GUIDE TO THE GENERA OF LIANAS AND CLIMBING PLANTS

IN THE NEOTROPICS

BIGNONIACEAE

By Renata G. Udulutsch & P. Acevedo-Rodríguez (May 2022)

A pantropical family of lianas, trees, shrubs, and rarely herbs with about 79 genera and 800 species, most diverse in northern South America, and with few genera occurring in temperate North America and Asia. Represented in the Neotropics by about 45 genera and 629 species. There are 24 genera and about 393 species of climbing Bignoniaceae in the Neotropics, two of these genera (2 species) are introduced and commonly cultivated as ornamentals, while the remaining taxa are endemic to the Neotropics. Except for *Tourrettia* and *Eccremocarpus* that belong to the Tourrettieae tribe, all climbing Bignoniaceae in the Neotropics belong in the Bignonieae tribe. Although found in diverse habitats, climbers in this family are predominantly found in lowland, moist or rain forests below 800 m elevation.

Bignonia corymbosa (Vent.) L.G. Lohmann, photo by R. Udulutsch

Diagnostics: Sterile Bignoniaceae are recognized by compound, opposite leaves where the distal leaflet(s) is modified as a simple or branched tendril; stem cross section has 4 phloem wedges, or in multiples or 4, or many numerous wedges in *Dolichandra*; and corolla gamopetalous, commonly large and often colored.

General Characters

1. STEMS. Woody, 1-5(12) cm in diameter and up to 30 m in length; mature stems for the most part are cylindrical (figs. 1 & 2), quadrangular (figs. 1f; 2a), 4-lobed, 4-ridged, hexagonal, and sometimes 4-winged (figs. 2a; 3d) or slightly asymmetrical (fig. 2d & e); young stems smooth or lenticellate; nodes sometimes flattened and wider in young branches (fig. 4d), often with interpetiolar ***crateriform glands*** (fig. 4c), and ***interpetiolar ridges*** (fig. 4a & d). Stem cross sections in neotropical climbing genera have a xylem tissue that is interrupted by ***phloem wedges*** resulting in a cross-shaped outline. Phloem wedges are more commonly ***four*** and equidistant (figs. 1, 2a & b), in ***multiples of four*** (fig. 2c & d), or sometimes more ***numerous*** and dissected by parenchyma tissue (fig. 2e & f; e.g., *Dolichandra*). Stems in *Tourrettia* and *Eccremocarpus* aren't well known, for the most part they are herbaceous with regular anatomy, recently acquired samples of older basal stems indicates that they can produce 4 phloem wedges similar to those in members of tribe Bignonieae (Marcelo R. Pace, pers. comm.). *Perianthomega* is the only genus of climbers with 4 shallow ***phloem arcs.*** The cultivated paleotropical species *Podranea ricasoliana* (Tanfani) Sprague and the temperate *Campsis radicans* (L.) Bureau have stems with ***regular anatomy.*** Barks of mature stems are frequently fissured (fig. 3a), corky, flaky (fig. 3c) or lenticellate (fig. 3b). Few genera have a juvenile growing phase with small leaves, which climbs through the aid of adhesive discs (i.e., *Amphilophium*; fig. 7e) or adventitious roots (i.e., *Dolichandra*).
2. EXUDATES. Clear and scanty or copious and watery in a few species.
3. PROPHYLLS & PERULES. Prophylls of axillary buds are common in most genera. These are foliaceous and stipule-like (figs. 3d; 4a &b) or small and scaly, persistent or caducous. Perules are common in axillary buds, these are scaly and produced in a tight overlapping series, and sometimes their shape is transitional into foliaceous leaves.

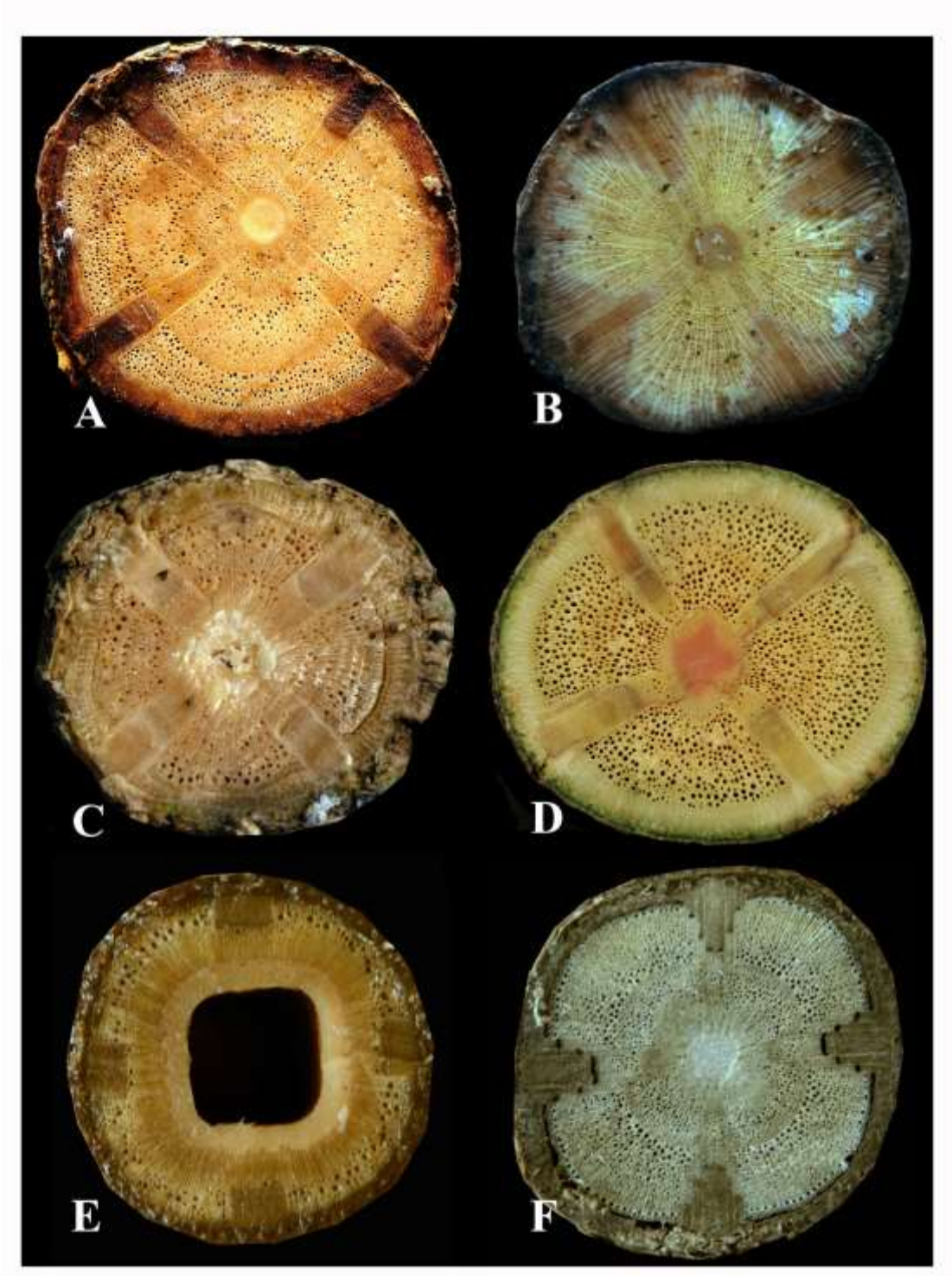


Figure 1. Cross sections of stems in Bignoniaceae. **A.** *Fridericia pearcei,* 4 straight phloem wedges. **B**. *Adenocalymma bracteatum,* 4 triangular phloem wedges. **C**. *Tanaecium pyramidatum,* 4 straight phloem wedges. **D**. *Fridericia craterophora* 4 straight phloem wedges. **E**. *Stizophyllum riparium* 4 straight phloem wedges & hollow medulla. **F**. *Cuspidaria convoluta,* 4 symmetrical phloem wedges. Photos by P. Acevedo.

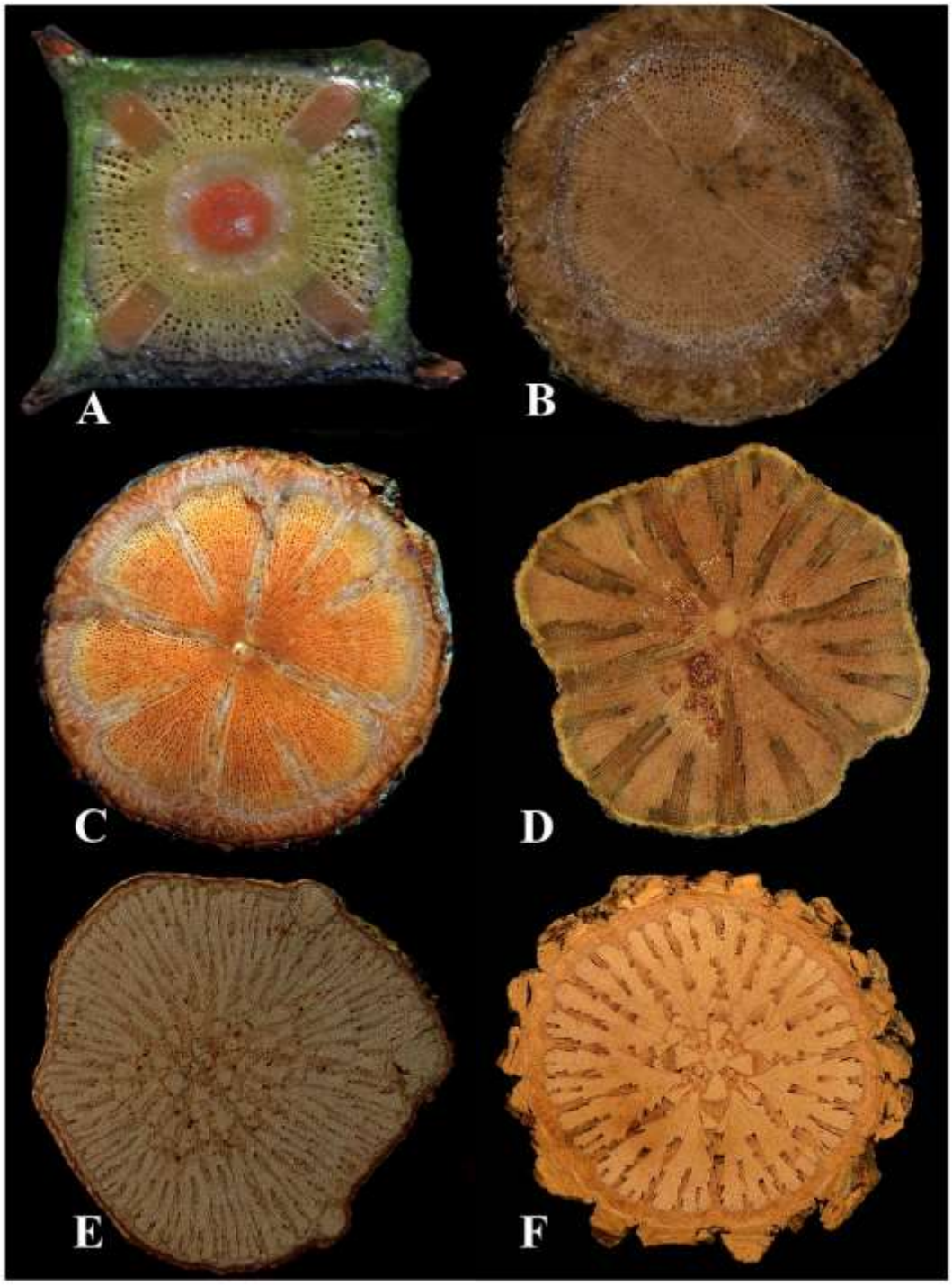


Figure 2. Cross sections of stems in Bignoniaceae. **A.** *Pleonotoma jasminifolia*, square, 4-winged with 4 straight phloem wedges. **B.** *Amphilophium crucigerum*, 4 linear phloem wedges included in the xylem. **C**. *Amphilophium paniculatum*, 8 linear, phloem wedges. **D.** *Mansoa parvifolia*, numerous, asymmetrical phloem wedges. **E**. *Dolichandra unguis-cati*, numerous asymmetrical phloem wedges. **F**. *Dolichandra quadrivalvis*, numerous asymmetrical phloem wedges. Photos by P. Acevedo.

