

First published on the Flora Mesoamericana Website, 21 Dec. 2011. Updated 25 Mar. 2014.

## 222. PLANTAGINACEAE

*Antirrhinaceae* Pers., *Aragoaceae* D. Don, *Callitrichaceae* Link, *Chelonaceae* Martinov, *Digitalidaceae* Martinov, *Ellisiophyllaceae* Honda, *Erinaceae* Duvau, *Globulariaceae* DC., *Gratiolaceae* Martinov, *Hemimeridaceae* Doweld, *Hippuridaceae* Vest, *Linariaceae* Brecht. & J. Presl, *Littorellaceae* Gray, *Oxycladaceae* Schnizl., *Psylliaceae* Horan., *Scopariaceae* Link, *Sibthorpiaceae* D. Don, *Trapellaceae* Honda & Sakis., *Veronicaceae* Cassel

Family description and key by M.J.M. Christenhusz.

Usually herbaceous annual or perennials, sometimes shrubs, small trees, submerged aquatics or vines. Leaves alternate and spiral or opposite, simple or compound. Inflorescences variable, racemose top cymose, solitary or compound, terminally or axillary. Flowers usually 4- or 5-merous. Calyx shallowly to deeply 4- or 5-lobed or -parted. Corolla open and lobed or cochleate, often bilabiate and sometimes spurred or saccate, the tube sometimes closed by an inflated palate. Stamens 5-8, usually inserted in the corolla, the thecae parallel, end-to-end, or sagittate. Styles various, simple to branched; stigma flattened, capitate or bilobed. Fruit usually a septicidal, sometimes a loculicidal, poricidal or circumscissile capsule. Seeds usually numerous. c. 90 gen., 1700 spp. Worldwide, mostly temperate.

It is not easy distinguishing between Plantaginaceae *s.l.* and other families in Lamiales. The frequent absence of regular partitions in the heads of glandular hairs and septicidal capsule dehiscence is however unusual among Lamiales, although this is by no means present in all genera of the Plantaginaceae (most notably these characters are not found in the type genus *Plantago*), and also not unique to it. This lack of morphological characters makes a case for uniting the bulk of Lamiales (including Acanthaceae, Lamiaceae, Verbenaceae, Bignoniaceae, Scrophulariaceae, Plantaginaceae, Gesneriaceae, etc.) into a single family excluding Boraginaceae and Oleaceae. However, in the treatment of Flora Mesoamerica I followed the family

classification provided by APG-III (2009), to make it consistent with the most recent opinion on family classification in Lamiales.

Phylogenetic studies initially found only weak support for the Plantaginaceae *s.l.* (as Veronicaceae in Olmstead et al. 2001). Oxelman et al. (2005) found a stronger support and Albach et al. (2005) discusses the circumscription and phylogenetic relationships of the family. Several genera are poorly defined or based on minute differences that may not hold in future revisionary or phylogenetic studies. Especially genera like *Bacopa*, *Conobea*, *Darcya*, *Mecardonia* and *Stemodia* appear rather poorly circumscribed and future molecular phylogenies of these genera may result in different generic delimitation. In this flora treatment I have been conservative and treated these in their traditional way, despite the frequent lack of generic characters.

Bibliography: Albach, D.C., Meudt, H.M. & Oxelman, B. *American J. Bot.* 92: 297-315. (2005). APG-III. *Bot. J. Linn. Soc.* 161: 105-121 (2009). Chase & Reveal. *Bot. J. Linn. Soc.* 161: 122-127 (2009). Fay, M.F., Bennett, J.R., Dixon, K.W. & Christenhusz, M.J.M. *Curtis's Bot. Mag.* 26 (4): 286-313 (2010). Olmstead, R.G., de Pamphilis, C.W., Wolfe, A.D., Young, N.D., Elisons, W.J. & Reeves, P.A. *Amer. J. Bot.* 8: 348-361 (2001). Oxelman, B., Kornhall, P., Olmstead, R.G. & Bremer, B. *Taxon* 54: 411-425 (2005). Stevens, P.F. *Angiosperm Phylogeny Website*: <http://www.mobot.org/MOBOT/research/APweb/> (2001 onwards). Tank, D.C., Beardsley, P.M., Kelchner, S.A. & Olmstead, R.G. *Australian Syst. Bot.* 19: 289-307 (2006). Wettstein, R. von, Scrophulariaceae. In: Engler, A. & Prantl, K., *Nat. Pflanzenfam.* 4(3b): 39-107 (1891).

1. Perianth absent, ovary developing into 4 nutlets. Minute often aquatic herbs.

#### **6. Callitriche**

1. Perianth present, ovary variously developing, but not into 4 nutlets. Minute to well-developed herbs, vines or shrubs.

2. Inflorescence of compact spikes. Perianth scarious and brownish.

#### **16. Plantago**

2. Inflorescence various, but if a compact spike, then not with scarious perianth, the corolla white or brightly coloured.

3. Herbaceous vines or scandent herbs, climbing with twining petioles.

4. Corolla extending into a spur below.

#### **8. Cymbalaria**

4. Corolla merely gibbous or saccate at base.

5. Leaves hastate to sagittate, glabrous.

**13. Maurandya**

5. Leaves deltate to cordiform, sparsely glandular puberulent to glandular-villous.

6. Calyx deflated, urceolate, deeply incised, margins of the segments basally imbricate and planate or recurved; peduncles horizontal to ascending.

**12. Lophospermum**

6. Calyx inflated and campanulate, shallowly lobed, margins of the segments basally united; peduncles pendent.

**17. Rhodochiton**

3. Terrestrial or aquatic herbs or shrubs, not climbing with the petioles.

7. Leaves pinnatifid to finely dissected.

8. Leaves finely dissected, the lobes linear. Plants aquatic, submerged or floating.

Capsule ovoid.

**5. Benjaminia**

8. Leaves pinnatifid, the lobes linear to lanceolate. Plants terrestrial, small annual herbs. Capsule linear.

**19. Schistophragma**

7. Leaves not finely dissected, simple, lobed or pinnate.

9. Corolla saccate or spurred.

10. Corolla bisaccate.

**2. Angelonia**

10. Corolla single saccate or single spurred.

11. Corolla tube with narrow, often pointed, spur (longer than wide) at the base.

***Linaria***

11. Corolla tube with broad, rounded pouch (wider than long) at the base.

12. Calyx lobes more or less equal, all shorter than corolla tube. Corolla > 2.5 cm

**3. Antirrhinum**

12. Calyx lobes distinctly unequal, all longer than the corolla tube. Corolla < 2 cm.

***Misopates***

9. Corolla not saccate or spurred.

13. Calyx tubular-campanulate, near-entire, only shallowly 4-5 dentate.

**24. Uroskinnera**

13. Calyx campanulate, deeply lobed to the lobes nearly free, united at most to half the length of the calyx.

14. Calyx 4-lobed or 4-parted.

15. Stamens 2.

**25. Veronica**

15. Stamens 4.

16. Leaves alternate, stems creeping, rooting at the nodes throughout, leaves rotund-reniform.

**21. Sibthorpia**

16. Leaves whorled (or opposite), stems erect, not rooting at the nodes, leaves rhombic-ovate to linear-oblongate. **20. Scoparia**
14. Calyx 5-lobed or 5-parted..
17. Calyx segments dissimilar, the outer three much broader than the inner two.
18. Stamens 2, calyx 5-lobed. **1. Achetaria**
18. Stamens 4, rarely 5; calyx 5-parted, imbricate.
19. Corolla white to purple; bracteoles at the tip of the pedicel, often appearing to be part of the calyx or absent. **4. Bacopa**
19. Corolla yellow; bracteoles at the base of the pedicel. **14. Mecardonia**
17. Calyx segments more or less equal, or one of the 5 segments enlarged.
20. Pedicels (bi-)bracteolate.
21. Inflorescences cymose, sometimes pseudo-umbellate. **23. Tetranema**
21. Inflorescences racemose, spicate or flowers solitary in the leaf axils.
22. Leaves palmately veined.
23. Fertile stamens 4, the thecae dorsally pubescent with stiff white hairs. **9. Darcya**
23. Fertile stamens 2, the thecae glabrous. **11. Gratiola**
22. Leaves pinnately veined.
24. Flowers long-pedicellate; leaves petiolate, not clasping at base. **7. Conobea**
24. Flowers subsessile; leaves sessile, clasping at base (or petiolate). **22. Stemodia**
20. Pedicels ebracteolate.
25. Leaves alternate. **10. Digitalis**
25. Leaves opposite or whorled.
26. Prostrate herbs. **22. Stemodia**
27. Erect herbs or subshrubs.
26. Staminode present, well-developed; capsules glabrous. **15. Penstemon**
26. Staminode absent; capsules densely packed with elator-like hairs. **18. Russelia**

**1. Achetaria** Cham. & Schldl.

By M.J.M. Christenhusz.

Herbaceous or suffruticose herbs. Leaves opposite, petiolate. Inflorescences spicate or flowers solitary and axillary; pedicels bibracteolate. Calyx 5-lobate, the lobes more or less free to the base, unequal, imbricate. Corolla bilabiate, white to purple, the adaxial lip bifid, the abaxial lip trilobate. Fertile stamens 2. Style simple, stigma clavate. Fruit a septicidal capsule, secundarily loculicidal. Seeds numerous, reticulate-alveolate. 6 spp. Tropical America (north-eastern Nicaragua, Colombia to Brazil, Antilles).

**1. *Achetaria scutellarioides*** (Benth.) Kuntze, *Rev. Gen. Pl.* 2: 456 (1891), as ‘scutellarioides’. *Beyrichia scutellarioides* Benth., *Scroph. Ind.* 9 (1835). Holotype: Brazil, Bahia, *Salzmann s.n., ex Herb. Hookerianum* (K-000528958). Illustr.: not found.

Herbs to 50 cm, decumbent or erect suffruticose. Stems quadrangulate, pubescent, punctate-glandular. Leaves 0.3-1 × 0.2-0.8 mm, ovate, the bases acute to rounded, the margins crenate, the apices obtuse; petioles 1-2 mm. Flowers solitary, axillary, pedicel 1-2 mm, bibracteolate. Calyx 2-4 mm, the lobes linear, unequal in size. Corolla 4-6 mm, white or lilac. Capsule 1.5-2.5 mm, subglobose. Flowering and fruiting August to October. *Beach, coastal bluffs and savannas. H (Nelson & Vargas 4982, MO); N (Vincelli 587, MO). 0-80 m. (Mesoamerica, Colombia, Venezuela, Guayanas, Brazil, Trinidad, Antilles.)*

## **2. *Angelonia* Bonpl.**

*Phylacanthus* Benth., *Physidium* Schrad., *Schelveria* Nees, *Thylacantha* Nees & Mart. By M.J.M. Christenhusz & K. Barringer.

Annual or perennial herbs. Leaves opposite, the uppermost ones (bracts) sometimes subopposite or alternate, petiolate. Inflorescences elongate-racemose or spicate, the flowers sometimes solitary in the leaf axils. Peduncles one-flowered, ebracteate. Calyx 5-lobate, the lobes free nearly to the base, equal in size. Corolla cupuliform to campanulate, bilabiate, the throat with a broad, obtuse sac, the adaxial lip bilobate, the abaxial lip trilobate and bisaccate. Stamens 4, didynamous. Style with capitate stigma at the apex. Fruit a globose to elliptic, bivalvate, loculicidal capsule, secundarily septicidal. Seeds numerous. Approx. 25 spp. Mexico, Mesoamerica, South America, Antilles.

Bibliography: Barringer, K. A new species of *Angelonia* (Plantaginaceae) from Mexico, *J. Bot. Res. Inst. Texas* 4(1): 51–54 (2010).

Note: The taxonomy of *Angelonia* is complicated due to the many introduced species that easily naturalize. Apart from the three native species, which are treated below, Barringer (in review) identified 4 other species of South American origin (*A. biflora* Benth., *A. gardneri* Hook., *A. pilosella* Kickx and *A. salicariifolia* Humb. & Bonpl.) that are frequently cultivated in Mesoamerica. These are not treated here in full, but are included in the key, in case they may be naturalized.

1. Stem or inflorescence glandular-pubescent.

2. Leaves to 4 cm. Upper corolla lobes 2-3 mm wide. Yucatan, native.

**3. *A. parviflora***

2. Leaves more than 4 cm. Upper corolla lobes more than 3 mm wide. Cultivated.

3. Pedicels 2 per axil. Sepals acute. (Cultivated, from Brazil) ***A. biflora***

3. Pedicels 1 per axil. Sepals acuminate.

4. Capsules 10 mm diam. Lateral and median corolla lobes abaxially glabrous. Bracts ovate to cordate. (Cultivated, from Colombia, Venezuela). ***A. salicariifolia***

4. Capsules 6-8 mm diam. Lateral and median corolla lobes abaxially glandular-pubescent. Bracts lanceolate. (cultivated, from Brasil). ***A. gardneri***

1. Stem or inflorescence eglandular pilose to glabrous.

5. Sepals acuminate. Leaves long-acuminate to attenuate at the apex, glabrous or nearly so. **1. *A. angustifolia***

5. Sepals acute, cuspidate. Leaves obtuse to subacute, copiously villous.

6. Pedicels pubescent. Corolla tube 6-7 mm deep. Stem and leaves densely pubescent. Native. **2. *A. ciliaris***

6. Pedicels glabrous. Corolla tube 9 mm deep. Stem glabrous to slightly pubescent on the angles. (Cultivated, from Cuba, Jamaica). ***A. pilosella***

**1. *Angelonia angustifolia*** Benth. in DC., *Prodr.* 10: 254 (1846). Lectotype (designated by Christenhusz, 2010): Mexico, *Galeotti 1013* (K!). Illustr.: not found. N.v.: Xacxiu, boca de la vieja, xac-xvi, xakxiw, chi-bálam xíw (Y, QR).

Perennial herbs. Stems to 1 m, erect, simple or branched, glabrous throughout or nearly so. Leaves 5-10 cm, narrowly lanceolate, (sub-)sessile, the bases attenuate, the margins remotely or closely serrate, the apices acuminate or attenuate.

Inflorescence a long raceme; bracts foliose; pedicels slender, upcurved, mostly longer than the subtending leaves. Calyx lobes acuminate. Corolla 1.5-2 cm, dark-lilac or violet with a white throat. Capsule 5-6 mm, globose, glabrous. Ch (*Breedlove 26673*, MO); Y (*Cabrera 13763*, MO); C (*Cabrera 13930*, MO); QR (*Cowan 5097*, MO); ES (*Berendsohn y Berendsohn WB0192*, MO); N (*Vincelli 674*, MO); CR (*Martinez 142*, MO); P (*von Wedel 1961*, MO). 0-200 m. (Mexico, Mesoamerica, often cultivated as an ornamental plant and sometimes naturalizing, found naturalized in Brazil and the Antilles.)

**2. *Angelonia ciliaris*** B.L. Rob., *Proc. Amer. Acad. Arts* 45(17): 400 (1910).

Holotype: Belize, *Peck 417* (GH). Illustr.: Standley & Williams, *Fl. Guat., Fieldiana Bot.* 24: 328, t. 66 (1973). N.v.: Xac-xvi, xakxiw, chi-bálam xíw (Y, QR).

Perennial herbs. Stems 30-60 cm, erect, simple or sparsely branched, obtusely quadrangular, long-ciliate on the angles. Leaves 2-5 cm, oblong-lanceolate or spatulate-oblong, sessile, the bases often clasping, the margins serrate, the apices obtuse to subacute, laxly villous above, ciliate beneath on the costa. Inflorescence an elongate raceme; bracts broadly-ovate, subcordate at base; pedicels usually longer than the subtending bracts, glabrous, recurved at the apex. Calyx lobes c. 3.5 mm, lanceolate, acute, cuspidate. Corolla c. 1 cm, blue or lavender. Capsule 5 mm in diameter, globose. Ch (*Breedlove 55288*, MO); Y (*Cabrera 9090*, MO); C (*Martínez S., Álvarez & Jiménez J. 31550*, MO); QR (*Tellez 3394*, MO); B (*Davidse & Brant 32902*, MO); G (*Contreras 2026*, MO); H (*Clewell 4437*, MO); N (*Davidse & Pohl 2315*, MO). 0-100 m. (Mexico, Mesoamerica, Antilles.)

**3. *Angelonia parviflora*** Barringer, *J. Bot. Res. Inst. Texas* 4(1): 51 (2010).

Holotype: Mexico, Yucatán, *Lundell & Lundell 8028* (US; isotypes: F, GH, NY). Illustr.: Barringer, *J. Bot. Res. Inst. Texas* 4(1): 52, t. 1. (2010). N.v.: Xac-xvi, xakxiw, chi-bálam xíw (Y, QR).

