

BIGNONIACEAE

Renata G. Udulutsch & P. Acevedo-Rodríguez

A pantropical family of lianas, trees, shrubs, and rarely herbs with ~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 ~45 genera and 629 species. There are 24 genera and ~400 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 to the Bignonieae tribe. Although found in diverse habitats, climbers in this family are predominantly found in lowland, moist forests or rainforests; < 800 m.

Diagnosics: 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 of 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 (Figures 56 & 57), quadrangular (Figures 56F; 57A), 4-lobed, 4-ridged, hexagonal, and sometimes 4-winged (Figures 57A; 58D) or slightly asymmetrical (Figure 57D); young stems smooth or lenticellate; nodes sometimes flattened and wider in young branches (Figure 59D), often with interpetiolar crateriform glands (Figure 59C), and interpetiolar ridges (Figures 59A, D). Stem cross sections in neotropical climbing genera

have a xylem tissue that is interrupted by phloem wedges resulting in a

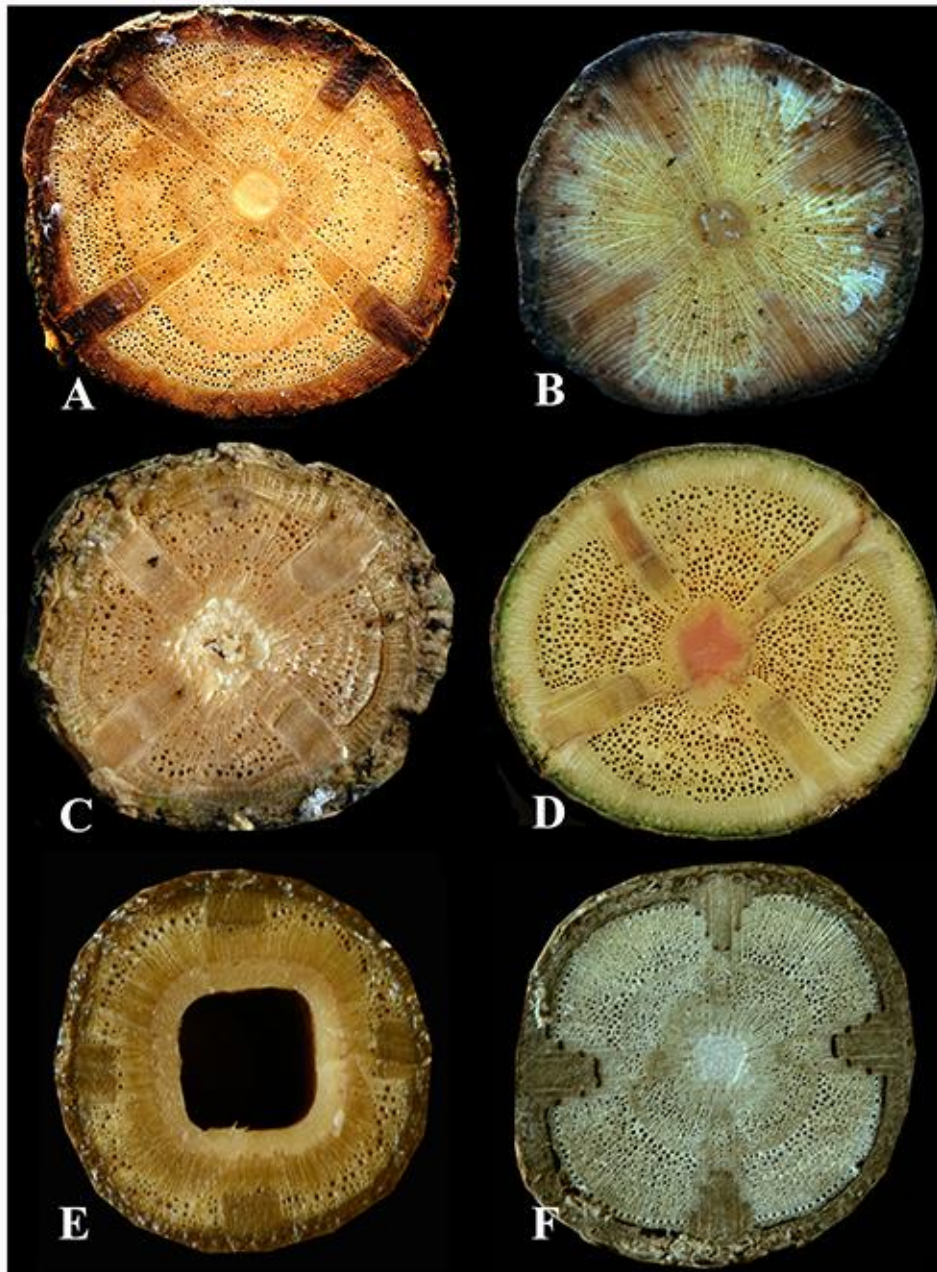


Figure 56. Cross sections of stems in Bignoniaceae. **A.** *Fridericia pearcei*, 4 straight phloem wedges. **B.** *Adenocalymma bracteatum*, 4 triangular phloem wedges. **C.** *Tanaecium pyramidatum*, 4 straight phloem wedges. **D.** *Fridericia craterophora* 4 straight phloem wedges. **E.** *Stizophyllum riparium* 4 straight phloem wedges & hollow medulla. **F.** *Cuspidaria convoluta*, 4 symmetrical phloem wedges. Photos by P. Acevedo.

