

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

## VITACEAE

By Júlio Antonio Lombardi (Jun, 2017)

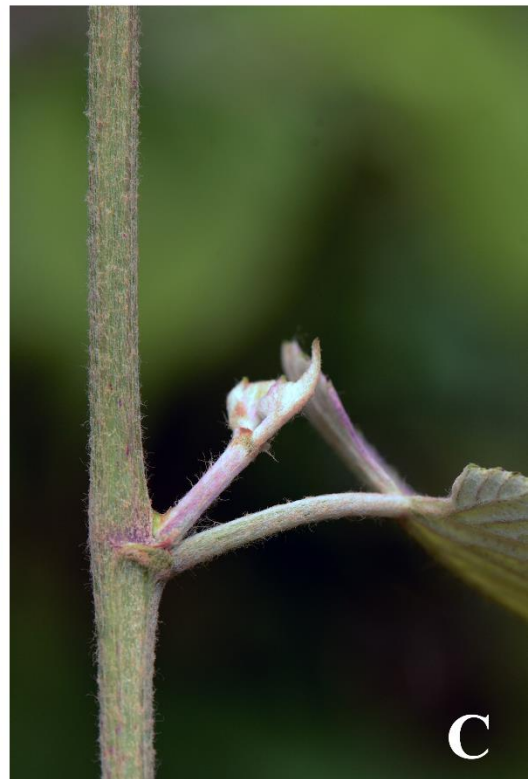
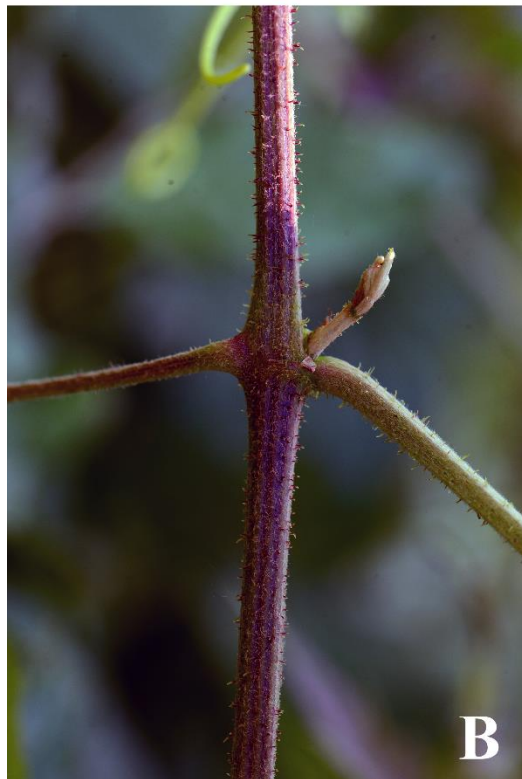


*Cissus verticillata* (photo: H. Medeiros)

Tropical, subtropical, and warm temperate family of lianas, vines, and rarely shrubs or hemicryptophytes. Lianas and vines are restricted to the Vitoideae subfamily comprising 13-14 genera and ca. 800 species. Most Neotropical Vitaceae are lianas or vines that climb by means of tendrils and are represented by 6 genera and ca. 100 species that occur in diverse habitats. Of these, *Cissus* is the most diverse, with numerous species of vines and even a few species of shrubby

hemicryptophytes that are restricted to the savannas of South America.

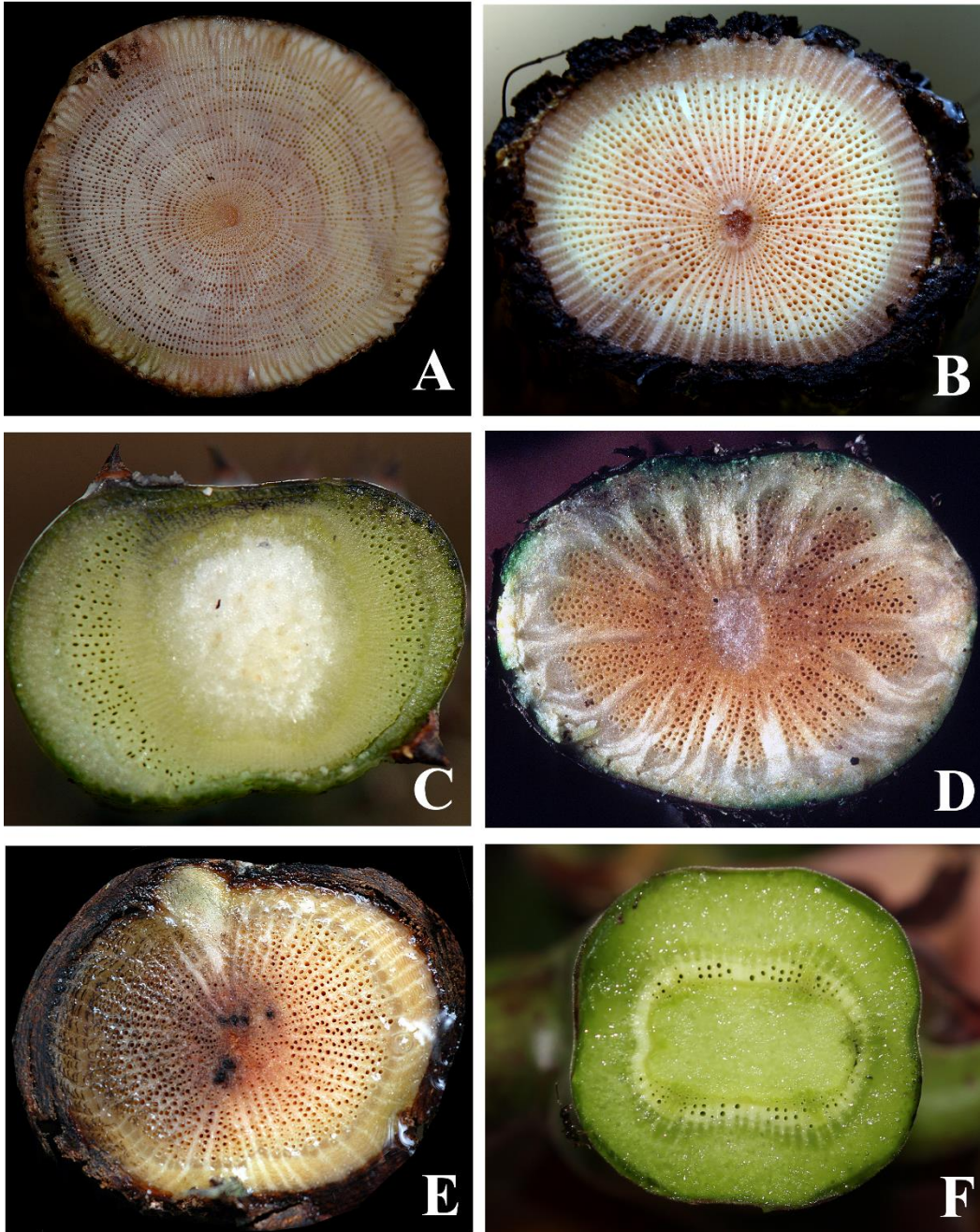
**Diagnosics:** Vitaceae is the only family of lianas with tendrils and inflorescences that are opposite to the leaves (fig. 1a), and therefore are very easy to recognize even in the absence of flowers or fruits.



