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

ARISTOLOCHIACEAE

By Pedro Acevedo-Rodríguez (Apr 2020)

Aristolochia esperanzae, photo by P. Acevedo

A primarily tropical family extending to temperate regions of the Northern Hemisphere with about 8 genera and about 710 species of twining lianas or vines, or less often rhizomatous herbs or shrubs. Vines and lianas in the Neotropics belong to *Aristolochia* and *Isotrema* with about 205 species. The family is found in diverse habitats including moist, wet, or seasonal lowland forest and savannas, from sea level to about 1700 m elevation.

Diagnostics: Twining lianas or vines, commonly with corky, fissured bark, and no exudate; stem cross sections with xylem and phloem dissected by multicellular rays into radial segments; leaves alternate, often with 3 to 5 main veins from the base, exstipulate; flowers zygomorphic, with an expanded distal limb; fruits septicidal capsules with numerous thin, wind-dispersed seeds. Sometimes confused with Convolvulaceae but distinguished by the lack of exudate, wood anatomy, and fertile characters.

General Characters

1. STEMS. Herbaceous to woody, cylindrical, smooth, known to reach up to 10 m in length and in some species up to 5 cm in diam.; bark commonly corky with longitudinal furrows (fig. 1b). Cross section commonly with vascular axial elements divided in ***radial segments*** (fig. 1a). Vessel elements are very wide and visible to the naked eye (fig. 1a).
2. EXUDATES. Watery or no visible exudate.
3. CLIMBING MECHANISMS. All climbing species of *Aristolochia* and *Isotrema* are **twiners**.
4. LEAVES. Alternate, distichous, chartaceous to coriaceous, simple, commonly cordiform, less often trilobed, oblong or lanceolate, with 3-5 main arcuate, sub-parallel veins from base, margins entire. Petioles short to long, sometimes twisted (fig. 2b). Stipules absent.
5. PEDICELS. Commonly long.
6. FLOWERS. Solitary and axillary or clustered and cauliflorous; bisexual, zygomorphic, apetalous, consisting of a well-developed calyx differentiated into an utricle (inflated basal portion), a median tube and an expanded distal limb; anthers fused to the stigmas forming a gynostemium; ovary inferior.
7. FRUIT. Septicidal, 5-6-locular, elongate to rounded, pendent, dry capsules with numerous seeds per locule. Seeds commonly flat, triangular, surrounded by a marginal wing, or less often with a sticky aril.

USES

Several species of *Aristolochia* are cultivated in tropical gardens for their large, showy, flowers, and vine trellises. In addition, several species have been used in traditional healing for the treatments of various ailments.

