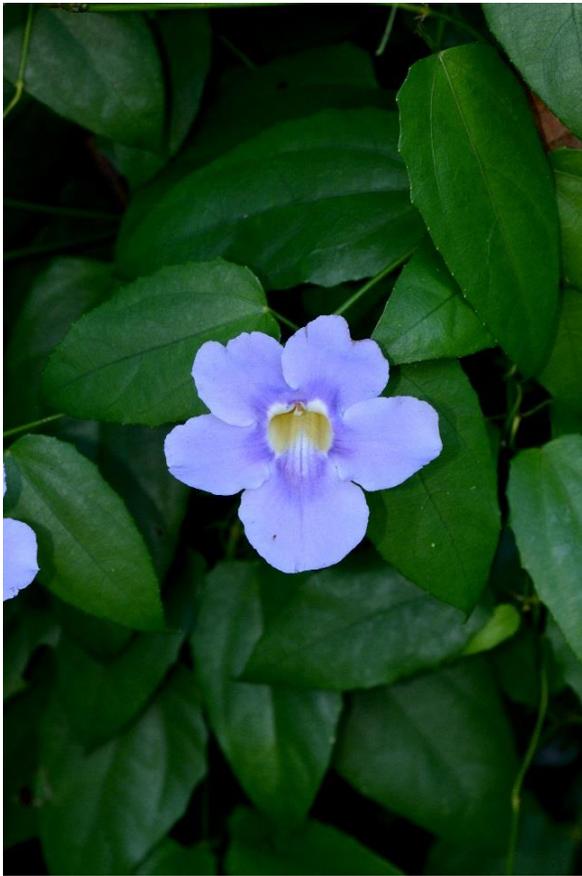


GUIDE TO THE GENERA OF LIANAS AND CLIMBING PLANTS IN THE NEOTROPICS

ACANTHACEAE

By Pedro Acevedo-Rodríguez (16 Jun 2017)



A predominantly pantropical family, extending to temperate regions, mostly of herbs or shrubs, sometimes twining vines or lianas, and less often scandent herbs or shrubs, or small trees. Twining vines and lianas in the Neotropics are restricted to the genera *Mendoncia* and *Thunbergia*, and some *Ruellia*. *Mendoncia*, and *Ruellia* are native to the Neotropics, while *Thunbergia* although naturalized in the Neotropics, is native to the Old World. Species with scandent habit occur in *Aphelandra*, *Asystasia*, *Dasytropis*, *Justicia*, *Neriacanthus*, *Odontonema*, *Oplonia*, *Ruellia*, and *Thyrsacanthus*. However, some of these species sometimes have erect habit. The family is represented in the Neotropics by about 2,000 species, 100 of which are lianas or climbers, most of which (65) belong to the genus *Mendoncia*.

Diagnosics: Leaves opposite, simple, entire, and exstipulate, usually with linear epidermal cystoliths; *Mendoncia* has stems with dispersed xylem (fig. 2a-b).

General Characters

1. **STEMS.** In herbaceous species, stems are cylindrical or quadrangular, weak, and ≤ 5 mm in diameter, reaching 2-5 m in length, with regular anatomy; in lianas stems are cylindrical, 1-4 cm in diameter, reaching up to 30 m in length in some species. Some *Mendoncia* are known to have dispersed xylem (fig. 2a-b) and some species of *Thunbergia* have interxylary phloem strands of different sizes, in *T. grandiflora* (Rottl.) Roxb. these are contiguous to the rays and difficult to see (fig. 2c-d).
2. **EXUDATES.** Exudates are odorless and colorless, inconspicuous in all genera.
3. **CLIMBING MECHANISM.** Lianas and vines are twiners, climbing shrubs are scandent (fig. 1).
4. **LEAVES.** Leaves are opposite and simple, petiolate, and exstipulate. Epidermal cystoliths occur in most genera but they are lacking in *Mendoncia* and *Thunbergia*.
5. **INFLORESCENCES.** Flowers are solitary or in hanging or ascending, axillary or distal, cymes, racemes or panicles. Inflorescences are never cauliflorous.
6. **PEDICELS.** Pedicels are long and robust in *Mendoncia* and *Thunbergia* but short and mostly slender in other genera.



Figure 1. *Ruellia inflata* Rich. Showing scandent habit with weak, cylindrical stems. Photo by P. Acevedo.