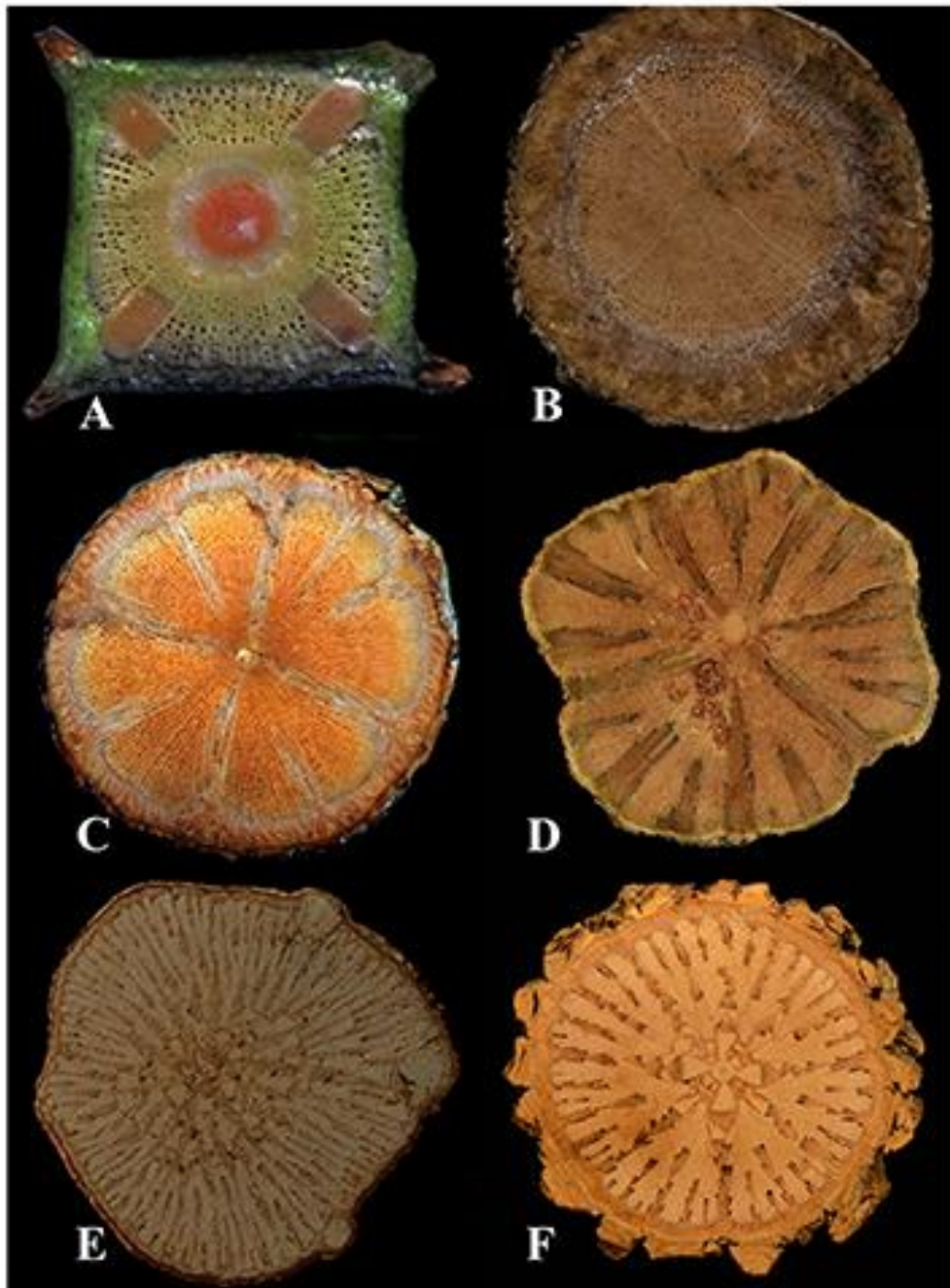


Figure 57. Cross sections of stems in Bignoniaceae. **A.** *Pleonotoma jasminifolia*, square, 4-winged with 4 straight phloem wedges. **B.** *Amphilophium crucigerum*, 4 linear phloem wedges included in the xylem. **C.** *Amphilophium paniculatum*, 8 linear, phloem wedges. **D.** *Mansoa parvifolia*, numerous, asymmetrical phloem wedges. **E.** *Dolichandra unguis-cati*, numerous asymmetrical phloem wedges. **F.** *Dolichandra quadrivalvis*, numerous asymmetrical phloem wedges. Photos by P. Acevedo.



Figure 58. 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.

cross-shaped outline. Phloem wedges are more commonly four and equidistant (Figures 56, 57A, B), in multiples of four (Figure 57C, D), or sometimes more numerous and dissected

by parenchyma tissue (Figure 57E, F; e.g., *Dolichandra*). The genus *Amphilophium* is unique in having phloem wedges that get included within the xylem (Figure 57B). 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 has stems with regular anatomy while the temperate *Campsis radicans* (L.) Bureau has interxylary phloem. Barks of mature stems are frequently fissured (Figure 58A), corky, flaky (Figure 58C) or lenticellate (Figure 58B). Few genera have a juvenile growing phase with small leaves, which climbs through the aid of adhesive discs (i.e., *Amphilophium*; Figure 62B) or adventitious roots (i.e., *Dolichandra*, Figure 63B).

2. EXUDATES. Clear and scanty or copious and watery in a few species.
3. PROPHYLLS and PERULES. Prophylls of axillary buds are common in most genera. These are foliaceous and stipule-like (Figures 58D; 59A, 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.
4. CLIMBING MECHANISM. Most neotropical genera have tendrils that are derived from the most distal leaflet(s), these are simple (Figures 61A; 62C) or branched (Figure 62A) and

prehensile and less often end in adhesive discs (e.g., *Amphilophium*, *Manaosella*; Figures 61B, C; 62B), or are modified into a claw-like structure (e.g., *Dolichandra*; Figure 62D).

