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

EUPHORBIACEAE

By Pedro Acevedo-Rodríguez, Kenneth J. Wurdack & Ramona Oviedo (Oct 2020)

Dalechampia sp., photo by P. Acevedo

A pantropical family extending into the temperate zone, with about 230 genera and over 6000 species of herbs, shrubs, trees, vines, and lianas. Climbers are represented in the Neotropics by 12 genera and about 170 species that occur in a wide range of habitats, including moist, wet or dry forests, scrublands, savannas, and open disturbed biomes but most diverse below 1500 m of elevation. Recent phylogenetic analyses have indicated 3 more climbing segregate genera from *Tragia* (in addition to recently resurrected *Bia* and *Zuckertia*) are warranted for aberrant Neotropical species.

Diagnostics: Recognized by their alternate, stipulate, simple, lobed to compound leaves, usually with serrate or serrulate margins and very often with a pair of glands or stipels at the base of the blade. For the most part climbing Euphorbiaceae are twiners and less often scrambling shrubs. Their exudate can be milky (*Dalembertia, Euphorbia, Mabea,* and *Manihot*) orange to reddish (*Croton, Omphalea*), or clear (*Dalechampia*). Plants are monoecious with pistillate and staminate flowers on the same or separate inflorescences. A few genera, such as closely related *Dalechampia*, *Platygyna* and *Tragia* (and its segregates) are distinguished by the presence of

stinging hairs. Some climbing Euphorbiaceae may be confused with members of Fabaceae, but they are easily distinguished from the latter by the presence of glands either distal on petioles or on the basal portion of leaf blades and by the unisexual flowers.

General Characters

1. STEMS. Stems are woody or herbaceous depending on the genus. Woody, mature stems, soft and pliable, and are known to reach up to 15 cm in diameter and 20 m in length for canopy lianas (e.g., *Omphalea, Plukenetia*). Stems are cylindrical or less often slightly asymmetrial or groved. Most genera have have ***regular*** wood anatomy (fig. 1a,b), sometimes with shalow ***phloem wedges*** or wide ray tissue. Older individuals of *Dalechampia* (fig. 1d) are known to produce ***neoformed vascular cylinders***, i.e., the formation of novel vascular cylinders outside the original vascular cylinder after prolonged secondary growth. ***Successive cambia***, that give rise to successive concentric bands of xylem and phloem are known in *Plukenetia* (fig. 1c).

2. EXUDATES. Exudates can be watery and colorless. However, in *Dalembertia*, *Euphorbia*, *Mabea*, and *Manihot* the exudates are white, while in *Omphalea* it is usually reddish (to pink), and *Croton* is typically orange.

3. CLIMBING MECHANISMS. Most climbers in Euphorbiaceae are ***twiners*** (i.e., *Bia, Dalechampia, Omphalea, Platygyna, Plukenetia, Romanoa, Tragia* and *Zuckertia*); the remaining genera (i.e., *Acidocroton*, *Croton*, *Euphorbia, Mabea,* and *Manihot*) are ***scramblers*** that climb by growing over the surrounding vegetation. *Omphalea diandra* L. is known to produce ***tendril-like stems***, i.e., short, sympodial twining stems (fig. 2a).

4. LEAVES. Leaves in Neotropical climbing Euphorbiaceae are alternate in arrangement, and simple, lobed, trifoliolate or palmately compound (fig. 3a-d). Many genera present a pair of swollen or projecting glands or stipels at the lamina base (fig. 2c & 3a-b), as well as flat glands in the leaf blade (usually on the abaxial surface). Petioles are long to short, pulvinate a base, and in some genera (e.g., *Coton*, *Omphalea*) they bear a pair of prominent glands on the distal portion.

5. STIPULES AND STIPELS. Stipules are persistent or caducous, and of various sizes and shapes, but mostly small. Stipels are present in some *Dalechampia* and *Plukenetia*.

6. INFLORESCENCES. Inflorescences of axillary cymes, spikes, racemes (fig. 4a) or pseudanthia in *Dalechampia* and *Euphorbia* (fig. 4b); spikes and racemes usually contain numerous staminate flowers clustered in cymules with 1-many pistillate flowers at the inflorescence base (fig. 4a).

7. FLOWERS. Unisexual and actinomorphic; perianth 3-6-merous or lacking; sepals valvate; petals 2-6 or absent, free; stamens 2 to many (sometimes reduced to 1), the filaments distinct or variously united, anthers opening by longitudinal slits; nectary disk intrastaminal, extrastaminal or wanting; ovary superior, (2-)3(-many)-carpellate, ovules 1 per locule with apical-axile attachment, the styles distinct or connate, stigmas free with lobes or branches, or united (punctate).

8. FRUITS. Typically an explosively dehiscent, schizocarpous capsule (fig. 5c), or less often inhiscent or tardily dehiscent (fig. 5a,b); seeds 1 per locule.

9. SEEDS. Seeds are quite variable in shape, size, texture, and color, some diagnostic at the generic level, and often with an aril (caruncle)