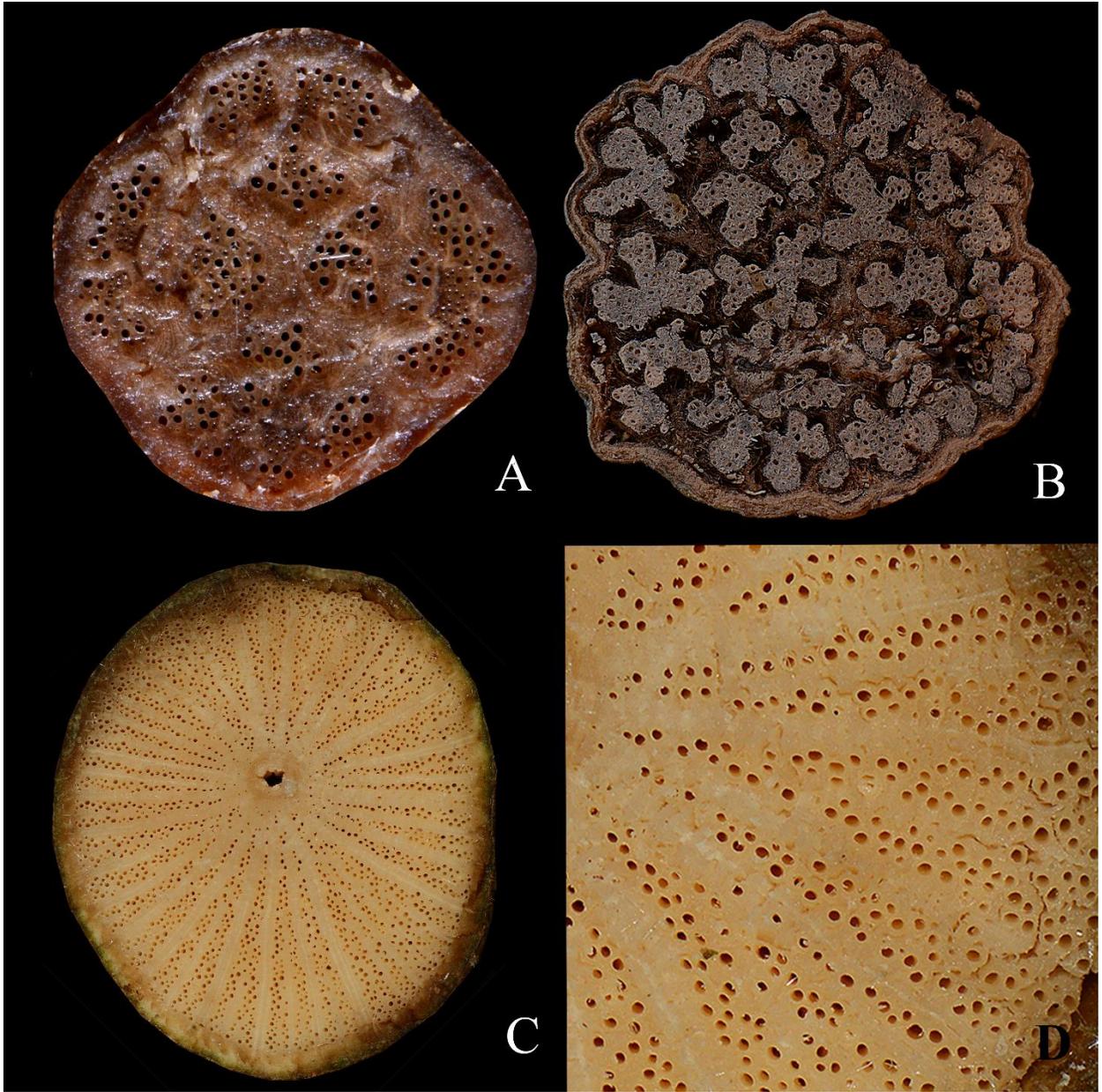


Figure 2. Cross section of stems. **A.** *Mendoncia sp.*, young, quadrangular stem with dispersed xylem. **B.** *Mendoncia hoffmannseggiana* Nees. **C-D.** *Thunbergia grandiflora* with interxylary phloem adjacent to ray cells. Photos by P. Acevedo.