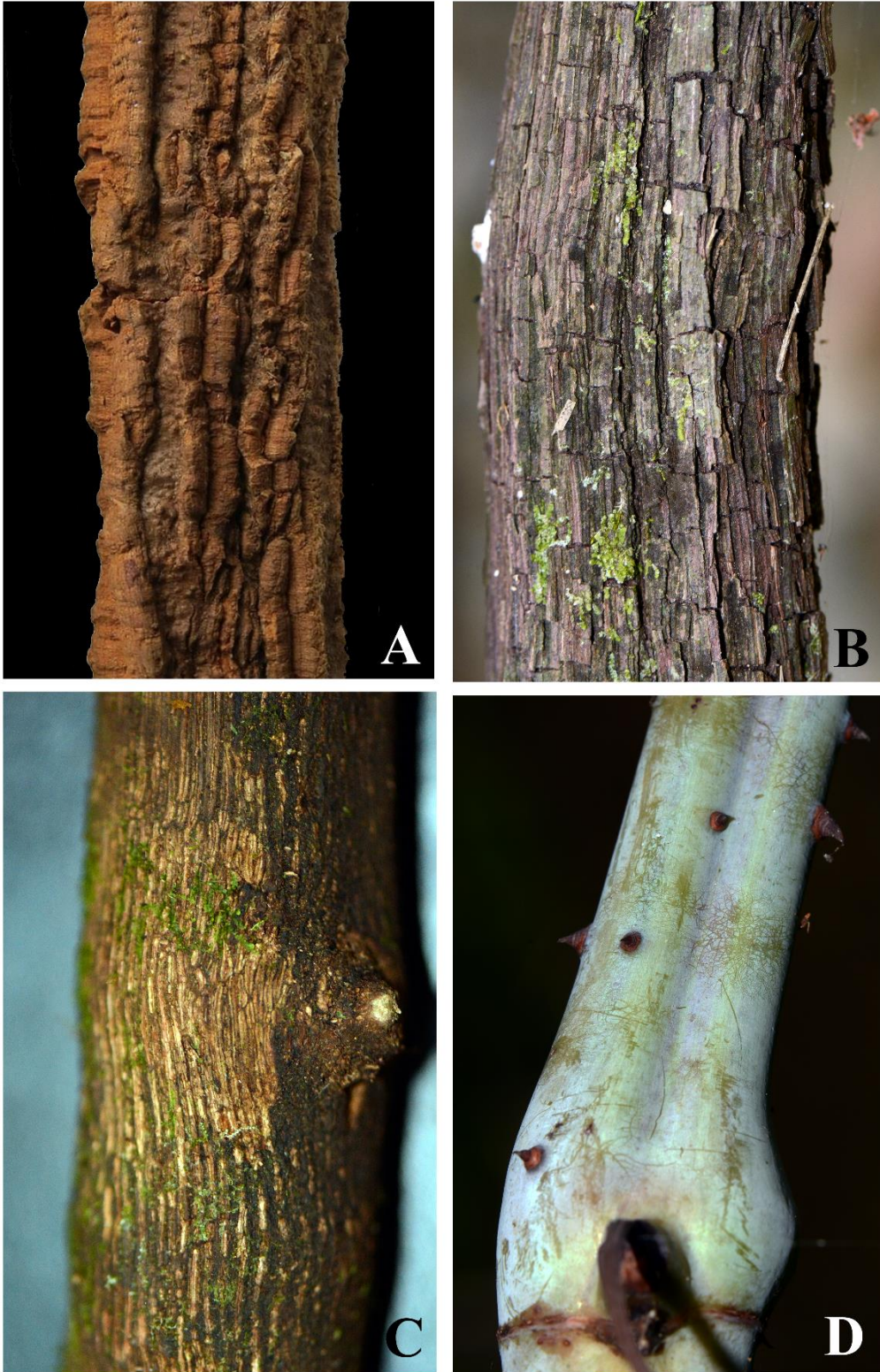
**Figure 1.** **A.** *Vitis* sp. showing leaf-opposite tendrils. **B.** Stems of *Vitis* sp. showing simple non-glandular hairs. **C.** Stem of *Vitis* sp. showing arachnoid hairs. Photos by P. Acevedo.