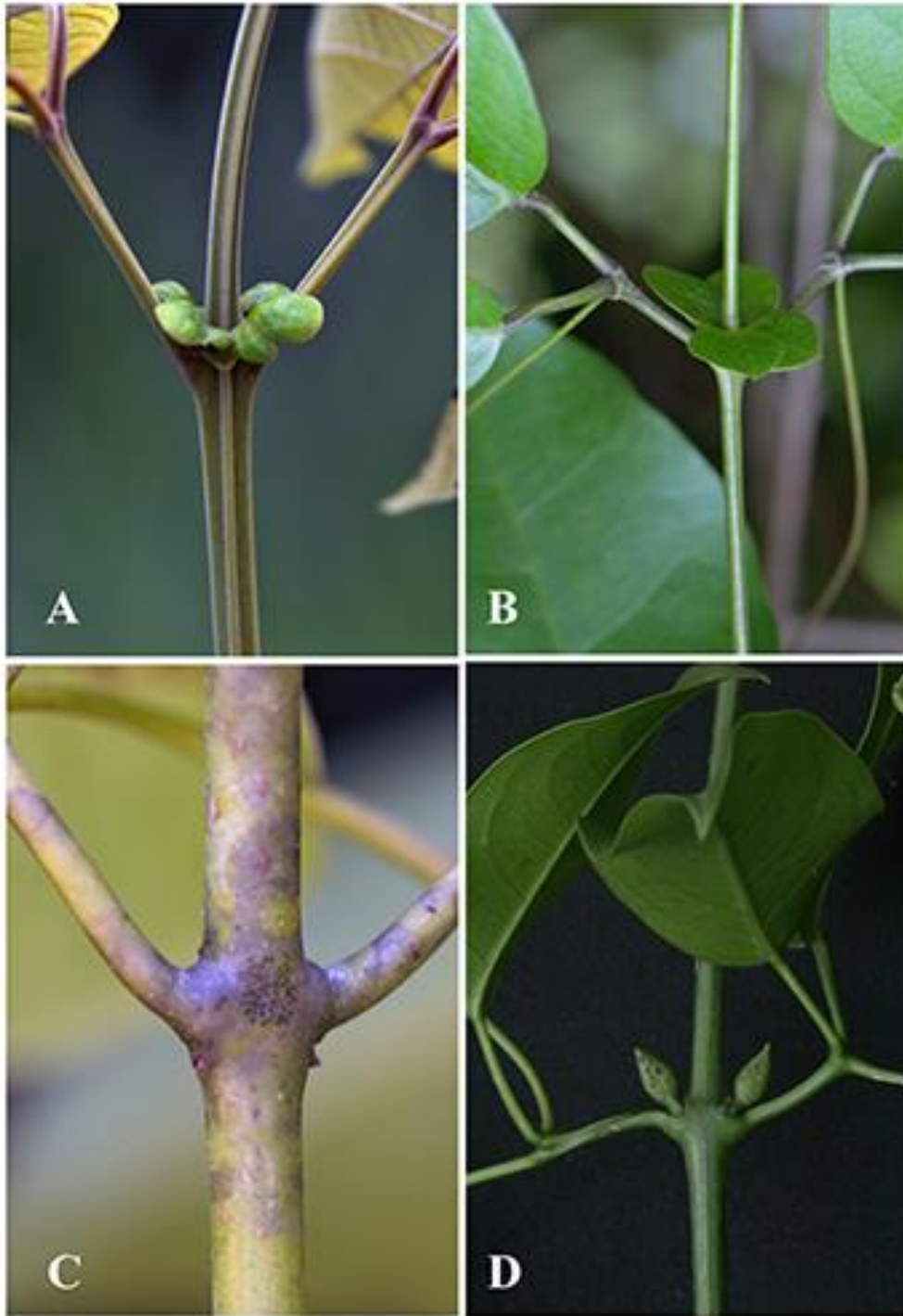


Figure 59. Prophylls and interpetiolar gland fields. **A.** *Tynanthus polyanthus*, foliaceous prophylls. **B.** *Bignonia campanulata*, foliaceous prophylls. **C.** *Lundia virginalis*, prophylls wanting. **D.** *Adenocalymma marginatum*, coriaceous prophylls. Photos: A–C by P. Acevedo; D by R. Udulutsch.



Figure 60. 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.

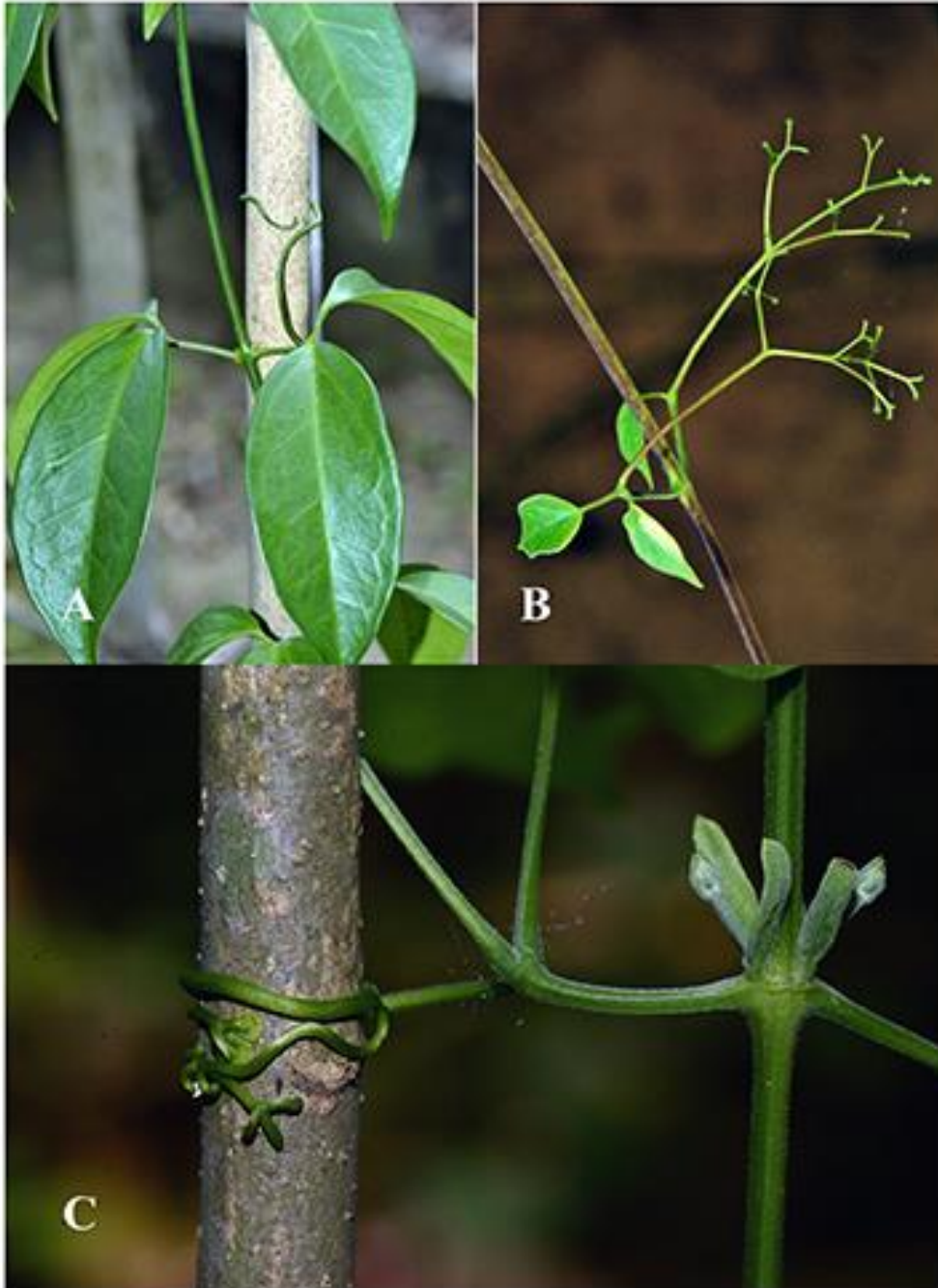


Figure 61. Tendrils. **A.** Bignoniaceae with trifoliolate leaves with distal leaflet replaced by a simple tendril. **B.** *Manosella cordifolia*, trifoliolate leaves with long, multifid tendrils with adhesive discs on distal ends. **C.** *Amphilophium crucigerum*, trifoliolate leaves, leaflets with long petiolules, tendril trifid, with adhesive pads. Photos by P. Acevedo.