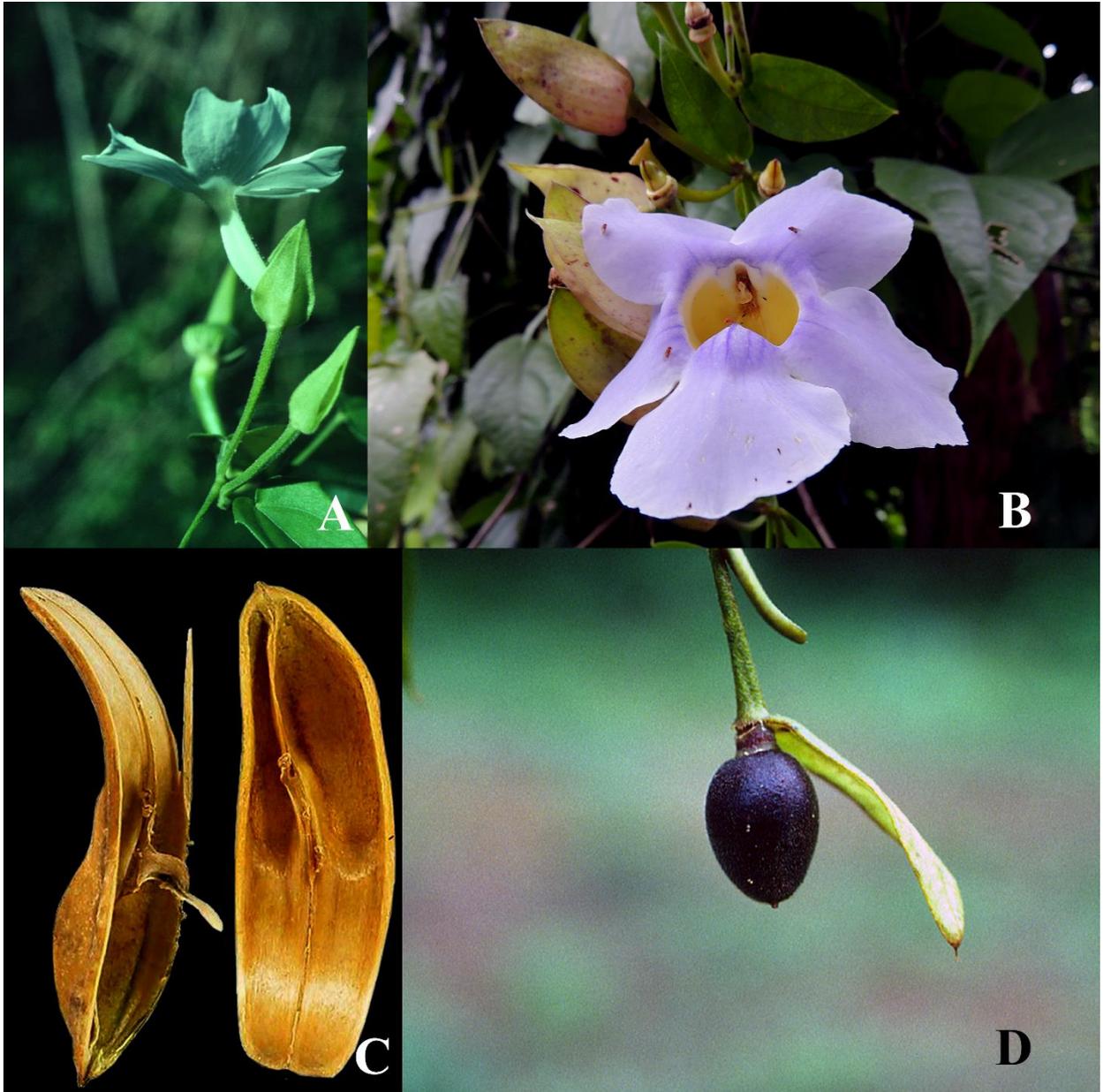


Figure 3. **A.** *Thunbergia fragrans* Roxb. Flower with large bracteoles at base. **B.** *Thunbergia grandiflora* showing flower buds covered by large bracteoles. **C.** Capsule valves showing typical hook-like placental tissue (*Justicia* sp.). **D.** *Mendoncia hoffmannseggiana* showing a drupaceous fruit, subtended by a persistent bracteole.

Photos A,B, D: by P. Acevedo; C: from STRI.