## General Characters

1. STEMS. Woody or less often herbaceous; 1 to 8 cm in diameter and up to 30 m in length; cylindrical (fig. 2a), tetragonal (fig. 2f), or slightly flattened (fig. 2b-e), with **regular anatomical configuration**, with **conspicuous rays** (fig. 2a-f), sometimes the rays very wide, dividing the xylem into **radial segments** (fig. 2d); the medulla is very large in species of *Ampelocissus*, *Ampelopsis*, and *Cissus* (fig. 2c, f). Bark is quite variable, very smooth and thin in species of *Ampelocissus* and *Ampelopsis* (fig. 3d), rough and flaky in *Vitis* (fig. 3b), fissured in species *Vitis* (fig. 3c), or corky in some *Cissus* (fig. 3a), sometimes with soft emergences or prickles in *Ampelocissus*, *Ampelopsis*, and *Cissus* (fig. 3d) or winged in species of *Cissus* (e.g. *C. sulcicaulis* Baker).
2. HAIRS AND EPIDERMAL FEATURES. Trichomes glandular or eglandular, branched or unbranched (fig 7b). Small, globose, multicellular structures also known as “**food bodies** or **pearl glands**” are found on the epidermis of some *Cissus* (fig. 7c).
3. EXUDATES. Watery and usually abundant (fig. 2e); *Vitis tiliifolius* Roem. & Schult. is known for the abundant discharge of drinkable water (fig. 4). The presence of scarce latex has been reported in a collection of *Cissus nobilis* Kuhl. in South America, but this report has not been confirmed.



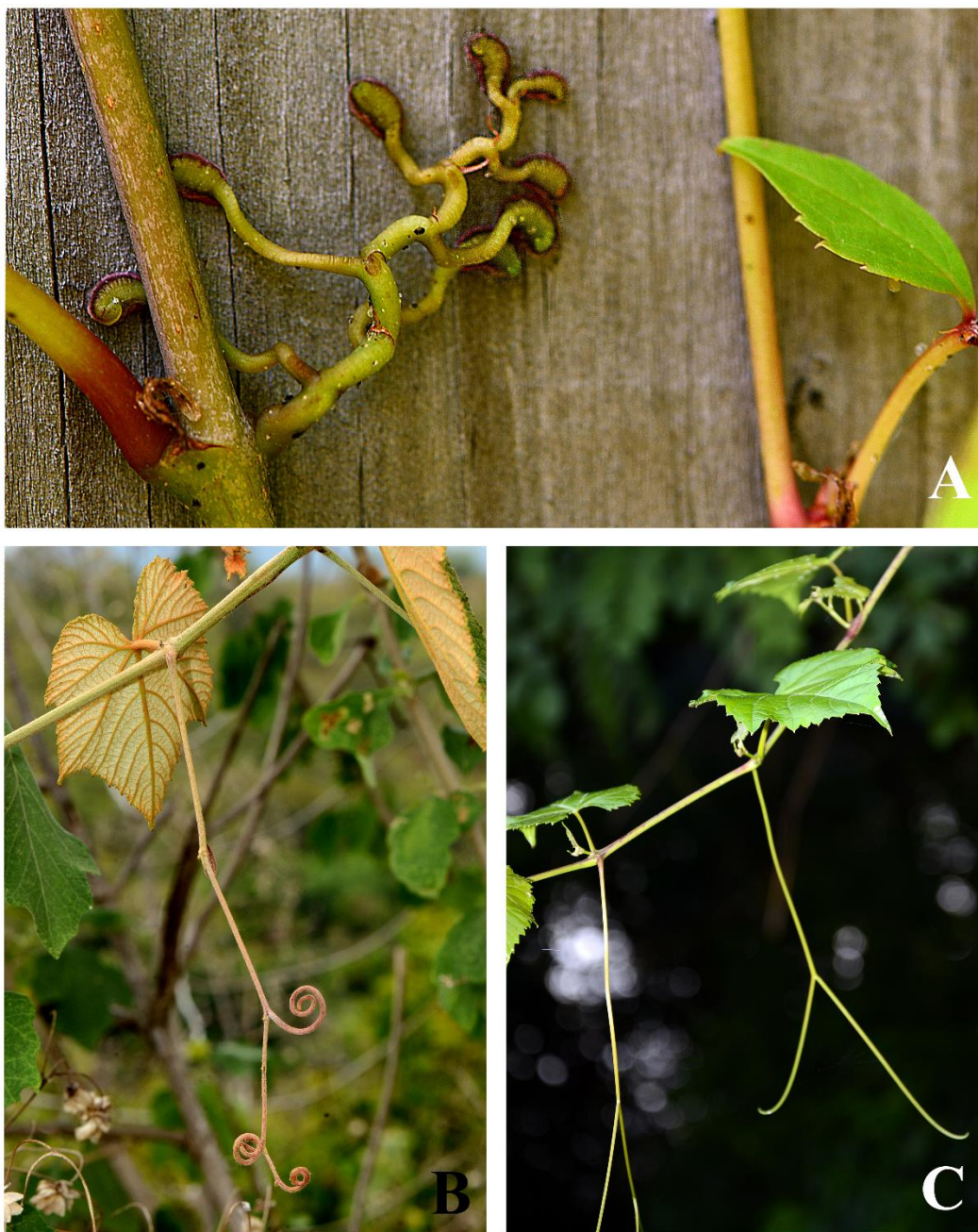
**Figure 2.** Stem's cross sections, with regular anatomy with wide rays. **A.** *Vitis popenoei* J.L. Fennell. **B.** *Vitis tiliifolia* Roem. & Schult. **C.** *Ampelopsis denudata* Planch., showing large medulla. **D.** *Cissus verticillata* (L.) Nicolson & C.E.Jarvis, showing radial segments. **E.** *Cissus obovata* Vahl, with watery exudate. **F.** *Cissus gongylodes*(Baker) Planch. Photos by A-E: P. Acevedo; F: H. Medeiros.