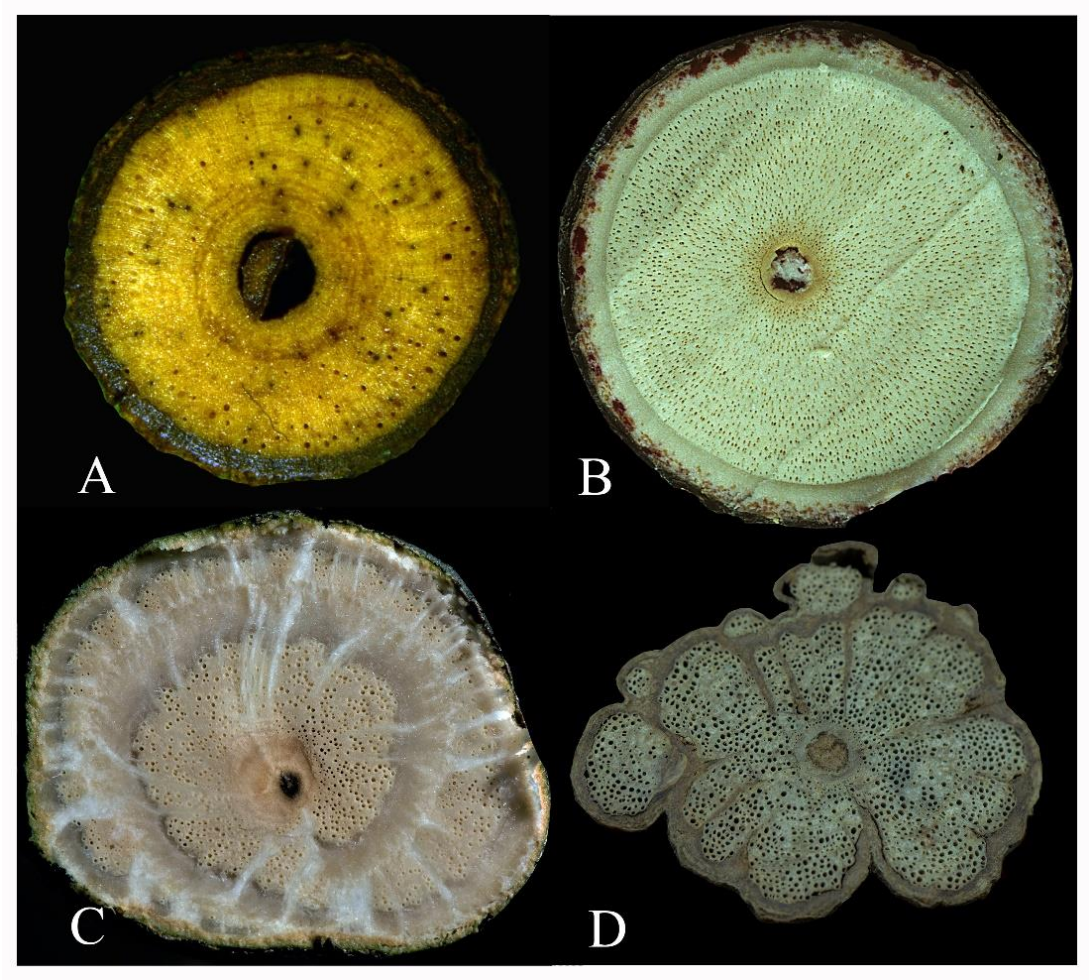


Figure 1. Cross sections of stems. **A**. *Mabea biglandulosa* with regular wood anatomy. **B.** *Omphalea diandra* with regular wood anatomy. **C**. *Plukenetia serrata* with successive cambia. **D**. *Dalechampia filicifolia* with neoformations. Photos by P. Acevedo.

Figure 2. Climbing Euphorbiaceae. **A.** *Omphalea diandra* with tendril-like, twining main stems. **B.** *Plukenetia serrata*, mature, furrowed stem. **C**. *Omphalea diandra* showing large nectary glands at the junction of petioles and blade. Photos by P. Acevedo**.**

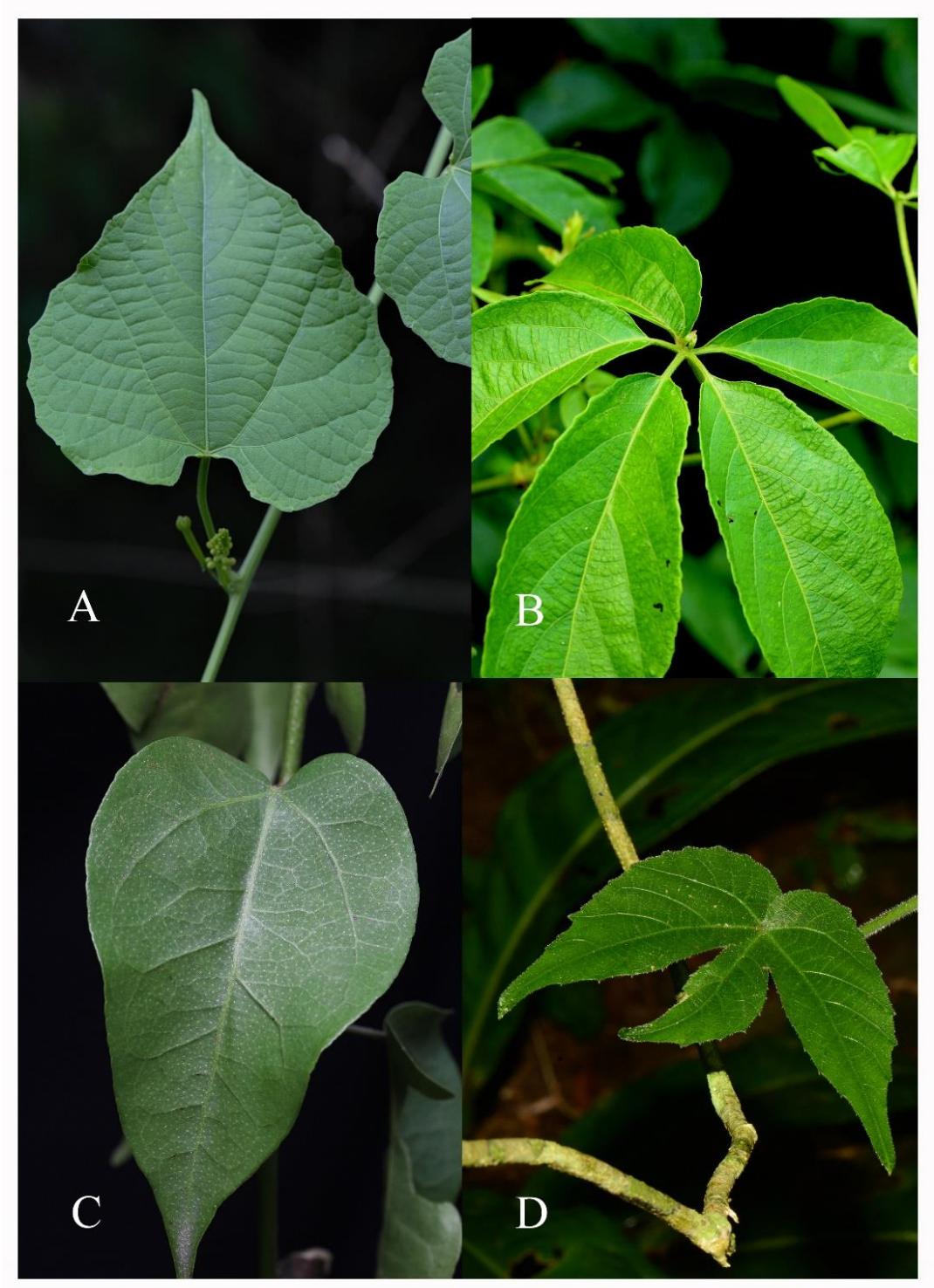


Figure 3. Leaves in climbing Euphorbiaceae. **A.** *Romanoa tamnoides* with simple cordiform leaves, bearing a pair of glands at the base of blade. **B.** *Dalechampia* sp. with palmately compound leaves, with a pair of stipels at the base of blade. **C.** *Croton* sp. with simple, cordiform leaves. **D.** *Dalechampia* sp. with trilobed leaves. Photos: A, B, D by P. Acevedo; C by J. Amith.