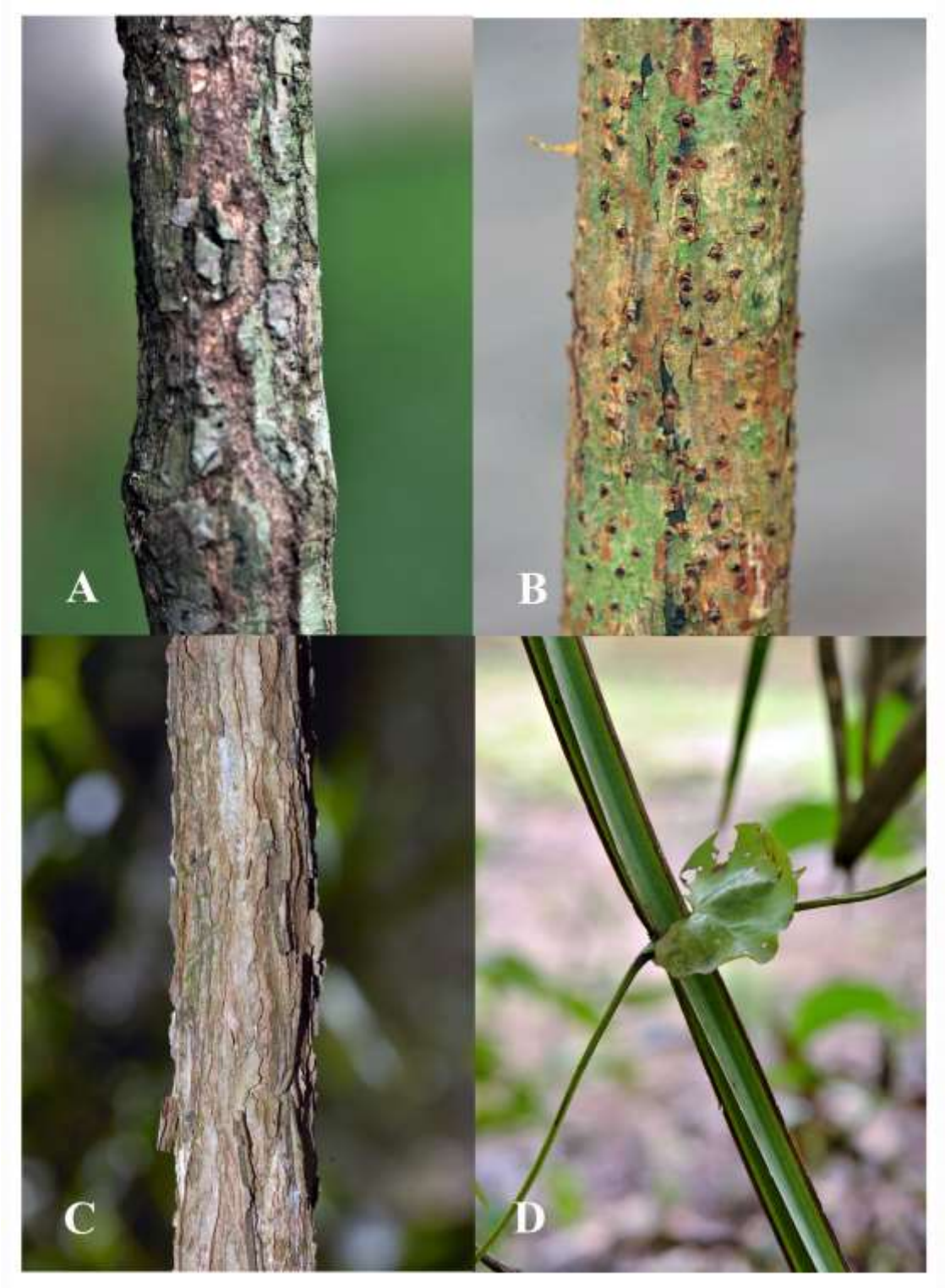


Figure 3. Stem fissures in climbing Bignoniaceae. **A**. *Fridericia trailii*, rough bark. **B.** *Fridericia craterophora*, lenticellate bark. **C.** *Amphilophium crucigerum*, shaggy bark. **D**. *Pleonotoma jasminifolia*, 4-winged stem with foliaceous prophylls. Photos by P. Acevedo.

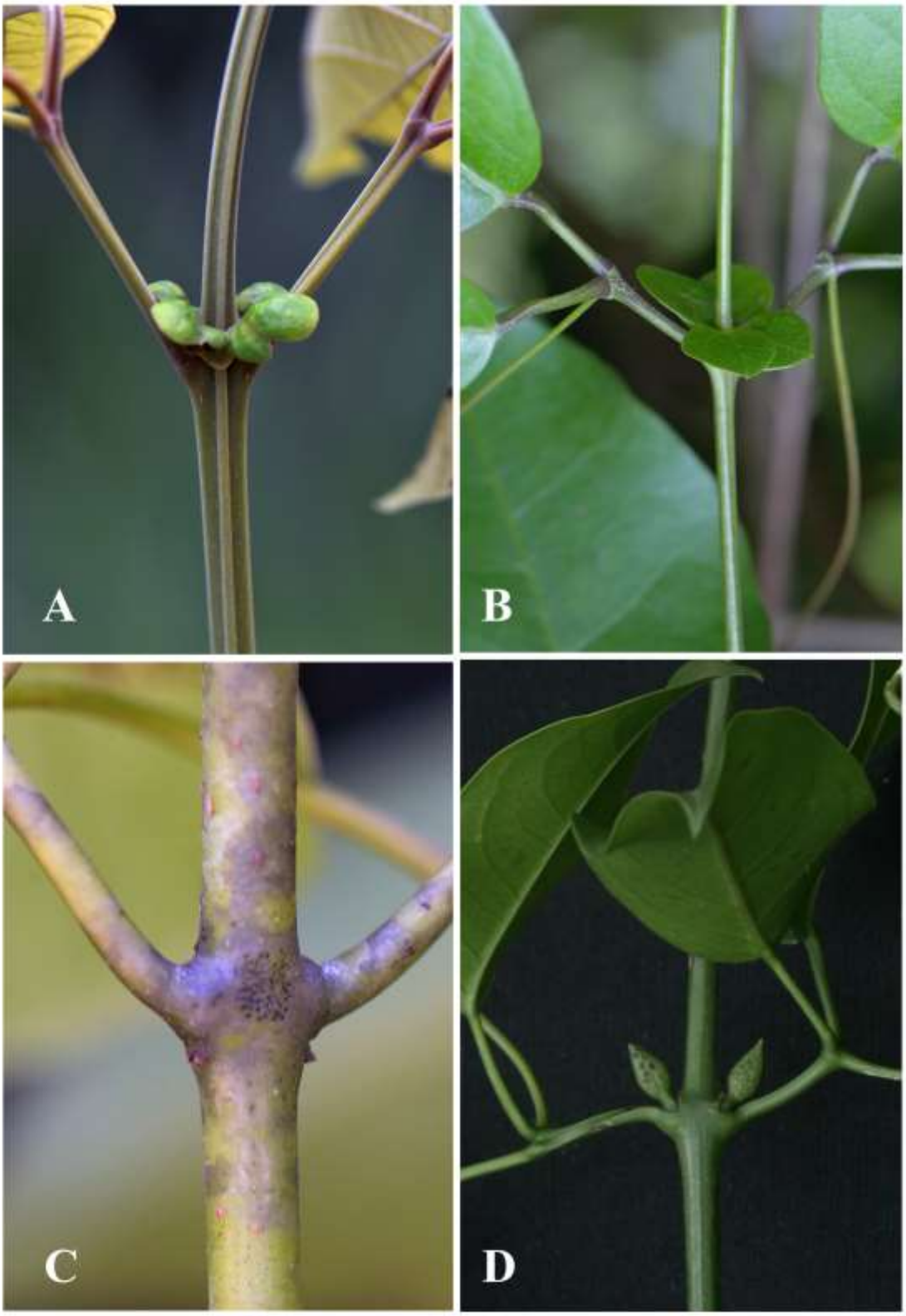


Figure 4. Prophylls and interpetiolar gland fields. **A**. *Tynanthus polyanthus*, foliaceous prophylls. **B.** *Bignonia campanulata*, foliaceous prophylls. **C**. *Lundia virginalis*, prophylls wanting. **D**. *Adenocalymma marginatum*, coriaceous prophylls. Photos: A–C by P. Acevedo; D by R. Udulutsch.

Figure 5. Leaves. **A**. *Fridericia conjugata*, trifoliolate leaf without tendril. **B**. *Bignonia campanulata*, young secondary branch with proximal leaves simple and distal leaves with two leaflets and a simple tendril. **C**. *Adenocalymma marginatum*, leaves bifoliolate, showing scar of caducous tendril. **D**. *Pleonotoma jasminifolia*, proximal biternate leaves without tendrils. Photos by P. Acevedo.

Figure 6. Tendrils. **A**. Bignoniaceae with trifoliolate leaves with distal leaflet replaced by a simple tendril. **B.** *Manaosella cordifolia,* trifoliolate leaves with long, multifid tendrils with adhesive discs on distal ends. **C**. *Amphilophium crucigerum*, trifoliolate leaves, leaflets with long petiolules, tendril trifid, with adhesive pads. Photos by P. Acevedo.

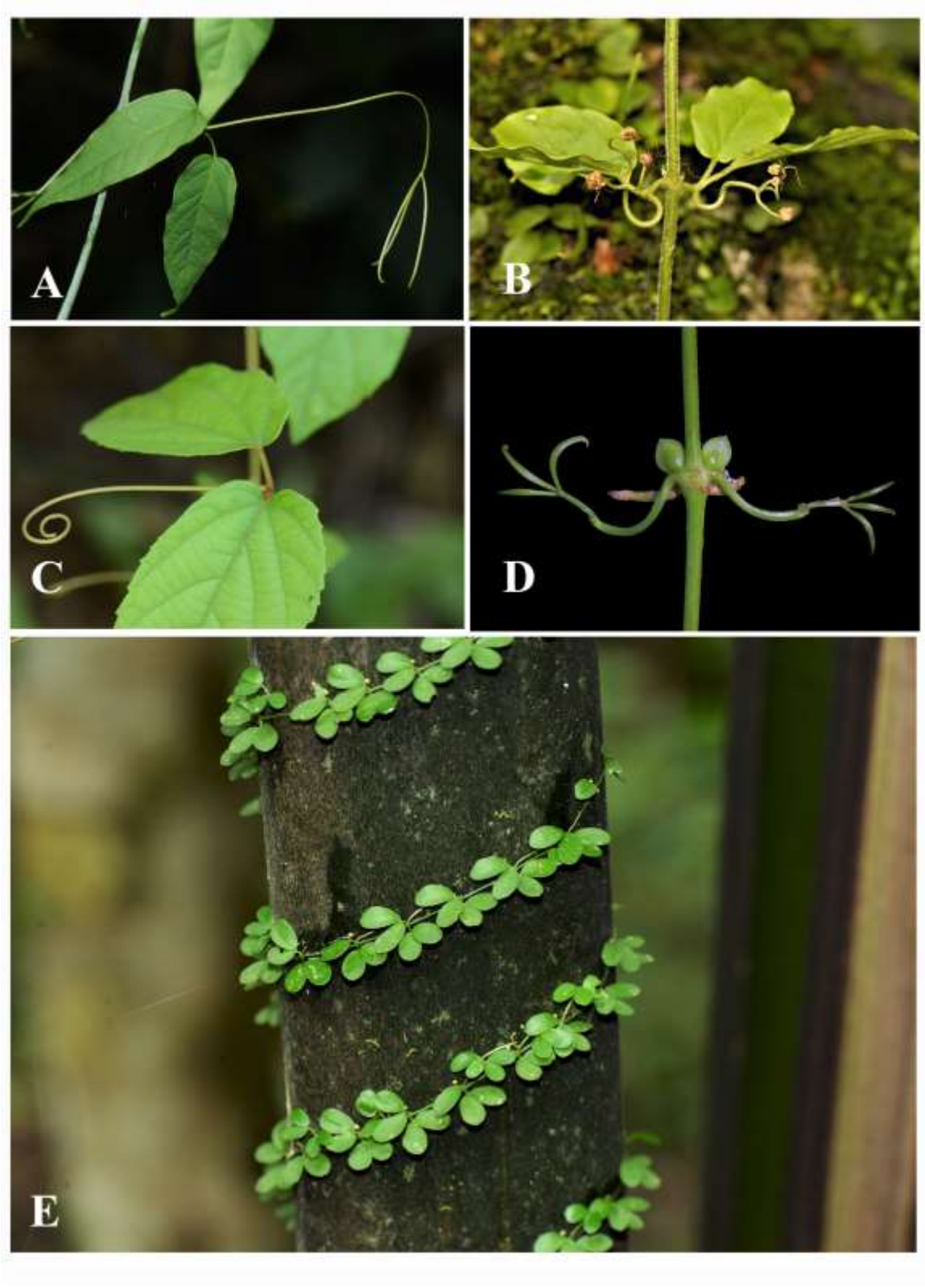


Figure 7. Climbing mechanisms. **A**. Bignoniaceae with trifoliolate leaves and distal, long, trifid tendril. **B**. *Amphilophium bauhinioides* with trifoliolate leaves and trifid tendrils with adhesive discs. **C**. *Stizophyllum perforatum*, with trifoliolate leaves with serrulate leaflets and simple tendrils. **D**. *Dolichandra unguis-cati*, trifoliolate leaves with caducous leaflets and persistent trifid, uncinate tendrils. **E**. *Dolichandra* sp. juvenile root-climbing phase with minute leaves and adventitious roots. Photos by P. Acevedo.