**Figure 3.** Stems in woody Vitaceae. **A.** *Cissus* sp. with corky bark. **B.** *Vitis tiliifolia* with rough, flaky bark. **C.** *Vitis popenoei* with fissure bark. **D.** *Ampelopsis denudata* with smooth, thin bark and thorns. Photos by A: J.A. Lombardi; B-D: P. Acevedo.



**Figure 4.** Person drinking water from a section of stem of *Vitis tiliifolia*. Photo by P. Acevedo.

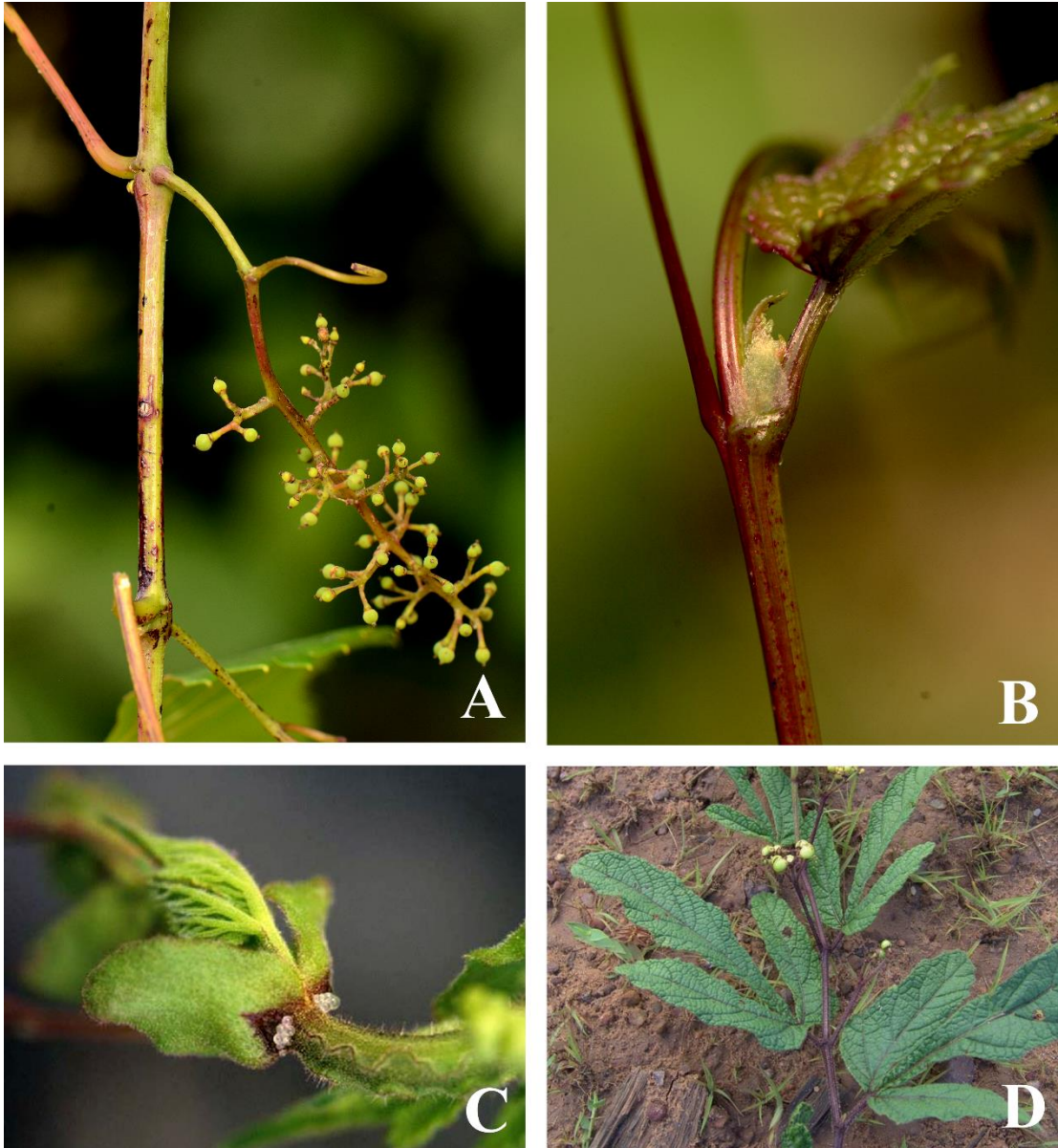


**Figure 5** Tendrils in Vitaceae. **A.** *Parthenocissus quinquefolia* (L.) Planch., tendril with adhesive pads. **B.** *Ampelocissus acapulcensis* (Kunth) Planch. With branched tendril. **C.** *Ampelopsis* sp. with bifurcate tendrils. Photos by P. Acevedo.



**Figure 6.** Inflorescence with prehensile branches. **A.** *Clematicissus tweedieana* (Baker) Lombardi.  
**B.** *Ampelopsis* sp. A. Photos by A: J.A. Lombardi; B: P. Acevedo.





**Figure 7.** **A.** *Vitis sp.* showing inflorescence with prehensile branch. **B.** *Vitis sp.* showing triangular stipule. **C.** *Cissus sulcicaulis* (Baker) Planch., young branch with immature leaf and a pair of large stipules with pearl glands. **D.** *Cissus duarteana* Cambess. showing trifoliate leaves. Photos by A-B: P. Acevedo; C-D: J.A. Lombardi.