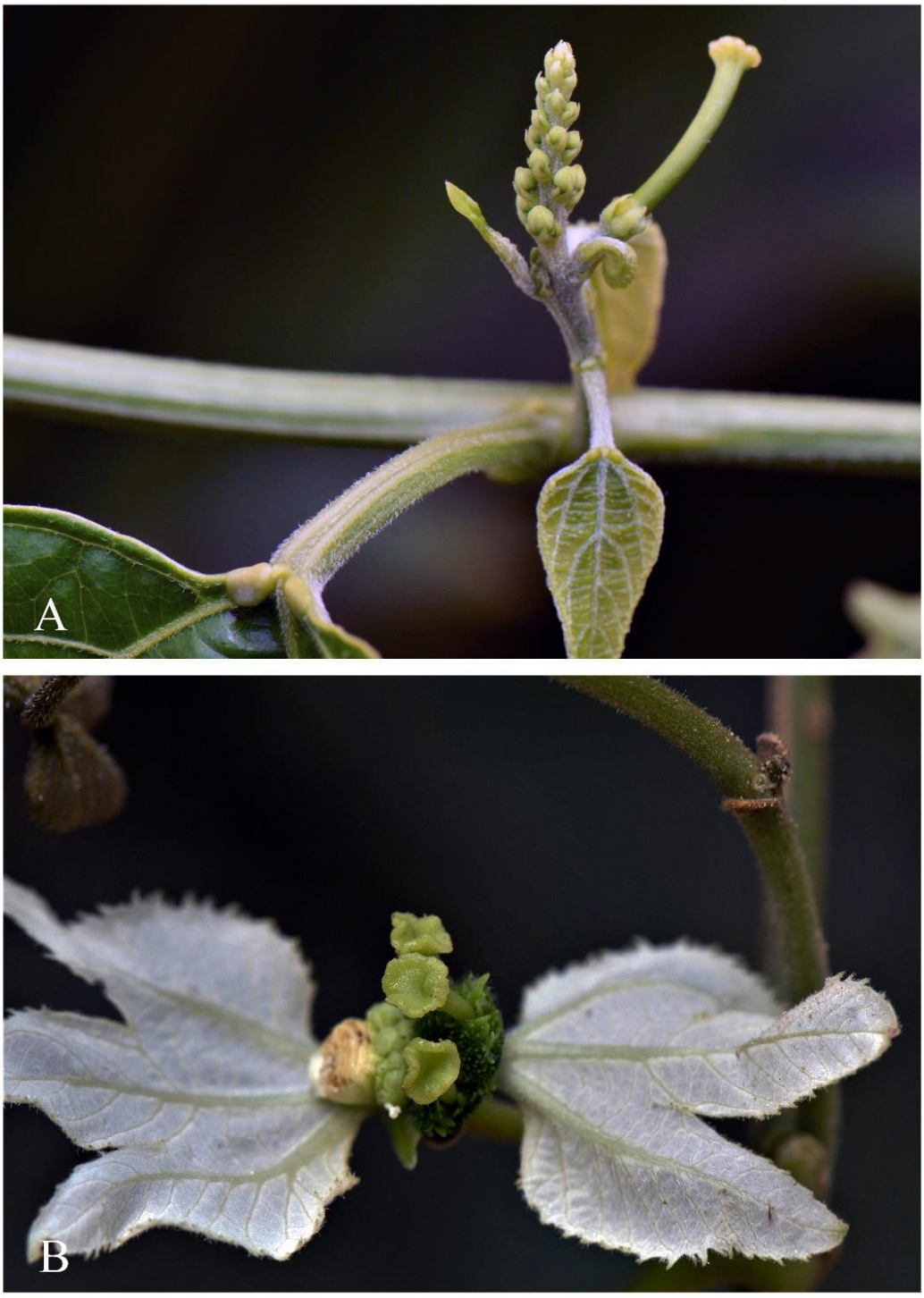


Figure 4. Inflorescences in climbing Euphorbiaceae. **A.** *Plukenetia volubilis*, axillary raceme with a single pistillate flower at the base and staminate flowers dispersed along the inflorescence axis. **B**. *Dalechampia* sp. with a cymose inflorescence (pseudanthium) bearing white, foliaceous bracts at the base, a resiniferous gland (at left), 3 pistillate flowers, buds of staminate sub inflorescence. Photos by P. Acevedo**.**