Figure 8. Climbing mechanism. **A**. *Perianthomega vellozoi*, biternate leaves with prehensile petioles. **B**. *Dolichandra unguis-cati*, mature phase with abundant adventitious roots. Photos by P. Acevedo.

4. CLIMBING MECHANISM. Most neotropical genera have ***tendrils*** that are derived from the most distal leaflet(s), these are simple (figs. 6a; 7c) or branched (fig. 7a) and prehensile and less often end in adhesive discs (e.g., *Amphilophium*,

Manaosella; figs. 6b & c; 7b), or are modified into a claw-like structure (e.g., *Dolichandra;* fig. 7d). In addition to tendrils, a few species climb through the aid of ***adventitious roots*** (e.g., *Dolichandra unguis-cati, D. steyermarkii, Mansoa difficilis;* fig. 8b). *Perianthomega* is the only neotropical genus that doesn't have tendrils, instead, it has ***prehensile petioles*** (fig. 8a). The introduced *Podranea ricasoliana* is a ***scrambling*** shrub lacking tendrils; and *Campsis radicans* is a root-climber.

5. LEAVES. Opposite, compound with distal leaflet(s) represented by tendrils (fig. 6), more commonly trifoliolate (figs. 5a & b; 6) but quite variable, sometimes pinnately compound, biternate (fig. 5d), triternate, or tripinnate leaves. In some genera, the first leaves of secondary branches are simple, later producing compound leaves without tendrils and ultimately compound leaves with tendrils (fig. 5b). Leaves are sometimes seemingly bifoliolate due to caducous tendrils (fig. 5c). Leaves are exstipulate, but the presence of prophylls and perules (bud scales) are often mistaken for stipules. Petioles are short to long, adaxially grooved to nearly terete, straight, or rarely pulvinate (i.e., *Adenocalymma*; fig. 5c). Blades are commonly entire except for several species of *Fridericia* and *Stizophyllum* where margins could be widely serrate or undulate (fig. 7c). Venation is commonly pinnate or seldom triplinerved (e.g., *Bignonia diversifolia* Kunth, *B. magnifica* W. Bull.)
6. INFLORESCENCE. Although most branched inflorescences are commonly referred to as paniculate, the family includes several types of inflorescences such as cymes, racemes, corymbs (only *Pyrostegia*), thyrses, and fascicles. In thyrsoid and cymose inflorescences, flowers are grouped into dichasia.
7. FLOWERS. Calyx is quite variable and therefore an important character in the recognition of genera. It is commonly cup-shaped to tubular or urceolate, truncate, 3–5-lobed, bilabiate, spathaceous (e.g., *Manaosella* and some species of *Adenocalymma* or *Bignonia*), or even double (e.g., *Amphilophium*). Calyx texture varies from membranaceous to coriaceous or even spongy as in the genus *Callichlamys and* may bear glands as seen in *Adenocalymma*. Corolla is gamopetalous, zygomorphic, with quite variable shape (i.e., tubular,

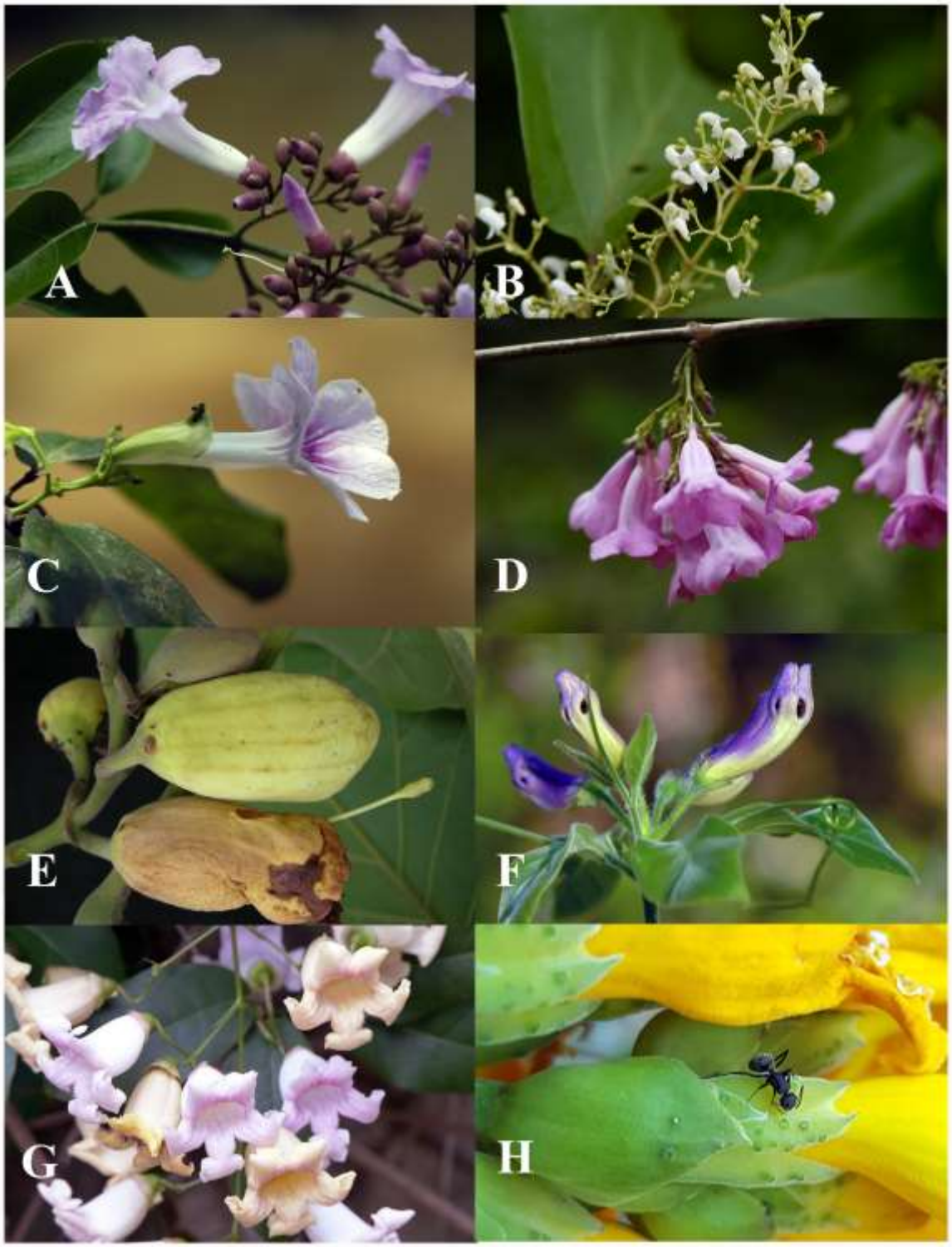


Figure 9. Flowers in climbing Bignoniaceae. **A**. *Tanaecium pyramidatum*, calyx truncate. **B**. *Tynanthus* cf. *micanthus*, minute flowers, corolla markedly bilabiate. **C**. *Bignonia corymbosa*, spathaceous calyx. **D**. *Cuspidaria floribunda*, corolla long tubular at the base. **E**. *Callichlamys latifolia*, spongy calyx. **F**. *Bignonia convolvuloides*, lobed calyx. **G**. *Bignonia campanulata*, campanulate, truncate calyx. **H**. *Adenocalymma bracteatum*, calyx with crateriform glands (Udulutsch 2999). Photos: A–D, F–G by P. Acevedo; E & H by R. Udulutsch.

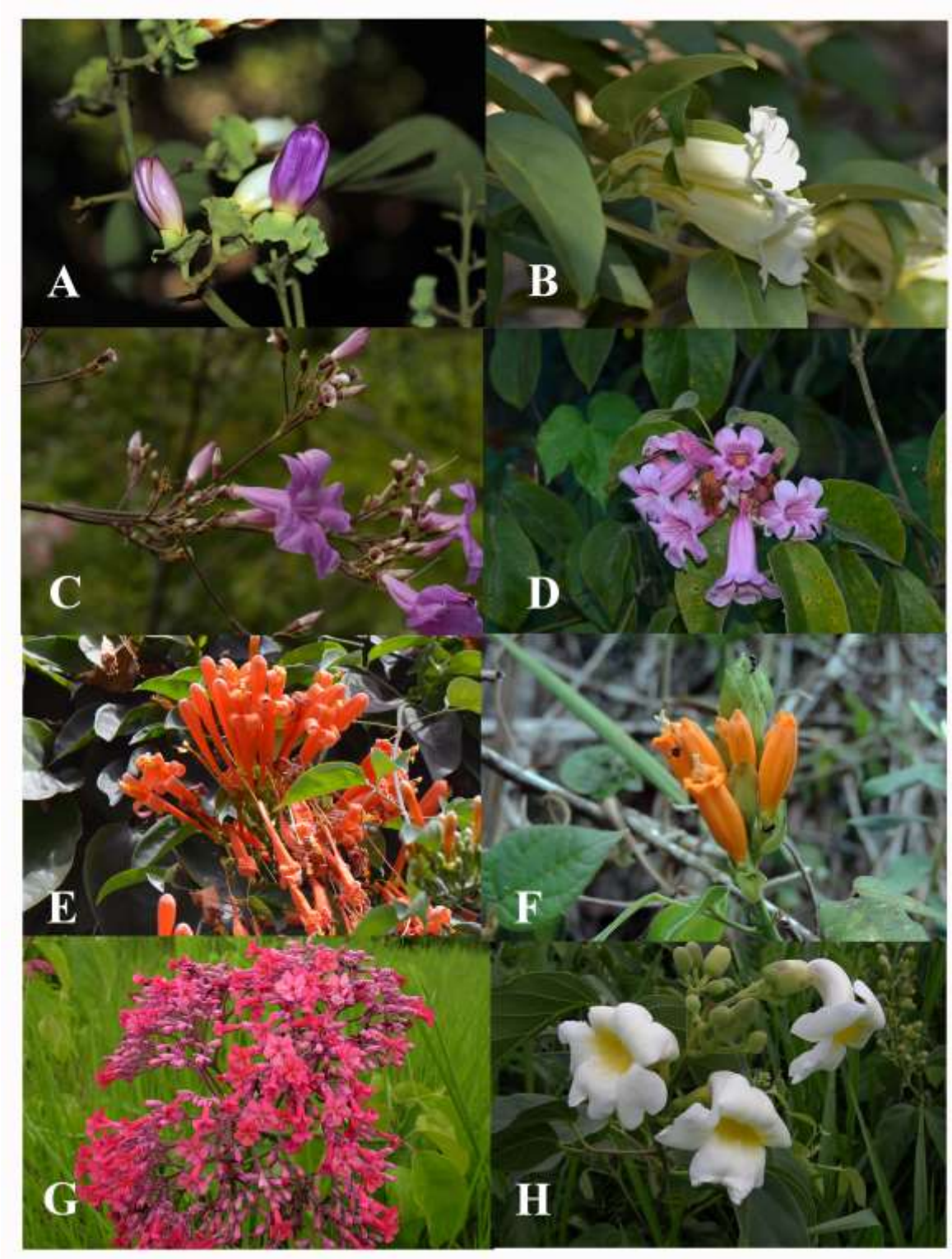


Figure10. Flowers in climbing Bignoniaceae. **A**. *Amphilophium paniculatum*, double calyx. **B**. *Anemopaegma laeve*, corolla tubular-campanulate. C. *Fridericia* sp., flowers in dichasia. **D**. *Mansoa hirsuta*, corolla narrowly tubular at the base. E. *Pyrostegia venusta*, flowers in corymbs. **F**. *Adenocalymma gibbosum*, corolla gibbous. **G**. *Fridericia trailii*, *inflorescence cymose*. **H**. *Amphilophium elongatum*, corolla tube curved. Photos: A–E by P. Acevedo; F by P. Dias; G–H by R. Udulutsch

hypocrateriform, crateriform, infundibuliform, campanulate), color (i.e., white, cream, yellow, purple, mauve, red, orange, or pink) or size (although in most species 3–5 cm long, they can be as small as 4 mm in *Tynanthus*, and up to 35cm in *Tanaecium jaroba* (Gentry 1980), bilabiate or 5-lobed, glabrous or with various indument, and frequently presenting nectar guides in the form of ridges or lines of variable colors. In a few genera, the corolla may present glands in linear arrangements either on the distal portion of the tube (e.g., *Adenocalymma*, *Anemopaegma* and *Pachyptera*) or along the margins (e.g., *Amphilophium*). Stamens in tribe Bignonieae are commonly 4 and didynamous, with well-developed filaments and one posterior staminode, except for one species of *Tanaecium* that has two stamens and no staminodes. Anthers are commonly glabrous, except in *Lundia* and *Pachyptera* where they are villous or pubescent respectively. Pollen grains are quite variable (see Gentry 1980) and produced in monads, except in *Cuspidaria*, where they are arranged in tetrads or polyads. Ovary is superior and generally sessile, except for *Anemopaegma* where it is stipitate. Nectary disc is commonly present and annular-patelliform but absent in *Bignonia*.