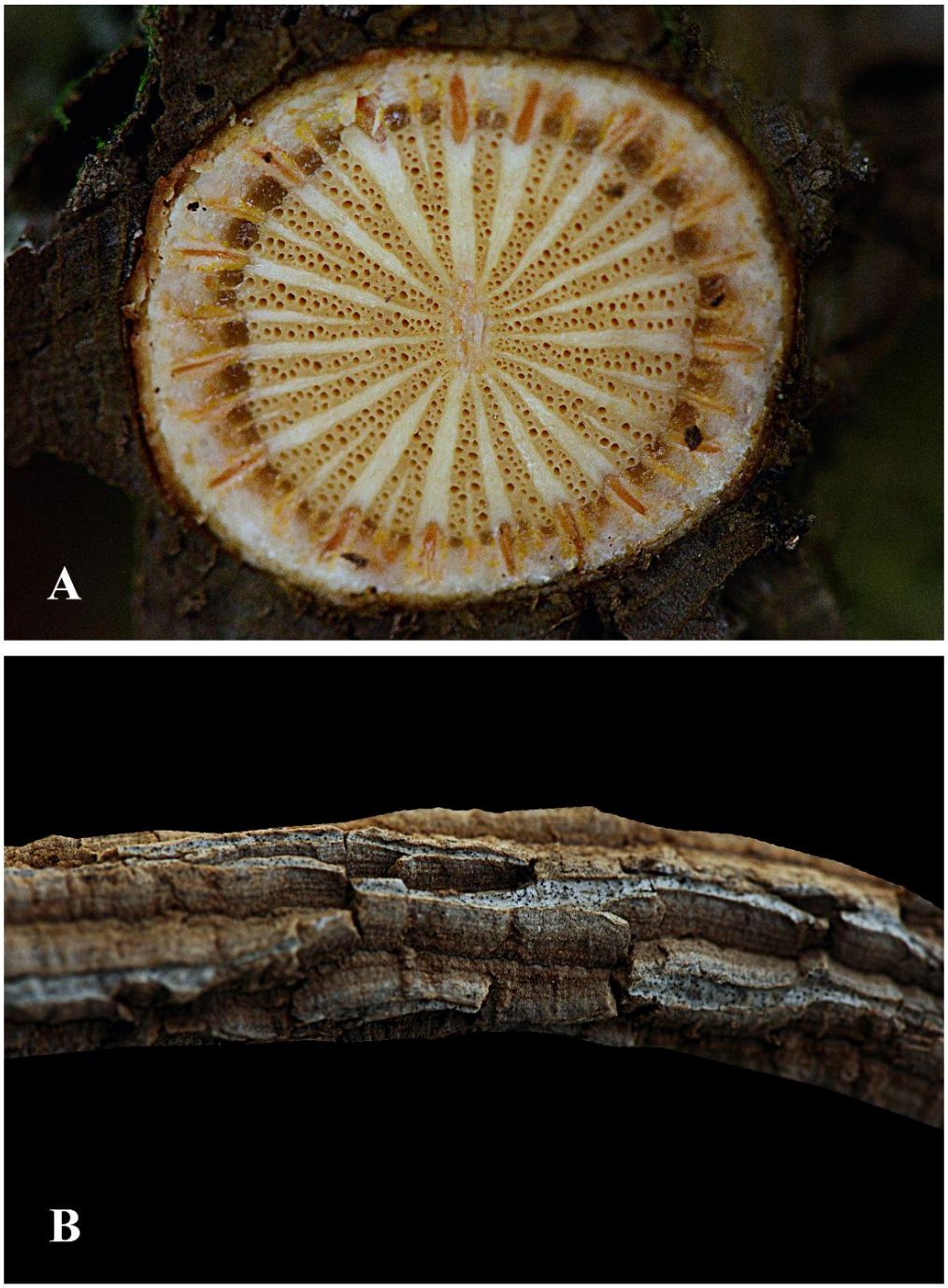

Figure 1. Stems in species of *Aristolochia.* **A.** Cross section of *A. maxima*, showing wide rays dividing the vascular axial elements into radial segments and vessel elements with very wide lumen. **B**. Corky, fissured bark of *A. elegans.* Photos by P. Acevedo.

Figure 2. **A**. Large pseudo-stipule of *A. esperanzae*. **B**. Twisting petiole of *Aristolochia sp.* Photos by P. Acevedo.