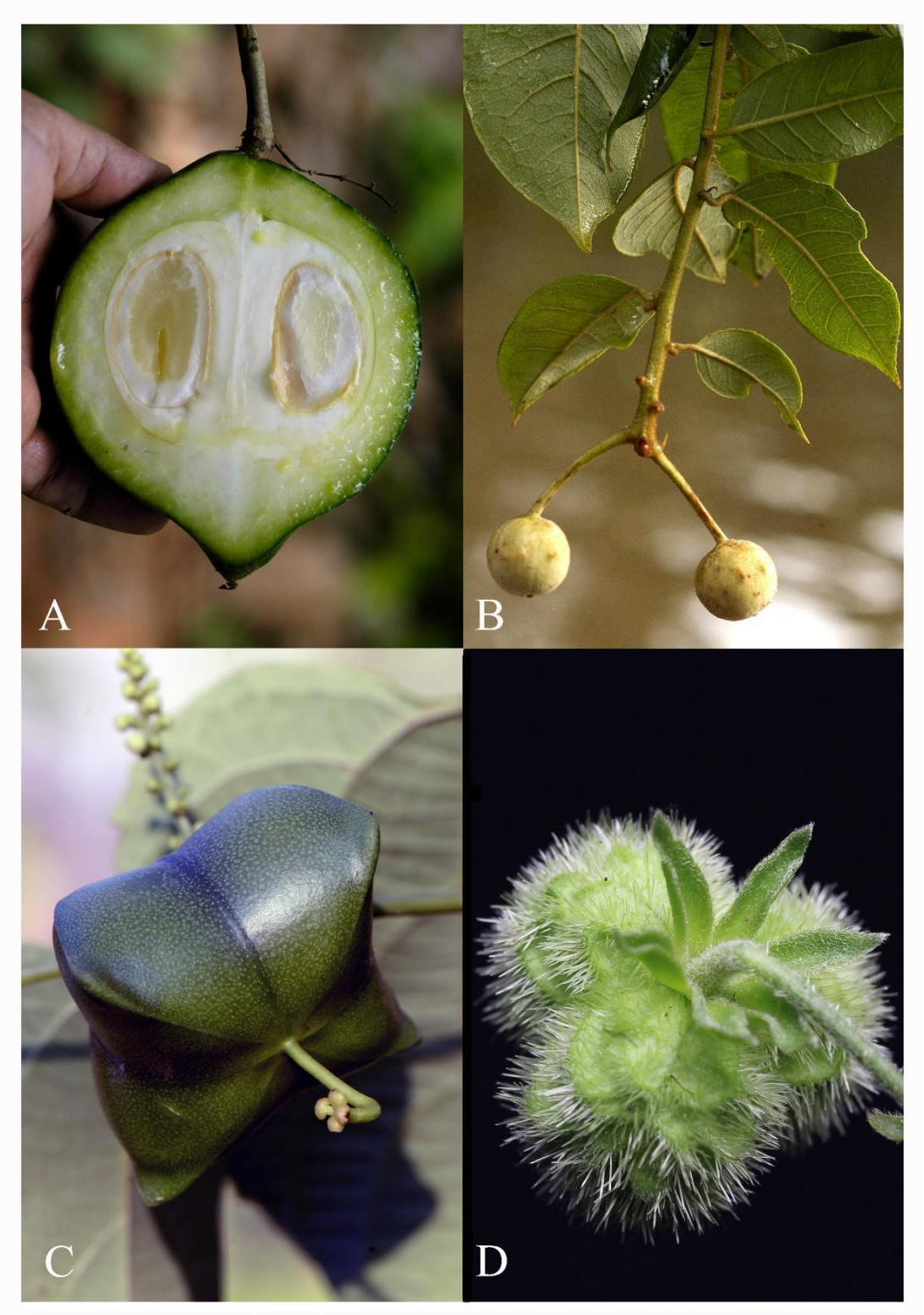


Figure 5. Fruits in climbing Euphorbiaceae. **A**. *Omphalea diandra* with large, indehiscent fruit. **B.** *Mabea taquari* with small capsular fruits. **C.** *Plukenetia volubilis*, 4-lobed capsule. **D**. *Tagia* sp. 3-lobed capsule with hispid, stinging hairs. Photos: A-C by P. Acevedo; D by J. Amith.

USES

Seeds of non-climbing *Omphalea* and *Plukenetia* are used as a source of cooking oil. Seeds of *Plukenetia volubilis* (sacha inchi) are roasted and eaten. Some species of *Dalechampia* and *Euphorbia* with showy leaves or inflorescences are grown as ornamentals. *Manihot esculenta* is the source of cassava and numerous products derived from this starchy root crop; *M. leptophylla* Pax & K. Hoffm., a climbing species has edible seeds and is tolerant to agricultural pests (Nagib et al. 2008).

KEY TO THE GENERA OF CLIMBING EUPHORBIACEAE

1. Plants twiners 2

1. Plants scrambling over the surrounding vegetation 9

2. Plants possessing urticant hairs (sometimes only on reproductive parts).....3

2. Plants lacking urticant hairs 7

3. Inflorescence a pseudanthium subtended by an involucre of large, often colored bracts .....***Dalechampia***

3. Inflorescence racemose or spicate, not subtended by large foliaceous bracts 4

4. Inflorescence bifurcate, one branch with staminate flowers, the other (axis sometimes very short) with pistillate flowers, stamens numerous.....5

4. Inflorescence racemose, unisexual or bisexual with distal staminate flowers and 1–2 pistillate flowers at the basal node(s), stamens 2–9(-22).....6

5. Leaves usually unlobed, staminate flowers with 3 (4) sepals, 5–10 disc segments, and 6–20 stamens, anthers muticous; South America to Costa Rica.....***Bia***

5. Leaves lobed, staminate flowers with 5 sepals, no disc, and 17–40+ stamens, anthers apiculate; Mexico, Central America .....***Zuckertia***

6. Inflorescences unisexual, usually <1 cm long, stamens 5–9(14); Cuba ..... ***Platygyna***

6. Inflorescence bisexual, >1 cm long, stamens (1)2-5(-22)..... ***Tragia***

7. Petioles with distal prominent glands; leaf blade lacking basal glands; fruits indehiscent, sub-globose 8-12 cm in diam.; Pantropical ..... ***Omphalea***

7. Petioles eglandular; leaf blade with 1 to several pairs of abaxial glands at the base; fruits dehiscent or indehiscent, 4-lobed or sub-globose, < 8 cm wide 8

8. Calyx of staminate flowers 5-merous; ovary 3-locular; Bolivia, SE Brazil, Paraguay ..... ***Romanoa***

8. Calyx of staminate flowers 4-merous; ovary 4(5)-locular; Pantropical..... ***Plukenetia***

9. Plant with clear exudate, armed with stipular spines; leaves congested in fascicles ..... ***Acidocroton***

9. Plants with white or colored exudate, unarmed; leaves conspicuously alternate 10

10. Plants with orange exudate, trichomes stellate or lepidote, petals present ..... ***Croton***

10. Plants with white exudate, glabrous or trichomes dendritic, petals absent.....11

11. Inflorescence a cyathium (pseudanthial) ..... ***Euphorbia***

11. Inflorescences racemose or spicate 12

12. Inflorescence spicate; staminate flowers with a single stamen; Mexico, Guatemala ..... ***Dalembertia***

12. Inflorescence racemose; staminate flowers with 10 or more stamens 13

13. Calyx large, corolla-like, bracts not glandular; Neotropics ..... ***Manihot***

13. Calyx of small to large sepals, not petaloid, bracts glandular; continental tropical America..... ***Mabea***

IDENTIFICATION OF GENERA BASED ON VEGETATIVE CHARACTERS

Nectary glands at base of leaf blade: *Plukenetia, Romanoa.*

Nectary glands on petioles: *Croton, Omphalea.*

Urticant hairs: *Dalechampia, Platygyna, Tragia, Zuckertia.*

Colored (red, pink, orange) exudate: *Omphalea, Croton*.