8. FRUITS. Most species in tribe Bignonieae have septicidal, 2-valved capsules with dehiscence that is parallel to the septum, although in *Dolichandra* dehiscence can be perpendicular to the septum and 4-valved. In *Tourrettia*, capsules are incompletely 4-valved, and in *Eccremocarpus*, they are 2-valved but lack a septum.
9. SEEDS. Winged and smooth in most species. However, unwinged seeds occur in some species of *Adenocalymma*, papillate to pubescent seeds in *Amphilophium*, and rough seeds in some *Adenocalymma* and *Xylophragma*.

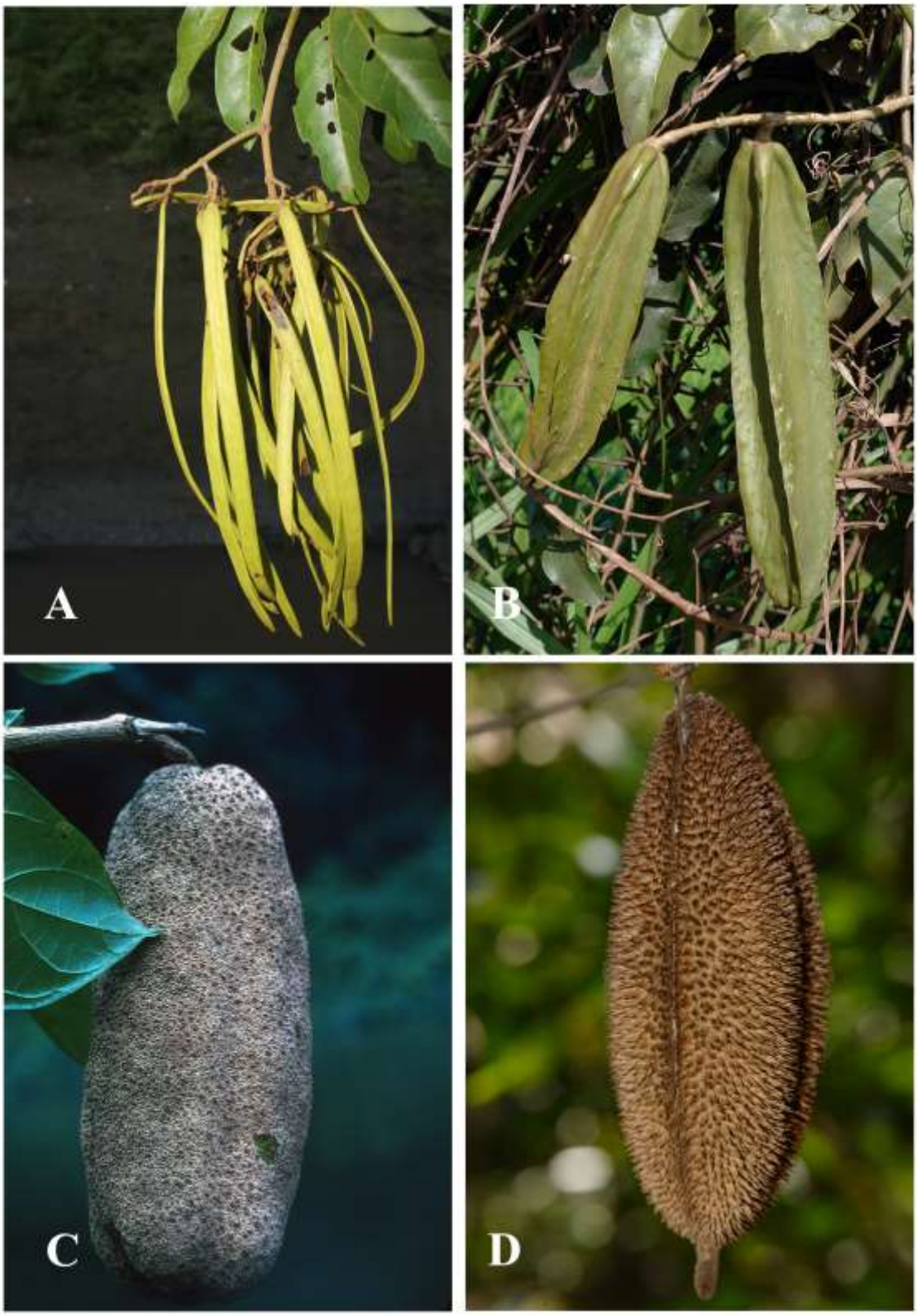


Figure 11. Fruits in climbing Bignoniaceae. **A**. *Fridericia florida* capsules flat, linear. **B**. *Adenocalymma bracteolatum*, capsule with 4 longitudinal ridges. **C**. *Bignonia nocturna*, capsule woody, lenticellate and subcylindrical. **D**. *Amphilophium crucigerum*, capsule echinate. Photos: A, C–D by P. Acevedo; B by R. Udulutsch.

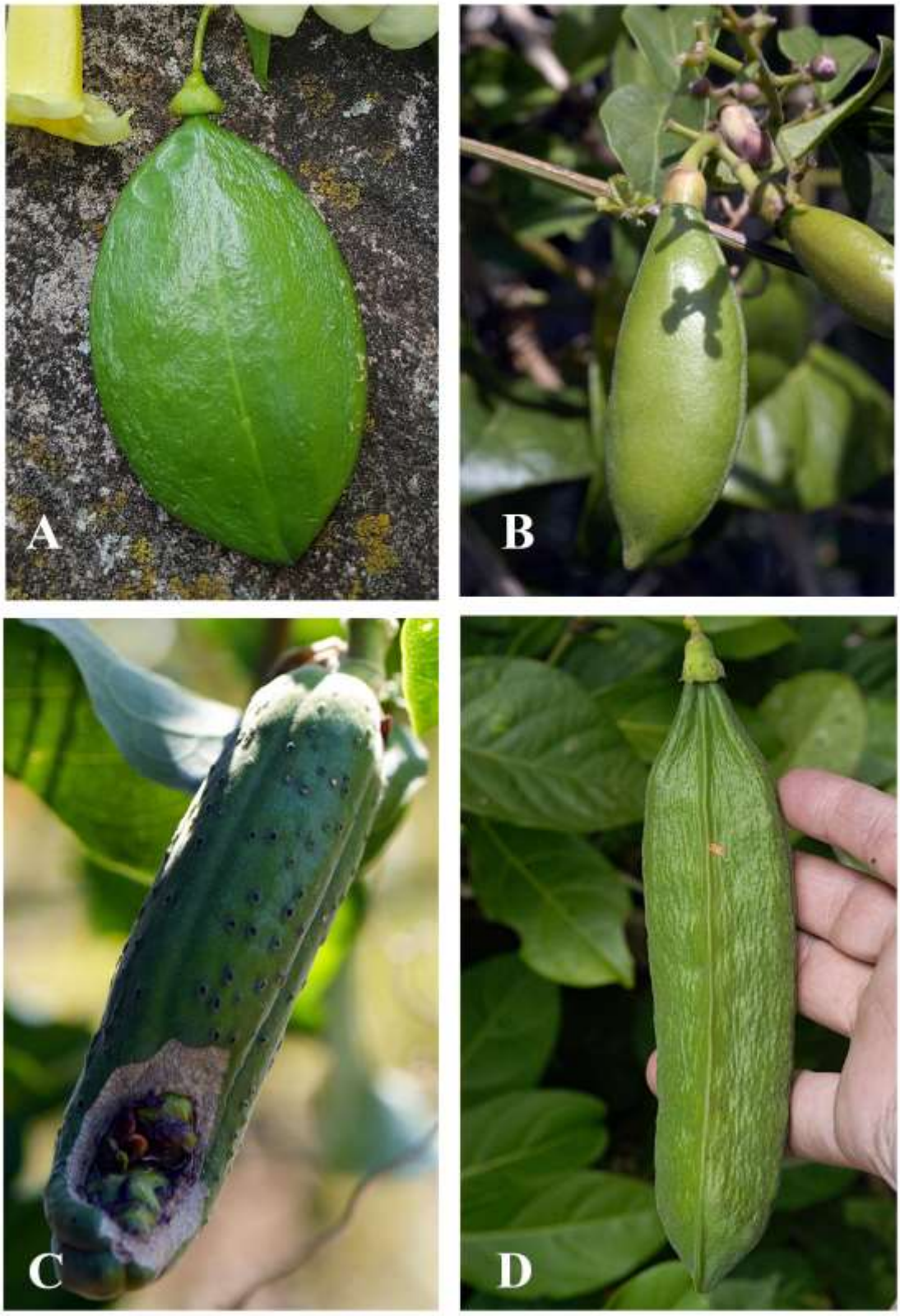


Figure 12. Fruits in climbing Bignoniaceae. **A.** *Anemopaegma chamberlaynii*, flat capsule. **B**. *Amphilophium lactiflorum*, septa with seed; smooth, glandless, short capsule. **C**. *Adenocalymma bracteatum*, with crateriform glands. **D**. *Tanaecium pyramidatum*, smooth with central ridge. Photos: A by R. Udulutsch; B–D by P. Acevedo.

USES

Climbing Bignoniaceae have great economic importance as they are often used as ornamentals, a source of food, dyes, and materials in the manufacture of handcrafts. While some species are use in religious rituals, as poisons, condiment, and medicines.

The most cultivated ornamental species in the tropics are *Bignonia magnifica, Dolichandra unguis-cati, Podranea ricasoliana*, *Pyrostegia venusta*, and *Mansoa difficilis*, and in the temperate zone *Campsis radicans.* In addition, many species are only locally used for this purpose while others, although suitable as ornamentals because of their beautiful flowers and foliage are rarely planted.

Stems of Bignoniaceae lianas are a great source of handcraft materials. Thing cross sections of stems with intricate designs are used in the making of parquet-like trays, boxes, cubes, tables, and placemats in southern Brazil. Stem splits are commonly used in the production of baskets and as binding material for the construction of huts and cottages by indigenous communities all over the Neotropics (e.g., *Amphilophium, Fridericia*). There are reports of juvenile stems of *Mansoa* being used as tourniquets for snakebite (Duke 10875, MO) by the Choco Indians of the Darien region in Panama. Several species of Bignoniaceae are used as a source for dyes. The best known of these is *Fridericia chica*, used by the local communities in the Amazon region of Colombia and Ecuador to paint women's lips as well as their faces and bodies.

Some species such as *Anemopaegma paraense, Cuspidaria inaequalis* and *Tanaecium dichotomum* are reported as used in indigenous religious rituals and superstitious activities. For example, in the Brazilian Xingú River area (Balee 2225, NY), *Stizophyllum riparium* is applied to children's legs with the intentions of making them to grow longer.

Bignoniaceae lianas are commonly reported as used in popular medicine due to the greatest variety of bioactive constituents. In many cases, the same taxa reported as medicinal have been reported as toxic. Among these, *Tanaecium exitiosum, T. bilabiatum* and *Fridericia elegans* are infamous for their toxicity to livestock. Crushed almond-scented leaves and stems of *Bignonia nocturna* are used by the Wayãpi of French Guiana to enervate bees while gathering honey. *Adenocalymma allamandiflorum* and *A. cladotrichum* are used as fish poison in the Brazilian Xingú

River and lowlands of Peru, respectively, and *Dolichandra quadrivalvis,* is used to immobilize crabs. Some genera are claimed to have aphrodisiac properties (e.g., *Tynanthus, Anemopaegma,* and *Tanaecium*) (Gentry 1992).