7. FLOWERS. Flowers bisexual, zygomorphic; calyx of 4-5, equal or unequal sepals, conspicuous or inconspicuous; corolla funnel-shaped, tubular, or salverform, 5-lobed or bilabiate; stamens 4 (all equal or 2 shorter) or 2, adnate to the corolla tube, anthers lanceolate or ellipsoid, opening by longitudinal slits; ovary superior, 2-locular, syncarpous, bicarpellate, usually subtended by a more or less cupular nectary disk, style long, filiform, stigma simple or branched; ovules numerous, with axile placentation.
8. FRUITS. Fruit capsular, opening by longitudinal valves, placental tissue usually hook-like and persistent after capsule dehisces (fig. 3c), or a fleshy drupe in *Mendoncia* (fig. 3d, 4d-e)

Key to the genera of climbing Acanthaceae

1. Twining vines, herbaceous to woody; bracteoles spathe-like, covering the calyx and much of the corolla tube; calyx cupuliform or with minute teeth..... 2
1. Scandent herbs or shrubs (seldom twining); bracteoles small, not covering the corolla; calyx with elongated, well-developed sepals 3
2. Corolla trumpet-shaped, straight or arcuate; fruit drupaceous, ellipsoid (C. & S. America) *Mendoncia*
2. Corolla funnel-shaped, arcuate; fruit a dry capsule, globose at base and abruptly beaked towards apex (4 species naturalized in the Neotropics)..... *Thunbergia*
3. Plants with axillary spines (West Indies)..... *Oplonia*
3. Plants without axillary spines4
4. Corollas funnel-or trumpet-shaped 5
4. Corollas tubular, bilabiate 7
5. Stamens exserted; stigma bifid (Mexico, C. & S. America)..... *Ruellia*
5. Stamens not exserted; stigma punctiform 6

6. Corolla pale violet, pink, white, or pale yellow, limb ca. 2.5 cm wide (invasive in the Neotropics)	<i>Asystasia</i>
6. Corolla red, limb ca. 1 cm wide (Colombia)	<i>Odontonema</i>
7. Stems hexagonal;	<i>Dasytropis</i>
7. Stems terete or quadrangular	8
8. Stamens 4; inflorescence flattened, with overlapping, usually colored bracts	9
8. Stamens 2; inflorescences otherwise	10
9. Stamens exserted; anthers 2-thealous (S. America).....	<i>Aphelandra</i>
9. Stamens not exserted; anthers 1-thealous (S. America).....	<i>Neriacanthus</i>
10. Calyx 5-lobed (S. America)	<i>Thysacanthu</i>
10. Calyx 4-lobed (Mexico, C. & S. America)	<i>Justicia</i>

GENERIC DESCRIPTIONS

APHELANDRA R. Brown, Prodr. 475. 1810.

Erect herbs, shrubs or small trees, exceptionally scandent shrubs. Leaves opposite; blades simple, entire to dentate, with linear cystoliths on the upper surface, secondary veins conspicuous; stipules absent. Inflorescences of distal or axillary spikes, with showy bracts. Calyx of 5, lanceolate sepals of unequal size; corolla nearly actinomorphic to bilabiate, red, crimson, or straw-colored, lower lip reflexed; stamens 4, of equal length, exserted but not exceeding the upper lip of the corolla; ovary superior, bicarpellate, bilocular, stigma simple, sub-capitate. Capsules claviform to subglobose; seeds 4, rounded.

Distinctive features: Showy, flat inflorescences with overlapping, large bracts.

Distribution: A genus of about 175 species from Mexico to Bolivia. The only scandent species, *A. tomentosa* Lind. is endemic to Venezuela, and can reach up to 10 m in length.

ASYSTASIA Blume, Bijdr. 796. 1826.



Asystasia gangetica (photo: P. Acevedo)

Erect, decumbent, or scandent herbs.

Leaves opposite; blades simple, with numerous linear cystoliths on the upper surface, the secondary veins conspicuous; stipules absent. Flowers bisexual, zygomorphic, arranged in spikes or one-sided, terminal racemes, accompanied at

the base by 2 small bracts and 2 bracteoles. Calyx of 5 linear or lanceolate sepals of equal size; corolla zygomorphic, pale violet, pink, white, or pale yellow, funnel-shaped, with 5 rounded lobes; stamens 4, didynamous; ovary superior, bicarpellate, bilocular, the stigmas bilobed or capitate. Capsules ellipsoid or claviform; seeds 2-4, lenticular.