White exudate: *Dalembertia, Euphorbia, Manihot, Mabea.*

Stem cross sections: Successive cambia, *Plukenetia*; Neoformations, *Dalechampia.*

GENERIC DESCRIPTIONS

ACIDOCROTON Grisebach, Fl. Brit. W. Indian Isl. 42. 1859 ['1864'], (nom. cons.).

A. oligostemon Urb., photo by José Luis Gómez

Erect shrubs, some species with scrambling branches reaching 4 m in length. Leaves fasciculate, with simple, non-stinging hairs; stipules becoming straight spines that are paired at the base of leaf fascicles. Inflorescences axillary, unisexual, glomerular or pistillate flowers solitary and subterminal. Flowers pedicellate; sepals 5–6, large, free, imbricate; disk annular, pubescent; staminate flowers: petals 5–7, imbricate, glabrous, longer than the sepals; stamens 20–numerous with distinct filaments, anthers with apiculate connective; pistillate flowers: petals rudimentary; ovary 3-locular, with a single ovule per carpel; styles 3, each 4-lobed or with 4 stigmatic branches. Fruits a globose capsule, with persistent sepals, columella persistent. Seeds trigonous, carunculate.

Distinctive features: Shrubs with scandent branches; leaves fasciculate; stipule becoming straight spine, paired at the base of leaf fascicles.

Distribution: A neotropical genus of 12 species, 10 of which are found in the Greater Antilles (Cuba, Hispaniola, Jamaica), 1 species in Mexico and 1 in Colombia. Only two species reported as scramblers, *A. oligostemon* Urb. from Cuba, and *A. gentryi* Fern. Alonso & R. Jaram. from Colombia; in dry forests or scrubs.

BIA Klotzsch, Arch. Naturgesch. 7(1): 189. 1841.

B. fallax (Mull.-Arg.) G.L. Webster, with bifurcated inflorescence, photo by E. MacLarnon

Herbaceous twining vines, clothed with urticating hairs, Stems slender reaching a few m in length. Leaves alternate, simple, membranaceous, with dentate, serrate, crenate or denticulate margins; petioles short to long, lacking glands; stipules conspicuous, lanceolate. Inflorescences opposite to leaves or terminal, bifurcate raceme with staminate main axis and lateral pistillate branch; staminate flowers in groups of 3 or solitary; pistillate flowers 5–20 per branch of inflorescence. Staminate flower: tepals 3(– 4)-lobed, valvate; disc interstaminal, of 5–10 cylindrial lobes; stamens 6–20, filaments connate and enlarged at base, anthers emarginate; pistillode absent. Pistillate flowers: subsessile, sepals 5–6-lobed, imbricate; disc absent; ovary of 3 uniovulate carpels, subglobose, styles short, with 3 elongated, papillose stigmata. Fruit a trilobed, valvate capsule with explosive dehiscence; seeds subglobose, papillose, ecarunculate.

Distinctive features: Herbaceous twining vines with urticant hairs, and similar to *Tragia* and *Zuckertia*. Differs in staminate flowers with 3(4) sepals, a dissected disc (of 5–10 segments), 6–20 stamens, and inaperturate, spheroidal pollen grains. The inflorescences of *Bia* are distinctly bifurcate with staminate and pistillate flowers on different axes.

Distribution: A genus of five species native from South America to Costa Rica, found in Venezuela, the Guianas, Peru, Brazil (northern, northeastern and southeastern regions) south to Paraguay, in lowlands wet to dry forest, savannas, scrublands and open habitats.

CROTON Linnaeus, Sp. Pl. 1004. 1753.

C. pullei Lanj., young fruit, photo G. Léotard

Herb, shrubs, small trees, or very rarely scrambling lianas; covered with stellate hairs and/or lepidote scales; producing a clear to orangish latex. Stems terete, some lianas recorded to 12 m in length. Lianas with alternate, simple leaves, with entire, unlobed or lobed margins, covered with stellate hairs especially on abaxial surface; petioles at least ½ the length of the blade (except for *C. javarisensis* Secco, which are < 1 cm long), often provided with a pair of prominent glands near the apex; stipules minute, deciduous. Flowers in axillary or terminal spikes or racemes, longer than the subtending leaves; calyx of 4-6 deeply parted sepals; corolla of 4-6 distinct petals, or absent; nectary disc annular or dissected into glands. Staminate flowers distal on inflorescence; calyx of 4-6 sepals; stamens 10 to many, free; pistillode absent. Pistillate flowers proximal on inflorescence; calyx of 5 sepals; petals usually absent; ovary of 3 uniovulate carpels; the styles 3, bifid to many times divided. Fruit a 3-lobed capsule with explosive dehiscence, leaving a central columella; one seed per locule.

Distinctive features: Leaning, scandent lianas, covered with stellate hairs and/or lepidote scales; petioles often long and provided with a pair of prominent glands at the apex.

Distribution: A genus of about 800 species with worldwide distribution, predominantly in the tropics, 720 species in the New World, with 5 species of lianas distributed in northern South America (the Guianas and Brazil).

DALECHAMPIA Linnaeus, Sp. Pl. 1054. 1753.

Dalechampia sp., photo by P. Acevedo

Twining vines or less frequently shrubs, usually with stinging hairs (sometimes restricted to inflorescences). Stems cylindrical or slightly asymmetrical, producing scarce watery sap, in some species up to 5 cm in diam., known to develop vascular cylinder neoformations during late secondary growth (fig. 1d). Leaves alternate, simple, 3-5-lobate, or palmately compound, petiolate, often with a pair of stipels at the base of the blade (fig. 3b); stipules, conspicuous, persistent. Flowers unisexual, actinomorphic, apetalous, clustered in bisexual cymes, with long peduncles and two foliaceous bracts that often are brightly colored and covered with stinging hairs, forming a pseudanthium. Staminate flowers in distal cymules; bracteoles often aggregated to form resin-secreting gland; calyx 4-6-valvate; stamens numerous, grouped on a short stipe to form a head, the anthers short, opening along longitudinal sutures; pistillode absent. Pistillate flowers 3 in proximal cymule; calyx with 8-12 lobes with glandular margins; ovary of 3 uniovulate carpels; styles connate into a column, with a capitate or peltate stigma. Fruit a trilobate capsule often surrounded by enlarged persistent calyx, dehiscence explosive leaving a central columella; seeds subglobose, smooth or rugose.