Annual herbs, branching from a short taproot. Stems erect, to 20 cm, glabrous or glabrescent with glandular trichomes, slightly quadrangular. Leaves opposite, sessile, 3-4 × 0.8-1 cm, lanceolate, glandular-pubescent, the bases attenuate, the margins serrate, the apices acute. Inflorescence a terminal raceme; pedicels 1 cm, glandular at the base, bracteolate or ebracteolate. Sepals ovate, 2 × 1 mm, glabrous, the margins opaque, the apices acute. Corolla purple, the tube 3 mm, 5 mm deep, the

sacs 1-2 mm deep, with two pads of glandular trichomes on the forward surface within, the upper lobes  $3 \times 2-3$  mm, obovate, ciliate, the lateral lobes  $3 \times 2$  mm wide, obovate, ciliate, abaxially glabrous, the median lobe  $4 \times 1-3$  mm, oblong to obovate, adaxially glandular-pubescent, abaxially glabrous, the palate  $3 \times 2$  mm, crateriform, ciliate; horn 1 mm, bifid. Stamens 4 mm, the filaments glandular-pubescent, the thecae ellipsoid, sessile, divaricate. Ovary and style glabrous. Capsule 4-5 mm in diameter, globose, the fruiting pedicel 0.8-1 cm, slightly recurved. Seeds  $0.5-1.5 \times 0.5-1.5$  mm, obpyramidal to obconic, light brown, reticulate. Flowering March to October. *Seasonally wet, open grasslands and thorn scrub on stony, pitted land.* Y (Gaumer 2198, MO); QR (Téllez & Cabrera 3276, MO). 0-15 m. (Endemic.)

### 3. *Antirrhinum* L.

By M.J.M. Christenhusz.

Perennial, glabrous or glandular herbs. Leaves alternate or the lowermost opposite or verticillate, entire, linear to ovate, sessile or shortly petiolate, Inflorescence racemose. Bracts foliose, reduced upwards. Pedicels short or long, usually straight. Calyx deeply 5-parted, the segments equal or unequal. Corolla distinctly bilabiate, variously blue or purple to white or red or yellow, the tube ventrally pouched-saccate to strongly gibbous or short-spurred near the base, the throat closed by a prominent palate. Stamens 4, didynamous; filaments often dilated towards the apex. Style with capitate stigma, persistent and deflexed in fruit. Fruit a woody, asymmetrical capsule, the larger cell opening by 2 terminal pores, the smaller cell opening by a simple terminal irregularly split pore. Seeds numerous with irregular, tuberculate, corky ridges. c. 20 spp., northern hemisphere, most diverse in the Iberian Peninsula, commonly naturalized.

**1. *Antirrhinum majus* L., *Sp. Pl.* 2: 617 (1753).** Lectotype (designated by Sutton in Jarvis & al. (ed.), *Regnum Veg.* 127 : 19 [1993]): “Habitat in Europae australis maceriis, sepibus”, *Herb. Linn. No. 767.58* (LINN). Illustr.: Britton & Brown. *Illustr. Fl. N. U.S.* 3: 178 (1913). N.v.: Snapdragon (B), dragón, boca de dragón (G), boca de león (CR).

Herbs to 80 cm, perennial. Stems erect, much-branched. Leaves more or less sessile; blades  $3-7 \times 0.4-1.4$  cm, linear to narrowly lanceolate, base attenuate, margin

entire, apex acute to acuminate, pinnately veined. Inflorescences racemose with alternate flowers. Bracts short, ovate to broad-lanceolate. Pedicels ascending, stout, 3-9(-15) mm, Calyx 4.5-8 mm, lobes broadly ovate, unequal, the apices rounded to obtuse. Corolla (2.7-)3-4.2 cm, distinctly bilabiate, blue or purple to violet, white or with yellow parts, the tube ventrally gibbous near the base. Stamens dilated towards the apex. Capsule 10-15 mm, ovoid, asymmetrical with 3 pores at dehiscence. Seeds deeply reticulate. *Commonly grown in gardens and parks, seldom naturalizing in fields, along pavements and on masonry.* G (Standley & Williams, 1973); H (*Garcés* 125, MO) c. 1700 m. (Mediterranean Europe, Asia Minor, northern Africa, naturalized in Canada, United States, Mexico, Mesoamerica, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil, Argentina, northern and western Europe, temperate Asia, South Africa, Australia, New Zealand.)

*Misopates orontium* (L.) Raf., lesser snapdragon, a native of Europe has naturalized in warm temperate parts of the United States, Ecuador and the Antilles, and is to be expected in Mesoamerica. It resembles *Antirrhinum majus*, but differs in its 9-14 mm long corolla (instead of 27-42 mm) and linear calyx lobes (instead of broadly ovate lobes).

*Linaria vulgaris* Mill., the common toadflax, is another European snapdragon with long-spurred yellow flowers that has been cultivated in Honduras (*Williams & Molina* 12133, MO).

#### 4. *Bacopa* Aubl., nom. cons.

*Amphianthus* Torr., *Anisocalyx* Hance ex Walp., *Brami* Adans., *Bramia* Lam., *Caconapea* Cham., *Calytriplex* Ruiz & Pav., *Cardiophus* Griff., *Geochorda* Cham. & Schltl., *Habershamia* Raf., *Heptas* Meisn., *Herpestis* C.F.Gaertn., *Hydrantheium* Kunth, *Hydrotrida* SmallWilld. ex Britton & A. Br., *Macuillamia* Raf., *Mella* Vandelli, *Moniera* Juss. ex P. Br.owne, *nom. rej.*, *Monocardia* Penn.ell, *Ranaria* Cham., *Ranapalus* KelloggSeptas Lour., *Septilia* Raf., *Sinobacopa* D.Y.Hong, By M.J.M. Christenhusz.

Erect or creeping herbs. Leaves opposite. Flowers solitary, axillary or in terminal racemes. Bracteoles 0-2. Calyx consisting of 5, entirely free, unequal, imbricate segments, the outer 3 largest, the 2 innermost smallest. Corolla tubular; limb patent, conspicuously or obscurely bilabiate, the upper lip bilobed, the lower lip trilobed,

white to violet or purple. Stamens 4, didynamous or equal in length, very rarely 5; anthers free, parallel. Stigma dilated, capitate or bilobed. Capsule ovoid or globose, with 2 grooves, 4-valved. Seeds numerous, minute. 56 spp. Pantropical with the greatest diversity in the Neotropics.

*Bacopa* is sometimes confused with other small prostrate herbs like *Lindernia* and *Micranthemum* (Linderniaceae), *Callitriche*, *Stemodia* and *Mecardonia* that may be found in similar habitats. The latter differs in its bright yellow corolla but is otherwise similar to *Bacopa*.

1. Decumbent herbs, the stems often creeping, but the tips ascending; fruiting pedicels > 3 mm, usually longer than the subtending leaves.

2. Stems densely pilose, especially at the shoot apices.

**8. B. salzmannii**

2. Stems glabrous to minutely pubescent.

3. Leaves 1-veined, narrowly obovate or oblong, usually less than 4 mm wide.

**5. B. monnieri**

3. Leaves conspicuously palmately 9-10-veined, rotund, sometimes broadly obovate, mostly more than 5 mm wide.

4. Leaf margins dentate, veins 5-7.

**3. B. egensis**

4. Leaf margins entire, veins 9-10.

**4. B. repens**

1. Erect herbs; fruiting pedicels in most species (except *B. bacopoides*, *B. laxiflora*) < 2 mm, shorter than the subtending leaves.

5. Leaf bases hastate, usually auriculate around the stem.

**4. B. laxiflora**

5. Leaf bases attenuate, sometimes the winged petiole clasping the stem but not auriculate.

6. Stems pubescent (pilose or appressed).

7. Stems densely pilose; fruiting calices 3 mm or larger.

**1. B. axillaris**

7. Stems finely appressed pubescent; fruiting calices minute, < 2 mm.

**6. B. monnierioides**

6. Stems glabrous (to minutely glabrescent).

8. Fruiting calices petiolate, in leaf axils.

**2. B. bacopoides**

8. Fruiting calices sessile, often whorled.

**9. B. sessiliflora**

**1. *Bacopa axillaris*** (Benth.) Standl., *J. Wash. Acad. Sci.* 15(20): 460 (1925). *Herpestis axillaris* Benth., *Prodr.* 10: 396 (1846). Holotype: Colombia, *Purdie s.n.* (K-000533454). Illustr.: not found.

*Caconapea axillaris* (Benth.) Pennell, *Moniera axillaris* (Benth.) Kuntze.

Herbs to 20 cm, erect, succulent. Stems branched at the base, terete, ribbed, with conspicuous spreading hairs, these ca 1 mm. Leaves sessile, 2-3.5 × 0.5-1.2 cm, narrowly lanceolate, the bases tapering, the margins obtusely serrate in the distal part, entire at the basal half, the apices obtuse, faintly pinnately veined, palmate at base, glabrous or sparsely pilose at the midrib near the base below, densely glandular-punctate beneath. Inflorescences of axillary fascicles; pedicels 0.5-1.2 mm; bracteoles 2, 0.4-0.7 mm, spreading. Calyx 2.4-3 mm, the outer 3 lobes broadly ovate, rounded, the apex mucronate, sometimes ciliate, glandular-punctate, the inner 2 shorter, narrowly lanceolate, acute, densely glandular-punctate. Corolla 2.5-3 mm, white. Stigmas flattened. Capsule 2 mm, narrowly ovoid, acute, enclosed by the calyx. Flowering September-December. *Wet places, seasonal ponds, wet pastures.* G (Barringer & Burger, 2000); N (*Stevens 4165*, BM); CR (*Opler 1920*, MO); P (*Ebinger 864*, MO). 15-400 m. (Mesoamerica, Colombia, Venezuela, Ecuador, Bolivia, Paraguay.)

**2. *Bacopa bacopoides*** (Benth.) Pulle, *Enum. Vasc. Pl. Surinam* 415 (1906). *Herpestis bacopoides* Benth., *Prodr.* 10: 399 (1846). Holotype: Brazil, Pernambuco, *Gardner 1090* (K-000533472). Illustr.: Standley & Williams, *Fl. Guat., Fieldiana Bot.* 24: 331, t. 67 (1973).

*Bacopa bracteolata* Pennell ex Standl., *B. lacertosa* Pennell ex Standl.

Herbs to 1.5 m, erect, stoloniferous, aquatic. Stems angled, glabrate, much branched, apically with a few sessile globose tawny glands. Leaves sessile, 1.7-8 × 0.2-1.9 cm, ovate to lanceolate or linear, the bases attenuate, clasping, the margins serrulate in the upper part, the apices acuminate, glabrate, scabrid above and along the midvein beneath, inconspicuously punctate with dark brown glands, the midvein evident, with 2 obscure veins on each side. Inflorescences of 1 or 2 axillary flowers, the pedicels slender, to 15 mm, pilose with short white hairs or appearing pulverulent; bracteoles 2, cucullate, puberulent, near the top of the pedicel. Calyx 5-7 mm, the outer 3 lobes cordate, the apices obtuse, puberulent, the inner 2 narrow, acute, costate, ciliolate. Corolla 4-5 mm, white, sometimes tinged pink or lilac. Stigmas bifurcate.

Capsule c. 3 mm, globose, sometimes apically glandular, the outer sepals to 15 mm, becoming wing-like in fruit. Flowering and fruiting throughout the year. *Wet places along trails, roadsides, puddles, ditches, pastures, savannas, ponds, swamps, river banks, secondary forests.* T (Cowan 2658, MO); Y (Chan 7060, MO); B (Whitefoord 10186, BM); G (Tún Ortíz 2239, MO); H (Proctor 38815, BM); N (Moreno & Sandino 11993A, BM); P (Dressler 3217, MO). 0-500(-850) m. (Mesoamerica, Venezuela, Suriname, Brazil.)

*Bacopa aquatica* Aubl. is very similar to *B. bacopoides* in its flowers and habit. It differs merely in the leaf margins that are entire in *B. aquatica*. It also closely resembles the Philippine species *B. floribunda* (R. Br.) Wettst., which may be conspecific. Further study on this complex is necessary to satisfy species delimitation.

**3. *Bacopa egensis*** (Poepp.) Pennell, *Proc. Acad. Nat. Sci. Philadelphia* 98(2): 96 (1946). *Hydrantheium egense* Poepp., *Nov. Gen. Sp. Pl.* 3: 75, t. 287 (1845). Type: Brazil, *Poeppig s.n.* (not found, but a possible type seen in BM). Illustr.: not found.

Herbs, annual, mat-forming, usually aquatic. Stems prostrate or buoyant in water, creeping and rooting at nodes, branched, succulent. Leaves sessile, 1.5-3.4 × 1-1.7 cm, obovate to obovate-lanceolate, smaller on branches, the bases attenuate-cordate, clasping the stem, the margins widely dentate, the apices rounded to obtuse; veins many, 5-7, palmate, parallel. Inflorescences of single axillary flowers; pedicels 0.4-1 cm; bracteoles absent. Calyx 2.5-4 mm, the outer 3 ovate, the apices rounded, the inner 2 lanceolate, the apices acute, the margins ciliate. Corolla 3-4 mm, 5-lobed, the lobes spreading, about as long as tube, white. Stigmas furcate, recurved. Capsule 1.7-3.5 mm, globose. Flowering June-October. *Canals, rice fields.* H (Davidse & Pohl 2417, MO); N (Nee & Robleto Tellez 28147, BM); CR (Crow 5977, MO). 20-70 m. (United States (Louisiana), Mesoamerica, Colombia, Brazil.)

**4. *Bacopa laxiflora*** (Benth.) Wettst. ex Edwall, *Bol. Commiss. Geogr. Estado São Paulo* 13: 176. (1897). *Herpestis laxiflora* Benth., *Prodr.* 10: 396 (1846). Holotype: Brazil, *Gardner 2702* (K-000533414). Illustr.: not found.

*Bacopa auriculata* (B.L. Rob.) Greenm., *B. laxiflora* var. *scabra* Edwall, *Caconapea auriculata* (B.L. Rob.) Pennell, *Herpestis auriculata* B.L. Rob., *Mella laxiflora* (Benth.) Pennell.

Herbs to 45 cm, erect. Stems quadrangular, glabrate, sometimes with a few short gland-tipped hairs near the apex, much branched, rooting at the lower nodes. Leaves sessile, 0.6-3.5 × 0.2-1 cm, oblong or ovate, the bases short auriculate, the auricles usually denticulate, clasping and appearing perfoliate, the margins serrate in the upper part, the apices acute, the midvein prominent, the lateral veins c. 5 on each side, drying obscure above and scabrid-glabrate beneath. Inflorescences of solitary or paired, axillary flowers, the subtending leaves sometimes reduced to small bracts; pedicels slender, scabrid, mostly exceeding the leaves; bracteoles 2, to 1 mm, narrowly ovate, scale-like. Calyx c. 4 × 2.5 mm, the outer 3 sepals ovate, basally narrowed, apically acute, the inner 2 narrow, ciliolate. Corolla minute, lilac or purplish, pubescent within. Stigmas bifurcate. Capsule 3-4 mm, subglobose, eglandular. Flowering Nov-Jan. *Wet pastures, depression in savannas, around ponds, vernal pools.* CR (Grayum & Espinoza 11315, BM); P (Nee 8214, MO). 100-650 m. (Mexico, Mesoamerica, Colombia, Venezuela, Suriname, Bolivia, Brazil, Paraguay.)

**5. *Bacopa monnieri* (L.) Wettst., *Nat. Pflanzenfam.* 4(3b): 77 (1891), as 'Monniera'. *Lysimachia monnieri* L., *Cent. Pl.* 2: 9 (1756). Neotype (designated by Cramer in Dassanayake & Fosberg (eds.), *Revised Handb. Fl. Ceylon* 3: 421 (1981)): "*Moniera minima repens, foliis subrotundis, floribus singularibus alaribus*" in Browne, *Civ. Nat. Hist. Jamaica* 269: t. 28, f. 3 (1756). Illustr.: Britton & Brown, *Illustr. Fl. N. U.S.* 3: 192 (1913). N.v.: water-hyssop (USA)**

*Bacopa monnieri* (L.) Wettst., *Bramia indica* Lam., *B. monnieri* (L.) Drake, *Calytriplex obovata* Ruiz & Pav., *Gratiola monnieri* (L.) L., *Habershamia cuneifolia* (Michx.) Raf., *Herpestis cuneifolia* Michx., *H. monnieri* (L.) Kunth, *H. procumbens* Spreng., *Limosella calycina* Forsk., *Moniera africana* Pers., *M. brownei* Pers., *M. pedunculosa* Pers., *Septas repens* Lour.