KEY TO THE GENERA OF CLIMBING BIGNONIACEAE

1. Leaves without tendrils; stem cross sections with regular vascular anatomy or with phloem arcs.....2
1. Leaves with distal leaflet(s) replaced by a tendril; stem cross sections with 4 or more numerous phloem wedges 4
2. Plants with prehensile petioles; leaves biternate; leaflets entire; stems cross sections with 4 phloem arcs ..... ***Perianthomega***
2. Plants scrambling; leaves imparipinnate; leaflets serrate; stem cross sections with regular anatomy.....3
3. Plants scrambling; corolla violet-pink, with light markings .....***Podranea***
3. Plants climbing by adventitious roots; corolla orange or reddish orange .....***Campsis***
4. Plants herbaceous or wiry vines 5
4. Plants woody vines (lianas).....6
5. Plants of high elevations (usually >3,000 m); placentation parietal; capsules smooth, 2-valved .....***Eccremocarpus***
5. Plants of 800-2,600 m elevation; placentation axile; capsules echinate, 4-valved .....***Tourrettia***
6. Cross sections of mature stem with phloem wedges in multiples of four 7
6. Cross sections of mature stem with only four phloem wedges 14
7. Tendrils trifid, and claw-like, tendril divisions short, rigid, not spiraled nor prehensile ..... ***Dolichandra***
7. Tendrils commonly trifid but not claw-like, tendril divisions elongated, filamentous, spiraled, and prehensile, rarely tendrils simple or multifid 8

8. Stem 6–8-angled 9

8. Stems cylindrical or angled but never 6–8 angled 10

9. Prophylls foliaceous; inflorescence a panicle..... ***Amphilophium***

9. Prophylls inconspicuous; inflorescence a corymb ..... ***Pyrostegia***

10. Petioles and petiolules pulvinate; crateriform glands present on prophylls, calyx, and/or fruit ..... ***Adenocalymma***

10. Petioles and petiolules not pulvinate, with or without glands but these never crateriform 11

11. Plant with garlic smell when crushed; leaflets usually triplinerved ..... ***Mansoa***

11. Plants without smell; leaflets pinnatinerved 12

12. Anthers villous ..... ***Lundia***

12. Anthers glabrous 13

13. Corolla with nectary guides (line markings); ovary and fruit sessile; nectary disc absent ..... ***Bignonia***

13. Corolla without nectary guides; ovary and fruit stipitate; nectary disc well-developed ..... ***Anemopaegma***

14. Plants (stem and foliage) with clove or spicy smell when crushed ..... ***Tynanthus***

14. Plants without smell 15

15. Tendrils multifid, often with adhesive discs; regular phloem with sclereids ..... ***Manaosella***

15. Tendrils simple, bifid, trifid or multifid, without adhesive discs; phloem without sclereids 16

16. Petioles and petiolules pulvinate; crateriform glands present on prophylls, calyx, and/or fruit ..... ***Adenocalymma***

16. Petioles and petiolules not pulvinate, with or without glands but these never crateriform 17

17. Stems with hollow pith (fistulose) ..... ***Stizophyllum***

17. Stems with solid pith 18

18. Anthers villous ..... ***Lundia***

18. Anthers glabrous 19

19. Tendrils absent, simple or bifid 20

19. Tendrils trifid 25

20. Tendrils bifid ..... ***Tanaecium***

20. Tendrils absent or simple 21

21. Calyx yellow and spongy ..... ***Callichlamys***

21. Calyx not as above 22

22. Fruit with 2 longitudinal ridges; pollen grains arranged in tetrads or polyads ..... ***Cuspidaria***

22. Fruit without longitudinal ridges; pollen grains never arranged in tetrads or polyads 23

23. Calyx bearing glands ..... ***Tanaecium***

23. Calyx not bearing glands 25

24. Leaves 1–5-foliolate; prophylls subulate and arranged in two opposite rows or bromeliad-like ..... ***Xylophragma***

24. Leaves 3-foliolate, rarely 1-foliolate; prophylls triangular, small and inconspicuous, with only one pair of prophylls per bud ..... ***Fridericia***

25. Interpetiolar zones without ridges, or ridges discontinuous 26

25. Interpetiolar zones with a continuous ridge 27

26. Leaves biternate, triternate, ternately bipinnate, or tripinnate; stems tetragonal, sharply angled and/or winged ..... ***Pleonotoma***

26. Leaves commonly 3-foliolate; stems cylindrical or tetragonal, not angled or winged ..... ***Tanaecium***

27. Stem with papery, peeling off bark; prophylls organized in 3–5 series; distal portion of calyx and corolla tube with patelliform glands arranged in lines ..... ***Pachyptera***

27. Stem not as above; prophylls only one pair per bud; calyx with scattered patelliform glands, corolla without glands ..... ***Martinella***

IDENTIFICATION OF GENERA BASED ON VEGETATIVE CHARACTERS

1. Stem cross sections (from M.R. Pace, 2015 onwards).
    a) Four phloem arcs. Within climbing Bignoniaceae, this character is restricted to *Perianthomega*.
    b) Four phloem wedges in mature stems. Found in most *Adenocalymma*, and all *Cuspidaria, Fridericia, Manaosella, Martinella, Pachyptera, Pleonotoma, Stizophyllum, Tanaecium, Tynanthus*, and *Xylophragma*.
    c) Regular phloem (the phloem between the 4 phloem wedges) with sclereids instead of fibers is unique to *Manaosella* (Fig. 2A).
    d) Four phloem wedges always straight in mature stems, not widening through the production of lateral "steps" is known only from *Tanaecium* (fig. 1c).
    e) Four phloem wedges perfectly symmetrical, with an almost equal number of steps on each side of the phloem wedges are known only from *Cuspidaria* and *Tynanthus* (fig. 1f).
    f) Four phloem wedges and a hollow medulla a character restricted to *Stizophyllum* (fig. 1e).
    g) Multiples of four phloem wedges in mature stems are present in *Adenocalymma, Amphilophium* (fig. 2c), *Anemopaegma, Bignonia, Lundia, Mansoa* (fig. 2d), and *Pyrostegia*.
    h) Included phloem wedges in mature stems, where the cambium resumes its regular activity after the initial period where phloem wedges are produced, resulting in the inclusion of the wedges into the xylem, a process restricted to *Amphilophium* (fig. 2b; Pace et al., 2009).
    i) Multiple dissected phloem wedges in mature stems, where the non-lignified parenchyma within the xylem multiplies, breaking up the lignified cells and engulfing the phloem wedges. This pattern characterizes the genus *Dolichandra* (fig. 2e & f).
2. Stems.

a. Square and winged: *Pleonotoma*.
b. Hollow medulla: *Stizophyllum.*

3. Smells.
   a) Clove or spicy smell in crushed foliage and stems is unique to *Tynanthus*
   b) Garlic smell in crushed foliage and stems is unique to *Mansoa*.
4. Leaves.
   a. Simple (in addition to compound in same individual) are known from some *Bignonia, Fridericia* and *Xylophragma.*
   b. Biternate or/and triternate: some *Adenocalymma, Perianthomega, Pleonotoma,* and *Tourrettia.*
   c. Pinnately compound: *Campsis* and *Podranea.*
   d. Bipinnatisect: *Eccremocarpus.*
5. Leaflets.
   a) Serrate margins: *Campsis*, *Fridericia* (usually in seedlings), *Mansoa difficilis*, *Podranea*, *Stizophyllum,* and *Tourrettia.*
   b) Pellucid punctate: *Stizophyllum.*
6. Tendrils.
   a) With adhesive discs. *Amphilophium*, *Manaosella cordifolia* and *Mansoa parvifolia.*
   b) Modified into short, claw-like structures: *Dolichandra*.
   c) Multifid: some A*denocalymma,* some *Bignonia, Eccremocarpus*, *Manaosella*, *Tourrettia*
   d) Absent: *Campsis*, *Perianthomega*, *Podranea.*
7. Adventitious roots. Known in several species of *Dolichandra* (e.g., *D. quadrivalvis, D. steyermarkii, D. unguis-cati*) and *Mansoa difficilis*.
8. Prophylls.
   a. Foliaceous: *Adenocalymma, Amphilophium*, some *Anemopaegma*, some *Bignonia*, *Stizophyllum, Tanaecium*, and *Tynanthus* (caducous)
   b. Minute: *Callichlamys*, *Cuspidaria, Fridericia, Lundia, Manaosella, Mansoa, Martinella, Perianthomega, Pyrostegia,* and *Stizophyllum.*
   c. In series of 2, 3 or more: *Pachyptera, Tanaecium* (*Bromeliad* type), and *Xylophragma* (*Bromeliad* type).
   d. Absent: *Campsis*, *Eccremocarpus*, *Perianthomega*, *Podranea,* and *Tourrettia*.

9. Crateriform glands: *Adenocalymma* in bracts, calyx, and fruits.
10. Echinate or spiny capsules. *Amphilophium crucigerum* and *Tourrettia lappacea*.
11. Ridged capsules: *Cuspidaria*, some *Adenocalymma*.

GENERIC DESCRIPTIONS

ADENOCALYMMA Martius ex Meisner, Pl. Vasc. Gen. 1: 300; 2: 208. 1840.

Gardnerodoxa Sandwith (1955); *Memora* Miers (1863); *Neojobertia* Baill. (1888).

Tendrilled lianas, sometimes shrubs or small trees; some species of lianas reaching> 30 m in length. Stems woody, terete or obtusely quadrangular, sometimes lenticellate when mature; interpetiolar glandular field and ridges sometime present; prophylls of axillary buds foliaceous or coriaceous, with crateriform glands; cross section with xylem presenting a cross-shaped outline due to 4 conspicuous phloem wedges, these are straight or nearly triangular, or rarely in multiples of four. Leaves trifoliolate, biternate or further divided, with the terminal leaflet replaced by a spiraled, simple, rarely bifid, trifid or multifid tendrils; blades with entire margins; petioles and petiolules pulvinate on both ends. Flowers produced in axillary racemes or in cauliflorous short shoots, with broad bracts, foliaceous, usually glandular. Calyx

Adenocalymma marginatum (Cham.) DC., photo by P. Acevedo

A. marginatum and *A. validum*, photo by P. Acevedo

campanulate, tubular, or spathaceous, membranaceous or coriaceous, usually glandular; corolla usually yellow, rarely white, orange, or red, infundibuliform, less commonly 2-labiate, tubular or gibbous, some with crateriform glands in vertical lines; stamens 4, included or exserted, didynamous, anthers glabrous; disk annular; ovary ovate-cylindrical, usually glandular, 2-locular, ovules in 2 series per locule. Fruit a linear or oblong-ellipsoid capsule, flattened or inflated, the valves parallel to the septum, usually glandular; seeds with two hyaline wings or wingless.

Distinctive features: Petiole and petiolules pulvinate, crateriform glands present on prophylls, calyx, and fruit.

Distribution: A neotropical genus of about 92 species, 82 of which are lianas; distributed from Mexico to SE Brazil and Uruguay; wet or seasonal flooded lowland forests; 0–1,500 m.

AMPHILOPHIUM Kunth, J. Phys. Chim. Hist. Nat. Arts 87: 451. 1818.

Distictella Kuntze (1904); *Distictis* Mart. ex Meisn. (1840); *Glaziovia* Bureau (1868); *Haplolophium* Cham. (1832); *Pithecoctenium* Mart. ex Meisn. (1840).

Tendrilled lianas, 5–25+ m long. Stems hexagonal with conspicuous obtuse ribs; cross section of mature stems with phloem wedges in multiples of four, sometimes phloem wedges included within the xylem (fig. 2b); interpetiolar zones not glandular; prophylls foliaceous, persistent or deciduous. Leaves usually 3-foliolate, with the terminal leaflet replaced by a trifid tendril, these sometimes bearing adhesive discs. Flowers produced in axillary or terminal thyrses or racemes,

Amphilophium lactiflorum (Vahl.) L.G. Lohmann, photo by P. Acevedo

usually on short axillary branches. Calyx campanulate, double or simple, with the inner margin thick, short and the outer undulate; corolla purple or yellow, tubular or infundibuliform, straight or strongly curved; stamens 4, didynamous, included, less commonly exserted, anthers glabrous; ovary ovate-cylindrical, 2-locular, ovules in multiple series per locule. Fruit an oblong-elliptical capsule, the valves parallel to the septum, woody, without glands, smooth to tuberculate; seeds with two hyaline wings not very differentiated from the body.

Distinctive features: Stems hexagonal with conspicuous obtuse ribs, prophylls foliaceous; tendrils long, trifid; calyx frequently double.

Distribution: A neotropical genus with about 47 species, distributed from Mexico to northern Argentina, including the Antilles; in diverse habitats including humid forests, riparian forests, dry forests, 0–800 (2470) m.

ANEMOPAEGMA Martius ex Meisner, Pl. Vasc. Gen. 1: 300; 2: 208. 1840 (nom. et orth. cons.).

Anemopaegma camberlanyii DC., photo by R. Udulutsch

Tendrilled lianas, sometimes shrubs. Stems woody, terete; cross section of mature stems with phloem wedges in multiples of four; interpetiolar zones usually not glandular; prophylls foliaceous, minute or absent. Leaves usually 3-foliolate, with the terminal leaflet replaced by a simple or trifid tendril. Flowers produced in axillary or terminal racemes or thyrses. Calyx campanulate, truncate or 5-denticulate, usually with glands near the margin; corolla cream or yellow, tubular or infundibuliform, lepidote on the outside, rarely with patelliform glands

distributed at the apex of the corolla tube; stamens 4, didynamous, included, the anthers glabrous; ovary ellipsoid, stipitate, 2-locular, ovules in 2–6 series per locule. Fruit an ellipsoid capsule, stipitate, flattened, the valves parallel to the septum, woody, without glands, smooth; seeds with two hyaline wings.