Distinctive features: Scandent herb with weak stems swollen at nodes and cordate leaves.

Distribution: A genus of about 40 species of Paleotropical origin. *Asystasia gangetica* (L.) T. Anders., a scandent herb, is the only species in this genus that is widely cultivated, naturalized and invasive in Central America, the West Indies, and parts of South America (Bolivia, Brazil (Rio de Janeiro), Colombia, Guyana, Peru, and Venezuela).

DASYTROPIS Urban, Repert. Spec. Nov. Regni Veg. 20: 310. 1924.

Scandent shrubs. Leaves opposite; blades entire, with numerous linear cystoliths on both surfaces; stipules absent. Flowers bisexual, arranged in distal panicles, accompanied at the base by 2 small bracteoles. Calyx of 5 linear-lanceolate sepals of equal size; corolla straight, bilabiate, pale green-white; stamens 2, exserted but not exceeding the upper lip of the corolla; staminodes wanting; ovary superior, bicarpellate, stigmas slightly bilobed. Capsules claviform; seeds 4, lenticular, glabrous.

Distinctive features: Small, chartaceous, ovate leaves.

Distribution: A single species (*D. fragilis* Urb.) endemic to Sierra de Nipe in Eastern Cuba.

JUSTICIA Linnaeus, Sp. Pl. 636. 1753.

Herbs or shrubs, erect or decumbent, rarely scandent shrubs; stems terete to nearly quadrangular. Leaves opposite; blades entire to crenate, with cystoliths; stipules absent. Flowers bisexual, zygomorphic, arranged in distal or axillar spikes, racemes, panicles, or thyrses accompanied at the base by 2 small bracteoles. Calyx of 4-5 sepals of equal size; corolla straight or curved, bilabiate, pale greenish, white; pink, red or purple, lower lip usually with markings; stamens 2, exserted; staminodes wanting; ovary superior, bicarpellate, stigmas simple to bilobed. Capsules claviform; seeds 2-4, spherical to discoid, sometimes reniform.

Distinctive features: Corolla elongated, strongly bilabiate.

Distribution: A cosmopolitan genus with about 600 species of shrubs or herbs, with about 490 species in the Neotropics. The following 13 species are consistently reported as scandent shrubs

that can reach 3 to 4 m in length: *Justicia anabasa* Leonard (Colombia), *J. cydoniifolia* (Nees) Lindau (Brazil), *J. fuchsifolia* Leonard (Colombia), *J. graciliflora* (Standl.) D. N. Gibson (Panama), *J. kirkbridei* Wassh. (Colombia), *J. megalantha* Wassh. & J.R.I. Wood (Bolivia, Peru), *J. monopleurantha* (Lindau) Wassh. (Bolivia, Peru), *J. nicaraguensis* Durkee (Nicaragua), *J. pyrhostachya* (Lindau) Wassh. (Brazil, Peru), *J. sarapiquensis* McDade (Costa Rica), *J. scansilis* (Rizzini) V. Graham (Brazil, Peru), *J. schomburgkiana* (Nees) V. Graham (Guianas, Venezuela), *J. spicigera* Schltld. (Mexico, Nicaragua, Panama).

MENDONCIA Vandelli, Fl. Lusit. Brasil. 43. 1788.

By Dieter C. Wasshausen

Herbaceous or woody twining vines; stems articulated and usually quadrangular (fig. 2a) when young, turning terete with age; at least some species with dispersed xylem (*M. hoffmannseggiana* Nees, *M. velloziana* Mart., *M. sp.*; fig. 2a-b). Leaves opposite; blades simple, lacking cystoliths; stipules absent. Flowers bisexual, zygomorphic, axillary, usually solitary, with long pedicels and a pair of flat or keeled, foliaceous bracteoles, partly connivent or connate, often covering most of the corolla tube. Calyx short, annular, cupuliform, truncate, irregularly dentate, or lobed; corolla large and showy, white, red, or greenish, often with purplish markings within, hypocrateriform, with a cylindrical to funnel-shaped tube, 5-lobed (fig. 4c), sometimes 2-lipped (fig. 4b); stamens didynamous, included, staminodes if present 1; nectary disc cupular, ovary superior, bicarpellate, bilocular or unilocular by reduction. Fruits a drupe, ovoid, ellipsoid or oblong, with fleshy mesocarp and bony endocarp (fig. 4d-e); seeds 1 or 2 per fruit.