Herbs prostrate to decumbent, succulent, glabrous. Stems creeping, to 50 cm, loosely ascending, rooting at nodes, much-branched. Leaves sessile, 0.5-2 × 0.15-0.8 cm, oblong-oblancheolate, the bases cuneate, the margins entire or denticulate, the apices rounded, with 1-3 parallel veins from the base of the blade, glabrous. Inflorescences of solitary axillary flowers; pedicels 0.5-1(-3.5) cm; bracteoles 2, 1.3-4.5 mm, lanceolate-linear, below calyx. Calyx 4.2-7 mm; outer 3 sepals succulent, ovate-lanceolate, apices rounded, inner 2 lanceolate to linear, keeled, ciliate. Corolla 6-9 mm, campanulate, 5-lobed, nearly regular, but the lower central lobe somewhat

longer and more separated from the other lobes, white, pink or lavender blue, often with purple lines, the throat dark purple, the tube yellow within. Stigma capitate, united. Capsule 4.5-5 mm, ovoid, enveloped in persistent calyx. Flowering and fruiting throughout the year. *Wet places, roadsides, gardens, lawns, along streams and lakes, wooded slopes, on the edges of mangrove swamps and on sandy beaches along the coast.* T (Novelo R. & Ramos V. 2798, MO); Ch (Alvarado C. 487, BM); Y (Carnevali et al. 6432, MO); C (Cabrera 14357, MO); QR (Cabrera 13105, MO); B (Whitefoord 8232, BM); G (Harmon 2445, MO); H (Nelson & Hernández M. 116, MO); ES (Sidwell, Villacorta & Monro 665, BM); N (Moreno 9053, MO); CR (Davidse & Herrera 30885, MO); P (Fendler 217, BM). 0-2800 m. (S & SE United States, Mexico, Mesoamerica, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil, Paraguay, Uruguay, Chile, Argentina, Trinidad, Antilles, Paleotropics [e.g. China, Saudi Arabia, Madagascar], sometimes cultivated and naturalized.)

For a discussion on the complex nomenclature of the species see Philcox, *Kew Bull.* 33: 679-680 (1979).

**6. *Bacopa monnierioides*** (Cham.) B.L. Rob., *Proc. Amer. Acad. Arts* 44(21): 614 (1909). *Ranaria monnierioides* Cham., *Linnaea* 8: 31 (1833). Lectotype (designated by Christenhusz, 2010): Brazil, *Sello s.n.* (K-000533423). Illustr.: not found.

*Bacopa beccabunga* (Griseb.) Pennell, *B. parviflora* Pennell ex Standl., *B. punctata* Pennell, *B. ranaria* Benth. ex Chodat & Hassl., *Herpestis ranaria* Benth., *H. ranaria* var. *panamensis* Seem., *Caconapea parviflora* Pennell, *Ranaria monnierioides* Cham.

Herbs to 45 cm, erect, semi-aquatic. Stems angular, rooting at the lower nodes, puberulent with weak, curled whitish hairs. Leaves sessile, 0.4-3 × 0.1-0.6 cm, narrowly oblong, the bases clasping, the margins entire or minutely denticulate, the apices obtuse or acute, the midvein prominent, the lateral venation obscure, palmate, strongly ascending, glabrous, both sides punctate with numerous sessile glands. Inflorescences of axillary, 1-5-flowered fascicles, the subtending leaves sometimes reduced to small bracts; pedicels to 1 mm, ebracteate. Calyx c. 1.5 mm, the outer 3 lobes ovate, to 0.7 mm wide, punctate with sessile glands, the inner 2 lobes narrow, acute, minutely ciliate. Corolla exerted c. 0.5 mm from the calyx, tubular, 4-lobed, white or bluish white, drying orange. Stigma convolute, crestlike. Capsule c. 1.5 mm

long, globose, eglandular. Flowering November-December. *Swamps, muddy places, in standing water, wet savannas.* G (Standley & Williams, 1973); H (Standley & Williams, 1973); N (Standley & Williams, 1973); CR (*Grayum et al. 12252*, MO); P (*Killip 3240*, MO). 0-1000 m. (Mexico, Mesoamerica, Colombia, Venezuela, Guyana, Bolivia, Brazil, Paraguay, Cuba.)

**7. *Bacopa repens*** (Sw.) Wettst., *Nat. Pflanzenfam.* 4(3b): 76 (1891). *Gratiola repens* Sw., *Prodr.* 14 (1788). Holotype: Jamaica, Swartz *s.n.* (S, isotype BM!).  
Illustr.: not found.

*Bacopa curtipes* Standl. & L.O. Williams, *B. limosa* (Pennell) Standl., *Herpestis repens* (Sw.) Schltldl. & Cham., *Hydrantheium repens* (Sw.) Pennell, *Macuillamia limosa* Pennell, *M. repens* (Sw.) Pennell, *Sinobacopa aquatica* D.Y.Hong.

Herbs, mat-forming. Stems prostrate or buoyant in water, creeping and rooting at nodes, branched, succulent. Leaves sessile, 1.2-2.5 × 0.7-1.3 cm, obovate to obovate-lanceolate, smaller on branches, the bases attenuate-cordate, clasping the stem, the margins entire, the apices rounded to obtuse; veins many, 9-10, palmate, parallel. Inflorescences of single axillary, pendulous flowers; pedicels 0.4-2 cm; bracteoles absent. Calyx 2.7-4.2 mm, the outer 3 lobes ovate, the apices rounded, the inner 2 lanceolate, the apices acute, the margins ciliate. Corolla 3-4 mm, 5-lobed, the lobes spreading, about as long as tube, white, rarely tinged blue. Stigmas furcate, recurved. Capsule 1.7-3.5 mm, globose. Flowering June-October. *Paddy fields, temporary puddles, wet meadows, shallow ponds, gravel pools, seaside fresh water marshes, swamps.* T (Ventura A. 20408, MO); Ch (*Breedlove 27340*, MO); B (*Schipp 992*, MO); G (*Aguilar 179*, MO); H (*Davidse & Pilz 31669*, BM); ES (*Carballo 856*, MO); N (*Seymour 2929*, BM); CR (*Crow 7592*, MO); P (*Bartlett & Lasser 16961*, MO). 0-1400 m. (Southeastern United States, Mexico, Mesoamerica, Colombia, Venezuela, Guyana, Ecuador, Peru, Argentina, Greater Antilles, naturalized in the paleotropics.)

**8. *Bacopa salzmännii*** (Benth.) Wettst. ex Edwall, *Bol. Commiss. Geogr. Estado São Paulo* 13: 176 (1897). *Herpestis salzmännii* Benth., *Companion Bot. Mag.* 2: 58 (1836). Type: Brazil, *Salzmann 400* (holotype K-000533401, isotype MO).  
Illustr.: D'Arcy, *Fl. Panama, Ann. Missouri Bot. Gard.* 66: 191, t. 3. (1979).

*Bacopa humilis* (Pennell) Standl., *B. lilacina* (Pennell) Standl., *B. salzmannii* var. *coerulea* Beauverd, *B. violacea* (Pennell) Standl., *Herpestis ciliata* Pennell, *Monocardia humilis* Pennell, *M. lilacina* Pennell, *M. violacea* Pennell, *Scrophularia procumbens* Vell.

Herbs to 45 cm, prostrate or scrambling-erect, somewhat succulent, mat-forming, aquatic or terrestrial. Stems often rooting at the lower nodes, puberulent with weak, curled whitish hairs. Leaves sessile, 0.6-1.9 × 0.3-1.6 cm, narrowly oblong, sessile, the base cordate, clasping, the margins entire or minutely denticulate, sometimes slightly inrolled, the apices obtuse or acute, the midvein prominent, the lateral venation palmate, glabrous, punctate-glandular. Inflorescences of axillary fascicles of 1-5 flowers; pedicels to 1.4 mm long, ebracteate. Calyx c. 1.5 mm, the outer 3 lobes ovate, the bases deeply cordate, to 0.7 mm wide, prominently costate, conspicuously glandular-punctate, the inner 2 lobes narrow, apices acute, minutely ciliate. Corolla, c. 6 mm, tubular, 4-lobed, white or bluish white, drying orange, exerted from the calyx, Stigmas convolute, crestlike. Capsules c. 1.5 mm. Flowering and fruiting throughout the year. *Floating or terrestrial along lake edges, swamps, bogs, puddles, woodland, wet pastures and meadows, damp roadsides, ponds, ditches, slopes in Pinus forest.* T (*Barlow 30/81*, BM); Ch (*Ton 2531*, F); G (Standley & Williams, 1973); ES (*Sidwell et al. 711*, BM); H (*Croat & Hannon 63949*, MO); N (*Stevens 20833*, MO); CR (*Vargas 1079*, MO); P (*Folsom & Kauke 2758*, BM). 0-1500 m. (Mexico, Mesoamerica, Colombia, Venezuela, Guyana, Bolivia, Brazil, Paraguay, Argentina, Antilles.)

**9. *Bacopa sessiliflora*** (Benth.) Edwall, *Bol. Commiss. Geogr. Estado São Paulo* 13: 175 (1897). *Herpestis sessiliflora* Benth., *Companion Bot. Mag.* 2: 58. 1836. Holotype: French Guiana, Cayenne, *Leprieur s.n.* (K-000533406). Illustr.: not found.

*Bacopa acuta* (S. Moore) Pennell, *B. conferta* (Pennell) Standl., *B. decumbens* (Fernald) F.N. Williams, *Caconapea conferta* Pennell, *C. sessiliflora* (Benth.) Pennell, *Herpestis acuta* S. Moore, *H. decumbens* Fernald.

Herbs to 50 cm, erect, glabrous. Stems branched, obscurely quadrangular. Leaves sessile, 2-4(-5) × 0.2-0.6(-1) cm, linear to narrowly oblanceolate, the bases attenuate, narrowed, the margins (shallowly) dentate, the apices acute; glandular punctate, pinnately veined. Inflorescences of solitary, axillary, subsessile flowers;

pedicels 0.2-1.5 mm; bracteole 1, 1-2 mm, linear. Calyx 3.3-6 mm, the outer 3 lobes broadly ovate, rounded, glandular punctate, the inner 2 shorter, lanceolate, acute. Corolla 3-3.5 mm, white, sometimes tinged lilac, the throat yellow. Style forked. Capsule 2.5-3 mm, ovoid. Flowering July-March. *Wet places, moist sandy ditches, savannas, shores, along lagoons, in wet scrub, beaches and mudflats along the coast, often in standing water.* Ch (*Breedlove 38499*, MO); B (*Gentle 9439*, MO); G (Standley & Williams, 1973); H (*Proctor 38917*, BM); N (*Ortiz 697*, BM); CR (*Hammel 19996*, MO); P (*Nee 9388*, MO). 0-750 m. (Mexico, Mesoamerica, Colombia, Venezuela, Guyana, Suriname, French Guiana, Ecuador, Brazil, Greater Antilles.)

### 5. *Benjaminia* Mart. ex Benj.

*Naiadothrix* Pennell ex Britton, *Quinquelobus* Benj.

By M.J.M. Christenhusz.

Rooted, submerged, aquatic herbs. Stems sometimes rooting at the nodes, glabrous, glabrescent or pubescent, glandular punctate. Leaves verticillate, deeply pinnately dissected, the segments filiform. Inflorescences solitary flowers in the leaf axils, the pedicels elongate in fruit, without bracts. Calyx 5-parted, the segments separate to near the base, subequal. Corolla bilabiate, the lobes rounded. Stamens 4, didynamous. Ovary obtuse, bilocular, surrounded by sterile filaments or tufts. Style straight; stigma flat, curved. Fruit an ovoid membranaceous capsule. Seeds numerous, oblong, longitudinally reticulate. 1 sp. Neotropics.

Bibliography: D'Arcy, W.G. *Ann. Missouri Bot. Gard.* 66: 193-196 (1979).

Smith L.B. & Pires, J.M. *J. Washington Acad. Sci.* 46: 86-86 (1956).

**1. *Benjaminia reflexa*** (Benth.) D'Arcy, *Ann. Missouri Bot. Gard.* 66: 194 (1979). *Herpestis reflexa* Benth., *Prodr. Syst. Nat. Regni Veg.* 10: 399 (1846). Lectotype (designated by D'Arcy, *Ann. Missouri Bot. Gard.* 66: 194. 1979): Brazil, Goias, *Gardner 4347* (K, dupl. MO). Illustr.: D'Arcy, *Fl. Panama, Ann. Missouri Bot. Gard.* 66: 195, t. 4. (1979).

*Bacopa longipes* (Pennell) Standl., *B. naias* Standl., *B. reflexa* (Benth.)

Edwall, *Benjaminia utriculariiformis* Mart. ex Benj., *Limnophila costaricensis* Suess.,

*Monniera reflexa* (Benth.) Kuntze, *Naiadothrix longipes* Pennell, *N. reflexa* (Benth.) Pennell, *Quinquelobus utriculariaeoides* Benj., *Q. utricularaeiformis* Benj.

Herbs with rooting stems, floating, aquatic. Stems frequently branching, the nodes sometimes jointed, sometimes rooting, glabrate or pubescent with weak, curved white, multicellular hairs, glandular punctate throughout. Leaves verticillate, 6-8 leaves per node, 0.2-3.5 × 0.02-1.4 cm, deeply imparipinnately dissected, with 5-20 segments on each side, these filiform, flat, the rachis broadly flattened, the leaf bases sometimes united into a rudimentary column; petiole absent or minute. Inflorescence of solitary flowers in the leaf axils, 1 per node, held above the water surface. Pedicels 0.05-1.8 cm, becoming to 2.5 cm long in fruit, ebracteate. Calyx c. 2-5 mm, 5-parted to the base, the lobes equal, narrowly lanceolate, cucullate, ciliate at the apex, punctate, persistent, enlarged and more angular in fruit. Corolla exerted c. 5 mm from the calyx, bilabiate, the lobes rounded, bluish pink or mauve with a yellow centre. Capsule c. 2.5 mm, ovoid, shorter than the calyx, probably not dehiscent, the style persistent. Seeds numerous, c. 0.6 mm, yellowish-brown. *Aquatic pools and swamps in savannas.* T (Cowan 2165, MO); B (Schipp 610, BM); H (Proctor 38987, BM); N (Haynes 8411, BM); CR (Crow 6239, MO); P (Knapp & Clary 3370, MO). 10-100 m. (Mexico, Mesoamerica, Colombia, Venezuela, Guyana, Suriname, French Guiana, Ecuador, Peru, Bolivia, Brazil, Antilles.)

A single species differing greatly throughout its geographic range. In Belize the plants are more robust with more angular stems, the Panamanian collections are hairier, in Cuba the capsules are flattened or emarginate and glandular, capsules from Brazil are subacute and not evidently glandular. A case could be made for splitting this species into a number of taxa, but the degree of phenotypic variation is not known. Studies of the plants in cultivation under controlled conditions may shed more light on these fascinating plants.

## 6. *Callitriche* L.

By R.V. Lansdown & M.J.M. Christenhusz.

Submersed, amphibious, or terrestrial, perennial, monoecious, or rarely dioecious herbs. Stem terete, usually filiform, rooted at least at basal nodes. Leaves opposite, decussate, exstipulate, somewhat congested toward the apex of stems reaching the water surface, forming a rosette, linear or spatulate, the bases often joined by a ridge

of tissue extending across the node, the margins entire or very rarely denticulate, the apices notched, always with a mid-vein, often with a series of secondary veins anastomosing or looped and interconnected. Scales (often described as glandular) on stems, leaves and in leaf axils; with a short stalk and those on stem and leaves with a disk of radiating cells, those in leaf axils fan-shaped. Inflorescences simple, axillary; flowers imperfect, minute, carpellate and staminate sometimes in same axil in various combinations, perianth absent, a subtending pair of bracts present in some species. Staminate flowers solitary, filament short or long, anther dehiscent laterally by longitudinal slits. Carpellate flowers bicarpellate, generally abaxial to staminate flower, in some a short gynophore present; carpels collateral, compressed transversely, commissures between the carpels perpendicular to the stem axis, four locular from a false septum extending inward from the midrib region of each carpel; styles 2, apical, central, long or short, stigmas two, erect or reflexed, papillate. Fruits a schizocarp, separating into four nutlets; nutlets dry, winged or not. Seed coat thin. c. 75 spp. Global (except Antarctica), in tropical regions it is mainly found in montane terrestrial environments, and plays only a minor part in aquatic ecosystems.