Distinctive features: Prophylls usually foliaceous, ovary stipitate, fruit ellipsoid, stipitate and flattened.

Distribution: A neotropical genus with about 45 species, distributed from Mexico to southeastern Brazil; in diverse habitats including humid forests, riparian forests and dry forests; 0–1,500(2,250) m.

BIGNONIA Linnaeus, Sp. Pl. 622. 1753 (nom. cons.).

Clytostoma Miers ex Bureau (1868); *Cydista* Miers (1863); *Macranthisiphon* Bureau ex K. Schum. (1894); *Mussatia* Bureau ex Baill. (1888); *Phryganocydia* Mart. ex Bureau (1872); *Potamoganos* Sandwith (1937); *Roentgenia* Urb. (1916); *Saritaea* Dugand (1945).

Tendrilled lianas, sometimes shrubs. Stems woody, cylindrical, irregularly angled, or tetragonal; cross section of mature stems with multiples of 4 phloem wedges; interpetiolar zones not glandular; prophylls foliaceous or minute and triangular, with or without glands. Leaves usually 3-foliolate, with the terminal leaflet replaced by a simple tendril, less often trifid or multifid tendril. Flowers produced in axillary or terminal thyrses or

Bignonia sciuripabulum (Hovel) L.G. Lohmann, photo by R. Udulutsch

racemes. Calyx campanulate or tubular, 5-lobed or bilabiate, with or without glands near the margins; corolla magenta, yellow, white or red, usually with conspicuous linear nectar guides, tubular or infundibuliform, without glands; stamens 4, didynamous, included, rarely exserted, anthers glabrous; ovary ovate-cylindrical, 2-locular, ovules in 2–6 series per locule; disc usually wanting. Fruit a linear, rarely ellipsoid capsule, flattened or inflated, the valves parallel to the septum, woody, without glands, smooth, echinate, or tuberculate; seeds with two opaque wings.

Distinctive features: Stems tetragonal; prophylls foliaceous in most species; tendrils simple; nectar guides (lines) conspicuous.

Distribution: A neotropical genus with about 31 species, distributed from United States to northern Argentina; in diverse habitats including humid forests, riparian forests and dry forests; 0–1,200(2700) m.

CALLICHLAMYS Miquel, Linnaea 18: 254. 1845.

Tendrilled lianas, 5–10 m long. Stems woody, terete, glabrous; cross section of mature stems with 4 phloem wedges; interpetiolar zones not glandular; prophylls triangular and minute, not glandular. Leaves usually 3-foliolate, with the terminal leaflet replaced by a simple, spiraled tendril; leaflets coriaceous. Flowers produced in axillary racemes. Calyx yellow, spathaceous, thick, spongy, puberulous, with sparse glands; corolla yellow, infundibuliform, puberulous externally; stamens 4, didynamous, included, anthers glabrous; ovary ellipsoid, glabrous, 2-locular, with multiple series of ovules in each locule. Fruit an ellipsoid capsule, slightly flattened, straight, woody, glabrous, the valves parallel

Callichlamys latifolia (Rich.) K. Schum., photo by P. Acevedo

to the septum, woody, smooth, with scattered glands; seeds with two opaque wings.

Distinctive features: Calyx yellow and spongy.

Distribution: A neotropical genus, with a single species distributed from Mexico to southeastern Brazil; in diverse habitats including humid forests and dry forests; 50–1000 m.

CAMPSIS Loureiro, Fl. Cochinch. 358, 377. 1790 (nom. cons.).

Root-climbing lianas, reaching 5 or more m in length; stem cylindrical, old stems with light, peeling-off bark; cross section with regular, continuous xylem; interpetiolar region lacking glands, but presenting interpetiolar ridges; prophylls lacking. Leaves 5-9(-11)-pinnately compound, lacking tendrils and not prehensile; leaflets serrate. Inflorescence terminal, panicle-shaped, few-flowered thyrses. Calyx tubular-campanulate to campanulate, orange or green-orange; corolla orange or red-orange, tubular-funnel-shaped; stamens 4, included, anthers glabrous, staminode rudimentary; ovary oblongoid, lepidote pubescent, with multiseriate ovules, style as long as the stamens, stigma 2-lipped; disc conical-annular. Capsule fusiform, woody, with lepidote scales, subtended by a persistent calyx; seeds thin, bialate.

Campsis radicans (L.) Bureau, photo by P. Acevedo

Distinctive features: Root-climbing liana with lepidote scales and pinnate leaves; corolla orange or red-orange.

Distribution: A northern temperate (North America and China) genus of two widely cultivated species. *Campsis radicans* (L.) Bureau although native to eastern North America it is cultivated in the highlands of Dominican Republic, Ecuador, Peru, southern Brazil, and Argentina.

CUSPIDARIA de Candolle, Biblioth. Universelle Genève ser. 2. 17: 125. 1838 (nom. cons.)

Tendrilled lianas, sometimes scandent shrubs. Stems woody, cylindrical, subtetragonal to tetragonal; cross section of mature stems with 4 phloem wedges; interpetiolar zones glandular or not, with a discontinuous ridge; prophylls minute and triangular, with or without glands. Leaves usually 3-foliolate, rarely biternate (e.g., *C. inaequalis* and *C. bracteolata*) with terminal leaflet replaced by a simple tendril. Flowers produced in axillary or terminal racemes or panicles. Calyx cupular, campanulate or tubular, 5-lobed, 5-aristate or 5-dentate, usually laciniate, with or without glands near margins; corolla magenta, pink, orange or red, tubular, infundibuliform, without glands; stamens 4, didynamous, included rarely exserted (*C. cinerea*), anthers glabrous or puberulous, pollen grains in tetrads or polyads; ovary linear-cylindrical, lepidote or glabrous, 2-locular, ovules in 2 or 4 series per locule. Fruit a linear capsule, flattened or sub-inflated, the valves parallel to the septum, woody, without glands, with or without wings, smooth or with midrib frequently developed into two longitudinal ridges; seeds with two hyaline wings.

Cuspidaria convoluta (Vell.) A.H. Gentry, photo by R. Udulutsch

Distinctive features: Fruit with midrib frequently developed into two longitudinal ridges; pollen grains arranged in tetrads or polyads.

Distribution: A neotropical genus with about 16 species, distributed from Mexico to Argentina, with most species found in Brazil; in diverse habitats including humid forests, riparian forests, and dry forests; 0–1000 m.

DOLICHANDRA Chamisso, Linnaea 7: 657. 1832.

Macfadyena A. DC. (1845); *Melloa* Bureau (1868); *Parabignonia* Bureau ex K. Schum. (1868).

Tendrilled lianas, 10–>25 m long, often with short adventitious roots dimorphic juvenile growth with very small leaves. Stems woody, cylindrical, reaching 15 cm in diam.; cross section of mature stems with multiple phloem wedges interrupted by parenchyma tissue (fig. 2e &f); interpetiolar zones glandular or not glandular; prophylls lanceolate, deltate or ovate, without glands. Leaves usually 3-foliolate with the terminal leaflet replaced by a trifid and uncinate tendril. Flowers produced in axillary or terminal racemes, panicles or cymes, rarely reduced to 1–3 flowers. Calyx cupular, campanulate or spathaceous, 3- or 5-lobed, rarely with glands; corolla yellow, pink or red, tubular or infundibuliform, with or without glands at the apex; stamens 4, didynamous, included or exserted, anthers glabrous; ovary linear-cylindrical, lepidote or glabrous, 2-locular, ovules in 2–4 (–multiple) series per locule. Fruit a linear or oblong capsule, rarely elliptic, flattened or inflated, the valves parallel to the septum, woody, incompletely

Dolichandra unguis-cati (L.) L.G. Lohmann, photo by P. Acevedo

divided longitudinally or completely divided in four, without glands, rugose or smooth; seeds with two hyaline wings.

Distinctive features: Trifid and uncinate tendril.

Distribution: A neotropical genus with 9 species, distributed from Mexico and the Antilles to northern Argentina and Uruguay; in diverse habitats including humid forests, riparian forests, and dry forests; 0–1,500(2000) m.

ECCREMOCARPUS Ruiz & Pavón, Prodr. 90. 1794.

Eccremocarpus scaber Ruiz & Pav., from Loddiges, Bot. Cab. 15: t. 1411. 1828.

Tendrilled, herbaceous vines; stem cylindrical; cross sections with regular anatomy, but with 4 phloem wedges at the base of older stems; interpetiolar region lacking glands; prophylls wanting; Leaves bipinnatisect or tripinnatisect, with a much-branched terminal tendril. Inflorescence racemose, axillary or terminal, commonly reduced to a few flowers. Calyx campanulate, often red or pink tinged, 5-lobed; corolla yellow, orange, or red, green or yellow at the tip, tubular, slightly curved or ventricose, sometimes urceolate; stamens 4, slightly exserted or situated just below the mouth of the tube, anthers glabrous, staminode rudimentary; ovary ovoid or conical, unilocular, placentation parietal, ovules multiseriate; disc annular-pulvinate. Capsule ellipsoid or ovoid, smooth, with

persistent calyx, valves papery and persistent; seeds suborbicular, with a narrow membranous wing circling the body of the seed.

Distinctive features: Leaves bipinnatisect or tripinnatisect; 1-locular ovary; a loculicidal capsule with valves that remain fused apically.

Distribution: A South American genus of three species found in the Andean region. *Eccremocarpus viridis* and *E. huainaccapac* occur mainly between elevations of 3200 and 3700 m in Colombia, Ecuador, and Peru; *E. scaber* occurs mainly from 1000 to 1800 m in Chile and southern Argentina.

FRIDERICIA Martius, Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 13(2) (Praef.): 7. 1827.

Arrabidaea DC. (1838); *Petastoma* Miers (1863); *Piriadacus* Pichon (1946).

Tendrilled lianas 5 to > 25 m long or less frequently small trees or shrubs. Stems woody, cylindrical or tetragonal; cross section of mature stems with 4 phloem wedges; interpetiolar zones usually glandular; prophylls small and inconspicuous.

Fridericia craterophora (DC.) L.G. Lohmann., photo by P. Acevedo

Leaves usually 3-foliolate, rarely simple (1-foliolate), with the terminal leaflet replaced by a long, filiform, spiraled, simple tendril. Flowers produced in axillary or terminal thyrses or dichasia, rarely in racemes. Calyx cupular, campanulate or tubular, truncate, bilabiate or minutely 5-denticulate at the apex, without glands; corolla magenta, pink, reddish, orange or white, infundibuliform or tubular, pubescent outside, without glands;

stamens 4, didynamous, included, less frequently exerted (e.g., *F. erubescens*), anthers glabrous; ovary cylindrical-oblong, usually lepidote, 2-locular, ovules in 2–4 series per locule. Fruit a linear capsule, flattened, the valves parallel to the septum, coriaceous or woody, without glands, without wings (winged in *F. erubescens*), smooth, rarely verrucose; seeds with two hyaline or opaque wings.

Distinctive features: Simple tendrils, interpetiolar zones usually glandular.

Distribution: A neotropical genus of 67 species, distributed from Mexico to SE Brazil and Argentina; in diverse habitats including humid forests, riparian forests and dry forests; 0–1,000(2,000) m.

LUNDIA de Candolle, Biblioth. Universelle Genève ser. 2. 17: 127. 1838.

Tendrilled lianas. Stems woody, cylindrical; cross section of mature stems with 4 or multiples of 4 phloem wedges; interpetiolar zone with many glands; prophylls small and inconspicuous, triangular. Leaves usually 3-foliolate, with the terminal leaflet replaced by a simple or trifid tendril. Flowers produced in axillary or terminal thyrses (but corymbose in *L. corymbifera*). Calyx cupular-closed, breaking transversely through a calyptra or less often longitudinally becoming bilabiate or subspathaceous, truncate or lobed, without glands; corolla white, cream or pink, rarely magenta or vinaceous, infundibuliform or tubular, pubescent or villous outside, without glands; stamens 4, didynamous, included, less frequently exerted (*L. longa*), anthers villous; ovary cylindrical-oblong, villous, 2-locular, ovules in 2–6 series per locule, stigma with ciliate margin; nectar disk inconspicuous or

Lundia virginalis DC., photo by P. Acevedo

wanting. Fruit a linear capsule, flattened, the valves parallel to the septum, coriaceous or woody, without glands, without wings, central ridge prominent, edges prominent, pubescent; seeds with two hyaline wings.