Distinctive features: Twining herbaceous to woody vines, often with urticant hairs especially on the bracts and calyx; easily differentiated by the large colored bracts at the base of the pseudanthia.

Distribution: A genus of about 120 species with tropical distribution, most species (95) in the Neotropics, 87 of which are climbers.

DALEMBERTIA Baillon, Étude Gén. Euphorb. 545. 1858.

Herbs, subshrubs or scrambling vines; often with tuberous roots; stems glabrous or with simple hairs, producing copious milky latex, reaching several m in length. Leaves simple, alternate, palmately 3-11-lobed; petioles short, eglandular; stipules persistent. Inflorescences terminal, bisexual; staminate flowers numerous, pedicellate, in distal racemose portion of inflorescence; pistilate flowers few, on long recurved pedicels, produced at the base of inflorescence; bracts bigladular subtending 1-3-flowered staminate cymules or a solitary pistillate flower. Staminate flowers: calyx unlobed, zygomorphic, with a solitary long-exserted stamen. Pistillate flowers: calyx of 3 free sepals; ovary of 3 uniovulate carpels, styles connate with 3 short, recurved stigmatic branches. Fruit capsular, with explosive dehiscence, leaving a persistent 3-angled columella; seeds smooth, ecarunculate.

D. populifolia Baill., photo by Fernando Pio León

Distinctive features: Scrambling vine with copious white latex, 3-11-lobed leaves, and capsules on long, recurved pedicels.

Distribution: A genus of 4 to 5 species, native to Mexico and Guatemala; found in deciduous woodlands.

EUPHORBIA Linnaeus, Sp. Pl. 450. 1753.

E. colletiodes Benth., photo by Wynn Anderson

Monoecious (rarely dioecious) shrubs, herbs, small trees or seldom leaning shrubs, sometimes with succulent stems, glabrous or with simple hairs, producing copious milky latex. Leaves simple, alternate, entire, sometimes succulent and deciduous; petioles short; stipules minute or lacking. Flowers borne within a cyathium (a specialized pseudanthium), the cyathia subtended by two clasping, often-colored bracts, and borne in compound axillary or terminal dichasial cymes; rarely (i.e., "*Pedilanthus*") cyathia bilaterally symmetrical, with a glandular spur at base and 5 elongate lobes toward the distal portion. Staminate flowers numerous, naked, of one stamen. Pistillate flowers, solitary, central on cyathium; ovary of 3 uniovulate carpels on an elongate pedicel; styles 3, free or united at base, stigmas usually bifid. Fruit a 3-lobed capsule on a long exserted, reflexed pedicel; explosive dehiscence, leaving a central columella.

Distinctive features: Leaning shrubs a few m long, with succulent stems and leaves, producing copious milky sap.

Distribution: A nearly cosmopolitan genus of about 2,000 species, of which 486 are native to the New World, three of which are reported as climbing shrubs. One species in Mexico, one in Guatemala, and one species in Brazil and the West Indies.

MABEA Aublet, Hist. Pl. Guiane 867. 1775.

M. spectabile (Tul.) Burkart with staminate flowers mostly abscised from long pedicels, photo by P. Acevedo

Trees, erect shrubs or sub-shrubs, less often scrambling (sometimes twining) vines, with dendritic hairs. Stems cylindrical reaching a few cm in diam., with regular wood anatomy, producing abundant milky latex. Leaves simple, coriaceous, with entire or serrulate margins and often with embedded glands; petioles short, eglandular; stipules minute or well-developed. Inflorescences of axillary or terminal racemose or paniculate, pendent thyrses; bracts glandular; flowers long-pedicellate. Staminate flowers globose, in cymose units distributed along the distal 2/3 of the inflorescence axis; calyx 3-5 lobed; petals and disc absent; stamens 10-70, anthers sub-sessile. Pistillate flowers 1-many on proximal 1/3 of the inflorescence; sepals 3-6, free, elongated, petals absent, disc absent or represented by 6 glands; ovary of 3 uniovulate carpels; styles long connate, crowned by 3 long and coiled simple stigmas. Fruit a capsule with explosive dehiscence, leaving a central columella; seeds carunculate.

Distinctive features: Leaning vines with dendritic hairs, copious milky latex; leaves simple, alternate with widely diverging secondary veins that form a loop close to the margins.

Distribution: A neotropical genus of about 50 species, 2 of which are reported as vines or climbing shrubs, occurring in Venezuela, the Guianas and north and northwestern Brazil; in moist and gallery low land forests.

MANIHOT Miller, Gard. Dict. Abr. ed. 4. 1754.

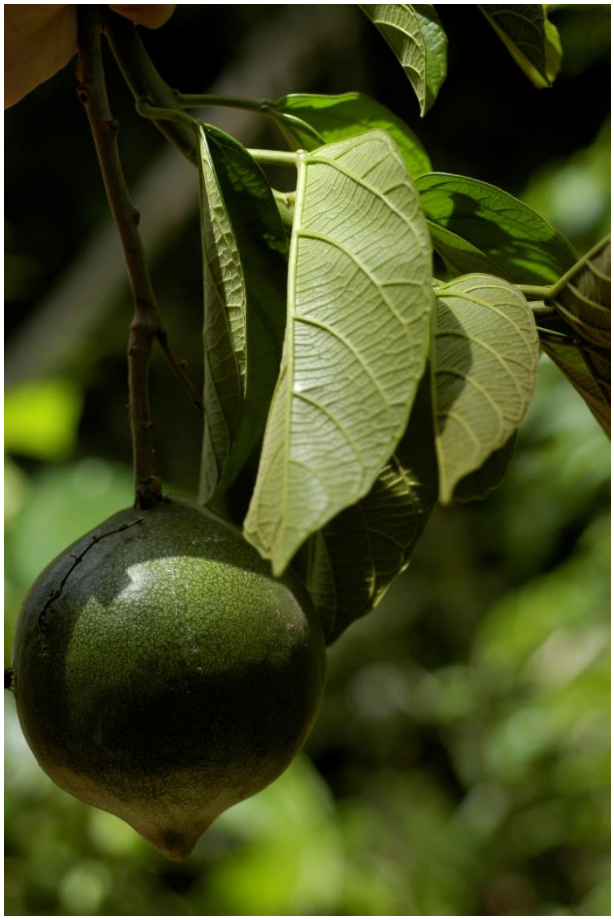
M. brachyloba Müll. Arg., photo by P. Acevedo

Erect shrubs, small trees, procumbent herbs or less often scrambling shrubs 3-7 m long. Stems slender, cylindrical, producing abundant milky latex. Leaves alternate, simple or palmately compound, with entire margins; petioles long, pulvinate at the apex, eglandular; stipules inconspicuous. Inflorescences of axillary or terminal racemes or panicles; pedicels long; Staminate flowers toward distal portion of inflorescence; sepals 5, connate into a bell-shaped calyx with 5 free lobes; corolla absent; disc large, annular; stamens 10, in two whorls, with free filaments; pistillode absent. Pistillate flowers on basal node of inflorescence, larger than the staminate flowers; sepals 5, free, often linear; corolla absent; disc annular; ovary of 3 uniovulate carpels, sessile, ovoid; styles 3, connate at base, stigmas longitudinally grooved. Fruit a capsule with explosive dehiscence; seeds lenticular-prismatic, carunculate.