Bibliography: Fassett, N.C. *Rhodora* 53: 137-155, 161-182, 185-194, 209-222 (1951). Hegelmaier, C.F. *Monogr. Callitriche*. i-v, 5-64, t. 1-4. (1864). Lansdown, R.V. *Water starworts of Europe*. BSBI Handbook 11 (2008). Miller, N.G. *Harvard Pap. Bot.* 5(2): 277-301 (2001).

The taxonomy of American *Callitriche* was last thoroughly revised by Fassett (1951). Subsequently some work has been carried out on South American (Baciglupo, 1979) and North American (Lansdown, 2009) members of the genus but nothing was focussed on Mesoamerica. The study of *Callitriche* in Mesoamerica is hampered by extremely small numbers of specimens combined with unreliable identifications in herbaria and in literature.

1. Mericarps swollen or (in dried material) with the bases swollen at the point where they meet, such that there is no evident flat face. **3. C. peploides**

1. Mericarps without swollen bases, at least one face flat.

2. Fruits pedunculate with peduncles 6 0.2 mm long; fruits much wider than long.

**4. C. terrestris**

2. Fruits sessile or subsessile; fruits longer than or as long as wide.

3. Fruits as wide as or wider than long; mericarps divergent at apex.

**1. C. heterophylla**

3. Fruits longer than wide; mericarps not divergent at apex.

**2. C. palustris**

**1. Callitriche heterophylla** Pursh, *Fl. Amer. Sept.* 1: 3 (1814). Type: United States, not designated. Illustr.: not found.

Stems white to pale green, not contrasting strongly with the colour of the leaves, usually much-branched, occasionally simple; internodes decreasing in length gradually along shoots to just below rosettes. Lingulate leaves (4.1-)0.69-24.7 × 0.3-1.1 mm, often elongate and very fine, shallowly to deeply notched at the apex. Expanded leaves 3.7-5.7 × 2.1-3.5 mm, obovate or oblong, occasionally tapering gradually into the petiole, often with a broadly sub-circular blade tapering abruptly to the petiole; petiole 2.5-5.2 mm; subsidiary venation characterized by a pair of secondary veins that anastomose with the primary vein near the leaf apex, usually with a pair of tertiary veins outside the secondary veins and few to many loops and arcs outside these. Flowers usually solitary or a single staminate and a single pistillate flower in the same axil, opposed by a solitary flower or occasionally with 2 pistillate flowers. Bracts (0.1-)0.13-1.3 mm, falcate or ovate, caducous. Filaments 0.8-3.8 mm. Anthers 0.2-0.3 × 0.2-0.4 mm, reniform or orbicular. Pollen ellipsoid, yellow, ornamented. Styles 1-6 mm, persistent or caducous, erect or spreading. Fruit 0.6-0.8 × 0.6-0.8 mm, ± as wide as long, usually cordate with mericarps more rounded and divergent at the apex, occasionally narrower at the apex than base, sessile, black when ripe, mericarps parallel. Wing absent or very narrow and only at the apex. *In North America occurring in most water body types, fast-flowing rivers and streams, backwaters, ditches, swamps, bogs, lakes, ponds, springs and seepages; also terrestrial on damp soil in shade; very rare in Mesoamerica.* Ch (Breedlove 9238, F); G (Bacigalupo, 1979). 2-3000 m. (Canada, United States, Mexico, Mesoamerica, Venezuela, Ecuador, Uruguay, Argentina, Antilles.)

Fasset (1951) reports a single specimen (*Steyermark 50222*) of *C. heterophylla* from Guatemala, which is presumably the source of the report by Bacigalupo. However material with that number in F cannot be determined with confidence as it lacks mature fruit. *Callitriche heterophylla* is widespread and abundant in North America (Lansdown, 2009), south to Veracruz and Chiapas in Mexico. The only other

reports of this species south of California are by Bacigalupo (1979). We have only been able to confirm a single specimen from Mesoamerica.

**2. *Callitriche palustris* L., *Sp. Pl.* 2: 969 (1753).** Lectotype (designated by Lansdown & Jarvis, 2004: 171): Europe, *Linnaeus 13.2*, lowermost three specimens on sheet (LINN-13.2). Illustr.: not found.

*Callitriche androgyna* L., *C. fallax* Petrov, *C. palustris* L. var. *minima* L., *C. palustris* var. *verna* (L.) Fenley ex Jepson, *C. stenocarpa* Hegelm., *C. verna* L.

There are a number of reports of *C. palustris* from Mesoamerica, including an account of the species in the Flora of Guatemala (Standley & Steyermark, 1949). Standley & Steyermark (1940) reported *C. palustris* “In pools of spring-fed streams, 3,400-3,700 meters. Huehuetenango (near Tojquiá and Tunimá). The accompanying description could apply to this species or *C. heterophylla* Pursh. No specimens of *C. palustris* have been confirmed south of Texas. It is therefore not likely that this species occurs in Mesoamerica, but it was included in the key here in case specimens are found in the future.

**3. *Callitriche peploides* Nutt., *Trans. Amer. Philos. Soc.*, n.s. 5: 141 (1835).** Lectotype (designated by Lansdown, 2006: 115): United States, Arkansas, *Nuttall s.n.* (NY-248737). Illustr.: not found.

*Callitriche drummondii* Hegelm., *C. peploides* Nutt. var. *media* Fassett, *C. peploides* var. *semialata* Fassett.

Stems white to pale green, not contrasting strongly with the colour of the leaves, usually much-branched; internodes gradually decreasing in length along shoots to just below apices. Lingulate leaves absent. Expanded leaves 1.4-2.3 × 0.4-1.5 mm, spatulate-obovate, often pointed and lacking an apical notch, tapering into petiole, petiole 0.8-1.2 mm; subsidiary venation characterized by two secondary veins arising from the base of the blade and rejoining the primary vein toward the leaf apex. Flowers not solitary, usually a staminate and pistillate flower in one of a pair of axils, opposed by a solitary pistillate flower. Bracts absent. Filaments 0.2 mm. Anthers 1 × 1 mm, reniform. Pollen ± spherical, yellow, ornamented. Styles 0.2-0.5 mm, persistent, erect, patent or loosely reflexed. Fruit 0.4-0.7 × 0.7-0.9 mm, wider than high, tapered toward the base, each mericarp swollen at the base so that from above fruit appears square, sessile, mature fruit black, mericarps parallel. Wing absent to

narrow throughout. Flowering and fruiting (January-)February-April and possibly October-December(-May) and October-December, depending on rain. *Seasonally damp hollows, usually on sandy soils in woodland and scrub, along trails and frequently as a weed of gardens and disturbed ground and rocky areas.* Ch (Trelease 28/05, MO); G (Standley 83331, F); H (Standley 25647, F); CR (Fassett, 1951). 1000-2500 m. (United States, Mexico, Mesoamerica.)

Three varieties of *C. peploides* have been recognized (Fassett, 1951), including var. *media* and var. *semialata* from Mesoamerica. The characters used to distinguish these varieties do not appear reliable and it seems best to disregard them unless further study shows them to be valid.

**4. *Callitriche terrestris* Raf., *Med. Repos. New York* 5: 358 (1808). Type:** United States, not designated. Illustr.: not found.

*Callitriche austinii* Engelm., *C. deflexa* A. Braun ex Hegelm., *C. deflexa* var. *austinii* (Engelm.) Hegelm., *C. deflexa* var. *subsessilis* Fassett, *C. terrestris* Raf. subsp. *subsessilis* (Fassett) Bacig. *C. terrestris* subsp. *turfosa* (Bertero ex Hegelm.) Bacig., *C. turfosa* Bertero ex Hegelm.

Stem white to pale green, not contrasting strongly with the colour of the leaves, usually much-branched; internodes decreasing in length gradually along shoots to just below apices. Lingulate leaves absent. Expanded leaves 1.5-3.9 × 0.8-1.4(-1.5) mm, uniformly obovate-ob lanceolate to spatulate, tapering to the petiole; petiole 0.1-1.2 mm; subsidiary venation characterized by two secondary veins derived from the base of the blade and rejoining the primary vein toward the leaf apex. Flowers solitary or a staminate flower and pistillate flower opposed by a solitary pistillate flower, or rarely a staminate and pistillate in each of a pair of axils. Bracts absent. Filament 0.1-0.4 mm, not lengthening after dehiscence. Anther (0.1-)0.2 × 0.2-0.3 mm, slightly wider than high. Pollen, spherical, yellow, ornamented. Styles 0.2-0.7 mm, persistent, deflexed, lengthening after fertilization. Fruit (0.5-)0.6-0.7(-0.8) × (0.5-)0.8-1 mm, wider than high, fruit very consistently shortly-pedunculate, with peduncles 0.4-0.6 mm long; black when ripe; mericarps parallel. Wing 0.01-0.03 mm. only at top. Flowering April-July(-August) and November-December. *On seasonally damp soil, in wet hollows, in cultivated fields, rocky ground, paths, tracks and on sandy river bars.* G (Steyermark 32440, F); H (Standley & Molina 4250, F);

CR (*Godfrey 67106*, MO). (United States, Mexico, Mesoamerica, Colombia, Ecuador, Peru, Bolivia, Brazil, Paraguay, Argentina, Paleotropics.)

Widely distributed but rarely collected in Mesoamerica, further study is needed.

## 7. *Conobea* Aublet

By M.J.M. Christenhusz.

Erect herbs. Stems quadrangular. Leaves opposite, sessile or petiolate, serrate, pinnately veined. Inflorescences racemose or flowers solitary in leaf axils. Bracteoles 2 at the apex of the pedicel, directly beneath the calyx. Calyx 5-parted, divided to near the base, equal. Corolla 5-lobed, bilabiate, palate pubescent. Stamens 4. Style branched; stigmas flattened. Fruit a septicidal and loculicidal capsule, 4-valved, globose. Seeds numerous, longitudinally ribbed. c. 7 spp. Mexico, Mesoamerica, Colombia, Venezuela, Guyana, Suriname, French Guiana, Ecuador, Peru, Brazil, Antilles.

**1. *Conobea scoparioides*** (Cham. & Schltld.) Benth. in DC., *Prodr.* 10: 391 (1846). *Sphaerotheca scoparioides* Cham. & Schltld., *Linnaea* 2: 606 (1827).

Holotype: Brazil, *Sellow s.n.* (HAL-98474). Illustr.: not found.

Herbs to 90 cm. Stems quadrangular, the angles ridged, rooting at the basal nodes. Leaves petiolate to subsessile, the petiole 0.3-1.2 cm, blade 2.5-10 × 0.7-2(-3.2) cm, lanceolate to ovate-lanceolate, the bases attenuate, the margins crenate-serrate, the apices acute, glaucous below, glandular punctate. Inflorescence racemose, with 2 (or 3) flowers per node; pedicels 1-1.7 cm; bracteoles 0.5-2.5 mm, narrowly lanceolate to subulate, usually appressed to the calyx. Calyx 2-5 mm, the segments broadly lanceolate, the apices acuminate or caudate, ciliate. Corolla 5-7(-9) mm, blue to violet or mauve, often whitish within, pubescent. Style 1.6-2.2 mm, distally pubescent, curved at the fork. Capsule 2-4 mm, depressed-globose. Seeds 0.2-0.7 mm, ribbed-reticulate, pale brown. *Marshes and other wet places.* Ch (*Breedlove 22195*, MO); T (*Cowan 3324*, MO); P (*Whitefoord & Eddy 507*, BM). 30-900 m. (Mexico, Mesoamerica, Colombia, Ecuador, Peru, Brazil.)

## 8. *Cymbalaria* Hill.

By M.J.M. Christenhusz.

Herbs, trailing or twining. Leaves alternate, long-petiolate, palmately lobed and veined. Inflorescence of solitary flowers in leaf axils. Calyx deeply 5-parted, the segments equal, exceeded by the capsule. Corolla bilabiate, the upper lip external in bud, the tube short-spurred at the base on the lower side, the throat closed by a prominent palate. Stamens 4, didynamous. Stigma capitate. Fruit a symmetrically globose capsule, first rupturing distally with 2 pores that are later extended to the base. Seeds ellipsoid. c. 9 spp. western and southern Europe to Iran.

**1. *Cymbalaria muralis*** P. Gaertn., B. Mey. & Scherb., *Oekon. Fl. Wetterau* 2: 397 (1800). *Antirrhinum cymbalaria* L., *Sp. Pl.* 2: 612 (1753). Lectotype (designated by Pennell in *Monogr. Acad. Nat. Sci. Philadelphia* 1: 316 (1935): "Habitat in rupibus & muris antiquis Basileae, Parisiis, Harlemi", *Herb. Linn. No.* 767.1 (LINN). Illustr.: Holmgren & Molau, 1984. *Fl. Ecuador* 21: 49, t. 4 C-E. N.v.: Alfombrilla (G).

*Antirrhinum hederaceum* (L.) Lam., *A. hederifolium* (L.) Salisb., *Elatine cymbalaria* (L.) Moench, *Linaria cymbalaria* (L.) Mill.

Herbs, perennial with trailing and twining stems, glabrous, often rooting at the nodes, sometimes pendent from walls or rocky slopes. Leaves with long slender twining petioles. Petioles 1.5-5.5 cm. Leaf blades 1-2.5(-3) × 1-3.5(-4) cm, suborbicular to reniform in outline, fleshy, palmately 5-9-lobed, the lobes broadly rounded with a mucronate tip, palmately 3-5-veined. Pedicels elongate, flexuose, 1-3.5 cm at anthesis, to 6 cm in fruit. Calyx 1.5-2 mm long, enlarged to 3 mm in fruit, the segments lanceolate, unequal in size. Corolla 6-10 mm long, strongly bilabiate, the spur 1.3-2.2 mm, ventrally at the base, blue to pale violet, rarely white, the palate creamy white with yellow marks on the ridges, the lower lip with 3 spreading lobes, the upper lip with 2 erect lobes. Capsule 2.5-3.5 mm long, globose, actively planted by the enlarged petiole. Seeds numerous, cork-winged. *Naturalized on rocky slopes, in gardens and on stone or adobe walls.* Ch (Mendez Larios & Villaseñor Ríos, 2001); G (*Christenhusz* 5738, BM); H (*Castro T. 136*, MO); CR (*Khan et al 32*, BM). 1000-2000 m. (Native to western and southern Europe, escaping from cultivation in Canada, United States, Mexico, Mesoamerica, Colombia, Ecuador, Bolivia, Brazil, Chile, Argentina, Antilles, Northern Europe, temperate Asia, South Africa.)

**9. Darcya** B.L. Turner & C. Cowan

By M.J.M. Christenhusz.

Herbs to 1 m, perennial, suffruticose. Stems woody at base, somewhat quadrangulate. Leaves opposite, simple, petiolate, with 3-5 principal nerves, or somewhat subpinnately veined, the margins serrulate. Inflorescence of terminal bibracteate racemes. Calyx lobes free, uniform. Corolla tubular, zygomorphic, bilabiate. Stamens sessile, the thecae dorsally pubescent with stiff white hairs. Fruit an ovoid, quadrivalvate capsule with persistent styles. Seeds trapezoidal, alveolate-reticulate. 2 spp. (Mesoamerica, Colombia).

The two species in this genus were previously included in *Stemodia*, because the capsular and calyx characters are similar, but they differ from that genus in having 3-5 nerves arising from the leaf base, trapezoidal seeds, pubescent anthers and short styles.

Bibliography: Turner, B.L. *Phytologia* 73: 251-254 (1992). Turner B.L. & C. Cowan. *Phytologia* 74: 267-270 (1993).

1. Leaf blades broadly ovate to subdeltoid; inflorescences and sepals glabrous; corolla strongly bilabiate.

**1. D. costaricensis**

1. Leaf blades ovate-oblongate; inflorescences and sepals hairy; corolla weakly bilabiate.

**2. D. reliquiarum**

**1. *Darcya costaricensis*** (B.L. Turner) B.L. Turner, *Phytologia* 74: 268 (1993). *Stemodia costaricensis* B.L. Turner, *Phytologia* 73: 253 (1992). Holotype: Costa Rica, *Almeda & Nakai 4734* (TEX, isotype: CAS). Illustr.: not found.