Distinctive features: Villous anthers and ovary; stigma with ciliate margin; nectar disk wanting; calyx opening through a calyptra.

Distribution: A neotropical genus of 13 species, distributed from Mexico to SE Brazil; in diverse habitats including humid forests, riparian forests and dry forests; 0–1,000(2,350) m.

MANAOSELLA J. C. Gomes f., Arch. Jard. Bot. Rio de Janeiro 9: 83. 1949.

Tendrilled lianas, 5–8 m long. Stems woody, cylindrical; cross-section with 4 phloem wedges, regular phloem (the phloem between the 4 phloem wedges) with sclereids instead of fibers; interpetiolar zones not glandular; prophylls minute and triangular, without glands. Leaves usually 3-foliolate with the terminal leaflet replaced by a multifid tendril with adhesive discs. Flowers produced in axillary racemes. Calyx spathaceous, without glands; corolla cream, yellow or magenta, infundibuliform, without glands; stamens 4, didynamous, included, anthers glabrous; ovary cylindrical, puberulous, 2-locular, ovules in 2 series per locule. Fruit a linear, flattened capsule, the valves parallel to the septum, coriaceous, without glands, smooth; seeds with two hyaline wings.

Manaosella cordifolia (DC.) A.H. Gentry, photo by R. Udulutsch

Distinctive features: Multifid tendrils, with adhesive discs.

Distribution: A neotropical genus of a single species, occurring in Venezuela, Bolivia, and in northern and north-central Brazil; humid forest; below 1,000 m.

MANSOA de Candolle, Biblioth. Universelle Genève ser. 2. 17: 128. 1838.

Tendrilled lianas, 5–10 m long. Stems woody, cylindrical to tetragonal, with strong garlic smell; cross section of mature stem with multiples of four phloem wedges; interpetiolar zones glandular or not; prophylls minute and triangular.

Mansoa hirsuta DC., photo by P. Acevedo

Leaves usually 3-foliolate, with the terminal leaflet replaced by a trifid tendril; petioles sometimes with an apical glandular zone; leaflets usually triplinerved, with dentate margins (especially in young plants). Flowers produced in axillary or terminal racemes or thyrses, rarely in axillary fascicules (*M. parvifolia*). Calyx cupular, campanulate, 5-dentate or truncate**,** without glands; corolla white, pink, magenta or purple, tubular, infundibuliform, without glands; stamens 4, didynamous, included, anthers glabrous; ovary linear-cylindrical, lepidote or glabrous, 2-locular, ovules in 2 series per locule. Fruit a linear capsule, inflated, the valves parallel to the septum, woody, without glands, with midrib frequently developed; seeds with two opaque wings.

Distinctive features: Leaflets usually triplinerved, tendril trifid but not uncinate, plant with strong garlic smell.

Distribution: A neotropical genus of 12 species, distributed from Mexico to Argentina; in diverse habitats including humid forests, riparian forests, and dry forests; 5–1,000 m.

MARTINELLA Baillon, Hist. Pl. 10: 30. 1888 ['1891'].

Tendrilled lianas. Stems woody, cylindrical to tetragonal; cross section of mature stems with 4 phloem wedges; interpetiolar zones with few patelliform trichomes and a continuous ridge; prophylls minute and triangular without glands. Leaves usually 3-foliolate, with the terminal leaflet replaced by a trifid tendril. Flowers produced in axillary or terminal racemes or thyrses. Calyx tubular-campanulate, irregularly 2–4(–5)-lobed, apices mucronate or aristate, with scattered glands; corolla magenta, purple, lilac or yellow, narrowly tubular at basal portion and wide campanulate at upper portion, without glands; stamens 4, didynamous, included, anthers glabrous; ovary cylindrical, glabrous, 2-locular, ovules in 1 series per locule. Fruit a linear capsule, flattened, the valves parallel to the septum, woody, without glands, smooth, with calyx normally persistent; seeds with two hyaline wings.

Martinella obovata (Kunth) Bureau & K. Schum., photo by R. Aguilar

Distinctive features: Minute triangular prophylls; interpetiolar ridges conspicuous; leaflets abaxially silvery or whitish; calyx irregularly 2–4(–5)-lobed; corolla narrowly tubular at base.

Distribution: A neotropical genus of five species; distributed from southern Mexico to eastern Brazil, including the Amazon region; moist and rain forests; 0–400(1,400) m.

PACHYPTERA de Candolle ex Meisner, Pl. Vasc. Gen. 1: 299; 2: 207. 1840.

Tendrilled lianas, 10 or more m long. Stems woody, cylindrical to tetragonal, with papery peeling bark; cross section of mature stems with 4 phloem wedges; interpetiolar zones glandular, with a continuous ridge; prophylls ensiform, rarely triangular and inconspicuous, 3–5-seriated. Leaves usually 3-foliolate, with the terminal leaflet replaced by a trifid tendril; leaflets with asymmetrical base; petioles with patelliform glands at apex. Flowers produced in axillary or terminal racemes. Calyx tubular or cupular, with glands on upper portion; corolla white to cream, orange to red (*P. erythraea*), or pink to purple (*P. incarnata*), infundibuliform or tubular, with a pair of patelliform glands arranged in lines externally; stamens 4, didynamous, included, anthers villous (glabrous in *P. aromatica*); ovary cylindrical, glabrous to pubescent, rarely lepidote, 2-locular, ovules in 2 series per locule. Fruit a linear capsule, flattened (inflated in *P. kerere*), the valves parallel to the septum, coriaceous or woody, with patelliform glands, smooth; seeds with two hyaline wings.

Pachyptera kerere (Aubl.) Sandwith, photo by P. Acevedo

Distinctive features: Stems with papery peeling bark; prophylls in series of three or more; patelliform glands arranged in lines on upper portions of the calyx and corolla tube.

Distribution: A neotropical genus of five species; distributed from Belize to Bolivia and Brazil including the Pacific coast of Colombia and Ecuador, and the Amazon basin; wet and seasonally flooded forests; 0–1,000 m.

PERIANTHOMEGA Bureau ex Baillon, Hist. Pl. 10: 33. 1888 [‘1891’].

Scrambling lianas, reaching 7 or more m in length. Stems woody, cylindrical; cross section of mature stem with continuous cambium and 4 phloem arcs; interpetiolar zones without glands or ridges; prophylls minute and triangular.

Perianthomega vellozoi Bureau., with prehensile petioles, photo by P. Acevedo

Leaves biternate, lacking tendrils; petioles elongated, prehensile (twining) and becoming woody. Flowers produced in axillary or terminal racemes. Calyx cupular, campanulate, 5-keelled, 5-dentate, without glands; corolla white, infundibuliform, without glands; stamens 4, didynamous, included, anthers glabrous; ovary linear-cylindrical, lepidote or glabrous, 2-locular, ovules in 2 series per locule. Fruit a linear, flattened capsule, the valves parallel to the septum, coriaceous, without glands; seeds with two hyaline wings.

Distinctive features: Lianas climbing by twining petioles that become woody; leaves biternate, lacking tendrils.

Distribution: A South American genus of a single species, distributed in eastern Bolivia (Chuquisaca, Santa Cruz, Tarija), central-west and southeastern Brazil (Espirito Santo, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Rio de Janeiro), and Paraguay; in dry forests and scrubs; 375–1,200 (1,700) m.

PLEONOTOMA Miers, Proc. Roy. Hort. Soc. London 3: 184. 1863.

Tendrilled lianas. Stems woody, tetragonal, usually winged, wings often purplish tinged, and detaching with age; cross section of mature stems with 4 straight phloem wedges that are opposed to the stem wings (fig. 2a); interpetiolar zones without glands or ridges; prophylls foliaceous or not, without glands. Leaves biternate, triternate, ternately bipinnate, or tripinnate, with the terminal leaflet replaced by a trifid tendril. Flowers produced in axillary or terminal racemes. Calyx cupular, campanulate or tubular, 5-dentate, with glands; corolla white, cream or light yellow, tubular, infundibuliform, with or without glands; stamens 4, didynamous, included, anthers glabrous; ovary linear-cylindrical, lepidote or puberulous, 2-locular, ovules in 2 series per locule. Fruit a linear or oblong, flattened capsule, the valves drying blackish, parallel to the septum, woody, with patelliform glands, smooth; seeds with two hyaline wings.

Pleonotoma melioides (S. Moore) A.H. Gentry, photo by P. Acevedo

Distinctive features: Stems tetragonal and winged, leaves biternate, triternate, ternately bipinnate, or tripinnate,

Distribution: A neotropical genus of about 14 species distributed from Guatemala to Argentina; in diverse habitats including humid forests, riparian forests and dry forests; 0–1,000 m.

PODRANEA Sprague in Thiselton-Dyer, Fl. Cap. 4(2): 449. 1904.

Scrambling lianas or climbing shrubs, 5–7 m long. Stems cylindrical; cross section of mature stems with regular vascular anatomy; interpetiolar zone not glandular; prophylls absent. Leaves opposite, 7-9-pinnately compound, without tendrils. Flowers in terminal panicle-shaped thyrses. Calyx campanulate, membranaceous, 5-lobed; corolla slightly zygomorphic, violet-pink, with dark lines (nectar guides) in the throat, tubular-campanulate; stamens 4, didynamous included; ovary linear, tetragonal, glabrous, 2-locular, ovules 6-seriate per locule; disc annular. Fruit a linear capsule, coriaceous, with valves perpendicular to the septum; seeds numerous, with membranaceous wings at the ends

Podranea ricasoliana (Tanfani) Sprague., photo by P. Acevedo

Distinctive features: Scrambling lianas with opposite, pinnately compound leaves; corolla pink to mauve with dark lines in the throat.

Distribution: A genus of two species of tropical eastern and southern Africa. *Podranea ricasoliana* (Tanfani) Sprague is commonly cultivated in the Neotropics (Mexico, El Salvador, Guatemala, Costa Rica Colombia, Ecuador Brazil, and the Antilles (Jamaica, Dominican Republic, Puerto Rico, Virgin Islands, Lesser Antilles) and becoming naturalized in Puerto Rico and the Virgin Islands.

PYROSTEGIA K.B. Presl, Abh. Königl. Böhm. Ges. Wiss. ser. 5. 3: 523. 1845.

Tendrilled lianas, 5–10 m long. Stems obtusely hexagonal or 6–8-subangular; cross section of mature stem with 8 phloem wedges; interpetiolar zone not glandular; prophylls inconspicuous. Leaves usually 3-foliolate, with a terminal spiraled, trifid tendril. Flowers in terminal or axillary corymbs. Calyx simple, crateriform, truncate or 5-denticulate, glandular-lepidote; corolla red-orange, zygomorphic, narrowly tubular-infundibuliform; stamens 4, didynamous, exserted; ovary linear-tetragonal, lepidote, 2-locular, ovules in 2 series per locule; disc annular-pulvinate. Fruit a linear, compressed capsule, smooth, the valves parallel to the septum; seeds numerous, with two brown wings with hyaline margins.

Pyrostegia venusta (Ker Gawl.) Miers., photo by P. Acevedo

Distinctive features: Corymbose inflorescences; corolla long tubular, bright orange; leaves abaxially with crateriform glands in the axils of the lowermost secondary veins.

Distribution: A genus of two species, with *P. millingtonioides* Sandwith endemic to the Amazon region of Brazil, and *P. venusta* (Ker Gawl.) Miers naturally distributed from Mexico to Brazil and Paraguay; 100–1,900 m.

STIZOPHYLLUM Miers, Proc. Roy. Hort. Soc. London 3: 197. 1863.

Tendrilled lianas, 2–7 m long. Stems woody, cylindrical, hollow; cross section of mature stems with 4 phloem wedges (fig. 1e); interpetiolar zones without glands or ridges; prophylls foliaceous or inconspicuous, early deciduous, without glands.

Stizophyllum perforatum (Cham.) Miers, photo by R. Udulutsch

Leaves usually 3-foliolate, with the terminal leaflet replaced by a simple or trifid tendril; leaflets conspicuously pellucid-punctate from lepidote-peltate glands on the lower surface. Flowers produced in axillary raceme. Calyx urceolate, irregularly bilabiate to 5-lobed, without glands; corolla white, magenta or pink, infundibuliform, without glands; stamens 4, didynamous, included, anthers glabrous; ovary cylindrical, lepidote, 2-locular, ovules in 2–4 series per locule; disc annular. Fruit a linear, flattened capsule, the valves parallel to the septum, coriaceous or woody, without glands, puberulous to villous; seeds with two hyaline wings.

Distinctive features: Stem hollow; prophylls foliaceous; leaflets pellucid punctate; calyx urceolate.

Distribution: A neotropical genus of three species, distributed from Mexico to southern Brazil; in diverse habitats including humid forests, riparian forests and dry forests; 50–1,000 m.