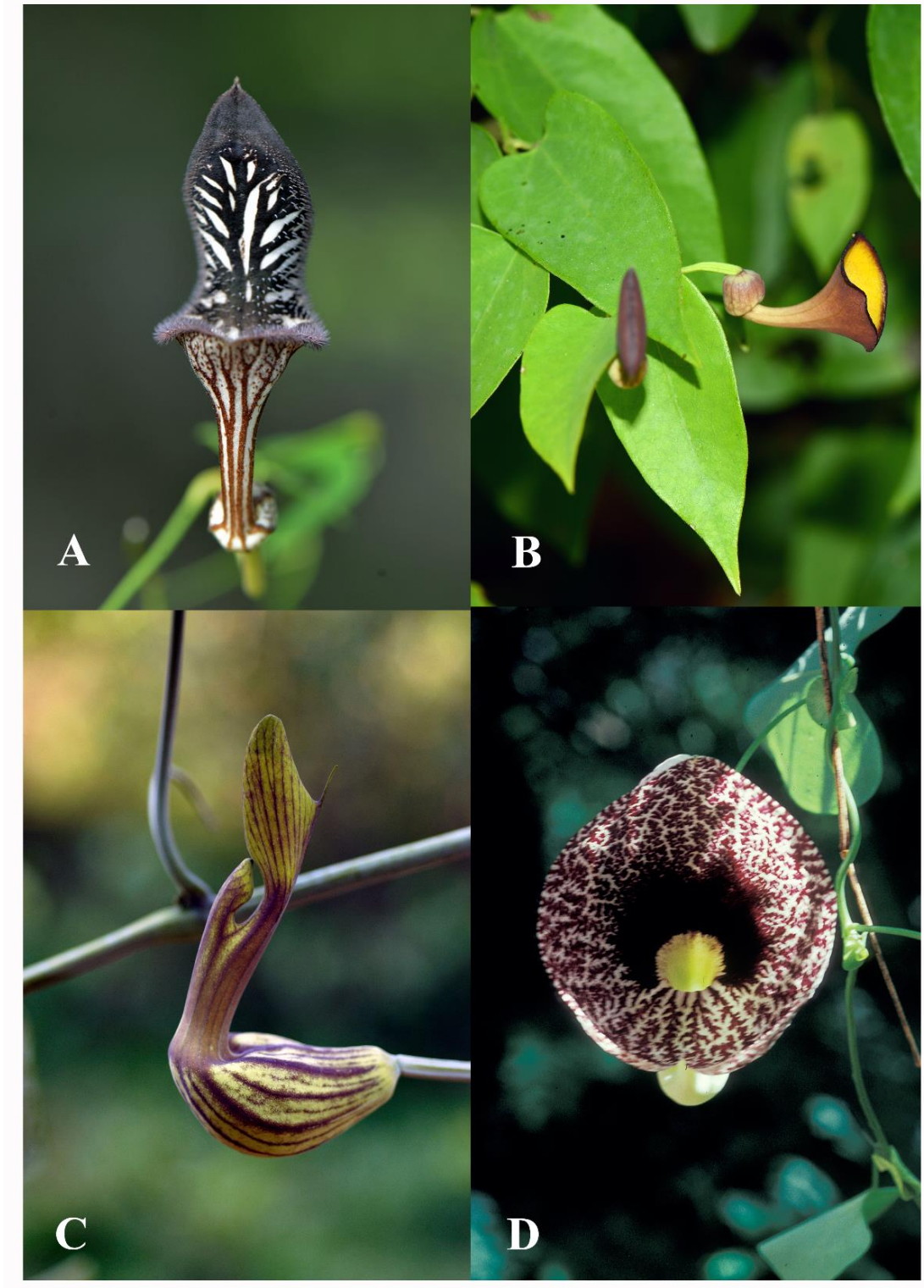

Figure 3. Flowers in *Aristolochia*. **A**. *Aristolochia sp.* with ascending limb. **B**. *Aristolochia sp.*, with abaxially yellow limb. **C.** *A. esperanzae* with erect bilabiate limb, upper lip bifurcate. **D.** *A. elegans*, flower with wide circular limb. Photos by P. Acevedo.