Herbs to 1 m, suffruticose, sprawling or trailing, glabrous. Petioles c. 3-8 mm; blades 2-4 × 1-1.8 cm, broadly ovate to triangular ovate, trinervate to somewhat subpinnately veined, minutely punctate below, the bases attenuate, the margins serrulate, the apices obtuse. Inflorescence a terminal bracteate raceme; pedicels 8-14 mm, glabrous. Calyx 3-4 mm, glabrous, the lobes subequal. Corolla tubular, bilabiate, deep violet blue, the tube c. 3 mm, the upper 2 lobes 2.5-3 mm, the lower 3 c. 3-6 mm. Capsule ovate, c. 4 mm. Seeds numerous, c. 5 mm, brown. Flowering

November-January. *Cloud-forested slopes and along rivers*. CR (Croat 46990, MO). 1400-1700 m. (Endemic.)

**2. *Darcya reliquiarum*** (D'Arcy) B.L. Turner & C. Cowan, *Phytologia* 74: 269 (1993). *Stemodia reliquiarum* D'Arcy, *Ann. Missouri Bot. Gard.* 66: 258, t. 20 (1979). Holotype: Panama, *D'Arcy 10893* (MO, isotypes: G, PMA; progeny of type material grown from seed in F, K and MO). Illustr.: D'Arcy, *Fl. Panama, Ann. Missouri Bot. Gard.* 66: 259, t. 20. (1979).

*Darcya mutisii* (Fern. Alonso) B.L. Turner, *Stemodia mutisii* Fern. Alonso.

Herbs to 40 cm, sprawling. Petioles 5-10 mm; blades 3-6 × 1.4-2.6 cm, ovate, trinervate, minutely glandular punctate below, the bases attenuate, the margins irregularly serrate, the apices obtuse to acute. Inflorescence a terminal bracteate raceme; pedicels 9-16 mm, sparsely pilose, not glandular. Calyx 2-4 mm, glabrous or nearly so, the lobes all equal. Corolla tubular, bilabiate, blue, the tube c. 4-5 mm, the lobes 2-3 mm, subequal, minutely pubescent. Capsule ovate, 4-5 mm. Seeds numerous, c. 3 mm, brown. Flowering July-March. *Cloud forest*. P (*Hammel 7407*, MO). 1200-1700 m. (Mesoamerica, Colombia.)

## 10. *Digitalis* L.

*Isoplexis* Lindl. ex Benth.

By M.J.M. Christenhusz

Herbs, perennial or biennial, rarely somewhat woody at base; stems usually simple, occasionally branched at base. Leaves alternate, large, often crowded in a rosette, margin entire or denticulate, pinnately veined. Inflorescence a terminal, bracteate, often secund raceme. Calyx 5-lobed, the lobes imbricate, usually parted nearly to the base. Corolla tubular-campanulate, open, often constricted beyond ovary, somewhat ventricose beneath, shallowly 5-lobed, the tube oblique, the limb bilabiate, the lower lip trilobed, longer than the upper and external in bud, the middle lobe longer than the lateral lobes, the upper lip lobes emarginate. Stamens 4, didynamous, included; anthers paired. Style with flattened, bilobate stigma. Fruit an ovoid, septicidal or loculicidal, 4-valved capsule. Seeds numerous. c. 25 spp. Europe, Macaronesia, west Asia, naturalized elsewhere.

**1. *Digitalis purpurea* L., *Sp. Pl.* 2: 622 (1753).** Lectotype (designated by D'Arcy, *Ann. Missouri Bot. Gard.* 66: 207 (1978); *Herb. Linn. No. 775.1* (LINN). N.v.: Foxglove (G, CR, P), dedalera, dedal de la reina, digital (G, CR Illustr.: Britton & Brown. *Illustr. Fl. N. U.S.* 3: 204 (1913). Illustr.: D'Arcy, *Fl. Panama, Ann. Missouri Bot. Gard.* 66: 217, t. 9 (1979).

Herbs 50-180 cm, biennial or perennial, grey-white pubescent and glandular. Stems simple, rarely branched, hairy or subpubescent, often caespitose. Leaves alternate, the basal ones mostly rosulate and long-petiolate, the cauline ones reduced upwards and subsessile; petiole to 15 cm, narrowly winged; blade 5-40 × 3-12 cm, ovate to oblong-elliptic or lanceolate, the base tapering, the margin crenate and rarely serrate, the apex acute to obtuse. Inflorescence a secund raceme. Bracts smaller than the leaves, entire. Pedicels 6-15(-22) cm, reflexed near the apex. Calyx campanulate, 10-13 mm, the lobes, ovate-lanceolate to elliptic, the apices acute to obtuse. Corolla 3-5(-6) cm, tubular-campanulate-ventricose, abruptly tapering into a short tube, purple, pink or white, the lower side paler and spotted inside, glabrous to hairy, the median lobe of the lower lip longest and broadest. Capsule 1-1.5 cm, ovoid. Seeds puberulent, numerous. Ch (Breedlove, 1986); ES (*Villacorta et al. 1020*, MO); CR (*Khan et al. 990*, BM); P (*Hammel 1486*, MO). 1100-3300 m (Native to Europe, sometimes naturalized in disturbed areas in Canada, United States, Mexico, Mesoamerica, Colombia, Venezuela, Ecuador, Peru, Bolivia, Chile, Argentina, temperate Asia, Australia, New Zealand).

This species is cultivated as an ornamental and as a medicinal plant (heart stimulant), but all of its parts are toxic, including the nectar.

## **11. *Gratiola* L.**

By M.J.M. Christenhusz.

Herbs, perennial (or annual), succulent, erect or prostrate. Stems and leaves glabrous or glandular hairy. Leaves opposite, sessile, margin entire to denticulate, palmately veined. Inflorescence of solitary, axillary flowers; pedicel short or long, filiform; bracteoles (1-)2, at the apex of the pedicel just below the calyx. Calyx deeply 5-parted, the lobes narrow, subequal. Corolla tubular or narrowly campanulate, bilabiate or nearly so, lips spreading, the lower lip trilobed, the upper lip entire and emarginate to bilobed. Fertile stamens 2, inserted on upper side of corolla tube, included;

staminodes 2 and included, or absent. Style filamentous; stigma bilamellate, included, flattened. Fruit a septicial and secondarily loculicidal capsule, ovoid to globose, the 4 valves separating from placental axis, apex acute. Seeds numerous, striate and transversely reticulate. 25 spp., mostly in temperate zones and mountains in the tropics.

**1. *Gratiola oresbia*** B.L. Rob., *Proc. Amer. Acad. Arts* 44(21): 614 (1909).

Holotype: Mexico, Chihuahua, *Nelson 6099* (GH). Illustr.: Standley & Williams, *Fl. Guat., Fieldiana Bot.* 24: 360, t. 76 (1973).

Herbs to 20 cm, small perennial. Stems rooting at the lower nodes. Leaves 1.1-3 × 0.2-0.5 cm, linear-(ob)lanceolate, the bases attenuate to rounded-clasping, the margins entire to minutely denticulate, the apices acute to obtuse, glabrous, obscurely or not glandular punctate. Inflorescence a solitary flower in the leaf axils. Pedicel to 1.5 cm. Bracteoles 3-6 × c. 0.5-1 mm. Calyx 3-5 mm, lobes subequal, linear-lanceolate, apices acute, glabrous. Corolla 5-10 mm bilabiate, yellow. Capsule 3.5-6 mm, globose or ovoid-attenuate. Flowering June-July. *Steep slopes in evergreen cloud forests, grassy banks in subalpine meadows, bogs in pools and along streams. Ch (Breedlove 25853, MO); G (Véliz 96.4771, MO). 3000-3500 m. (Mexico, Mesoamerica.)*

A larger form with smaller flowers and fruits was reported from Guatemala (Standley & Williams (1973), but I have not seen the sample, *Steyermark 49911*, on which this is based. The accompanied illustration and description strongly resembles Chiapas material of *G. oresbia*, so I believe these to be conspecific.

**12. *Lophospermum*** D. Don ex R. Taylor

By M.J.M. Christenhusz.

Herbaceous, perennial vines, often woody at base. Stems flexible, scandent or clambering, occasionally with adventitious roots. Petioles twining; blades deltate to cordiform, the bases cordate, the margins dentate to broadly crenate, the apices acute to mucronate, venation palmate. Inflorescences of a solitary flower in the leaf axils. Peduncles terete, ascending to horizontal, hairy. Calyx deflated, urceolate, 5-lobed, the segments distinct or basally connate, narrowly to broadly ovate, subequal, dorsally planate, pubescent, the bases obtuse to cordate, imbricate or overlapping and

recurved, the margins entire, the apices acute, often enlarging in fruit. Corolla bilabiate or subtubular, open-throated, variously red, violet, dark purple or white, sparsely to densely glandular pubescent outside, ventral plicae variously coloured, glabrous or sparsely pubescent or with translucent or yellow ligulate trichomes, the lobes subequal or dimorphic, apically rounded or broadly acute, the upper 2 recurved the lower 3 projecting forward, occasionally all recurved or all projecting forward. Stamens included, didynamous or subequal, basally villous; staminode rudimentary or occasionally of variable length. Ovary bilocular, glabrous or with glandular trichomes; style terete, glabrous or with glandular trichomes at bases, included. Fruit a bivalved, loculicidal, irregularly ovoid or globose capsule. Seeds brown, circumalate, numerous. 3-6 spp. Mexico, Mesoamerica.

Bibliography: Elisens, W.J. *Syst. Bot. Monogr.* 5: 1-97 (1985).

1. Margins of the calyx segments basally imbricate and planate, not recurved. Corolla dark purple.

**1. L. breedlovei**

1. Margins of the calyx segments basally recurved. Corolla variously coloured, red to violet.

**2. L. erubescens**

**1. *Lophospermum breedlovei*** Elisens, *Syst. Bot. Monogr.* 5: 83 (1985).

Holotype: Mexico, Chiapas, *Breedlove* 9533 (DS, isotypes: F, LL, MICH, WIS).

Illustr.: not found.

Herbaceous vines, scandent. Petioles 1.2-4.1 cm, twining; blades 2-6.6 × 1.6-5.8 cm, cordiform, the bases cordate, the margins broadly dentate, the apices mucronate. Inflorescence of solitary, axillary flowers. Peduncles 1.1-2.8 cm. Calyx 1.2-1.6 cm, green, commonly tinged purple, sparsely glandular-villous, not enlarging in fruit, the segments ovate, 4-5 mm wide at base, the bases obtuse, basally imbricate and planate, the margins entire, the apex acute. Corolla bilabiate, dark purple, sparsely glandular villous outside, ventral plicae sparsely puberulent, the tube 2.6-3.2 cm, the lobes dimorphic, the upper 2 recurved, the lower 3 projected forward, the medial lobe narrower than the lateral, apices rounded. Stamens 1.1-1.5 cm, basally translucent-villous; staminose rudimentary. Ovary with glandular trichomes; style 1.4-1.7 cm; stigma forked and divergent. Capsule 1.3-1.5 cm, globose, symmetrical. Flowering and fruiting April to October. *On rocks and vegetation on slopes, roadcuts and*

*clearings in mixed montane forests. Ch (Breedlove & Raven 13734, BM). 2000-3000 m. (Endemic.)*

**2. *Lophospermum erubescens*** D.Don in Sweet, *Brit. Flow. Gard. Ser. II*. 1: t. 68 (1830). Lectotype (designated by Elisens, *Syst. Bot. Monogr.* 5: 74. 1985): Mexico, Veracruz, *Schiede & Deppe s.n.* (BM). Illustr.: not found.

*Asarina erubescens* (D.Don) Pennell, *A. lophospermum* (L.H.Bailey) Pennell, *A. purpusii* (Brandege) Pennell, *Lophospermum chiapense* Elisens, *L. scandens* Sessé & Moc. ex D.Don, *L. purpusii* (Brandege) Rothm., *L. turneri* Elisens, *Maurandya glabrata* (I.M.Johnst.) Ramírez, *nom. superfl.*, *M. erubescens* (D.Don) A.Gray, *M. erubescens* var. *glabrata* I.M.Johnst., *M. erubescens* var. *purpusii* (Brandege) I.M.Johnst., *M. lophospermum* L.H.Bailey, *M. purpusii* Brandege, *M. scandens* (D.Don) A.Gray, *non M. scandens* (Cav.) Pers., *M. scandens* var. *erubescens* (D.Don) A.Voss, *M. scandens* var. *glabrior* A.Voss, *M. scandens* var. *spectabilis* A.Voss.

Herbaceous vines, scandent. Stems glandular pubescent or pilose. Petioles 1.2-5.5 cm, twining; blades 2-15 × 2.2-13 cm, triangular-cordiform (or obscurely 5-lobate), the bases cordate, the margins broadly dentate, the apices acuminate, sparsely or densely villous. Inflorescence of solitary, axillary flowers. Peduncles 2-6 cm, twining, villous. Calyx 1.5-2 cm, green, commonly tinged purple, sparsely to densely glandular-villous, not enlarging in fruit, the segments (broadly) ovate, to 15 mm wide at base, the bases overlapping and recurved, the margins entire, the apices obtuse to acute. Corolla bilabiate, variously coloured, red to violet, glabrous or finely pubescent outside, ventral plicae sparsely puberulent, the tube 4-7 cm, the lobes subequal, the upper 2 recurved, the lower three projected forward, apices rounded. Stamens 1-1.5 cm, basally translucent-villous; staminode rudimentary. Ovary with glandular trichomes; style 1.4-1.7 cm; stigma forked and divergent. Capsule 1.3-1.5 cm, subglobose, symmetrical, pubescent. Seeds brown, oblong, with a broad pale wing. Flowering and fruiting April to October. *Clearings and road sides in cloud forests. G (Christenhusz 5585, BM); ES (Rosales 1194, MO); CR (Hammel 20227, MO); P (Croat 16191, MO). 900-2200 m. (Mexico, Mesoamerica, cultivated and often naturalized.)*

A variable species complex in which Elisens (1985) recognised 5 taxa based on characters of ovary hairiness, corolla colour, peduncle length, and calyx size.

These characters appear non-consistent, and I have therefore opted for a broad circumscription of the name *L. erubescens*, pending further studies on this genus.

### 13. *Maurandya* Ortega

By M.J.M. Christenhusz.

Annual or perennial scandent, glabrous herbs, often tinged purple. Stems flexible, occasionally with adventitious roots, becoming woody at base. Lower leaves opposite, upper leaves alternate, with twining petioles, the blades hastate to broadly sagittate, rarely cordiform, margins entire or (rarely) broadly crenate, venation palmate. Inflorescence of solitary flowers in the leaf axils. Peduncles ascending, terete or alate. Calyx deflated and urceolate, deeply 5-lobed, the lobes lanceolate, the apices acute, equal or unequal, dorsally planate or carinate, glabrous or glandular-villous, margins entire, basally imbricate and planate, occasionally enlarging in fruit. Corolla bilabiate, pink, red, blue, violet or whitish, palate occasionally inflated, the lobes subequal, the apices rounded or broadly acute, occasionally emarginate, the upper 2 lobes recurved, the lower 3 recurved or projecting forward. Fertile stamens 4, didynamous, included, the 5<sup>th</sup> stamen sterile, rudimentary; filaments villous at base. Ovary bilocular; style terete or basally planate, glabrous or with glandular trichomes basally, included; stigma conical and shallowly grooved. Fruit an irregularly ovoid, triangularly ovoid or globose, septicidal capsule opening with 2 valves. Seeds numerous, rectangular and apterous with tumid-tuberculate or cristate, or ovate and circumalate, minutely tuberculate. 2-4 spp. United States (Arizona, New Mexico, Texas), Mexico, commonly naturalised elsewhere.

Bibliography: Elisens, W.J. *Syst. Bot. Monogr.* 5: 1-97 (1985).

- |   |                                |
|---|--------------------------------|
| 1. Calyx glandular-villous; corolla blue-violet                 | <b>1. <i>M. barclayana</i></b> |
| 1. Calyx glabrous or with few glandular trichomes; corolla pink | <b>2. <i>M. scandens</i></b>   |

**1. *Maurandya barclayana*** Lindl., *Bot. Reg.* 13: t. 1108 (1827). Lectotype (designated by Elisens, *Syst. Bot. Monogr.* 5: 43. 1985): Mexico, *Hort. Barclay 1827* (CGE). Illustr.: Standley & Williams, *Fieldiana Bot.* 24: 375, t. 83 (1973).

*Asarina barclayana* (Lindl.) Pennell.