TANAECIUM Swartz, Prodr. 6, 91. 1788.

Paragonia Bureau (1872); *Spathicalyx* J.C. Gomes (1956).

Tendrilled lianas or shrubs; stems woody, cylindrical or tetragonal; cross section of mature stems with 4 phloem wedges; interpetiolar zones with or without glands, without ridges; prophylls bromeliad-like and/or subulate, 2–3 seriate, or foliaceous, without glands. Leaves usually 3-foliolate, with the terminal leaflet replaced by a simple or trifid tendril (bifid in *T. pyramidatum*). Flowers produced in terminal or axillary racemes or thyrses. Calyx campanulate, cupular or tubular, bilabiate or truncate, with glands; corolla magenta, pink, yellow or white, infundibuliform, without glands; stamens 4, didynamous, included, anthers glabrous; ovary cylindrical, lepidote, 2-locular, ovules in 1–many series per locule; disc annular. Fruit an elliptic or linear, flattened capsule, the valves parallel to the septum, coriaceous or woody, without glands, puberulous to villous; seeds with two hyaline or opaque wings, or wingless.

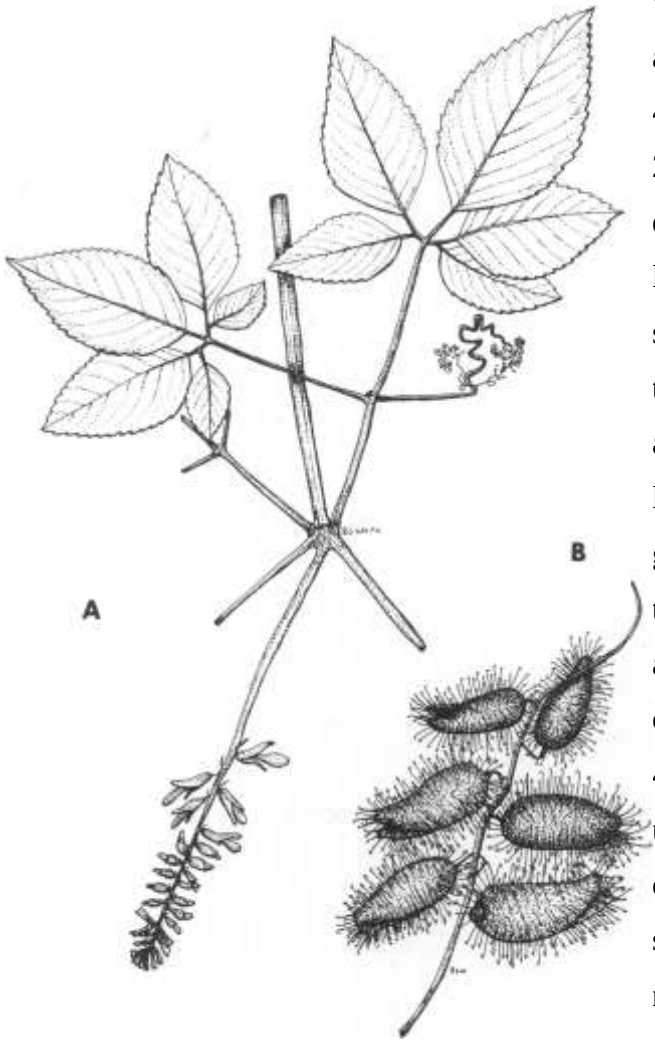
Tanaecium pyramidatum (Rich.) L.G. Lohmann, photo by P. Acevedo

Distinctive features: Prophylls bromeliad-like and/or subulate, 2–3 seriated.

Distribution: A neotropical genus of 22 species, 17 of which are lianas; distributed from Southern Mexico to Northern Argentina; in diverse habitats including humid forests, riparian forests, and dry forests; 0 –500(2,250) m.

TOURRETTIA Fougeroux, Hist. Acad. Roy. Sci. Mém. Math. Phys. (Paris, 4to) 1784 (Mém.): 205. 1787, (nom. et orth. cons.).

Herbaceous vines; stem angled; interpetiolar region lacking glands; prophylls wanting; cross section with regular anatomy but older stems developing 4 phloem wedges at the base. Leaves 2–3-ternate, often with a trifid, dichotomously branching tendril; leaflets serrate and often more or less subdivided. Inflorescence racemose, terminal, the upper flowers sterile and caducous. Calyx red, bilabiate, 2-lobed, caducous; corolla purplish to greenish, tubular, bilabiate, shorter than the calyx; stamens 4, included, anthers glabrous, staminode absent; ovary ovoid, densely short-echinate, 4-locular, placentation axile, ovules uniseriate; disc annular. Capsule ovoid, densely echinate with uncinate spines; seeds suborbicular, with narrow and hyaline membranous wings.



Tourrettia lappacea (L'Hér.) Willd., from Flora of Panama

Distinctive features: Inflorescence with upper flowers sterile; corolla shorter than the calyx; ovary 4-locular; fruit densely echinate with uncinate spines.

Distribution: A neotropical genus of a single species (*T. lappacea*) distributed in the mountains from southern Mexico to Argentina; 1500–2600 m.

TYNANTHUS Miers, Proc. Roy. Hort. Soc. London 3: 193. 1863.

Tendrilled lianas, 5–25 m long; stems woody, cylindrical or tetragonal, with strong clove or spicy smell; cross section of mature stems with 4 phloem wedges;

Tynanthus polyanthus (Bureau) Sandwith, photo by P. Acevedo

interpetiolar glands absent or present, interpetiolar ridge absent or present; prophylls absent or foliaceous, early caducous, without glands. Leaves usually 3-foliolate, with the terminal leaflet replaced by a simple or trifid tendril, with or without adhesive-discs on tips. Flowers numerous, minute, produced in terminal or axillary thyrses. Calyx campanulate, subtruncate, usually 5-denticulate, with or without glands; corolla white, cream or pale yellow, infundibuliform, bilabiate, with two (almost totally fused) upper lobes and three lower lobes, without glands; stamens 4, didynamous, inserted or subexerted, anthers glabrous; ovary conical to oblong, densely pubescent, 2-locular, ovules in 2–4 series per locule. Fruit a linear flattened to subtetragonal capsule, the valves parallel to the septum, coriaceous or woody, central ridge double or single, prominent or not, margins slightly or prominently raised, without glands; seeds with two hyaline wings.

Distinctive features: Crushed stems and leaves with strong clove or spicy smell; tendrils often with adhesive discs on tips; flowers small or minute (< 1 cm long), with bilabiate corolla; and fruits with raised margins.

Distribution: A neotropical genus of 14 species, distributed from Southern Mexico to southern Brazil and Bolivia; in humid forests, few representatives are also found in dry forests; 0–300 (1,000) m.

XYLOPHRAGMA Sprague, Hooker's Icon. Pl. 28: t. 2770. 1903.

Tendrilled lianas or scandent shrubs; stems woody, cylindrical or tetragonal; cross section of mature stems with 4 phloem wedges; interpetiolar zones with or without glands, with inconspicuous or without ridges; prophylls arranged in two opposite rows or bromeliad-like, without glands. Leaves 1–5-foliolate, with the terminal leaflet replaced by a simple tendril. Flowers produced in terminal or axillary thyrse. Calyx campanulate or tubular, lobed or truncate, without glands, with glandular trichomes; corolla pink or purple externally, pink, white or yellow internally, infundibuliform, without glands, wooly, puberulous or villous; stamens 4, didynamous, included or at the same height of the mouth of the tube, anthers glabrous; ovary cylindrical, lepidote, 2-locular, ovules in 1–3 series per locule; disc annular. Fruit a straight and linear capsule, flat or inflated, the valves parallel to the septum, coriaceous or woody, smooth or tuberculate, without glands; seeds with two hyaline wings.

Xylophragma myrianthum (Cham.) Sprague, photo by P. Acevedo

Distinctive features: 1–5-foliolate leaves with a simple tendril; prophylls arranged in two opposite rows or bromeliad-like; ovary usually lepidote.

Distribution: A neotropical genus of 7 species, distributed from Mexico to Paraguay; in diverse habitats including humid forests, riparian forests, and dry forests; 5–500 m.

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PICTURE VOUCHERS

Figure 1.
A. *Fridericia pearcei* (Rusby) L.G. Lohmann (Acevedo 14391)
B. *Adenocalymma bracteatum* DC. (Acevedo 16834)
C. *Tanaecium pyramidatum* (Rich.) L.G. Lohmann (Acevedo 15208)
D. *Fridericia craterophora* (DC.) L.G. Lohmann (Acevedo 17016)
E. *Stizophyllum riparium* (Kunth) Sandwith (M.R. Pace 16)
F. *Cuspidaria convoluta* (Vell.) A.H. Gentry (M.R. Pace 48).

Figure 2.
A. *Pleonotoma jasminifolia* Miers (Acevedo 16979)
B. *Amphilophium crucigerum* (L.) L.G. Lohmann (no voucher)
C. *Amphilophium paniculatum* Kunth (H. Medeiros 1187)
D. *Mansoa parvifolia* (A.H. Gentry) A.H. Gentry (Acevedo 7547)
E. *Dolichandra unguis-cati* (L.) L.G. Lohmann (no voucher)
F. *Dolichandra quadrivalvis* (Jacq.) L.G. Lohmann (no voucher).

Figure 3.
A. *Fridericia trailii* (Sprague) L.G. Lohmann (Acevedo 17000)
B. *Fridericia craterophora* (Acevedo 17016)
C. *Amphilophium crucigerum* (no voucher)

D. *Pleonotoma jasminifolia* (Acevedo 16979).

Figure 4.
A. *Tynanthus polyanthus* (Bureau) Sandwith (Acevedo 17038)
B. *Bignonia campanulata* Cham. (Acevedo 16952)
C. *Lundia virginalis* DC. (Acevedo 16966)
D. *Adenocalymma marginatum* DC. (Udulutsch 2490).

Figure 5.
A. *Fridericia conjugata* (Vell.) L.G. Lohmann (Acevedo 17158)
B. *Bignonia campanulata* Cham. (Acevedo 16580)
C. *Adenocalymma marginatum* (no voucher)
D. *Pleonotoma jasminifolia* (Acevedo 16979).

Figure 6.
A. Bignoniaceae indet. (no voucher)
B. *Manaosella cordifolia* (DC.) A.H. Gentry (no voucher)
C. *Amphilophium crucigerum* (no voucher).

Figure 7.
A. Bignoniaceae indet. (no voucher)
B. *Amphilophium bauhinioides* (Baill.) L.G. Lohmann (Acevedo 16878)
C. *Stizophyllum perforatum* (Cham.) Miers (no voucher)
D. *Dolichandra unguis-cati* (no voucher)
E. *Dolichandra* ? (no voucher).

Figure 8.
A. *Perianthomega vellozoi* Bureau (Acevedo 16597)
B. *Dolichandra unguis-cati* (no voucher).

Figure 9.
A. *Tanaecium pyramidatum* (Acevedo 13629)
B. *Tynanthus* cf. *micanthus* K. Schum. (Acevedo 13639)
C. *Bignonia corymbosa* Vent. (Acevedo 13625)
D. *Cuspidaria floribunda* (DC.) A.H. Gentry (Acevedo 13702)
E. *Callichlamys latifolia* (Rich.) K. Schum. (Udulutsch 2663)
F. *Bignonia convolvuloides* (K. Schum.) L.G. Lohmann (Acevedo 16591)
G. *Bignonia campanulata* Cham. (Acevedo 16580)
H. *Adenocalymma bracteatum* (Udulutsch 2999).

Figure10.
A. *Amphilophium paniculatum* (H. Medeiros 1187)
B. *Anemopaegma laeve* DC. (no voucher)
C. *Fridericia* sp. (Roque 2685)
D. *Mansoa hirsuta* DC. (no voucher)
E. *Pyrostegia venusta* Miers (Acevedo 16856)
F. *Adenocalymma gibbosum* Udulutsch & Assis (P. Dias 500)
G. *Fridericia trailii* (Udulutsch 2684)
H. *Amphilophium elongatum* (Vahl) L.G. Lohmann (Udulutsch 2641).

Figure 11.
A. *Fridericia florida* (DC.) L.G. Lohmann (Medeiros 1358)
B. *Adenocalymma bracteolatum* (Udulutsch 2776)
C. *Bignonia nocturnum* (Barb. Rodr.) L.G. Lohmann (no voucher)
D. *Amphilophium crucigerum* (no voucher).

Figure 12.
A. *Anemopaegma chamberlaynii* (Sims) Bureau & K. Schum. (Udulutsch 2968)
B. *Amphilophium lactiflorum* (Vahl) L.G. Lohmann (Acevedo 15447)
C. *Adenocalymma bracteatum* DC. (Acevedo 16834)
D. *Tanaecium pyramidatum* (Acevedo 15208).