

VITACEAE

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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 ~800 species. Most neotropical Vitaceae are lianas or vines that climb by means of tendrils and are represented by 6 genera and ~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 (Figure 243A), and therefore are very easy to recognize even in the absence of flowers or fruits.

General Characters

1. STEMS. Woody or less often herbaceous; 1–8 cm in diameter and up to 30 m in length; cylindrical (Figure 243A), tetragonal (Figure 243F), or slightly flattened (Figure 243B–E), with regular anatomical configuration, with conspicuous rays (Figure 243A–F), sometimes the rays very wide, dividing the xylem into radial segments (Figure 243D); the medulla is very large in species of *Ampelocissus*, *Ampelopsis*, and *Cissus* (Figure 243C, F). Bark is quite variable, very smooth and thin in species of *Ampelocissus* and *Ampelopsis* (Figure 244D), rough and flaky in *Vitis* (Figure 244B), fissured in species *Vitis* (Figure 244C), or corky in some *Cissus* (Figure 244A), sometimes with soft emergences or prickles in *Ampelocissus*, *Ampelopsis*, and *Cissus* (Figure 244D) or winged in species of *Cissus* (e.g., *C. sulcicaulis* Baker).

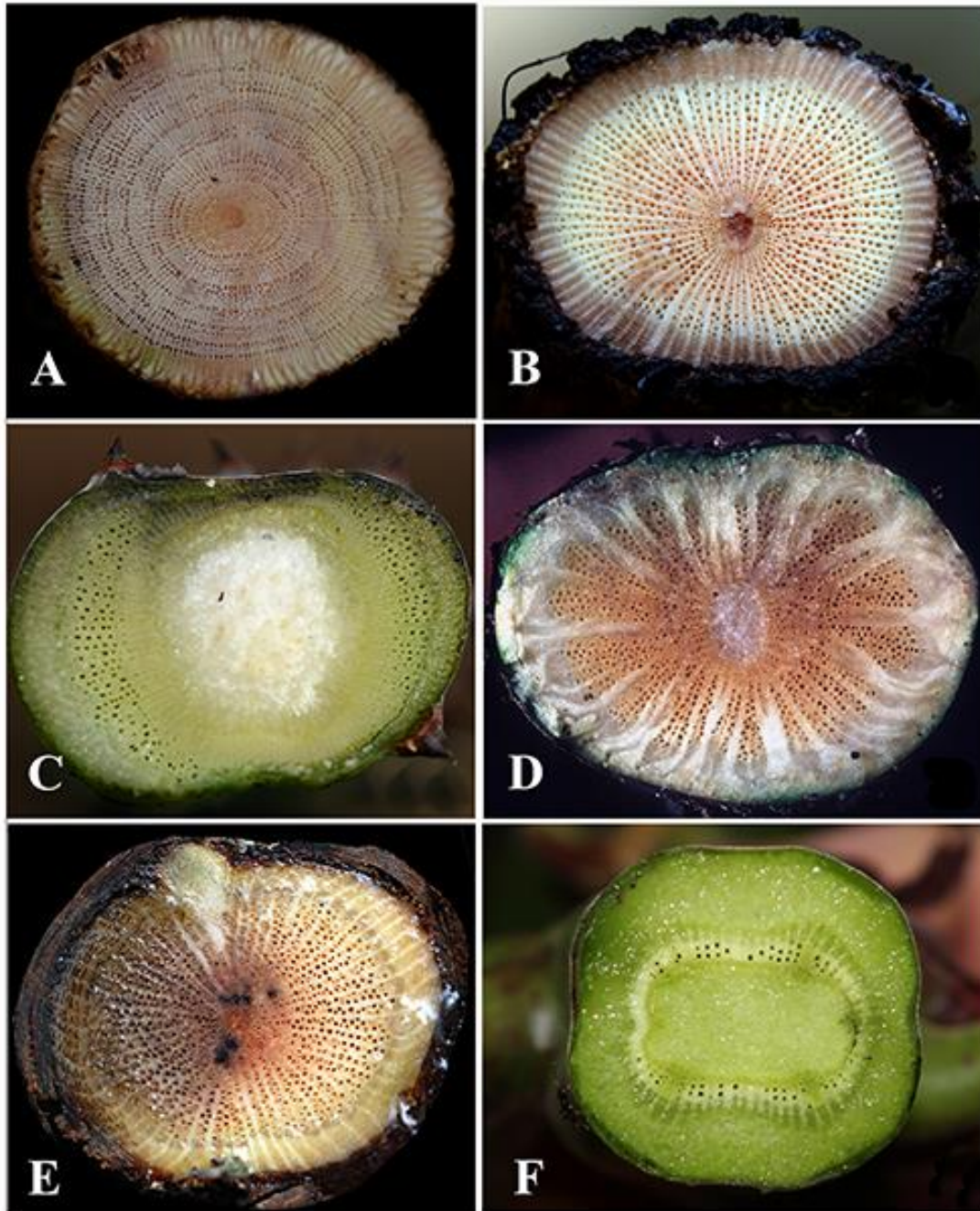


Figure 243. Stem cross sections, with regular anatomy with wide rays. **A.** *Vitis popenoei*. **B.** *Vitis tiliifolia*. **C.** *Ampelopsis denudata*, showing large medulla. **D.** *Cissus verticillata*, showing radial segments. **E.** *Cissus obovata*, with watery exudate. **F.** *Cissus gongyloides*. Photos: A–E by P. Acevedo; F by H. Medeiros.

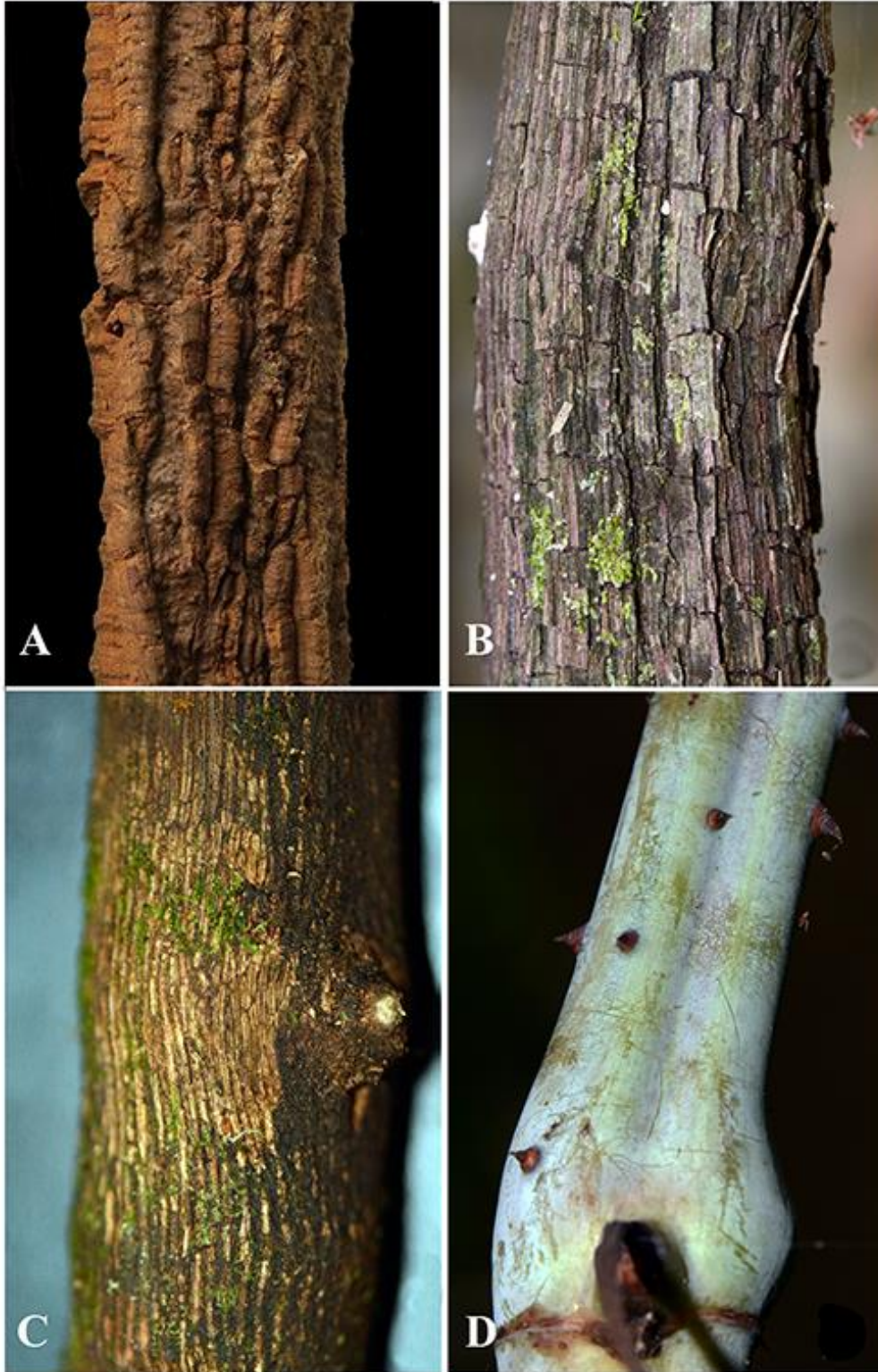


Figure 244. Stems in woody Vitaceae. **A.** *Cissus* sp. with corky bark. **B.** *Vitis tiliifolia* with rough, flaky, blackish bark. **C.** *Vitis popenoei* with fissure bark. **D.** *Ampelopsis denudata* with smooth, thin bark and prickles. Photos by A: J.A. Lombardi; B–D: P. Acevedo.