Herbaceous, scandent perennials. Stems usually without adventitious roots. Petioles 1-3.2 cm; blades 1.3-3.5 × 1.4-3.5 cm, hastate to broadly sagittate (rarely cordiform), the bases cordate, the margins entire (rarely broadly crenate), the apices acute to acuminate. Inflorescence of solitary flowers in the leaf axils. Peduncles 1.6-5.9 cm, conspicuously alate, appearing flattened, the margins undulate. glabrous or glandular pubescent distally. Calyx segments 1-1.6 × 0.2-0.3 cm, dorsally planate, densely glandular-villous. Corolla open-throated, blue-violet, sparsely glandular-pubescent outside, ventral plicae yellowish, glabrous, the tube 2.6-3.1 cm, the lobes 0.6-1 cm, apically rounded, the lower 3 projecting forward. Stamens 13-19 mm, apically enlarged. Ovary with glandular trichomes at apex; style 13-16 mm, terete, with glandular trichomes at base. Capsule 11-17 mm, irregularly ovoid, asymmetrical, apically rounded. Seeds rectangular, apterous. Flowering and fruiting from March-November. *Rock faces, open slopes and on ruderal waste-grounds. CR (Khan et al. 159, BM). 1000-2400 m. (Mexico, Chihuahua to Oaxaca, commonly cultivated and naturalised.)*

**2. *Maurandya scandens*** (Cav.) Pers., *Syn. Pl.* 2(1): 160 (1806). *Usteria scandens* Cav., *Icon. Descr. Pl.* 2: 15, t. 116 (1793). Lectotype (designated by Elisens & Regueiro, *Taxon* 35: 720 (1986): Mexico, *coll. unknown, ex herb. Cavanilles* (MA-292400). Illustr.: not found.

*Asarina scandens* (Cav.) Pennell, *Maurandya semperflorens* Ortega, *nom. superfl.*, *Reichardia scandens* (Cav.) Roth, *nom. inval. hom.*

Herbaceous, scandent perennials. Stems frequently rooting adventitiously. Petioles 0.8-4.2 cm; blades 1.1-6.2 × 0.4-4.5 cm, hastate to sagittate, the bases cordate, the margins entire, the apices acute to acuminate, glabrous. Inflorescence of solitary flowers in the leaf axils. Peduncles 3-8.5 cm, slightly alate, glabrous. Calyx lobes 1-1.5 × 0.2-0.4 cm, dorsally planate, glabrous or sparsely glandular pubescent. Corolla open-throated, pink, sparsely glandular pubescent outside, ventral plicae yellowish, glabrous, the tube 2.2-3 cm, the lobes 0.6-1 cm, apically rounded or (occasionally) emarginate, the lower 3 projecting forward. Stamens 11-17 mm, apically enlarged. Ovary glabrous or occasionally with glandular trichomes at the apex; style 13-16 mm, terete, glabrous. Capsule 10-12 mm, irregularly ovoid, asymmetrical, apically rounded. Seeds rectangular, apterous. Flowering and fruiting April-December. *Rocky slopes, ravines, disturbed land and in open places in moist*

*subtropical montane forests*. G (*Lehmann 1477*, BM); H (*García 95*, BM); ES (*Villacorta 384*, MO). 1200-2200 m. (Central Mexico, cultivated and commonly naturalised and many parts of the world).

#### 14. *Mecardonia* Ruiz & Pavón

By M.J.M. Christenhusz.

Much-branched glabrous herbs. Stems quadrangular. Leaves opposite, glandular-punctate, pinnately veined. Inflorescence of solitary, axillary, flowers. Bracteoles 2, at the base of the pedicel. Calyx 5-parted, incised to near the base, the segments unequal, the outer 3 distinctly broader than the inner 2. Corolla bilabiate, the upper lip emarginate to distinctly bilobed, the lower lip trilobed, pubescent within at the base of the posterior lobes. Stames 4, didynamous, all fertile, anthers 2-celled. Stigmas 2, lamelliform. Fruit a septicidal capsule. Seeds numerous, reticulate. c. 10 spp. North, Central and South America.

**1. *Mecardonia procumbens*** (Mill.) Small, *Publ. Field Columbian Mus., Bot. Ser.* 2(6): 261 (1907). *Erinus procumbens* Mill., *Gard. Dict.* (ed. 8) no. 6 (1768). Holotype: Mexico, Veracruz, *Houston s.n.* (BM-000953379). Illustr.: Holmgren & Molau (1984) *Fl. Ecuador* 21: 8, t. 1 A-E. N.v.: Hierba té (G), trencilla (ES), xacanalum, xnocac (Y).

*Bacopa chamaedryoides* Cook. & Coll., *B. montevidensis* (Spreng.) Mert. & Melch., *B. procumbens* (Mill.) Greenm., *B. procumbens* var. *schottii* Greenm., *Herpestis caprarioides* Kunth, *H. chamaedryoides* Kunth, *H. colubrina* Kunth, *H. montevidensis* Spreng., *H. peduncularis* Benth., *H. procumbens* (Mill.) Urban, *H. vandellioides* Kunth, *Lindernia dianthera* Sw., *Mecardonia peduncularis* (Benth.) Small, *M. tenuis* Small, *M. vandellioides* (Kunth) Pennell, *M. viridis* Small, *Monniera caprarioides* (Kunth) Kuntze, *M. dianthera* (Sw.) Millsp., *M. montevidensis* (Spreng.) Kuntze, *M. procumbens* (Mill.) Kuntze, *Pagesia dianthera* (Sw.) Pennell, *P. peduncularis* (Benth.) Pennell, *P. procumbens* (Mill.) Pennell.

Herbs, prostrate or decumbent, rooting at the lower nodes. Leaves petiolate, (0.7-)1-2.2 × (0.5-)0.7-1.4 cm, (ob)ovate, the bases cuneate, the margins crenate, slightly revolute, the apices obtuse to rounded; petiole 2-5 mm, flattened. Inflorescence solitary flowers in the leaf axils; pedicels (0.5-)10-20 cm. Bracteoles (2-

)3.5-7 mm, oblanceolate, the apex rounded, entire. Calyx with the outer 3 segments 6.5-9.5 mm, broadly lanceolate to ovate, the margin denticulate distally, the apices obtuse to rounded; the inner 2 segments 6-8 mm, narrowly lanceolate, the apex acute. Corolla c. 7-8 mm, yellow, the lobes c. 2 mm, rounded, the tube included in the calyx. Style c. 1.5 mm, stigma lobes distinct, flattened. Capsule 5-7 mm, narrowly ovoid, somewhat flattened, the apices obtuse to rounded. Seeds 0.3-0.4 mm, cylindrical, brown. *Wet places along river banks and in depressions in meadows and roadsides.* T (Hanan Alipi *et al.* 1002, MO); Ch (Davidse 9494, MO); Y (Schott 616, BM); C (Martínez, E. *et al.*, 2001); QR (Lewis 6552, MO); B (Whitefoord 10185, BM); G (Wallnöfer & Tut-Tesucun 5892, MO); H (Chorley 406, BM); ES (Rosales 408, MO); N (Nichols 1743, BM); CR (Herrera & Chacón 2436, BM); P (D'Arcy 5211, BM). 0-2500(-3500) m. (United States [Florida], Mexico, Mesoamerica, Cocos Island, Colombia, Venezuela, Guyana, Suriname, French Guiana, Ecuador, Peru, Bolivia, Brazil, Paraguay, Uruguay.)

### 15. *Penstemon* Schmidel

By M.J.M. Christenhusz.

Perennial herbs, some species suffrutescent and woody at the base. Stems glabrous or pubescent. Leaves opposite, rarely whorled or alternate, entire to dentate or rarely laciniate-pinnatifid, the lower often petiolate, the upper (sub-)sessile. Inflorescence a cymose or thyrsoid panicle or in some species a bracteolate raceme. The bracts foliose below, becoming reduced towards the upper part of the inflorescence, opposite (rarely alternate). Calyx deeply 5-parted, the segments subequal. Corolla tubular to strongly ventricose-ampliate, slightly to strongly bilabiate, usually blue to purple, sometimes magenta, lavender, pink, red, white or yellow, the upper lip bilobed, the lower lip trilobed. Fertile stamens 4, didynamous; staminode 1, as long as the fertile stamens. Style long, usually becoming exerted, entire; stigma capitate. Fruit a septical capsule, often loculicidal at the apex, cartilaginous. Seeds few to numerous, irregularly angled. C. 250 spp. North America, from Alaska and Yukon to Guatemala, most species rich in the western United States.

1. Leaves serrate; calyx lobes lanceolate, the apices acute. **1. *P. campanulatus***

1. Leaves entire; calyx lobes broadly ovate, the apices obtuse.

## 2. *P. gentianoides*

**1. *Penstemon campanulatus*** (Cav.) Willd., *Sp. Pl.* 3: 228 (1800). *Chelone campanulata* Cav., *Icon. Pl.* 1: 18, tab. 29 (1791). Type: Mexico, *Pavón s.n.* (isotype BM-000953330!). Illustr.: not found.

*Chelone angustifolia* (Nutt. ex Pursh) Kunth, *Penstemon kunthii* G. Don

Herbs to 75 cm, erect. Stems simple, glabrous to sparsely hairy in the inflorescence. Leaves opposite, 1-6 × 0.1-0.9 cm, linear to lanceolate, the bases cordate, clasping the stem, the margins sharply serrate, the apices acuminate, glabrous. Inflorescences of many-flowered raceme-like panicles, the peduncles to 1.5 cm, pubescent, with 1-3 flowers, bracts elliptic, 3-4 mm, pedicels to 2 cm, pubescent, slender. Calyx to 7 mm, incised to the base, the lobes lanceolate, the apices acute, pubescent. Corolla 2-2.5 cm, tubular (or ventricose), bilabiate, red (or blue-purple), tube sparsely hairy outside, the lobes rounded. Capsule to 1 cm, ovoid. Flowering January. *In tall evergreen forests.* Ch (*Martines S. 15500a*, BM) 300-400 m. (Louisiana to Mexico, south to Chiapas. Records from Guatemala (as *P. campanulatus* (Cav.) Willd.) are not confirmed by any specimens, and it is not likely to occur there.

*Penstemon campanulatus* is distinguished by its blue to purple, funnel-shaped corollas. It has not been found in Mesoamerica, but in Mexico fertile intermediates between *P. campanulatus* and *P. kunthii* (hybrid swarms?) were found (*Straw & Gregory 1077, 1112*, BM), making the distinctiveness of these species doubtful, but if the species were to be kept separate, the correct name applicable to the Mesoamerican material is *P. kunthii*.

**2. *Penstemon gentianoides*** (Kunth) Poir., *Dict. Sci. Nat.* (ed. 2) 38: 385 (1825). *Chelone gentianoides* Kunth, *Nov. Gen. Sp. Pl.* 2: 363, t. 172 (1818). Type: Mexico, Edo. México, *Humboldt s.n.* (B). Illustr.: Standley & Williams, *Fl. Guat., Fieldiana Bot.* 24: 387, t. 88 (1973). N.v.: Campanola, flor de margarita (G).

*Penstemon skutchii* Straw.

Stout herbs to 1 m or large shrubs to 2 m. Stems sparsely branched, mostly glabrous. Leaves opposite, 2-10(-12) × 0.15-2.1(-2.5) cm, lanceolate to linear-lanceolate, the bases acute in the lower leaves, cordate and clasping the stem in he

upper leaves, the margins entire, the apices long-acuminate, glabrous, coriaceous. Inflorescences of elongate thyrses, often sessile and many-flowered, the peduncles to 3 cm, with 1-6 flowers, bracts elliptic, 10-18 mm, pedicels to 2 cm, minutely pubescent. Calyx c. 1 cm, incised to the base, the lobes imbricate, ovate, the apices acuminate, glabrate. Corolla 2.5-3.5 cm, ventricose, glabrous, glabrescent or obscurely pubescent outside, variable in colour, pink to purple or (dark) red with a white throat, the tube glabrous, the lobes rounded. Capsule 0.8-1.4 cm, ovoid. Flowering July-March, fruiting August-February. *In open* Juniperus-Pinus grasslands, Alnus forests, Quercus shrub-lands, on alpine meadows, rocky slopes and in Pinus-Drumys evergreen cloud forests. Ch (Breedlove 8013, F); G (Skutch 1250, F). (1300-)2200-4100 m. (Mexico, Mesoamerica; sometimes cultivated in Costa Rica).

*Penstemon perfoliatus* A.Brongn. was mentioned as a cultivated ornamental plant in Guatemala (Standley & Williams, 1973). The specimen on which this account was based: *Steiermark 35575* (F), is different from typical material of *P. perfoliatus*, which usually has rounded dentate, amplexicaul leaves and viscose pubescence. It appears that this is a broad-leaved form of *P. gentianoides*, which is commonly cultivated and sold on markets as cut-flowers.

## 16. *Plantago* L.

*Psyllium* Mill.

By M.J.M. Christenhusz.

Annual, biennial or perennial herbs (or rarely small shrubs in some extra-Mesoamerican species), usually acaulescent (rarely stemmed), with a taproot with numerous fibrous roots. Leaves simple; petiole vaginate at base, usually more or less winged or sessile; blade ovate, elliptic, oblong, lanceolate, linear, or subulate, margin entire, repand, erose, or irregularly toothed (rarely pinnately or palmately dissected). Inflorescences axillary, or arising from rosette, spicate, the spike narrowly cylindrical, capitate or uniflorous. Calyx 4 parted, equal or 2 longer, margins scarious. Corolla salverform or tubular, persistent, dry and membranaceous, the tube cylindrical or constricted at the throat, 4-lobed, these spreading or closing in fruit. Stamens 2 or 4, filaments inserted in the corolla tube. Ovary bilocular or sometimes with an additional 1-2 false compartments. Fruit a bilocular pyxis, circumscissile at or below

the middle, with 1 to numerous seeds. c. 270 spp., cosmopolitan but few in the tropics.

Bibliography: Gibson, D.N. in *Fl. Guatem., Fieldiana Bot.* 24, vol. 10: 462-466 (1974).

1. Plants dioecious, the spikes with only 1 or 2 flowers.      **5. P. tubulosa**  
1. Plants monoecious, the spikes many-flowered.  
2. Leaves linear, 1-3 mm wide.      **4. P. nivea**  
2. Leaves broadly ovate, elliptic-ovate or (ob-)lanceolate.  
3. Spikes conic-ovoid at first but later capitate to shortly cylindrical (especially in fruit); peduncle strongly furrowed.      **2. P. lanceolata**  
3. Spikes narrowly cylindrical to cylindrical; peduncle not furrowed.  
4. Leaves short-petiolate to sessile, long-attenuate at base, blades lanceolate, oblanceolate or narrowly elliptic-obovate; corolla closed in fruit.  
**1. P. australis**  
4. Leaves usually rather abruptly contracted at base, decurrent along the petiole, blades broadly ovate to elliptic-ovate.      **3. P. major**

**1. *Plantago australis*** Lam., *Tabl. Encycl.* 1: 339 (1792). Holotype: Argentina *Commerson s.n.* (P). Illustr.: not found. N.v.: Tzepente' jomol, yok' tz'i', yak wakax, yak tz'i' wamal (Ch), llantén, sractzi (G).

*Plantago australis* subsp. *hirtella* (Kunth) Rahn, *P. capillaris* E.Mey ex Decne., *P. galeottiana* Decne., *P. hartwegii* Decne., *P. hirtella* Kunth, *P. leptophylla* Decne., *P. macrostachys* Decne., *P. oreades* Decne., *P. schiedeana* Decne., *P. sodiroana* Pilger, *P. tomentosa* Lam., *P. veratrifolia* Decne.

Herbs, perennial, with short, thick rootstock. Leaves in basal rosettes, (2.5-)10-25(-50) × 0.6-4(-9) cm, very variable in shape and size, oblanceolate, lanceolate to elliptic-ovate, glabrescent to densely villous on both sides, the base cuneate, attenuate along the petiole, the margins entire to undulate-dentate, the apices obtuse (to acute), veins 5-7, sessile or short-petiolate. Inflorescences narrowly cylindrical spikes; peduncle 3-30 cm, erect or decumbent, usually much longer than leaves, sparsely to densely hairy, the spike (1-)12-35(-56) cm, densely flowered, sometimes interrupted in lower part; bracts c. 2-4 mm, variably triangular to ovate, glabrous or pubescent along keel, the margins commonly irregularly ciliate. Calyx lobes 2-3 mm,

ovate to oblanceolate, asymmetrical, usually pubescent along keel, the margins minutely ciliate. Corolla lobes 1.5-3 mm, narrowly ovate, the apices acute, conspicuously closing in fruit. Pyxis 1.2-2.8 mm. Seeds 3, brown, naviculate. Flowering and fruiting throughout the year. *Roadsides, thickets, wet meadows, stream banks, in forests and in gardens.* Ch (Stafford et al. 284, BM); G (von Türckheim II 1876, MO); H (Espinal 107, BM); ES (Villacorta & Araniva 705, MO); N (Grijalva 878, MO); CR (Davidse 25051, BM); P (Croat 75018, BM). 350-3500 m. (Mexico, Mesoamerica, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil, Argentina.)