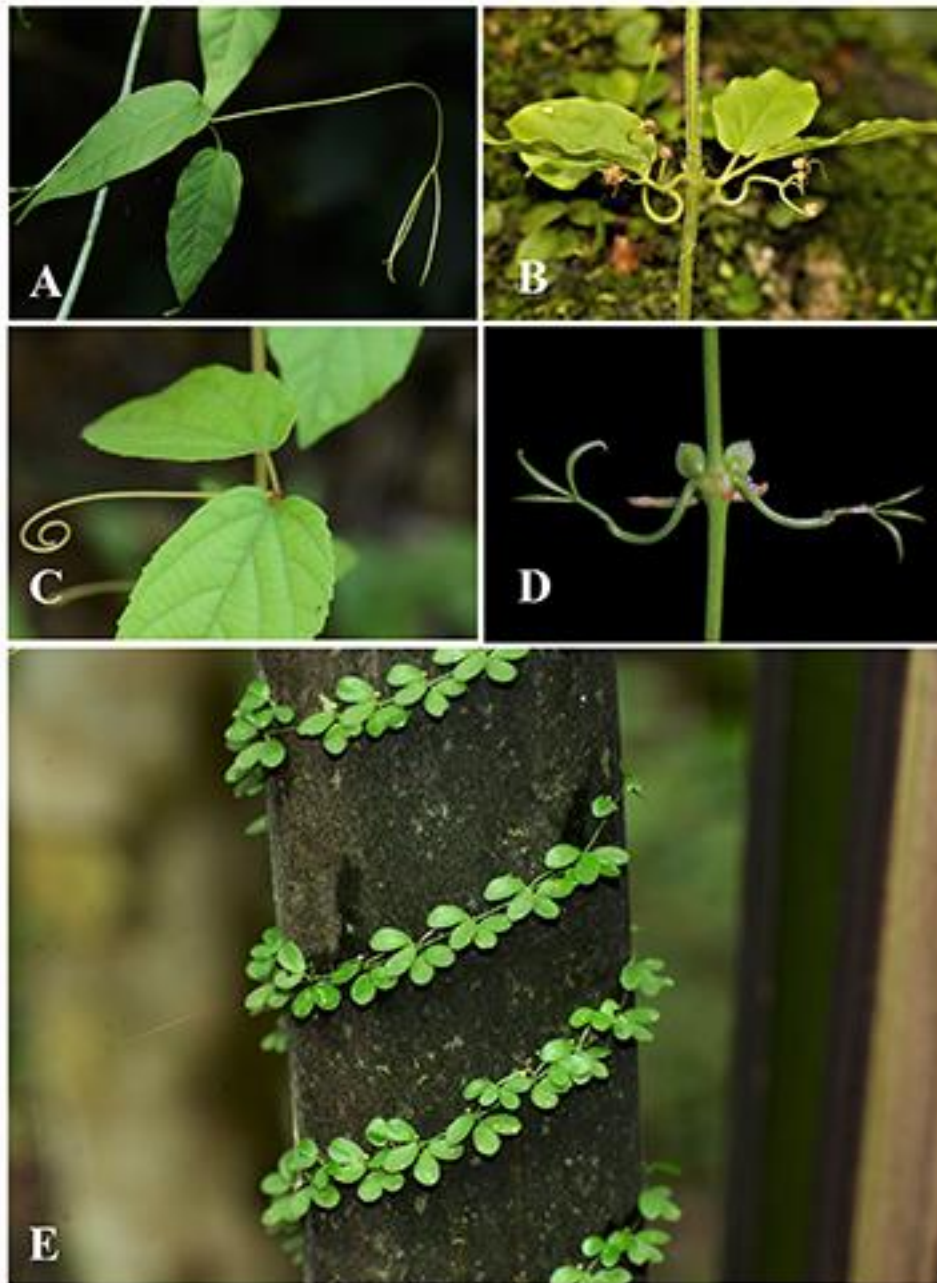


Figure 62. Climbing mechanisms. **A.** Bignoniaceae with trifoliolate leaves and distal, long, trifid tendril. **B.** *Amphilophium bauhinioides* with trifoliolate leaves and trifid tendrils with adhesive discs. **C.** *Stizophyllum perforatum*, with trifoliolate leaves with serrulate leaflets and simple tendrils. **D.** *Dolichandra unguis-cati*, trifoliolate leaves with caducous leaflets and persistent trifid, uncinately curved tendrils. **E.** *Dolichandra* sp. juvenile root-climbing phase with minute leaves and adventitious roots. Photos by P. Acevedo.



Figure 63. Climbing mechanisms. **A.** *Perianthomega vellozoi*, biternate leaves with prehensile petioles. **B.** *Dolichandra unguis-cati*, mature phase with abundant adventitious roots. Photos by P. Acevedo.

In addition to tendrils, a few species climb through the aid of adventitious roots (e.g., *Dolichandra unguis-cati* (L.) L.G. Lohmann, *D. steyermarkii* (Sandw.) L.G. Lohmann, *Mansoa difficilis* (Cham.) Bureau & K. Schum.; Figure 63B). *Dolichandra quadrivalvis* (Jacq.) L.G. Lohmann and *D. unguis-cati* in addition, their main stems sometimes twine. *Perianthomega* is the only neotropical genus that doesn't have tendrils, instead, it has prehensile petioles (Figure 63A). The introduced *Podranea ricasoliana* (Tanfani) Sprague is a scrambling shrub lacking tendrils; and *Campsis radicans* (L.) Bureau is a root-climber.

5. LEAVES. Opposite, compound with distal leaflet(s) represented by tendrils (Figures 61 & 62), more commonly trifoliolate (Figures 60A; 62A, B) but quite variable, sometimes pinnately compound, biternate (Figure 60D), triternate, or tripinnate leaves. Sapling commonly have simple leaves. In some genera, the first leaves of secondary branches are simple, later producing compound leaves without tendrils and ultimately compound leaves with tendrils (Figure 60B). Leaves are sometimes seemingly bifoliolate due to caducous tendrils (Figure 60C). 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*; Figure 60C). Blades are commonly entire except for several species of *Fridericia* and *Stizophyllum* where margins could be widely serrate or undulate (Figure 62C). 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.