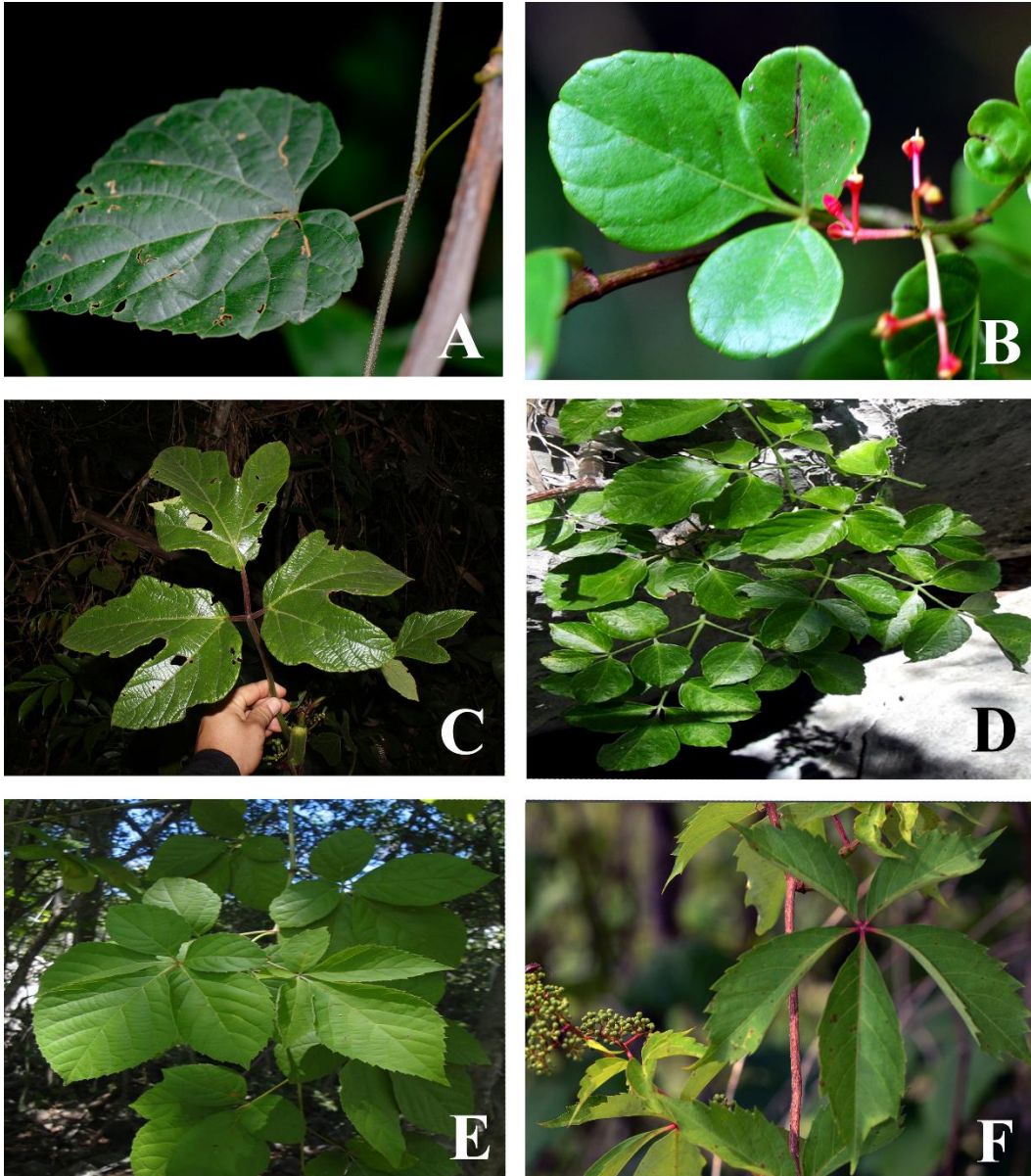
4. TENDRILS. Opposite to leaves, simple or branched (fig. 1a, 5a-c), bifurcate (fig. 5c) or further branched, these sometimes forming part of the inflorescence (prehensile branches) in species of *Ampelocissus*, *Ampelopsis*, *Clematicissus* and

*Vitis* (fig. 6a-b, 7a). In addition, some *Cissus* (e.g., *C. erosa* L.C. Rich.) and *Parthenocissus* develop adhesive pads in the apexes of tendril branches (fig. 5a).