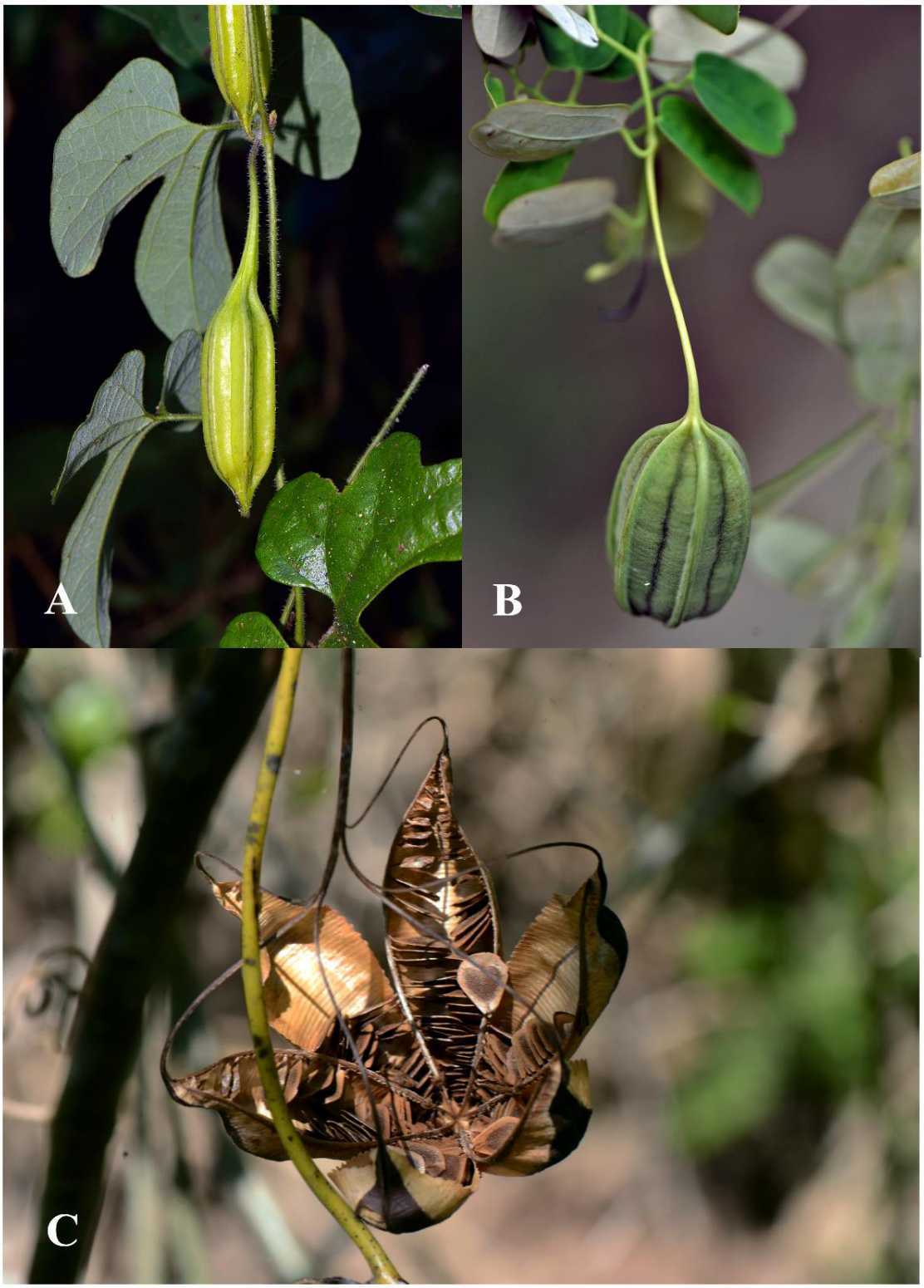

Figure 4. Pendent capsules. **A.** 5-locular capsule of *Aristolochia sp.* **B.** 6-locular capsule of *Aristolochia* sp. **C.** Acropetally dehiscent, 6-locular capsule of *Aristolochia* sp. where pedicel is split into strands that retain the opened valves at a 45° exposing numerous trigonous, winged seeds. Photos by P. Acevedo.

KEY TO THE GENERA

1. Perianth limb and gynostemium 3-lobed; perianth strongly curved; anthers in pairs on the outer surface of each gynostemium segment; capsules basipetally dehiscent; Mexico & Central America ..... ***Isotrema***

1. Perianth limb variously shaped but not 3-lobed, gynostemium 5- or 6-lobed; perianth not strongly curved; anthers single on outer surface of each gynostemium segment; capsules acropetally dehiscent; neotropical ..... ***Aristolochia***

GENERIC DESCRIPTION

ARISTOLOCHIA Linnaeus, Sp. Pl. 1032. 1753.

Aristolochia sp., photo by J. Amith.