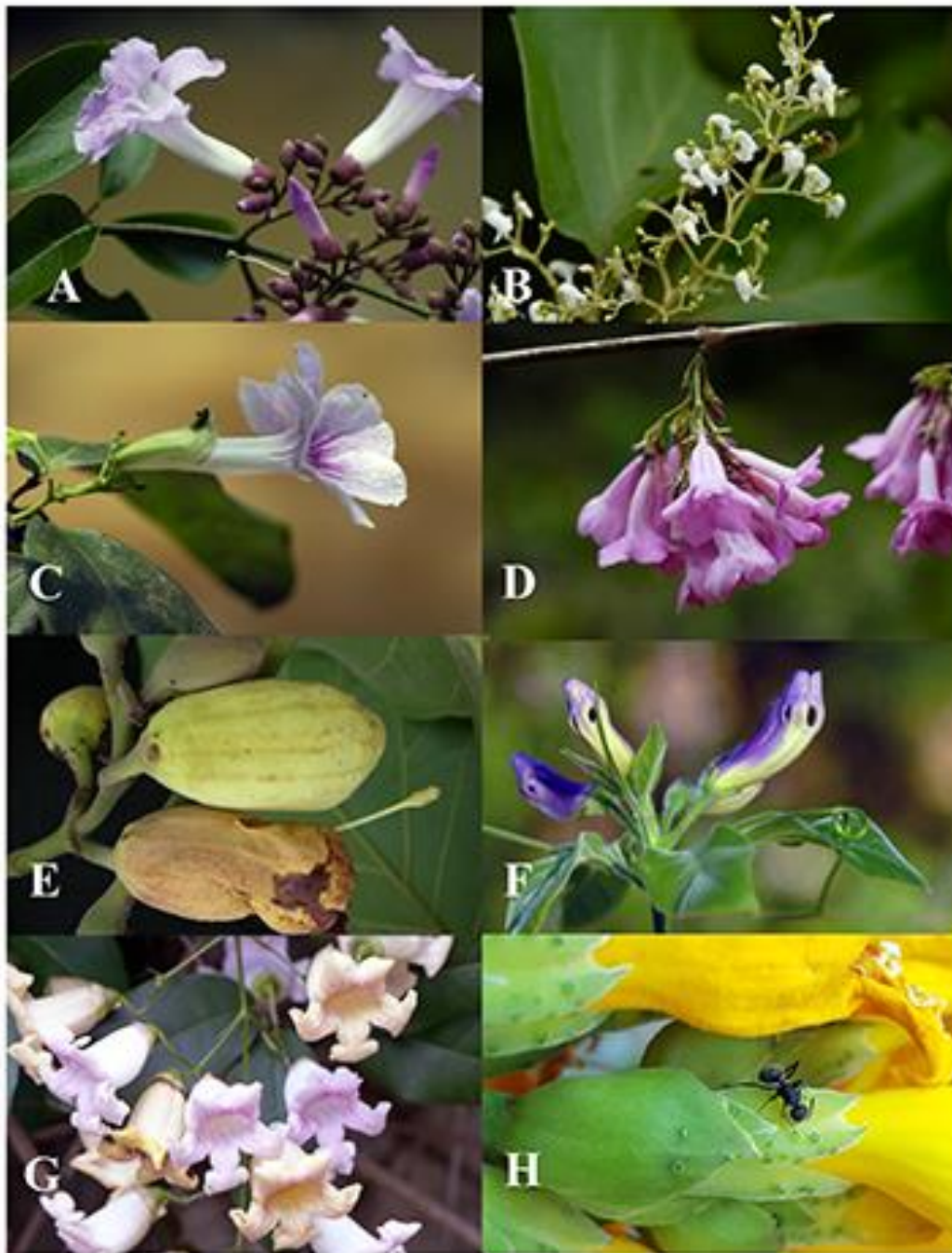


Figure 64. Flowers in climbing Bignoniaceae. **A.** *Tanaecium pyramidatum*, calyx truncate. **B.** *Tynanthus* cf. *micranthus*, minute flowers, corolla markedly bilabiate. **C.** *Bignonia corymbosa*, spatheous calyx. **D.** *Cuspidaria floribunda*, corolla long tubular at the base. **E.** *Callichlamys latifolia*, spongy calyx. **F.** *Bignonia convolvuloides*, lobed calyx. **G.** *Bignonia campanulata*, campanulate, truncate calyx. **H.** *Adenocalymma bracteatum*, calyx with crateriform glands. Photos: A–D, F–G by P. Acevedo; E, H by R. Udulutsch.