A weedy and very variable species.

**2. *Plantago lanceolata* L., *Sp. Pl.* 1: 113 (1753).** Lectotype (designated by Verdcourt in Milne-Redhead & Polhill (ed.), *Fl. Trop. E. Africa, Plantaginaceae* 6 (1971)): *Herb. Clifford* 6, *Plantago* 3, *sheet A* (BM). Illustr.: Britton & Brown. *Fl. N. U.S.* 3: 246 (1913). N.v.: narrow-leaf plantain.

Herbs, perennial, with long and thick rootstock. Leaves in a basal rosette, glabrous or pubescent; blade 6-20 × 0.5-4.5 cm, linear-lanceolate, lanceolate, or elliptic-lanceolate, the bases narrowly cuneate and decurrent, the margins entire or remotely denticulate, the apices acuminate to acute, the veins usually 5, sometimes 3 or 7; petiole 2-10 cm, tenuous. Inflorescence spikes 1-5(-8) cm, conical-ovoid at first but later capitate to shortly cylindrical, densely flowered; peduncle 10-60 cm, furrowed, appressed pubescent; bracts 3.5-5 mm, ovate to elliptic, densely hirsute, keel spatulate, the apices caudate. Calyx lobes 2-3.5 mm, abaxially usually hirsute, keel narrow and not extending to the apex, the anterior calyx lobes connate to near apex, broadly obovate, 2-keeled, the margin sparsely ciliate; posterior sepals distinct, broadly ovate. Corolla 1.5-3 mm, white, glabrous, the lobes ovate-lanceolate, the apices shortly acuminate. Stamens exserted. Pyxis 3-4 mm, narrowly ovoid, circumscissile near base. Seeds (1-)2, brown to dark brown, narrowly ellipsoid to oblong. Flowering and fruiting throughout the year. *Fields, meadows and roadsides.* P (Béliz 179, MO). 1000-1500 m. (Native to North America, Europe, North Africa and Asia, sporadically naturalized elsewhere in temperate and subtropical regions.)

**3. *Plantago major* L., *Sp. Pl.* 1: 112 (1753).** Lectotype (designated by Verdcourt, 1971): *Herb. Linn. No. 144.1* (LINN). Illustr.: Smith et al., *Fl. Pl. Neotrop.* 289, fig 154 (2004); Britton & Brown. *Fl. N. U.S.* 3: 245 (1913). N.v.: Llantén,

lantén, sractzí, socchicam (G), plantain, white man's foot (B), llanten, yantén (H), llantain (N).

*Plantago borysthenica* Wissjul., *P. dregeana* Decne., *P. intermedia* Gilib., *P. latifolia* Salisb., *P. officinarum* Crantz, *P. uliginosa* F.W.Schmidt.

Herbs, perennial, with short thick rootstock. Leaves in a basal rosette, glabrous or nearly so, long-petiolate; blade 3-18(-30) × 2-12(-21) cm, variable, but usually broadly ovate to broadly elliptic, the bases usually abruptly contracted and decurrent along petiole, the margins remotely dentate to nearly entire, sometimes more deeply sinuate-dentate, the apices bluntly acute to obtuse, the veins 3-9(-11); petiole 1-10(-26) cm. Inflorescence spikes 1-20(-40) cm, narrowly cylindrical to cylindrical, usually densely flowered, often basally interrupted; peduncle (2-)10-18(-50) cm, pubescent to glabrescent; bracts 1.2-2 mm, broadly ovate-triangular, glabrous or pubescent at apex, the keel broad and thick, enlarged in fruit. Flower sessile. Calyx lobes 1.5-2.5 mm, glabrous or ciliolate, keel not extending to the rounded apex; anterior lobes elliptic to broadly elliptic; posterior lobes broader. Corolla white, glabrous, the lobes 1-1.5 mm, narrowly ovate. Stamens exserted. Pyxis 2-3 mm, subglobose, ovoid, or broadly ellipsoid, circumscissile at or just below middle, Seeds 8-34, yellowish brown, ovoid, ellipsoid, or rhomboid. Flowering and fruiting throughout the year. *Swampy meadows, fields, gardens, roadsides, trails, urban areas, waste places.* Ch (Aguilar M. 6502, BM); Y (Lundell 1208, MO); B (Arnason 17924, MO); G (Kufer 124, BM); H (Dueñas 82, MO); N (Atwood 2099, BM); CR (Döbbeler 1394, BM); P (Hampshire & Whiteford 103, BM). 0-2000 m. (Native to Asia and Europe, naturalized throughout most of the world.)

Most European flora accept two subspecies, both occurring in Mesoamerica. *Plantago major* subsp. *intermedia* (Gilib.) Lange differs from the typical subspecies in being a usually smaller plant with shorter spikes. The leaves are mostly 3-5-veined (5-9-veined in subsp. *major*), with a subacute apex and a broadly cuneate, more or less undulate-toothed base. Even though these subspecies are obvious in their native range, I found these subspecies difficult to apply in naturalized populations in Mesoamerica and I therefore do not follow this subspecific classification here.

**4. *Plantago nivea*** Kunth, *Nov. Gen. Sp. Pl.* 2: 228 (1817). Holotype: Mexico, Guanajuato, *Humboldt & Bonpland* 4257 (P). Illustr.: Gibson, *Fl. Guatem.* 24 (10): 465, t. 108 (1974).

*Plantago agrostophylla* Decne., *P. amblyacme* Pilger, *P. barneoudii* Decne., *P. bernoulliana* Vatke, *P. eriorrhiza* Willd. ex Spring., *P. graminea* Willd. ex Schult., *P. linearis* Kunth, *P. linearis* var. *mexicana* Pilger, *P. luzuloidea* Decne., *P. mexicana* Link, *P. xorullensis* Kunth.

Herbs, perennial, with a slender rootstock. Leaves in basal rosettes, sessile, (1-)5-15 × 0.1-0.2 cm, linear, erect or decumbent, glabrous or glabrescent, the bases dilated and sheathing, the margins entire, the apices acute. Inflorescences conical to capitate spikes, 1-3 cm; peduncle (2-)5-20 cm, as long as or longer than leaves, villous; bracts 1.5-2 mm, ovate, the apices acute to acuminate, villous, strongly keeled, the keel brown. Calyx 2.5-3 mm, the sepals oblanceolate, the apex obtuse, glabrous or villous along brown keel. Corolla lobes c. 2 mm, ovate, with brown spot near base of lobe, apex acute to rounded, spreading in fruit. Stamens exerted. Pyxis 2-3 mm. Seeds 2, naviculate. *Alpine meadows on rocky slopes, sometimes in Pinus-Quercus-Arbutus/Drimys forest.* Ch (*Breedlove 39570*, MO); G (Gibson, 1974). 1950-4000 m. (Mexico, Mesoamerica, South American Andes.)

A variable species complex.

**5. *Plantago tubulosa*** Decne. in DC. *Prodr.* 13(1): 728 (1852). Holotype: Peru, *Weddell 4781* (P). N.v.: Petatillo (G). Illustr.: not found.

*Plantago purpusii* Brandegee.

Dioecious, minute perennial herb to 4 cm, with thick rootstock, forming dense mats. Leaves in basal rosettes, sessile, 2-5 × 0.1-0.5 cm, linear or narrowly linear-lanceolate, sessile, clumped, rosulate, rigid, glabrous, the margins entire to coarsely lobate-sinate or dentate, the apices obtuse. Inflorescences axillary; peduncle short (< 5 mm), inconspicuous, with 1-2 flowers; bracts 5-8 mm, clasping, rotund-ovate, prominently keeled. Calyx lobes connate at base. Corolla tubes 1-2 mm, slender, the lobes c. 2 mm, ovate. Stamens long exerted. Pyxis on a 2-3.5 cm, stalk. Seeds 4-6. *Wet alpine meadows, usually along streams, rare.* G (*Standley 81103*, F). 3300-3750 m. (Mexico, Mesoamerica, South American Andes.)

## **17. *Rhodochiton*** Zucc. ex Otto & Dietr.

By M.J.M. Christenhusz.

Scandent herbaceous vines, becoming woody at base. Stems densely branched. Leaves cordiform, the apices mucronate, venation palmate. Inflorescences of solitary flowers in the leaf axils, the flowers pendent; peduncles pendent, glandular puberulent to glandular villous. Calyx inflated, open-campanulate, shallowly 5-lobed, the lobes broadly acute, green, but usually tinged pink to purple, the margins smooth and united. Corolla subtubular to bilabiate, dark purple, glandular-pubescent outside, ventral plicae often pink or light purple, sparsely pubescent, the lobes apically rounded. Stamens subequal to didynamous; staminode rudimentary, villous at base. Ovary with glandular trichomes; style with glandular trichomes at base, included or exerted, stigma recurved or straight. Capsule globose, symmetrical. Seeds numerous, winged. 3 spp. Southern Mexico (Guerrero, Oaxaca, Chiapas) and Guatemala.

Bibliography: Elisens, W.J. *Syst. Bot. Monogr.* 5: 1-97 (1985).

Species of *Rhodochiton* and *Lophospermum* share many characters - especially in habit, petioles, lamina shape and seeds - and have been suggested to be congeneric. Even though Elisens (1985) makes very strong arguments to do so, I have opted here for maintaining *Rhodochiton*, to preserve stability and because it is under this name that one of the species is most commonly provided in the horticultural trade. In the phylogenetic analysis of Ghebrehiwet *et al.* (2000) the two genera appear as sisters. The genera differ in characters of the calyx and peduncle.

1. Flowering peduncles 6-12 cm; corolla subtubular, tube 4-4.5 cm.

**1. R. atrosanguineum**

1. Flowering peduncles 3.5-4.5 cm; corolla bilabiate, tube 2.8-3.2 cm.

**2. R. nubicola**

**1. *Rhodochiton atrosanguineum*** (Zucc.) Rothm., *Feddes Repert. Sp. Nov. Regni Veg.* 52: 25. 1943. *Lophospermum atrosanguineum* Zucc., *Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss.* 1: 306, t. 13 (1832). Lectotype (designated by Elisens, 1985): Mexico, Oaxaca, *Karwinsky s.n.* (M). N.v.: Purple bell vine. Illustr.: not found.  
*Lophospermum rhodochiton* D.Don, *Maurandya atrosanguinea* (Zucc.) G.Nicholson, *Rhodochiton volubile* Zucc.

Herbaceous vines. Stems woody at base, often forming adventitious roots. Petioles 2.6-5.5 cm; blades 2.6-5 × 2.1-4.3 cm, the bases cordate, the margins shallowly crenate, the apices acute. Inflorescences of solitary flowers in the leaf axils.

Peduncles 5-12 cm, pendent. Calyx 2.5-3 cm, tinged pink to purple. Corolla subtubular, dark purple, the tube 4-4.5 cm, the lobes 1-1.2 cm, subequal, all recurved. Stamens subequal, 3.6-4 cm, included. Style 3.8-4.3 cm, exerted; stigma conical, lobed, straight. Capsule 1.5-2 cm. Flowering and fruiting June-January, or throughout the year in warmer regions in cultivation. *Clearings and ruderal terrains, often cultivated in gardens.* 1400-3500 m. (Mexico [Oaxaca], commonly cultivated and naturalized.)

This species is not yet definitely known from Mesoamerica from vouchered specimens, but since it is widely cultivated, the chances are good that it will become naturalized in the future.

**2. *Rhodochiton nubicola*** (Elisens) D.A. Sutton., *Revis Antirrhineae* 509 (1988). *Lophospermum nubicola* Elisens, *Syst. Bot. Monogr.* 5: 83 (1985). Holotype: Mexico, Chiapas, *Matuda 2359* (MEXU, isotypes: F, LL, MICH). Illustr.: not found.

Herbaceous vines. Stems without adventitious roots. Petioles 3.5-6 cm; blades 4.5-9.5 × 4.4-7.7 cm, the bases cordate, the margins broadly crenate to coarsely dentate. Inflorescences of solitary flowers in the leaf axils. Peduncles 3.5-4.5 cm, pendent. Calyx 2.1-2.6 cm, green but often tinged pink or purple. Corolla bilabiate, dark purple, the tube 2.8-3 cm, the lobes 1-1.4 cm, subequal, the upper 2 recurved, the lower 3 pointing downwards. Stamens subequal, 0.8-1 cm, included. Style 1.4-1.6 mm, included; stigma forked and recurved. Capsule 1.6-2 cm. Flowering and fruiting throughout the year. *Cloudforests.* Ch (*Purpus 6696*, MO); G (*Steyermark 36996*, F). 1300-3000 m. (Endemic.)

## **18. *Russelia* Jacq.**

By M.J.M. Christenhusz.

Small wiry shrubs, sometimes appearing herbaceous. Stems rigid, terete, often ridged or angled, glabrate or pubescent. Leaves opposite or verticillate, petiolate or sessile, ovate to lanceolate, sometimes reduced and caducous, entire to deeply incised, venation pinnate, gland-dotted or not. Inflorescences of axillary cymose clusters, mostly pedunculate; bracts foliose, mostly pubescent. Pedicels slender. Calyx 5-partite, nearly to the base, the lobes with hyaline margins. Corolla tubular, slightly bilabiate, the mouth not spreading, mostly glabrous outside, pubescent near the

mouth. Stamens 4, didynamous, included, the filaments inserted just above the base of the tube, often a short staminode also present. Style included; stigma entire. Fruit a rotund septicidal, glabrous capsule, with a persistent or beak-forming style. Seeds numerous, small, oblong or elliptical, striate or reticulate. c. 30 spp. Mexico, Mesoamerica, Colombia, Greater Antilles, one species (*R. equisetiformis*) cultivated and naturalized pantropically.

Bibliography: Carlson, M.C. (1957) *Fieldiana, Bot.* 29: 231-292. Robinson, B.L. *Proc. Amer. Acad. Sci.* 35: 319-321 (1900).

1. Plants rush-like; branches slender, numerous, verticillate; inflorescences (1- or) 2-flowered. **4. R. equisetiformis**

1. Plants not rush-like; branches not numerous at the nodes, usually opposite or ternate; inflorescences usually with more than 2 flowers.

2. Leaves with entire margins, or with an occasional tooth.

3. Stems 4-angled, the angles ridged; corollas often pinkish or purplish, sometimes red. **1. R. campechiana**

3. Stems terete or subterete, if angular, the angles very rounded and inconspicuous; corollas always red.

4. Stems glabrous or glabrescent. **3. R. contrerasii**

4. Stems densely pubescent. **7. R. purpusii**

2. Leaves with serrate, dentate or crenate margins.

5. Stems terete or subterete, often obscurely angled.

6. Inflorescences pedunculate; leaves resinous-lepidote below.

**2. R. coccinea**

6. Peduncles absent, the inflorescence sessile; leaves without resinous scales, sometimes with gland-tipped hairs. **9. R. rugosa**

5. Stems 4-6 angular, the angles sharply ridged or winged.

7. Calyx 5-7 mm. **5. R. longisepala**

7. Calyx 2.5-4.5 mm.

8. Calyx with lepidote glands. **6. R. parvifolia**

8. Calyx without lepidote glands.

9. Leaves with lepidote glands.

10. Inflorescences with more than 15 flowers, the lepidote glands sunken in the leaf tissue below. **2. R. coccinea**

10. Inflorescences with 3-7 flowers, the lepidote glands shallow, not sunken.

11. Stem ridges roughened by swollen bases of hairs; capsules ovoid.

**8. R. retrorsa**

11. Stem ridges glabrous; capsules globose.

**11. R. standleyi**

9. Leaves without lepidote glands, sessile glandular punctations present or not.

12. Corolla 10-16 mm; leaves with resinous dots on lower side of leaves, or when without resinous dots the corolla 12-13 mm.

**10. R. sarmentosa**

12. Corolla 8-10 mm; leaves without resinous dots.

**12. R. ternifolia**

**1. Russelia campechiana** Standl., *Contr. U. S. Nat. Herb.* 23(4): 1309 (1924).

Holotype: Mexico, Campeche, *Goldman 467* (US-396830). Illustr.: not found. N.v.: eek'k'i'ix (Mexico)

*Russelia campechiana* var. *lilacina* Lundell, *R. lilacina* (Lundell) Lundell.