Twining vines or lianas, herbaceous or commonly woody. Stems cylindrical, up to 20 m long and 5 cm in diam.; bark corky and fissured in woody species; cross sections with visible wide vessel elements lumens and axial elements divided in radial segments. Leaves alternate, distichous, simple to deeply trilobed, commonly cordiform or hastate at base, with palmate venation (3-5 main arcuate, parallel veins), the margins entire; petioles short to long, not pulvinate, sometimes geniculate; stipules absent, but ca. 60 species have circular, sessile prophylls that resemble a stipule, hence called ***pseudo-stipules.*** Flowers solitary and axillary, or congested and cauliflorous, pendent, ascending or plageotropic, long-pedicelled, bisexual, zygomorphic, 5- to 6-merous. Perianth showy, formed by 3 fused sepals forming a

pitcher-like structure with an inflated basal portion (utricle) and a median tube that expands toward the margins into an entire, circular or bilobed limb, the lobes generally unequal, some forming a long tail; corolla absent; stamens 5 or 6, sessile, the anthers fused to the stigmas forming a gynostemium; ovary inferior or partly inferior, of 5-6 united carpels; ovules numerous per locule; styles 5-6 connate. Fruit a 5-6-locular, septicidal, 5 or 6 lobed, cylindrical or nearly globose capsule, that opens acropetally (with pedicels splitting into strands that retain the opened valves at a 45° angle exposing the wind dispersed seeds); seeds numerous flat, triangular, surrounded by a marginal wing, or less often with a sticky aril.

Distinctive features: Herbaceous to woody twiners with corky bark, lacking exudate, with alternate, distichous, entire to trilobed, leaves with palmate venation; flowers pitcher-like, often with foul smell.

Distribution: A pantropical genus with over 500 species, 272 of which are distributed in the Western Hemisphere, and 204 species in the Neotropics; occurring in lowland moist, wet or seasonal forests, scrubs, and open habitats.

ISOTREMA Rafinesque, Amer. Monthly Mag. & Crit. Rev. 4(3): 195. 1819.

I. veracruzana, photo by Jan Meerman

Twining lianas, erect shrubs or small rhizomatous herbs; bark corky and fissured. Leaves alternate, veins pinnate or 3-7-palmate from base, margin entire (in our flora). Flowers solitary and axillary, fasciculate and cauliflorous or in distal racemes, long-pedicelled, bisexual, zygomorphic, 6-merous. Perianth showy, formed by fused sepals forming a pitcher-like structure with an inflated basal portion (utricle) and a geniculate curved median tube that expands toward the margins into a 3-lobed limb; corolla absent; stamens 6, sessile, the anthers fused in pairs to the stigmas forming a 3-lobed gynostemium; ovary inferior, of 6 united carpels. Fruit dry, 6-locular capsules, dehiscing basipetally; seeds flat or plano-convex, with fleshy funicle.

Distinctive features: Similar to *Aristolochia* but differing by the characters shown in the key.

Distribution: A predominantly pantropical genus of about 98 species distributed in East Asia, South Asia, North America, Mexico, and Central America; 6 of which are twining lianas distributed from Mexico south to Nicaragua; occurring in lowland, moist, wet or seasonal forests up to 1600 m elevation.

RELEVANT LITERATURE

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PICTURE VOUCHERS

Figure 1.

A. *Aristolochia maxima* Jacq. (Acevedo 16443)
B. *Aristolochia elegans* Mast. (Acevedo 16284)

Figure 2.

A. *Aristolochia esperanzae* Kuntze (Acevedo 16559)
B. *Aristolochia sp.* (no voucher)

Figure 3.

A. *Aristolochia sp.* (Acevedo 17166)
B. *Aristolochia sp.* (no voucher)
C. *Aristolochia esperanzae* Kuntze (Acevedo 16559)
D. *Aristolochia elegans* Mast. (Acevedo 4136)

Figure 4.

A. *Aristolochia sp.* (no voucher)
B. *Aristolochia sp.* (no voucher)
C. *Aristolochia sp.* (no voucher)