Figure 4. **A.** *Mendoncia hoffmannseggiana*, corolla partly covered by elongated bracteoles. **B.** *Mendoncia sp.*, large, ovate bracteoles. **C.** *M. cordata* Leonard. **D.** *M. hoffmannseggiana*, drupe subtended by large persistent bracteoles. **E.** *M. cordata*, purple fleshy drupe. Photos by P. Acevedo.

Distinctive features: Twiners, stems with dispersed xylem (fig. 2a-b); flowers with a pair of foliaceous bracteoles covering most of the corolla (fig 4a-c); calyx minute; fruit a drupe with fleshy pericarp (fig. 4d-e).

Distribution: Approximately 90 species in tropical America and Africa, 65 of which occur from Mexico to Bolivia. The richest region appears to be Colombia where between 35 and 40 species have been described.

NERIACANTHUS Bentham in Bentham and J. D. Hooker, Gen. 2: 1096. 1876.

Erect herbs, erect or scandent shrubs; stems in woody species terete, < 1 cm in diam.

Leaves opposite; blades entire to undulate, with no cystoliths; stipules absent. Flowers bisexual, nearly actinomorphic, arranged in distal or axillar spikes bearing imbricate, entire, whitish or pinkish bracts; bracteoles minute, shorter than the calyx. Calyx of 5 lanceolate, free sepals; corolla straight, bilabiate; stamens 4, not exserted; staminodes filiform, anthers slender 1-thecous; ovary superior, bicarpellate, stigmas bilobed. Capsules clavate; seeds 4, sub-rounded.

Distinctive features: Recognized by its decussate greenish to lavender overlapping bracts; and anthers with a single theca.

Distribution: A South American genus with about five species. *Neriacanthus nitidus* Leonard, a Venezuelan endemic, is the only species reported as a scandent shrub.

ODONTONEMA Nees, Linnaea 16: 300. 1842 (nom. cons.).

Erect herbs, or shrubs, with a single scandent species. Leaves opposite; blades simple, entire to crenate, with linear cystoliths; stipules absent. Inflorescences of distal spikes, racemes or thyrses with flowers in alternate, opposite or whorled dichasia, with inconspicuous bracts. Calyx of 5, subulate to lanceolate, sepals of equal size; corolla nearly actinomorphic to bilabiate,

red; stamens 2, not exerted, staminodes 2; ovary superior, bicarpellate, bilocular, stigma simple, sub-capitate. Capsules stipitate, obovoid, usually constricted at the middle; seeds 4, lenticular, glabrous.

Distinctive features: Showy, red corollas on long spicate inflorescences with minute bracts.

Distribution: A genus of about 29 species from Mexico to Bolivia. The only scandent species, *O. ampelocaula* Leonard, is endemic to Colombia and can reach 3-4 m in length.

OPLONIA Rafinesque, Fl. Tell. 4: 64. 1838.



Oplonia microphylla (photo: P. Acevedo)

Erect or clambering shrubs, usually with opposite, axillary spines. Leaves opposite, small, with linear cystoliths on upper surface, short-petioled or sessile, secondary veins inconspicuous; stipules absent. Flowers bisexual, zygomorphic, heterostylous, axillary, solitary or in

short, condensed racemes; calyx of 5 acicular sepals; corolla funnel-shaped, zygomorphic, with 5 lobes, one of them wider than the others; stamens 2, inserted or exerted; ovary superior, bicarpellate, bilocular, style filiform, stigma bilobed. Fruit capsular, claviform; seeds 2 or 4, lenticular.

Distinctive features: Leaves small or minute, with numerous cystoliths; plant with axillary opposite spines.

Distribution: A genus of about 18 species, 12 native to the West Indies, one to northern Peru, and 5 to Madagascar; often found in dry or coastal forest or scrubs on limestone or sandy substrate. The following five species are consistently reported as scandent or climbing shrubs that can reach 2-4 m in length: *Oplonia armata* (Sw.) Stearn (Jamaica), *O. jamaicensis* (Lindau) Stearn (Jamaica), *O. microphylla* (Lam.) Stearn (West Indies), *O. spinosa* (Jacq.) Raf. (West Indies), and *O. tetrasticha* (Griseb.) Stearn (Cuba).

RUELLIA Linnaeus, Sp. Pl. 634. 1753.