2. **HAIRS AND EPIDERMAL FEATURES.** Trichomes glandular or eglandular, branched or unbranched. Small, globose, multicellular structures also known as “food bodies or pearl glands” are found on the epidermis of some *Cissus*.
3. **CLIMBING MECHANISM.** All climbing genera have tendrils that are leaf-opposed, simple or branched, bifurcate (Figure 245B, C) or further branched, these sometimes forming part of the inflorescence in species of *Ampelocissus*, *Ampelopsis*, *Clematicissus* and *Vitis*. In addition, some *Cissus* (e.g., *C. erosa* L.C. Rich.) and *Parthenocissus* develop adhesive pads in the apexes of tendril branches (Figure 245A).
4. **EXUDATES.** Watery and usually abundant; *Vitis tiliifolia* Schult. is known for the abundant discharge of drinkable water. 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.
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 spines. Sometimes the pair growing on a dilated structure that include the leaf node.
7. **INFLORESCENCES.** Inflorescences are opposite to the leaves, umbelliform cymes (Figure 246A, B), racemose thyrses (Figure 247A), or glomerules, usually ascending, spreading or hanging. Sometimes accompanied by tendrils in *Ampelocissus*, *Ampelopsis*, *Clematicissus* and *Vitis*; 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

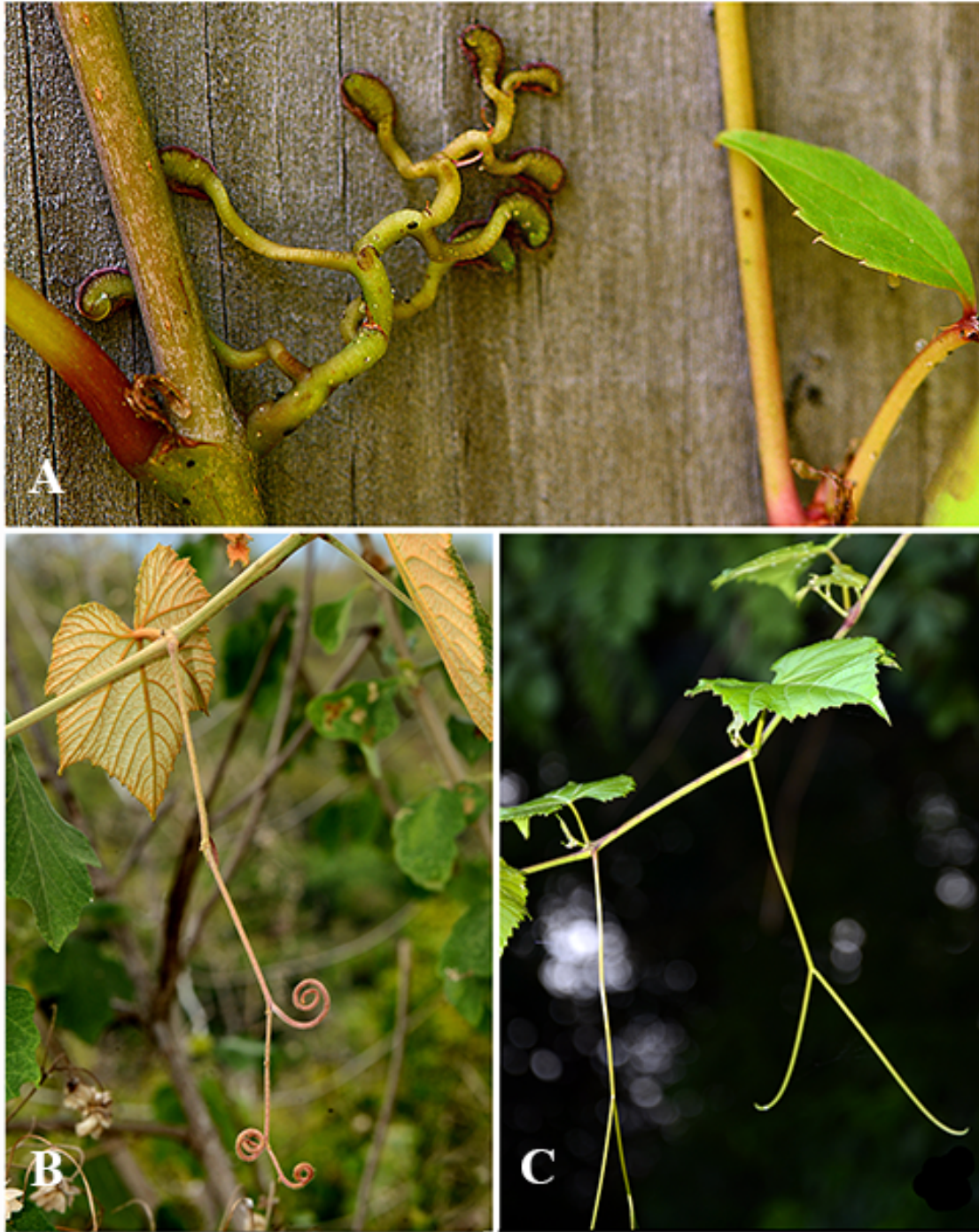


Figure 245. Tendrils in Vitaceae. **A.** *Parthenocissus quinquefolia*, tendril with adhesive pads. **B.** *Ampelocissus acapulcensis* with branched tendril. **C.** *Ampelopsis* sp. with bifurcate tendrils. Photos by P. Acevedo.

into an elongate, hanging, profusely branched structure that is sometimes taken for a parasitic plant in the Viscaceae family.

8. FLOWERS. Actinomorphic, bisexual or sometimes unisexual in monoecious or polygamous species of *Ampelocissus* or *Vitis*. Perianth green, cream, or red, usually concolorous; calyx gamosepalous, cupular, small, truncate or with minute lobes, a few *Cissus* species with conspicuous spreading or reflexed lobes; 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; pericarp thin and papery, or thick and crustaceous, smooth, less often lenticellate; 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.

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. 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 climbing Vitaceae

- 1. Inflorescences umbelliform cymes or glomerules, arachnoid hairs absent2
- 1. Inflorescences thyrsoid, racemose, arachnoid hairs present5
- 2. Nectary indistinct from the ovary wall (Mexico, Guatemala, Bahamas, Cuba)
..... *Parthenocissus*
- 2. Nectary conspicuous, clearly distinct from the ovary wall3
- 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 branches4
- 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*

Identification of genera based on vegetative characters

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

Barks. Dark, rough, flaky barks are characteristic of *Vitis tiliifolia*, while corky or thorny are limited to a few species of *Ampelopsis* and *Cissus*.