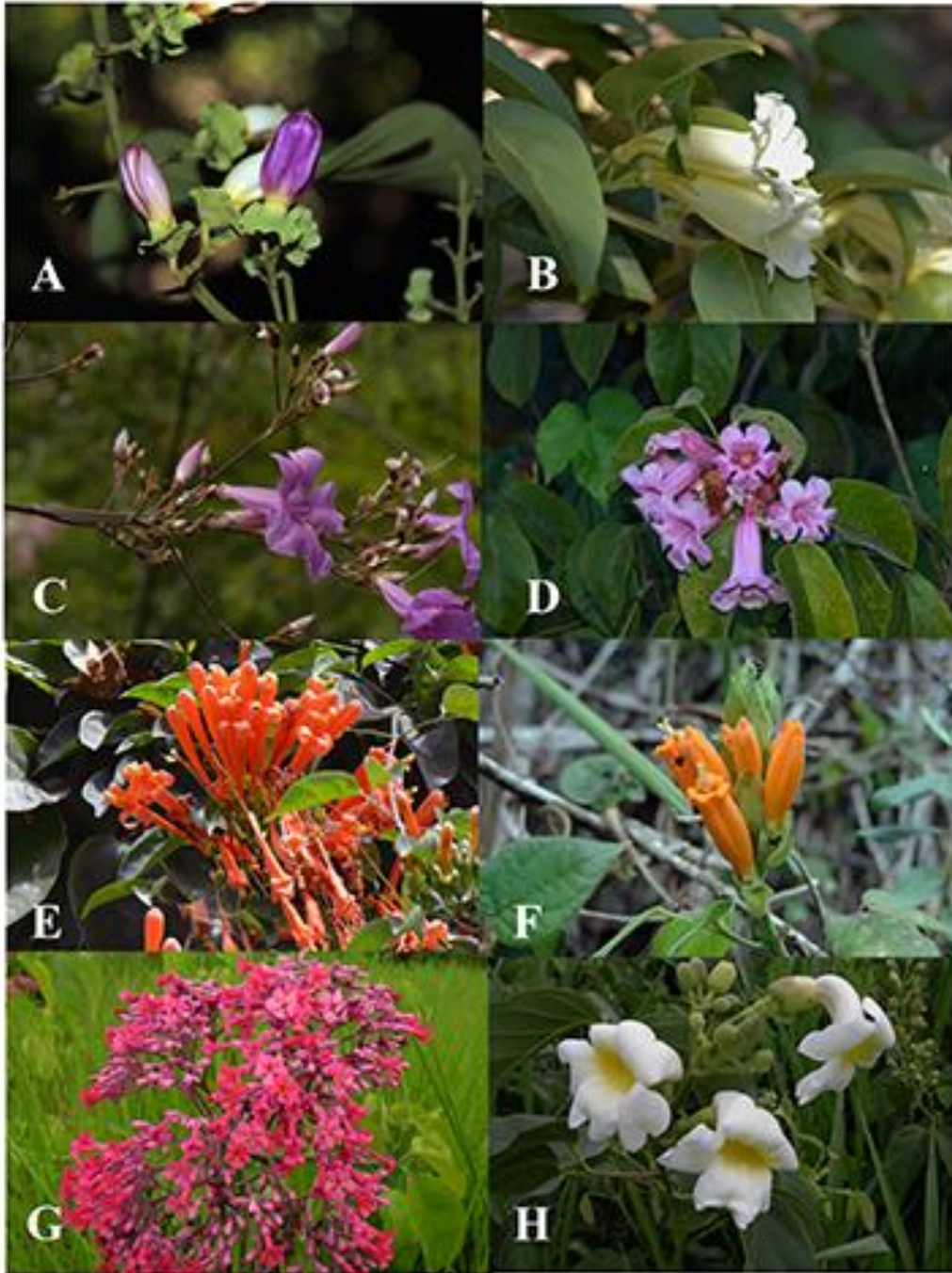


Figure 65. Flowers in climbing Bignoniaceae. **A.** *Amphilophium paniculatum*, double calyx. **B.** *Anemopaegma laeve*, corolla tubular-campanulate. **C.** *Fridericia* sp., flowers in dichasia. **D.** *Mansoa hirsuta*, corolla narrowly tubular at the base. **E.** *Pyrostegia venusta*, flowers in corymbs. **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.

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, 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 annular-patelliform but absent in *Bignonia* and sometimes in *Lundia*.
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*.

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. Some species are used in religious rituals or as poisons, condiment, and medicines.

The most cultivated ornamental species in the tropics are *Bignonia magnifica*, *Dolichandra unguis-cati*, *Podranea ricasoliana*, *Pyrostegia venusta* (Ker Gawl.) Miers, 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. Thin 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.

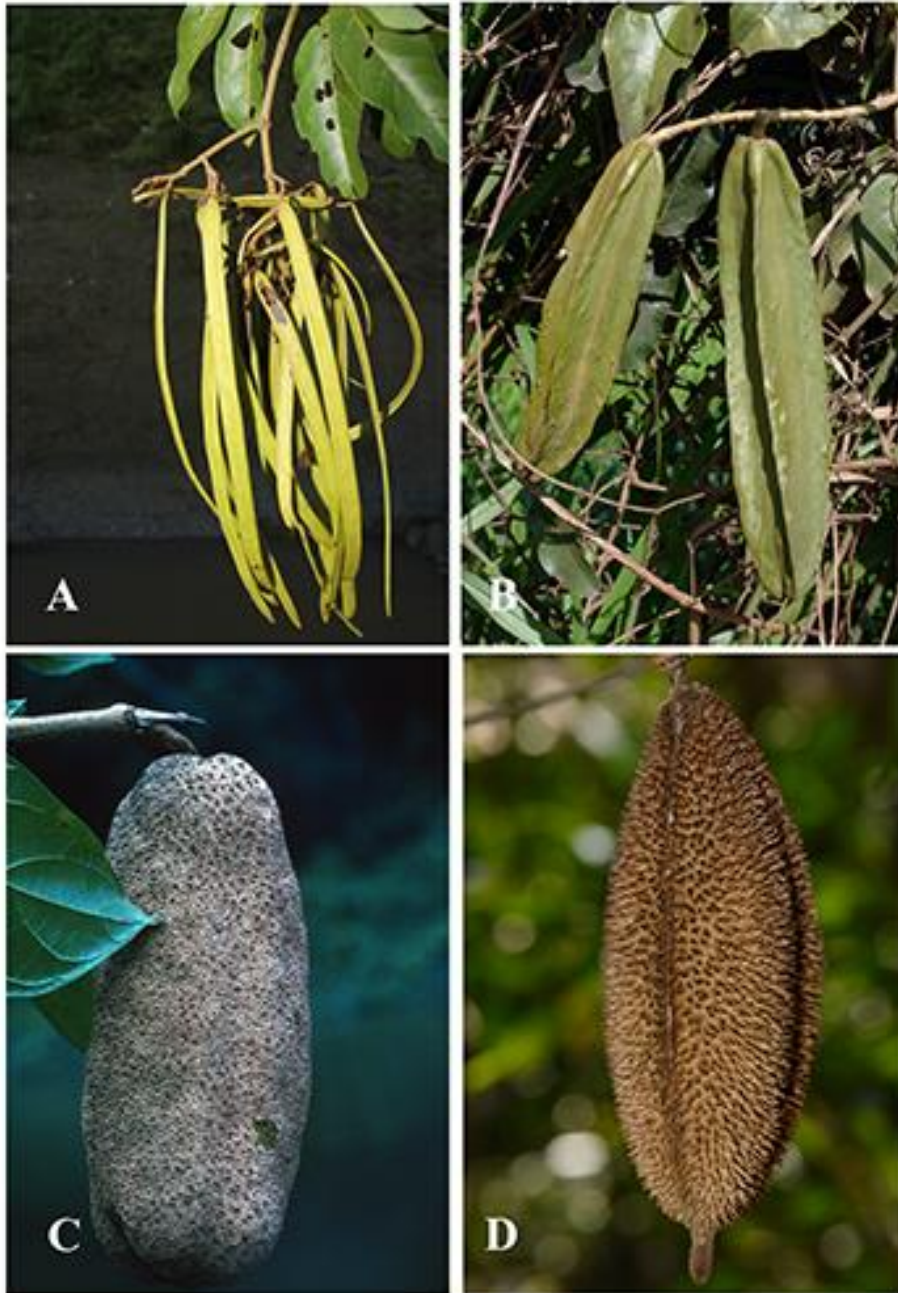


Figure 66. Fruits in climbing Bignoniaceae. **A.** *Fridericia florida* capsules flat, linear. **B.** *Adenocalymma bracteolatum*, capsule with 4 longitudinal ridges. **C.** *Bignonia nocturna*, capsule woody, lenticellate and subcylindrical. **D.** *Amphilophium crucigerum*, capsule echinate. Photos: A, C–D by P. Acevedo; B by R. Udulutsch.