Ruellia inflata (photo: P. Acevedo)

Herbs, subshrubs or shrubs, sometimes scandent shrubs or vines. Leaves with numerous, transversely oriented cystoliths, entire to repand-crenulate at margins. Flowers solitary or in axillary or terminal spikes, racemes or panicles; calyx with 5 linear

sepals, deeply cleft to the base; corolla red, yellow, white, or mauve, funnel-shaped or salverform, sometimes saccate; stamens 4, didynamous; stigma with 2 unequal lobes. Capsule oblong or club-shaped; seeds 8-32 (or more numerous) per capsule, lenticular.

Distinctive features: Flowers > 2.5 cm long, red or white, saccate or funnel-shaped.

Distribution: Approximately 250 species with pantropical distribution, 230 of which occur in the Neotropics. The following 4 species are consistently reported as scandent shrubs or vines that can reach 3-5 m in length: *Ruellia beckii* Wassh. & J.R.I. Wood (Bolivia), *R. inflata* Rich. (Bolivia, Brazil, Guianas, Peru), *R. sprucei* Lindau (Brazil (AM) and Colombia), and *R. steyermarkii* Wassh. (Venezuela).

SAPPHOA Urban, Repert. Spec. Nov. Regni Veg. 18: 24. 1922.

Scandent shrubs. Leaves opposite; blades simple, with numerous cystoliths; stipules absent. Flowers bisexual, actinomorphic, with long pedicels, produced in axillary clusters; calyx with 5 linear sepals, deeply cleft to the base; corolla short, cupuliform, truncate or dentate; corolla blue, regular, funnel-shaped, limb with 5 equal lobes; stamens 2, not exerted, borne on upper half of tube; staminodes 2; ovary superior, bicarpellate, style elongated; stigma 2-lobed. Fruits capsular, sessile, oblong, 4-seeded.

Distinctive features: Small leaves; corolla blue, ca. 1.5 cm long, actinomorphic, with 2 stamens and 2 staminodes.

Distribution: Endemic to eastern Cuba, with 1 or 2 species.

THUNBERGIA Retzius, *Physiogr. Sälsk. Handl.* 1(3): 163. 1780 ['1776'] (nom. cons.).



Thunbergia fragrans (photo: P. Acevedo)

Herbaceous or woody twining vines or less frequently erect shrubs. Leaves opposite; blades simple, undulate to shallowly lobed, lacking cystoliths; stipules absent. Flowers bisexual, zygomorphic, axillary, usually solitary or in short racemes, with long pedicels and a pair of foliaceous bracteoles covering the lower portion of the corolla. Calyx short, cupuliform, truncate or dentate; corolla funnel-shaped or hypocrateriform, large and showy, regular or irregular; stamens didynamous; ovary superior, bicarpellate, bilocular. Fruits capsular, globose at the base, with the apex in the form of a beak; seeds subglobose.

Distinctive features: Relatively large flowers, subtended by two large foliaceous bracteoles; fruit capsular.

Distribution: Approximately 200 species from the Paleotropics. The herbaceous vines, *T. alata* Sims and *T. fragrans* Roxb. and the liana *T. grandiflora* Roxb.) are naturalized through most of the Neotropics.

THYRSACANTHUS Moric., Pl. Nouv. Amer. 9: 165. 1847.

Erect, densely branched shrubs, scandent shrubs or less often vines; stems terete, < 1 cm