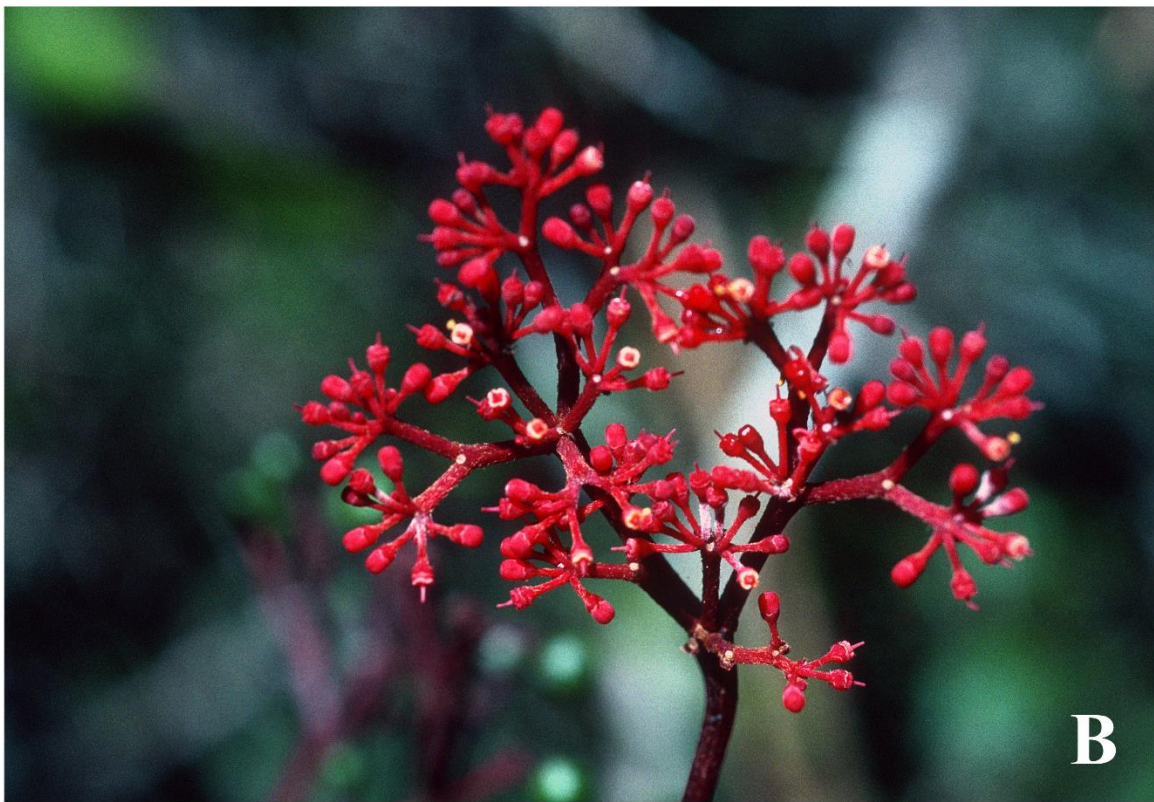
5. LEAVES. Alternate, simple, lobed or compound, with serrate margins. Petioles and rachis are cylindrical and canaliculate or rarely winged.
6. STIPULES. Always present, usually small and early deciduous, rarely persistent or becoming turgid thorns. Sometimes the pair growing on a dilated structure that include the leaf node.
7. INFLORESCENCES. Inflorescences are opposite to the leaves, umbelliform cymes (fig. 9b), racemose thyrses (fig. 9a), or glomerules, usually ascending (fig. 9b), spreading or hanging (fig. 9a). Sometimes with prehensile branches in *Ampelocissus*, *Ampelopsis*, *Clematicissus* and *Vitis* (fig. 6a-b, 7a); bracts are scale-like small, sometimes nectar secreting. The inflorescence of several species of *Cissus* (e.g., *C. verticillata*) are often infested by the parasitic fungus *Mycosyrinx cissi* (Poiret) G. Beck, that causes the inflorescence to turn into an elongate, hanging, profusely branched structure that is sometimes taken for a parasitic plant in the Viscaceae family (fig. 10).
8. FLOWERS. Actinomorphic, bisexual or sometimes unisexual in monoecious or polygamous species of *Ampelocissus* or *Vitis*. Perianth green, cream, or red, usually concolorous (fig. 11a-c); calyx gamosepalous, cupular, small, truncate or with

minute lobes, a few *Cissus* species with conspicuous spreading or reflexed lobes (fig. 11c); petals distinct, connate at base, or distally coherent and calyptra-like in *Vitis*, deciduous at anthesis, rarely persistent; stamens 4-5; nectary disc intrastaminal, adnate to ovary in *Ampelocissus*, *Cissus*, and *Clematicissus*, annular and free in *Ampelopsis*, or of separated lobes in *Vitis*; ovary superior, bicarpellate and bilocular, style short with minute stigma at apex; placentation axial, ovules 2 per locule.

9. FRUITS. Fruits are fleshy berries, spherical, ovoid, oblate or ellipsoid, purple, green, brown, or less often white (fig. 11d-f); pericarp thin and papery (fig. 11d), or thick and crustaceous (fig. 11e), smooth, less often lenticellate (fig. 11f); some *Cissus* have pilose or winged fruits.
10. SEEDS. Seeds are heart-shaped, pear-shaped, subspherical or prismatic, with smooth, ribbed or grooved testa.
11. TUBERS. A few species of *Cissus* produce aerial or subterranean, fleshy or woody tubers, some of which are used as a food source by local people.



**Figure 8.** Leaves in Vitaceae. **A.** *Vitis tiliifolia* with simple, cordate leaves. **B.** *Cissus obovata* Vahl with trifoliolate leaves. **C.** *Cissus gongyloides* with trifoliolate leaves. **D.** *Cissus decidua* Lombardi with tripinnate leaves. **E.** *Clematicissus simsiana* (Schult. & Schult.f.) Lombardi with palmate leaves. **F.** *Parthenocissus quinquefolia* (L.) Planch. Photos by A-B, F: P. Acevedo; C: by H. Medeiros; D-E: J.A. Lombardi.



**Figure 9.** **A.** Racemose inflorescence in *Vitis tiliifolia*. **B.** Umbelliform inflorescence in *Cissus erosa*.  
Photo by A: J. Amith; B: P. Acevedo.

## USES

*Vitis* species and its hybrids, the source of grapes, are cultivated worldwide for the production of wine, juice, fruits, and raisins. *V. vinifera* L. (European grape), *V. labrusca* L. (slip skin grape), *V. rotundifolia* Michx. (muscadine grape), with many varieties and cultivars, were introduced in tropical America. The stems of *Vitis tiliifolia*, commonly known as water vine, are the source of clean drinkable water (fig. 4). Some *Ampelocissus* are grown for their edible fruits which are used for wine and vinegar. Species of *Cissus* are used in traditional medicines and cultural rituals by indigenous people in the Americas, e.g., *Cissus verticillata* (L.) Nicolson & Jarvis which in addition is grown as an ornamental plant. Exotic species of *Cissus*, *Tetrastigma* and *Parthenocissus* are grown as ornamental vines in parts of the Neotropics.