Distinctive features: Weak-stemmed leaning shrub with abundant milky latex; long-petioled leaves. Sometimes confused with species of climbing Caricaceae, but distinguished by the floral characters.

Distribution: A neotropical genus of about 98 species, including 11 reported as climbers, which are mostly from Brazil with few species extending into Ecuador, Peru, and Venezuela, one species (*M. chlorosticta* Standl. & Goldman) endemic to Jalisco, Mexico; found in moist forest understory.

OMPHALEA Linnaeus, Syst. Nat. ed. 10. 1254, 1264, 1378. 1759, (nom. cons.).



O. diandra L., picture by P. Acevedo

Trees, shrubs, or canopy lianas with indumentum of simple hairs; lianas climbing by mean of a sympodial succession of twining stems with determinate growth that behave like tendrils; stems cylindrical attaining up to 20 cm in diam. sometimes producing a red or pink latex; cross section with regular anatomy (fig. 1b). Leaves simple, coriaceous, entire or sinuate, with pinnate venation; petioles long, with a pair of prominent round glands on distal portion (fig. 6a); stipules small, persistent. Inflorescence a terminal or axillary paniculate thyrse (fig. 6b), cymose subunits bisexual with central flower(s) pistillate; bracts elongate, biglandular; bracteoles small, triangular, usually eglandular; flowers pedicellate. Sepals 4-5, imbricate, unequal; corolla absent; disc extrastaminal, annular, or absent in pistillate flowers; staminate flowers with 2 stamens with filaments connate into a slender staminal column, crowned by a cap formed from expanded connate anther connectives, lacking a pistillode; pistillate flowers with ovary of 3 uniovulate carpels; style single, massive. Fruit indehiscent, large (8-12 cm in diam), subglobose; seeds ellipsoid, slightly flattened radially, with white testa, surface smooth, roughened, or tuberculate.

Distinctive features: Canopy liana > 30 m long, known to produce a succesion of sympodial twining main stems with determinate growth, that behave like tendrils; leaves large, coriaceous, long-petioled with a pair of prominent glands at the junction with the blade; fruits indehiscent, sub-woody, sub-globose, 10-15 cm long. Similar to *Plukenetia* but in addition to very different flowers is vegetatively distinguished by the larger nearly entire leaves with subglobose petiolar glands and red exudate (vs. serrate leaves with a pair of slightly swollen glands at the base of the

lamina, and clear exudate). The juvenile leaves on seedlings are usually deeply dissected compared with the very different entire leaves of adult plants, a dimorphism seen in diverse climbing taxa.

Distribution: A pantropical genus of 17 species, and of the eight species in the Neotropics, 5 are lianas, of which *O. diandra* L. is a canopy liana native to the lowlands of South America, Panama and Costa Rica, occurring in moist or wet forests.

Figure 6. *Omphalea diandra*. **A**. Petiolar glands. **B.** Inflorescence of mostly staminate buds. Photos by P. Acevedo.

PLATYGYNA Mercier, Bull. Bot., Geneva 168. 1830.

P. hexandra (Jacq.) Müll. Arg., photo by José Luis Gómez

Woody or sub-woody twining vines, covered with urticant hairs; sap clear. Leaves simple, alternate, peninerved, oblong with dentate margins; petioles short, eglandular; stipules subulate, persistent. Flowers in unisexual racemes, distal on short branches or axillary; corolla and nectary disc lacking. Staminate flowers fasciculate or solitary along the axis of a spike, sessile or short pedicellate; calyx of 3-6 valvate sepals; stamens 3-14, the filaments free, short, inserted on a thick receptacle; pistillode absent. Pistillate flowers 1-4 per inflorescence, sessile; calyx 5-9 imbricate sepals; ovary of 3-4 uniovulate carpels, styles connate at base, stigmas 3, as long as the styles, papillate. Fruit a trilobed capsule with hirsute, stinging hairs, explosive dehiscence leaving a central columella; seeds nearly spherical.

Distinctive features: Twining vines with urticant hairs, similar to *Bia* and *Zuckertia* but with unisexual racemes and oblong dentate-margined leaves.

Distribution. A genus of 7 species endemic to Cuba, in seasonally dry forest, often in open and disturbed habitats.

PLUKENETIA Linnaeus, Sp. Pl. 1192. 1753.

P. volubilis L., photo by P. Acevedo

Monoecious or rarely dioecious, twining lianas or vines with clear, watery sap. Stems nearly cylindrical, pliable and soft even when old, some species reaching > 20 m in length and up to 8 cm in diam. Leaves alternate, simple, palmately or pinnately veined, with one to several pairs of adaxial laminar glands near the base, and often with scattered glands on abaxial surface, margins serrate or subentire; petioles elongated, eglandular; stipules minute, deciduous. Inflorescence axillary or terminal, bisexual or unisexual, of racemose thyrses, with numerous staminate flowers in condense cymes along the main axis, and 1(2) pistillate flower near the base; bracts small, eglandular. Staminate flower short to long pedicellate; sepals 4-5, valvate; corolla absent; disc interstaminal, segmented, annular, or absent; stamens 15-40, filaments free, short to elongate or anthers sessile; pistillode absent. Pistillate flower long-pedicellate; sepals 4; corolla absent; disc absent; ovary of 4(5) uniovulate carpels, 4(5)-angled to deeply 4-lobed; styles partly to completely connate into a massive column. Fruit a 4(5)-seeded capsule, dry or fleshy, sub-globose to deeply 4-lobed, explosively dehiscent or indehiscent; seeds sub-globose, ovoid, or lenticular, ecarunculate.