diam, with regular anatomy. Leaves opposite,

blades with numerous, minute cystoliths, short-

petioled or sessile. Flowers bisexual,

zygomorphic, in secund spikes or thyrses; calyx of

5 deeply lobed, lanceolate sepals; corolla red,

funnel-shaped, zygomorphic, bilabiate, upper lip

entire or 2-lobed, lower lip 3-lobed; stamens 2,

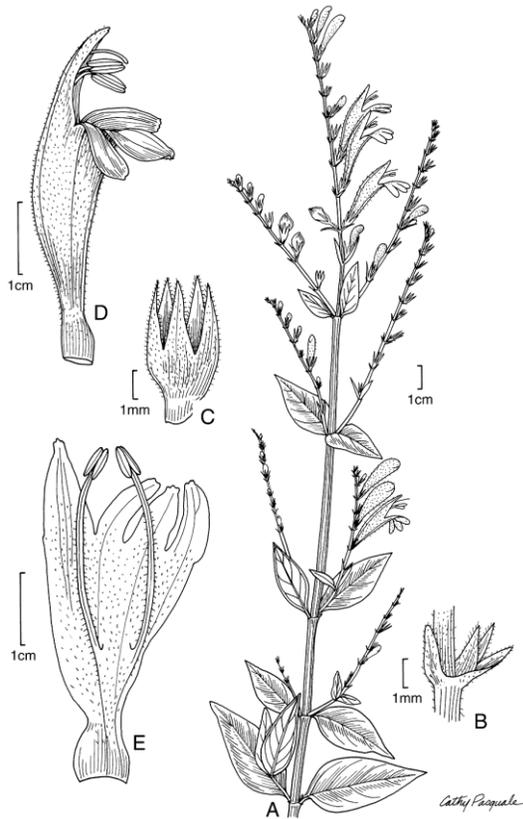
exserted; staminodes wanting; ovary superior,

bicarpellate, bilocular, the style filiform, stigma

bilobed. Fruit capsular, ovoid, stipitate; seeds 2 or

4, lenticular, sparsely tuberculate, rugulose, or

smooth.



Thyrsacanthus ramosissimus

Distinctive features: Red, slightly curved, funnel-shaped corollas; leaves with numerous cystoliths.

Distribution: A genus of 5 to 7 species, native to South America. The following two species are consistently reported as scandent or climbing shrubs which can reach 5 m in length:

Thyrsacanthus secundus (Leonard) A. Côrtes & Rapini, (Brazil, Suriname, Guyana, French Guiana, Venezuela) and *T. ramosissimus* Moric. (North-eastern Brazil).

RELEVANT LITERATURE

- Côrtes, A.L., Borges, R.L.E. & Rapini A. 2010. Reinstatement of *Thyrsacanthus* Moric. (Acanthaceae) and taxonomic novelties in the genus. *Taxon* 59(3): 965-972.
- Daniel, T.F. 1992. Acanthaceae: Mendoncioideae of Mexico. *Acta Botánica Mexicana* 17:53-60.
- Durkee, L.H. 1978. Flora of Panama, Family 177. Acanthaceae. *Ann. Missouri Bot. Gard.* 65:155-283.
- Durkee, L.H. 1986. Flora Costaricensis, Family 200, Acanthaceae. *Fieldiana, Bot.* 18:1-92
- León, H. & H. Alain. 1957. Flora de Cuba. Vol 2 (4). Habana, Cuba.
- Leonard, E.C. 1951. The Acanthaceae of Colombia. *Contr. U.S. Natl. Herb.* 31:1-117.
- Magnaghi, E.M., and T.F. Daniel. 2017. Systematics of Mendoncia (Acanthaceae: Thunbergioideae) in the Paleotropics. *Proc. Calif. Acad. Sci, ser. 4,* 64:37-94.
- Mennega, A.M.W. 2006. Mendonciaceae. Wood Anatomy Characteristics. *Flora of the Guianas* 159:159 – 161.
- Nees von Esenbeck, C.G., 1847. Acanthaceae. Pages 46-519 in Alph. de Candolle, ed., *Prodromus Systematis Naturalis Regni Vegetabilis.* Victoris Masson, Paris, France.
- Profice, S.R. 1988. Mendoncia Vell. ex Vand. (Acanthaceae) espécies ocorrentes no Brasil. *Arq. Jard. Bot. Rio de Janeiro* 29:201- 279.
- Turrill, W. 1919. A revision of the genus Mendoncia. *Bull. Misc. Inform.* 1919: 407-425.
- Wasshausen, D.C. 1989. New species of Mendoncia (Acanthaceae) from the Venezuelan Guayana. *Ann. Missouri Bot. Gard.* 76: 1118-1124.
- Wasshausen, D.C. 1993. Acanthaceae. Catalogue of the flowering plants and gymnosperms of Peru, Monog. Syst. Bot. Missouri Bot. Gard. 45:9-10.

Wasshausen, D.C., and J.R.I. Wood. 2004. Acanthaceae of Bolivia. *Contr. U.S. Natl. Herb.* 49:1-152.

Wasshausen, D.C. 2006. Mendonciaceae. *Flora of the Guianas* 159: 142-151.

Wasshausen, D.C. 2013. Acanthaceae. *Flora of Ecuador* 89: 3-325. Wasshausen, D.C. 2013.

Acanthaceae. In: C. Persson & B. Stahl (edts.) *Flora of Ecuador*. 89: 1-328.