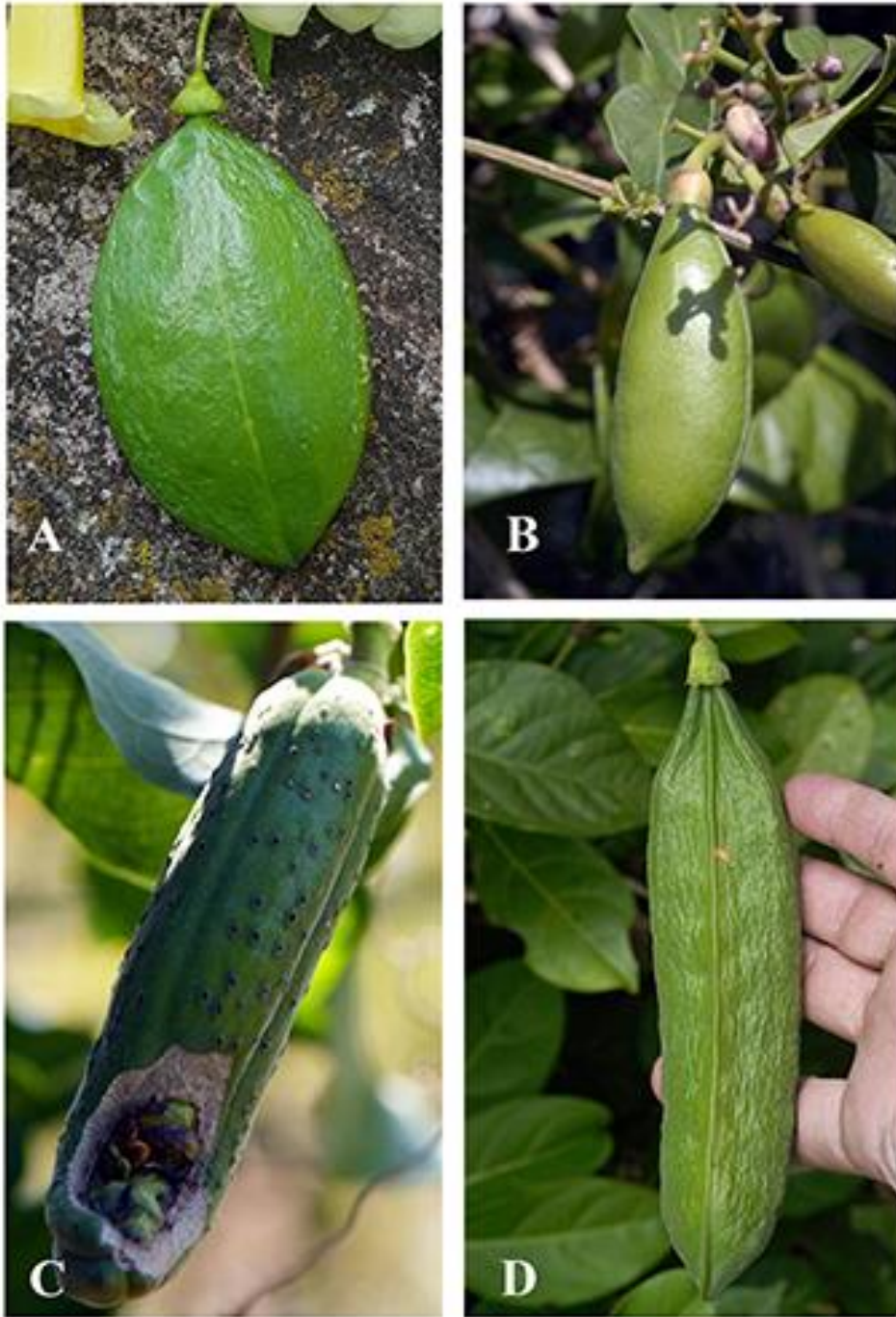


Figure 67. Fruits in climbing Bignoniaceae. **A.** *Anemopaegma chamberlaynii*, flat capsule. **B.** *Amphilophium lactiflorum*, septa with seed; smooth, glandless, short capsule. **C.** *Adenocalymma bracteatum*, with crateriform glands. **D.** *Tanaecium pyramidatum*, smooth with central ridge. Photos: A by R. Udulutsch; B–D by P. Acevedo.

Some species such as *Anemopaegma paraense*, *Cuspidaria inaequalis* (Splitg.) L.G. Lohmann and *Tanaecium dichotomum* (Jacq.) Kaehler & L.G. Lohmann are reported as used in indigenous religious rituals and superstitious activities. For example, in the Brazilian Xingú River area (*Balee* 2225, NY), *Stizophyllum riparium* (Kunth) Sandw. is applied to children's legs with the intention 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* Dugand, *T. bilabiatum* (Sprague) L.G. Lohmann and *Fridericia elegans* (Vell.) L.G. Lohmann 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* (K. Schum.) L.G. Lohmann and *A. cladotrichum* (Sandw.) L.G. Lohmann 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; stem 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	<i>Lundia</i>
12. Anthers glabrous	13
13. Corolla with nectary guides (line markings); ovary and fruit sessile; nectary disc absent	<i>Bignonia</i>
13. Corolla without nectary guides; ovary and fruit stipitate; nectary disc well-developed	<i>Anemopaegma</i>
14. Plants (stem and foliage) with clove or spicy smell when crushed	<i>Tynanthus</i>
14. Plants without smell.....	15
15. Tendrils multifid, often with adhesive discs; regular phloem with sclereids	<i>Manaosella</i>
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 <i>Adenocalymma</i>	
16. Petioles and petiolules not pulvinate, with or without glands but these never crateriform	17
17. Stems with hollow pith (fistulose)	<i>Stizophyllum</i>
17. Stems with solid pith	18
18. Anthers villous	<i>Lundia</i>
18. Anthers glabrous	19
19. Tendrils absent, simple or bifid	20
19. Tendrils trifid	25
20. Tendrils bifid	<i>Tanaecium</i>
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 24
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*.
 - d) Four phloem wedges always straight in mature stems, not widening through the production of lateral “steps” is known only from *Tanaecium* (Figure 56C).
 - 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* (Figure 56F) and *Tynanthus*.
 - f) Four phloem wedges and a hollow medulla a character restricted to *Stizophyllum* (Figure 56E).
 - g) Multiples of four phloem wedges in mature stems are present in *Adenocalymma*, *Amphilophium* (Figure 57C), *Anemopaegma*, *Bignonia*, *Lundia*, *Mansoa* (Figure 57D), 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* (Figure 57B; 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* (Figure 57E, 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 *Adenocalymma*, some *Bignonia*, *Eccremocarpus*, *Manaosella*, *Tourrettia*
 - d) Absent: *Campsis*, *Perianthomega*, *Podranea*.
7. Adventitious roots. Known in several species of *Dolichandra* (e.g., *D. quadrivalvis*, *D. steyermarii*, *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*.

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



Adenocalymma marginatum, photo by P. Acevedo.

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 (Figure 56B), 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 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; disc 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.