### Key to the genera of Vitaceae

1. Inflorescences umbelliform cymes or glomerules, arachnoid hairs absent .....2
1. Inflorescences thyrsoid, racemose, arachnoid hairs present .....5
2. Nectary indistinct from the ovary wall (Mexico, Guatemala, Bahamas, Cuba).....  
..... *Parthenocissus*
2. Nectary conspicuous, clearly distinct from the ovary wall .....3
3. Stipules free from petiole base; inflorescence lacking prehensile branches (S North America to South America, West Indies).....*Cissus*
3. Stipules adnate to petiole base, inflorescence with prehensile branches .....3
4. Leaves digitate (South America) .....*Clematicissus*
4. Leaves trifoliolate (Mexico, Guatemala) ..... *Ampelopsis*
5. Nectary annular (Mesoamerica) ..... *Ampelocissus*
5. Nectary 5-lobed (North America to NW South America, West Indies)..... *Vitis*



**Figure 10.** Deformed inflorescence of *Cissus verticillata* by the parasitic fungus *Mycosyrinx cissi*. Photo by P. Acevedo.



**Figure 11.** A-C. Flowers in Vitaceae. D-F. Fruits in Vitaceae. **A.** *Cissus tiliacea* Kunth. **B.** *Clematicissus tweedieana* (Baker) Lombardi . **C.** *Cissus apendiculata* Lombardi . **D.** *Cissus verticillata*. **E.** *Ampelocissus acapulcensis* **F.** *Cissus* sp. Photos by A-C: J.A. Lombardi; D-F: P. Acevedo.



## IDENTIFICATION OF GENERA BASED ON VEGETATIVE CHARACTERS

Although Vitaceae are easily distinguished by opposite-to leaf tendrils and inflorescences, the additional characters are useful in distinguishing genera or groups of species.

1. **Barks.** Dark, rough, flaky barks are characteristic of *Vitis tiliifolia*, while corky or thorny are limited to a few species of *Ampelopsis* and *Cissus*.
2. **Hairs.** The presence of ***T-shaped*** (Malpighiaceae) hairs in Vitaceae, although not universal, are restricted to *Cissus*; ***arachnoid*** hairs are found exclusively in *Ampelocissus* and *Vitis*.
3. **Stipules.** Stipules that are ***adnate to the base*** of the petiole are found only in *Ampelopsis* and *Clematicissus*. Large, fleshy and persistent stipules occur in a few species of *Cissus*.
4. **Leaves.** ***Simple leaves*** are found in *Ampelocissus*, *Ampelopsis*, *Vitis* and many species of *Cissus*; ***digitate leaves*** are found in *Parthenocissus*, *Clematicissus* and three species of *Cissus* (i.e., *C. cucurbitina* Standl., *C. mexicana* DC., and *C. palmata* Poir.); ***pinnately compound*** are found in few South American species of *Cissus*; ***trifoliate*** leaves in the Neotropics are found only in *Cissus* and *Ampelopsis denudata* Planch.

## GENERIC DESCRIPTIONS

**AMPELOCISSUS** Planchon, Vigne Amér. Vitic. Eur. 8: 371. 1884 (nom. cons.).



*Ampelocissus acapulcensis* (photo: P. Acevedo)

Monoicous or functionally dioecious lianas; trichomes unbranched, eglandular, and arachnoid. Leaves simple, commonly lobed, with great morphological variation even within individual plants; stipules free; petioles canaliculate. Inflorescences racemose thyrses, with prehensile branches. Flowers 5-merous, functionally unisexual (seemingly bisexual) in Mesoamerican species; calyx patelliform; petals induplicate,

coherent at the margins, deciduous after anthesis; nectary slightly lobed, completely adnate to the ovary; style very short or absent, stigma punctiform or slightly capitate.

Fruit wall papery, smooth or lenticellate; seeds (1-)3-4, heart-shaped or cuneiform.

**Distinctive features:** With arachnoid trichomes on leaves (mostly underside) and young branches; nectary disc 5-or 10 lobed.

**Distribution:** A tropical genus with ca. 95 species, distributed in Asia, Africa and the New World, with 3 species in Mexico and Central America.

**AMPELOPSIS** Michaux, Fl. Bor.-Amer. 1: 159. 1803.



*Ampelopsis denudata* (photo: P. Acevedo)

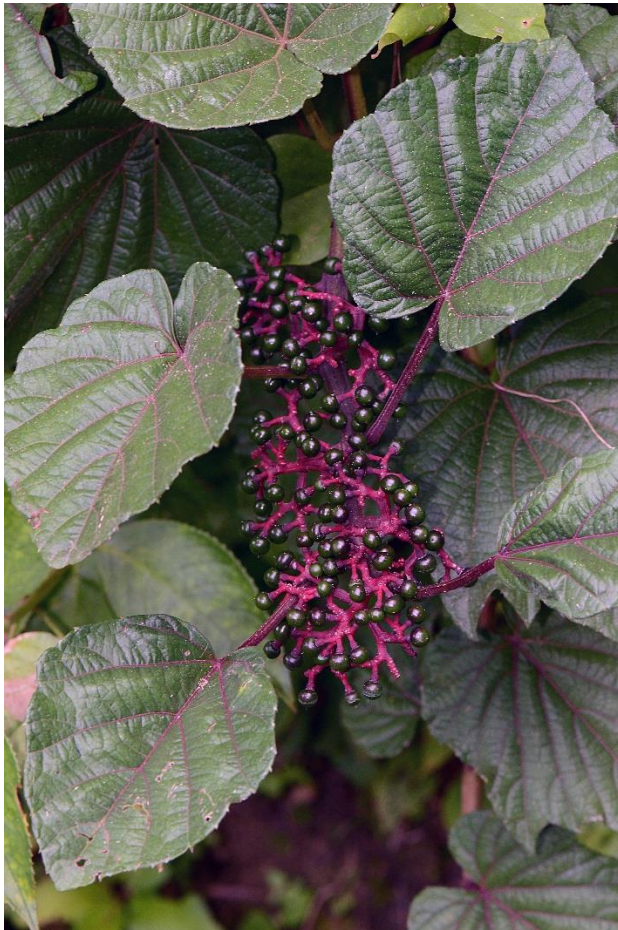
Monoecious lianas; trichomes simple and eglandular. Leaves simple or trifoliate in Mesoamerican species; stipules adnate to petiole base; petioles canaliculate. Inflorescences umbelliform, with prehensile branches.