Distinctive features: Twining vines or lianas with serrate to subentire, simple leaves, often with 1 or more pairs of laminar glands at the base of the blade; fruits 4-locular, often capsular.

Distribution: A pantropical genus of 25 species, of which 16 are in the Neotropics, from Mexico to southeastern Brazil, and one of the Lesser Antilles; in moist to wet lowland to lower montane forests (200-1000 m elev.).

ROMANOA Trevisan, Saggio Monogr. Alghe Cocc. 99. 1848.

R. tamnoides (A.Juss.) Radcl.-Sm., photo by P. Acevedo

Twining herbaceous vines; stems cylindrical, 3-4 m long, with regular anatomy. Leaves simple, cordate, with sinuate margins and a pair of adaxial laminar glands at the base (fig. 3a); petioles long, eglandular; stipules minute, deciduous. Inflorescences of axillary, bisexual, short racemose thyrse with staminate flowers few-flowered cymes along the main axis, and 1-2 pistillate, larger flower near the base; bracts small, eglandular. Staminate flowers: sepals 5, free, white; disc 5-lobed, interstaminal, yellowish; stamens 10, free; anthers medi-fixed. Pistillate flowers; sepals 5-6 green; ovary of 3 uniovulate carpels; styles connate, columnar, stout, with 3 short stigmatic branches. Fruit a trigonous-globose capsule; seeds lenticular, ecarunculate.

Distinctive features: A sub-woody twining vine a few meters long, leaves cordiform, pistillate calyx 5-6-merous; ovary and fruits 3-locular (distinguishing it from *Plukenetia*), trigonous-globose.

Distribution. A neotropical genus of a single species distributed in Bolivia, southeastern Brazil and Paraguay; occurring in scrubs (cerrados vegetation), gallery forest, seasonal wet forest, and the Atlantic coastal forest on sandy substrate (Restinga).

TRAGIA Linnaeus, Sp. Pl. 980. 1753.

Tragia sp., photo by P. Acevedo

Herbaceous twining vines, sometimes erect herbs, covered with urticant hairs; sap clear. Leaves simple or trilobed, alternate, serrate or entire; petioles short, eglandular; stipules minute or small, deciduous or persistent. Flowers in terminal or axillary, bisexual racemes; corolla and nectary disc lacking. Staminate flowers on short pedicels, numerous, usually one per raceme node; calyx of 3 or 4 valvate sepals; stamens (2-)3-5, the filaments connate at base, or frequently up to half of their length; pistillode small. Pistillate flowers usually solitary at the base of racemes, long-pedicellate; calyx of 2 whorls of 3 imbricate sepals; ovary of of 3 uniovulate carpels, styles connate, with simple stigmatic branches, the stigma papillate. Fruit usually a 3-lobed thin-walled capsule (fig. 5d) with explosive dehiscence, leaving a central columella; seeds nearly spherical, smooth or slightly rough.

Distinctive features: Twining vines with urticant hairs, similar to *Bia* and *Zuckertia* but distinguished the flowers with 2-5 stamens (vs. 6-20 in *Bia* and 17-40 in *Zuckertia*).

Distribution. A genus of about 150 species of tropical, subtropical and warm temperate regions, in seasonally dry to wet forest, sometimes open and grassy habitats.

ZUCKERTIA Baillon, Étude Gén. Euphorb. 495, t. 4. 1858.

Herbaceous twining vines, with hispid urticating hairs. Stems slender, reaching up to 3 m in length. Leaves alternate, membranaceous, 3-lobed or cordiform, with serrate or dentate margins, petioles long (3-15 cm), lacking glands; stipules conspicuous, persistent, ovate. Inflorescences opposite to the leaves, bifurcate with staminate and pistillate (axis sometimes short with flowers clustered) branches; flowers pedicellate; Staminate flowers, articulate at the base of pedicel, solitary or in groups of 2-4; tepals 5, valvate, green; disc absent; stamens 17-35(40), with free filaments; pistillode absent. Pistillate flowers not articulate at pedicel; solitary along elongated inflorescence branch or in a cluster at the base of raceme; tepals 6 sepals; disc absent; of 3 uniovulate carpels, styles short, with 3 elongated, papillose stigmata. Fruit a trilobed, obloid, hispid capsule with explosive dehiscence, leaving a central columella; seeds subglobose, smooth, with a conspicuous ventral scar.

Z. manuelii (V.W.Steinm. & Ram.-Amezcua) Card.-McTeag. & L.J.Gillespie, photo by V.W. Steinmann

Distinctive features: Similar to *Bia* but distinguished by usually 3-lobed leaves, staminate flowers with 5 sepals, lacking a disc, 17–40+ free stamens, and tricolpate, oblate-spheroidal pollen grains. Also similar to *Bia*, the inflorescences of *Zuckertia* are bifurcate but the pistillate branch in the latter can be very short, resembling a small cluster of flowers.

Distribution: A genus of two species distributed from central Mexico south to Costa Rica, with a species endemic to western-central Mexico (Michoacán); in deciduous forest.

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PICTURE VOUCHERS

Figure 1.
A. *Mabea biglandulosa* Baill. ex Müll. Arg. (Acevedo 3280)
B. *Omphalea diandra* L. (Acevedo 7631)
C. *Plukenetia serrata* (Vell.) L.J.Gillespie. (Acevedo 16900)
D. *Dalechampia filicifolia* Lam. (no voucher)

Figure 2.

A**.** *Omphalea diandra* L. (Acevedo 7631)
B. *Plukenetia serrata* (Vell.) L.J.Gillespie. (Acevedo 16900)
C. *Omphalea diandra* L. (no voucher)

Figure 3.
A. *Romanoa tamnoides* (A. Juss.) Radcl.-Sm. (no voucher)
B. *Dalechampia* sp. (no voucher)
C. *Croton* sp. (Amith 31307)
D. *Dalechampia* sp. (no voucher)

Figure 4.
A. *Plukenetia volubilis* L. (Acevedo 17418)
B. *Dalechampia* sp. (Acevedo 16927)

Figure 5.
A. *Omphalea diandra* L. (Acevedo 13613)
B. *Mabea taquari* Aubl. (Acevedo 15957)
C. *Plukenetia volubilis* L. (Acevedo 17418)
D. *Tragia* sp. (Amith 31497)

Figure 6.
A & B. *Omphalea diandra* L. (Acevedo 7631)