleshy; leaves often aromatic.

Distribution: A genus of tropical and subtemperate zones of ~1,417 species, 1,128 of which occur in the Neotropics; only the following four species considered climbers as defined in this project. *Peperomia manarae* Steyerem. (Venezuela and Guyana), *P. psilophylla* C. DC. (Bolivia),

P. rotundifolia and *P. urocarpa* (most of the Neotropics); mostly in humid or moist lowland forests.

PIPER Linnaeus, Sp. Pl. 28. 1753.

Small trees, shrubs, scrambling, twining or root-climbing vines or lianas. Stems



Piper hostmannianum, photo by P. Acevedo.

cylindrical, reaching 3–16 m in length and up to 10 cm in diam. (e.g., *P. multiplinervium* C. DC.), bark 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 ~2,150 species, represented in the Neotropics by 1,817 known species of which only 52 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.