Figure 68. *Adenocalymna saulense*. **A.** Flowering branch. **B.** Node with persistent tendrils. **C.** Portion of inflorescence and detail of glands on calyx. **D.** Flower lateral view. **E.** Flower, longitudinal section of base & corolla. **F.** Stamens. **G.** Staminode with basal trichomes. **H.** Gynoecium with nectary disc at base, & detail of stigma. Drawing courtesy of Bobbi Angell.

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

Distribution: A neotropical genus of ~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



Amphilophium lactiflorum, photo by P. Acevedo.

included within the xylem (Figure 57B, C); interpetiolar zones not glandular; prophylls foliaceous, persistent or deciduous. Leaves usually 3-foliolate, with the terminal leaflet replaced by a trifold tendril, these sometimes bearing adhesive discs. Flowers produced in axillary or terminal thyrses or racemes,

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 exerted, 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 ~49 species, distributed from Mexico to northern Argentina, including the Antilles; in diverse habitats including humid forests, riparian forests, dry forests, 0–800 (2,470) m.

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

|Tendrilled lianas, sometimes shrubs, one species (*A. carajasense* A.H. Gentry ex Firetti-



Anemopaegma chamberlaynii, photo by R. G. Udulutsch.

Legg. & L.G. Lohmann) a scrambling shrub with no tendrils. 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 ~48 species, 43 of which are climbers, 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); *Potamogonos* Sandwith (1937); *Roentgenia* Urb. (1916); *Saritaea* Dugand (1945).

Tendrilled lianas, sometimes shrubs. Stems woody, cylindrical, irregularly angled, or



Bignonia sciuripabulum, photo by R. G. Udulutsch.

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 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 exerted, 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 ~31 species, distributed from United States to northern Argentina, 28 species found within the limits of the Neotropics; in diverse habitats including humid forests, riparian forests and dry forests; 0–1,200 (2,700) m.

CALLICHLAMYS Miquel, *Linnaea* 18: 254. 1845.

Tendrilled lianas, 5–10 m long. Stems woody, terete, glabrous; cross section of mature



Callichlamys latifolia, photo by P. Acevedo.

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 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 and dry forests; 50–1,000 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,

Campsis radicans, photo by P. Acevedo.

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.

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 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



Cuspidaria convoluta, photo by R.G. Udulutsch.

tetragonal; cross section of mature stems with 4 phloem wedges that are perfectly symmetrical (Figure 56F); 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 subinflated, 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.

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

Distribution: A neotropical genus with ~20 species, distributed from Mexico to Argentina, with most species found in Brazil; in diverse habitats including humid forests, riparian forests, and dry forests; 0–1,000 m.

DOLICHANDRA Chamisso, *Linnaea* 7: 657. 1832.

Doxandra Miers (1863); *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



Dolichandra unguis-cati, photo by P. Acevedo.

of mature stems with multiple phloem wedges interrupted by parenchyma tissue (Figure 57E, 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 uncinat

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

Distinctive features: Trifid and uncinat 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 (2,000) m.

ECCREMOCARPUS Ruiz & Pavón, Prodr. 90. 1794.

Tendrilled, herbaceous vines; stem cylindrical; cross sections with regular anatomy, but



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

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 3,200–3,700 m elevations in Colombia, Ecuador, and Peru; *E. scaber* occurs mainly from 1,000–1,800 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,



Fridericia craterophora, photo by P. Acevedo.

cylindrical or tetragonal; cross section of mature stems with 4 phloem wedges (Figure 56A, D); interpetiolar zones usually glandular; prophylls small and inconspicuous. 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* (DC.) L.G. Lohmann), 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 ~61 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



Lundia virginalis, photo by P. Acevedo.

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 (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; nectary disc inconspicuous or 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; nectary disc 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



Manaosella cordifolia, photo by R.G. Udulutsch.

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.

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



Mansoa hirsuta, photo by P. Acevedo.

smell; cross section of mature stem with multiples of four phloem wedges (Figure 57D); interpetiolar zones glandular or not; prophylls minute and triangular. 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 fascicles (*M. parvifolia* (A. H. Gentry) A. H. Gentry). 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 uncinata, 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



Martinella obovata, photo by R. Aguilar.

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.

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 forests and rainforests; 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



Pachyptera kerere, photo by P. Acevedo.

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.

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. Leaves biternate, lacking tendrils; petioles elongated, prehensile (twining) and becoming woody.

Perianthomega vellozoi, photo by P. Acevedo.

Flowers produced in axillary or terminal

racemes. Calyx cupular, campanulate, 5-keeled, 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 (Espírito 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,



Pleonotoma melioides, photo by P. Acevedo.

and detaching with age; cross section of mature stems with 4 straight phloem wedges that are opposed to the stem wings (Figure 57A); 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.

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

Distribution: A neotropical genus of ~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



Podranea ricasoliana, photo by P. Acevedo.

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

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 including Mexico, El Salvador, Guatemala, Costa Rica Colombia, Ecuador Brazil, and the Antilles (Jamaica, Dominican Republic, Puerto Rico, Virgin Islands, and Lesser Antilles) and is 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



Pyrostegia venusta, photo by P. Acevedo.

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.

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



Stizophyllum perforatum, photo by R.G. Udulutsch.

stems with 4 phloem wedges (Figure 56E); interpetiolar zones without glands or ridges; prophylls foliaceous or inconspicuous, early deciduous, without glands. 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 that are always straight (not widening through the



Tanaecium pyramidatum, photo by P. Acevedo.

production of lateral steps, Figure 56C) (except for the treelet *T. tetramerum* (A.H. Gentry) Zuntini & L.G. Lohmann which lacks 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.

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

Distribution: A neotropical genus of 22 species, 20 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.

TOURETTIA Fougereux, 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;



Tourrettia lappacea, photo by B. Hammel.

cross section with regular anatomy but older stems developing 4 phloem wedges at the base. Leaves 2–3-ternate, often with a trifold, 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 uncinata spine-like projections; seeds suborbicular, with narrow and hyaline membranous wings.

Distinctive features: Inflorescence with upper flowers sterile; corolla shorter than the calyx; ovary 4-locular; fruit densely echinate with uncinata spine-like projections.

Distribution: A neotropical genus of a single species (*T. lappacea*) distributed in the mountains from southern Mexico to Argentina; 1,500–2,600 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



Tynanthus polyanthus, photo by P. Acevedo.

or spicy smell; cross section of mature stems with 4 phloem wedges that are perfectly symmetrical; interpetiolar glands absent or present, interpetiolar ridge absent or present; prophylls absent or foliaceous, early caducous, without glands. Leaves usually 3-foliate, 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 subexserted, 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



Xylophragma myrianthum, photo by P. Acevedo.

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.

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 forest, riparian forest, and dry forest; 5–500 m.