Flowers bisexual; 5-merous, calyx patelliform; petals induplicate, coherent at the margins, deciduous after anthesis; nectary 5-lobed, adnate at the base of the ovary; style short, cylindrical, stigma punctiform. Fruit wall papery, smooth; seeds 2-4, heart-shaped or cuneiform.

**Distinctive features:** Trichomes short, simple, eglandular; stipules adnate to petiole base; leaves trifoliate; inflorescences with prehensile branches.

**Distribution:** A predominantly temperate genus with ca. 25 species, distributed in Asia and the New World, with one species in the United States, and 1 (*Ampelopsis denudata* Planch.) in Mexico and Guatemala.

**CISSUS** Linnaeus, Sp. pl. 1: 117. 1753.



*Cissus* sp. (photo: P. Acevedo)

Lianas, rarely hemicryptophytic subshrubs; plants monoecious; trichomes eglandular, glandular, unbranched, or T-shaped. Leaves simple or variously compound, petiolate or rarely sessile; stipules free; petioles canaliculate or winged. Inflorescences umbelliform cymes, or rarely glomerules, without prehensile branches. Flowers bisexual; 4(5)-merous, calyx cup-shaped or rarely patelliform, with conspicuous spreading or reflexed lobes in few species; corolla dialypetalous, petals

induplicate, coherent at the margins, deciduous after anthesis or rarely persistent; nectary more or less 4-lobed, adnate and covering the ovary; style cylindrical or conical, stigma punctiform or slightly capitate. Fruit wall papery or crustaceous, smooth or lenticellate,

very rarely pilose or winged; seeds 1(-4), heart-shaped, hippocrepiform, sub-prismatic, subspherical, or fusiform.

**Distinctive features:** Glandular and T-shaped hairs occurs only in *Cissus*, but not in all species; stipules free; leaves variously compound, pinnate/bipinnate leaves occurs only in *Cissus*; inflorescences without prehensile branches; few species with calyx transversely enlarged or basely lobed; nectary disc annular, short-tubular in few species.

**Distribution:** A chiefly tropical genus with ca. 350 species, distributed in southern Arabia, Asia, sub-Saharan Africa, Australia, New Guinea, and the New World south of the United States to central Argentina and southern Chile, and West Indies. There are 89 known species climbing of *Cissus* in the Neotropics.

**CLEMATICISSUS** Planchon in A. & C. De Candolle, Monogr. Phan. 5(2): 422. 1887.



*Clematicissus tweedieana* (photo: J. Lombardi)

Lianas, woody rootstock commonly present; trichomes, when present, unbranched, eglandular. Leaves digitate; stipule adnate to petiole base; petiole canaliculate. Inflorescences umbelliform, with prehensile branches. Flowers bisexual, 4-5-merous; calyx cup-shaped; corolla dialypetalous, petals induplicate, coherent at the margins, early deciduous; nectary more or less 4-5-lobed, adnate to the ovary base; style short, conical, stigma punctiform. Fruit wall papery, smooth; seeds 1(-4), heart-shaped.

**Distinctive features:** Stipules adnate to petiole base; leaves digitate; inflorescences with prehensile branches.

**Distribution:** Six species, two Australian and four South American, including the only species in the family that occurs naturally in Chile.

**PARTHENOCISSUS** Planchon in A. & C. De Candolle, Monogr. Phan. 5(2): 447.

1887.



*Parthenocissus quinquefolia* (photo: P. Acevedo)

petals induplicate, reflexed at anthesis, persistent; nectary 10-lobed, indistinct from the ovary; style short, conical, stigma punctiform. Fruit a thin-walled, smooth, depressed-globose berry; seeds 1(-4).

Lianas or herbaceous vines;  
glabrous or with simple trichomes.  
Leaves digitate, trilobed, or  
palmately lobed, serrate or serrate-  
mucronate at margins; stipule deltate,  
early deciduous; petiole canaliculate  
along upper surface; tendrils many-  
branched, with adhesive elliptic pads.  
Inflorescences umbelliform  
compound cymes not bearing  
prehensile branches. Flowers  
bisexual or unisexual, 5-merous;  
calyx cup-shaped, with 5 minute  
teeth; corolla green, dialypetalous,

**Distinctive features:** Tendrils with adhesive pads; leaves digitate (in the native species);  
nectary indistinct from the ovary wall.

**Distribution:** About 10 species in North America and Asia, with *P. quinquefolia* (L.) Planch. naturally occurring in Mexico Guatemala, Bahamas, and Cuba.

**VITIS** Linnaeus, Sp. Pl. 1: 202. 1753.



*Vitis tiliifolia* (photo: P. Acevedo)

calyptra; stamens in functionally female flowers reflexed or rarely absent; nectary composed of 5 free lobes alternating with the stamens; style short or absent, stigma punctiform or slightly capitate, pistillodium present in staminate flowers. Fruit wall papery, smooth or lenticellate; seeds (1-)3-4, heart-shaped.

Polygamous-dioecious lianas.  
Trichomes unbranched and eglandular, arachnoid. Leaves simple and commonly lobed, with great morphological variation even within the same plant; stipules free; petioles canaliculate. Inflorescences thyrses with prehensile branches. Flowers 5-merous, functionally unisexual; calyx patelliform; corolla dialypetalous, petals induplicate, united at the apex, coherent at the margins, deciduous after anthesis in a propeller-like



**Distinctive features:** Arachnoid trichomes chiefly on leaves underside and young branches; flowers functionally unisexual; nectary of 5 free glands.

**Distribution:** A chiefly temperate genus with ca. 65 species, distributed in the North America, Europe, and Asia, with only 5 species from Mexico to NW South America, including the West Indies.

## RELEVANT LITERATURE

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