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*.

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*.

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 leaves are found in few South American species of *Cissus*; trifoliate leaves in the Neotropics are found only in *Cissus* and *Ampelopsis denudata* Planch.

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

Monoicous or functionally dioecious lianas; trichomes unbranched, eglandular, and



Ampelocissus robinsonii, tendrilled inflorescence opposite to leaves, photo by P. Acevedo.

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 ~95 species, distributed in Asia, Africa and the New World, with three species in Mexico and Central America.

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

Monoecious lianas; trichomes simple and eglandular. Leaves simple or trifoliolate in



Ampelopsis denudata infructescence; fruits maturing white, photo by P. Acevedo.

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 trifoliolate; inflorescences with prehensile branches.

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



Figure 246. A. *Cissus* sp. with reddish stems, petioles, main veins and inflorescence axes. B. *Cissus* sp. with leaf-opposed inflorescences. C. *Cissus* sp. with infructescence. Photos by P. Acevedo.

CISSUS Linnaeus, Sp. Pl. 117. 1753.

Lianas, rarely hemicyptophytic subshrubs (Figure 246); 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 occur only in *Cissus*, but not in all species; stipules free; leaves variously compound, pinnate/bipinnate leaves occur only in *Cissus*; inflorescences without prehensile branches; few species with calyx transversely enlarged or basely lobed; nectary disc annular, short-tubular in a few species.

Distribution: A chiefly tropical genus with ~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 climbing species of *Cissus* in the Neotropics.

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

Lianas, woody rootstock commonly present; trichomes, when present, unbranched,



Clematicissus tweediana, photo by J.A. Lombardi.

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.

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;



Parthenocissus quinquefolia, photo by P. Acevedo.

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, 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).

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. 202. 1753.

Polygamous-dioecious lianas. Trichomes unbranched and eglandular, arachnoid (Figure 247C). 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



Figure 247. *Vitis*. A–B. *V. tiliifolia*. **A.** Leaf-opposed racemiform inflorescence. **B.** Mature fruits. **C.** *Vitis* sp., with arachnoid pubescence. Photo by P. Acevedo.

induplicate, united at the apex, coherent at the margins, deciduous after anthesis in a propeller-like 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.

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

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