Shrubs to 1.5 m, suffrutescent or scandent. Stems quadrangular, ridges conspicuous, scattered with short appressed hairs. Leaves opposite, 5-7 × 2.5-4 cm, ovate-lanceolate, the bases rounded, the margins entire, reflexed, the apices acuminate, coriaceous, lustrous on upper surface, glabrous, minute impressed glandular dots on lower surface; petioles 7-9 mm, pubescent especially at base. Inflorescences cymose, toward stem apices, axillary, compact, many-flowered; peduncles 5-10 mm, pubescent; bracteoles linear, pubescent; pedicels to 5 mm, pubescent. Calyx 3.5 mm, the lobes ovate, subulate-acuminate, the tips sometimes recurved, shortly pubescent on costa and margin, without glandular dots. Corolla 11-13 mm, red or rose pink to purplish, the dorsal lobe not notched, 3.5 × 2.5 mm, the ventral lobes 3 × 1.5 mm, the inside of median lobe densely bearded with yellow hairs especially at throat and at base near attachment of stamens. Capsule c. 10 mm, globose, beaked. Flowering December to July. *Semi-deciduous forests, roadsides, hill-tops, pine ridges, often on calcareous soils.* T (*Ventura A. 20159*, MO); Ch (*Martínez S. 17785*, MO); Y (*Darwin & White 2224*, BM); C (*Chan V. 200*, MO); QR (*Télez 1470*, BM); B (*Davidse & Brant 32577*, MO); G (*Lundell 17166*, F). 30-600 m. (Endemic.)

This species very closely resembles the Mexican *R. syringifolia* Schlttdl. & Cham., but it differs in its longer petioles and shorter corollas.

**2. *Russelia coccinea* (L.) Wettst., *Nat. Pflanzenfam.* 4(3b): 63 (1891).**

*Scrophularia coccinea* L., *Sp. Pl.* 2: 621 (1753). Neotype (designated by Carlson, *Fieldiana, Bot.* 29(4): 251. 1957): Mexico, *Seler 705* (GH). Illustr.: not found.

*Russelia acuminata* Carlson, *R. coccinea* forma *stipitata* Carlson, *R. laciniata* Standl. & Steyerl., *R. longifolia* Carlson, *R. multiflora* Sims, *R. paniculata* M.Mart. & Galeotti, *R. serratifolia* Lundell.

Shrubs to 3 m, scrambling, weak suffruticose, Stems not able to support themselves, subterete or very weakly 4-6 ridged, these rounded, narrow and with striations between ridges, glabrous, not resinous-lepidote. Leaves opposite, ternate or verticillate, 3.5-9 × 0.9-5 cm, ovate-lanceolate to rhombic-ovate, the bases truncate, cuneate or subcordate, the margins serrate, the apices acute or acuminate, glabrous except for a few multicellular hairs on the upper side and on the veins below, with resinous dots on the lower side, without dots or sometimes sparsely dotted above; petioles 1-5 mm, glabrous or pubescent. Inflorescences cymose, sometimes appearing racemose, one or two from an axil near the ends of the branches, usually with numerous (c 15-25) flowers; peduncles 5-15 mm, glabrous or slightly pubescent; bracteoles linear, pubescent, ciliate; pedicels 3-10 mm, glabrous or slightly pubescent. Calyx 3.5-4.5(-7) mm, the lobes ovate-lanceolate, apices acuminate, glabrous or sparsely pubescent on the midrib. Corollas 10-16 mm, red, the upper lip slightly notched, the lower lip trilobed, the lobes 3 mm, with flat hairs on the inner side of the median ventral lobe of the corolla, and shorter hairs near the attachment of the stamens. Capsules 3-4(-6) mm, globose, beaked, shorter than the persistent calyx lobes. Flowering throughout the year. Ch (*Ventura & López 1128*, BM); G (*Williams et al. 41313*, F). 500-1800 m. (Mexico, Mesoamerica, Cuba, Trinidad, sometimes cultivated.)

A variable species that needs further investigation. Several taxa described by Carlson are within the variability of the species, e.g. *Russelia laciniata* seems to be an aberrant form with incised leaf margins.

**3. *Russelia contrerasii* B.L. Turner, *Phytologia* 81(5): 335 (1996). Holotype:**

Guatemala, *Contreras 7464* (LL, isotypes LL, WISC). Illustr.: not found.

Woody vines. Stems terete to weakly angular, the angles rounded, glabrate. Leaves opposite 5-10 × 2-6 cm, broadly ovate, the bases rounded or cordate, the

margins entire, the apices acuminate, glabrous or nearly so, minutely glandular-punctate beneath; petioles 5-10 mm. Inflorescences paniculate, terminal, diffuse and open 6-25 flowered; peduncles 8-30 mm; bracteoles, minute, linear; pedicels 10-16 mm, glabrous. Calyx 3-3.4 mm, the lobes broadly ovate to subcordate, the apices acute or apiculate, glabrous or the margins minutely ciliate. Corollas 12-16 mm, red, glabrous, the lobes 3-4 mm, the apices broadly rounded. Capsules c. 8 mm, broadly ovoid. Flowering October-January. *Rocky slopes in forest and cliffsides*. Ch (Téllez V. 6684, BM); G (Contreras 7380, MO). 400-1200 m. (Endemic.)

**4. *Russelia equisetiformis*** Schtdl. & Cham., *Linnaea* 6(2): 377 (1831).

Holotype: Mexico, Veracruz, *Schiede & Deppe 1187* (HAL-97776, isotypes B, GH).  
Illustr.: not found. N.v.: Lluvia de coral.

*Russelia juncea* Zucc.

Shrubs to c. 1 m, suffruticose. Stems profusely branching verticillately, rush-like, somewhat resembling a horsetail (*Equisetum*), with small, caducous leaves; branches verticillate below, opposite above, spreading. Stems green, glabrous, 4-12-angled, with prominent ridges on angles and striations between them, upper stems very slender. Lower leaves verticillate, 3-6 in a whorl, 0.85-1.5 × 0.6-0.9 cm, ovate or elliptical, the margins entire or larger ones with a few large dentations on each side, the apices acute; upper leaves opposite, smaller, linear, the margins entire; glabrous on both sides, with few circular resinous dots; petioles 3-4 mm, often remaining appressed to stem when leaves fall. Inflorescences near the stem apices, opposite or verticillate, 1-2-flowered; peduncles 3-4 cm, glabrous; bracteoles small, linear, with few resinous dots; pedicels 1-1.5 cm, glabrous. Calyx 2-3 mm, the lobes broadly ovate, the apices acute or mucronate, glabrous, without resinous dots. Corollas 1.5-2.5 cm, red (or yellow in some cultivars), glabrous outside, the dorsal lobe deeply notched, the 3 ventral lobes about the same length as dorsal one. Capsules 3-6 mm, globose, the persistent calyx covering lower third of capsule; persistent style to 15 mm. Flowering throughout the year. *In open sunny places, usually cultivated*. Ch (*Breedlove 23765*, MO); Y (*Cabrera 8591*, MO); C (*Cabrera C. 12745*, MO); QR (Téllez 1023, BM); B (*Spellman & Stoddart 2468*, MO); G (*Steyermark 33241*, MO); H (*Castillo 122*, MO); ES (*Berendsohn WB 0070*, MO); N (*Nichols 896*, MO); CR (*Khan et al. 924*, BM); P (*D'Arcy 10640A*, MO). 0-1200(-1700) m. (Most collections

are cultivated plants, although collectors do not always indicate it. Native to Central Mexico, cultivated in most tropical countries.)

**5. *Russelia longisepala*** Carlson, *Fieldiana, Bot.* 29(4): 254 (1957). Holotype: Guatemala, *von Tuerckheim 2249* (NY). Illustr.: not found.

Shrub 30-50 cm, suffruticose. Stems 4-6-angled, narrowly ridged on the angles, glabrous except at tips of branches. Leaves opposite, 1.5-2.5 × 0.7-1.5 cm, elliptic, the bases cuneate, the margins serrate, the apices acute, the upper sides and veins of below of younger leaves sparsely short-appressed-pubescent, sparsely resinous-lepidote below; petioles 1 mm, pubescent. Inflorescences 2-4-flowered; peduncles 8 mm, glabrous; bracteoles long-oval; pedicels 3-5 mm, glabrous. Calyx 6-7 mm, the lobes, lanceolate, gradually tapering from base to apex, the margins red-purple, pubescent in narrow line along midrib. Corollas 9-11 mm, red, the lobes 4 mm, spreading, barbate on inner side of ventral lobe near mouth. Capsules 8 mm, elongate. Flowering April. Ch (Méndez-Larios & Villaseñor Ríos, 2001); G (*von Tuerckheim 2249*, NY). c. 1300 m. (Endemic.)

Distinguished by the long, gradually tapering calyx lobes and the spreading 2-lipped corolla, with lobes longer than in most species. The species is only known from the type although it was reported from Chiapas, a record which could not be confirmed.

**6. *Russelia parvifolia*** Carlson, *Fieldiana, Bot.* 29(4): 282, t. 6 (1957). Holotype: Guatemala, *Deam 6069* (MICH, isotype GH, PA). Illustr.: not found.

Shrubs 1-1.5 m, suffruticose. Stems branching, 4-6-angled, with thickened ridges on angles, densely hirsute with straight multicellular hairs of unequal lengths. Leaves opposite or ternate, 0.7-2.5(-4) × 0.8-2.7 cm, broadly ovate or elliptic, the bases truncate or widely cuneate, the margins serrate or serrate-crenate, the apices acute or obtuse, densely hirsute on both sides especially on the veins below, scattered resinous lepidote on both sides; petioles 2-4 mm, hirsute. Inflorescences cymose, axillary, 3-8-flowered; peduncles 4-8 mm, densely hirsute, without glands; pedicels 3-4 mm, densely hirsute, without glands. Calyx 3 mm, the lobes ovate, pubescent in the middle and on the subulate tip, densely or sparingly resinous-lepidote. Corollas 11-12 mm, red, the ventral lobes 3 × 1 mm, the dorsal lip shorter, emarginate, glabrous

outside, bearded within along median ventral lobe and at base near attachment of stamens. Capsules 3 mm, globose. Flowering December-January. *Savannas, rocky hillsides*. Ch (*Juzepczuk 1399*, F); B (*Hawkins 1254*, MO); G (*Harmon & Dwyer 2799*, MO). 10-1100 m. (Endemic.)

**7. *Russelia purpusii*** Brandegee, *Univ. Calif. Publ. Bot.* 4: 385 (1913).

Holotype: Mexico, Veracruz, *Purpus 6039* (UC, isotypes: BM, F. MO, NY, US).

Illustr.: not found.

Shrubs, much branched. Stems appearing terete, but with inconspicuous ridges and no striations between these ridges, all densely velutinous. Leaves opposite, 2.5-9 × 1.5-5 cm, broadly ovate, the bases truncate or subcordate, the margins entire, recurved, the apices acuminate, sparsely pubescent above, more densely so on margin and veins and below, velvety to the touch, petioles 5-6 mm, pubescent. Inflorescences of axillary 3-6-flowered cymes; peduncles 7-10 mm, pubescent; bracteoles small, linear, pubescent; pedicels 8-11 mm, pubescent. Calyx 3 mm, the lobes ovate, the apices acute or acuminate, without hairs or glands. Corolla 15-17 mm, red, glabrous outside, the dorsal lobe 1.5 mm, slightly notched, the ventral lobes slightly longer and narrower, pubescent along inside of median ventral lobe. Capsules c. 6 mm, ovate, the apex acuminate, the style persistent, the persistent calyx covering less than half of the capsule. Flowering August-October. *Rocky forests, walled canyons, limestone outcrops*. Ch (*Breedlove 39817*, MO). 600-1000 m. (Mexico.)

**8. *Russelia retrorsa*** Greene, *Pittonia* 1: 176 (1888). Holotype: Mexico,

Jalisco, *Palmer 540* (US). Illustr.: not found.

*Russelia trachypleura* B.L. Rob.

Shrubs, 1.2-1.6 m, suffrutescent. Stems branched, 4(-8)-angled, the angles prominent, narrow, the ridges roughened by swollen bases of hairs, the hairs 3-9-celled, 0.6-0.7 mm, the areas between the ridges flat, with striations and usually with hairs, the hairs usually numerous but sometimes few and scattered, usually straight but sometimes retrorse. Leaves opposite or ternate, 2-6 × 1-3.5 cm, ovate or elliptic-ovate, the bases rounded or cuneate, the margins crenate, the apices acute or obtuse, both surfaces densely pilose, upper and sometimes lower with large resinous scales, the veins densely pilose; petioles 1-2 mm, pilose. Inflorescences cymose, axillary,

with 3-7 flowers; peduncles 3-7 mm, pubescent; bracteoles linear, pubescent; pedicels 3-7 mm, pubescent. Calyx 2.5-3 mm, the lobes ovate, acuminate, with a few hairs along the midrib or sometimes glabrous. Corollas 10-12 mm, bright red, the upper lip deeply notched, the lobes of lower lip 2 mm, rounded, barbate on inner surface of median lobe near throat and near attachment of stamens. Capsules 3-5 mm, ovoid, about as long as the persistent calyx lobes. Flowering throughout the year. Ch (Roe *et al.* 1124, F). 900-1500(-2400) m. (W & C Mexico.)

**9. *Russelia rugosa*** B.L. Rob., *Proc. Amer. Acad. Arts* 43(2): 58 (1907).

Holotype: Guatemala, *Deam 183* (GH, isotypes F!, MICH, MO!, NY, PH, US).

Illustr.: Standley & Williams, *Fl. Guat., Fieldiana, Bot.* 24: 395, t. 89 (1973).

*Russelia steyermarkii* Carlson.

Shrubs to 2 m, suffruticose. Stems terete or subterete with 4-6 very narrow inconspicuous ridges and fine striations between the ridges, the lateral branches densely pubescent, the main stems less so. Leaves opposite or ternate, 2-7 × 1-4.5 cm elliptic, the bases cuneate, the margins crenate-serrate except at the base, the apices acute or obtuse, usually rugose, thin, both surfaces pilose with multicellular hairs, especially beneath on the veins, sometimes both surfaces densely covered with short gland-tipped hairs, without resinous dots; petioles 4-5 mm, pilose. Inflorescences axillary, sessile, 2-3-flowered, much shorter than the leaves; peduncles absent; pedicels slender, 4-6 mm, pilose. Calyx 5-10 mm, the lobes lanceolate, pubescent. Corollas 11-15 mm, red, deeply cleft, the lobes spreading-undulate, exterior with hairs, some gland-tipped, the upper lobe cleft 1.5 mm, lower lobes 3 × 2.5 mm, pubescent near throat on the inside of the ventral lobe of tube and at base near attachment of the stamens, the hairs much finer and more matted than in other species. Capsules 4 mm, ovoid. Flowering January. *Ravines and dry tropical forests*. Ch (*Ghiesbreght 615*, MO); G (*Steyermark 42980*, F); H (*Andino Bustillo 173*, MO). 1200 m. (Endemic.)

**10. *Russelia sarmentosa*** Jacq., *Selec. Stirp. Amer. Hist.* 178 (1763).

Lectotype (designated by Christenhusz, 2010, in press): Cuba, Jacquin, *Selec. Stirp. Amer. Hist.* vol. 2: tab. CXIII (1763). Note: Jacquin coined the name earlier in his

*Enum. Syst. Pl.* 25 (1760), but this is not accompanied by a description and is therefore not the place of valid publication. Illustr.: not found.

*Russelia chiapensis* Lundell, *R. colombiana* Pennell, *R. flavoviridis* S.F.Blake, *R. oxyphylla* Lundell, *R. sarmentosa* forma *eglandulosa* Carlson, *R. sarmentosa* forma *pubescens* Carlson, *R. sarmentosa* forma *velutina* Carlson, *R. sarmentosa* var. *nicaraguensis* Carlson, *R. tabascensis* Lundell.

Shrubs 1-2 m, suffruticose. Stems branched, erect or later reclining, 4-angled or main stems 6-angled, branches 4-angled, the angles often extended as wings 0.1-0.5 mm. wide, with thickened ridges on the angles or on the margins of the wings, the flat sides striate, usually glabrous but sometimes slightly pubescent, and occasionally sparsely resinous-lepidote. Leaves opposite or ternate, 1.5-8(-10) × 1-5 cm, narrowly ovate to broadly ovate or elliptic, the bases truncate, cuneate, subcordate or rounded, the margins serrate, dentate or crenate, with 5-9 teeth on each side, the apices acute, obtuse or (long-)acuminate, the upper surface glabrous and somewhat lustrous or sparsely pubescent with multicellular hairs, the lower surface glabrous or with hairs on the main veins, both surfaces with yellowish or brownish resinous dots, these sometimes numerous and conspicuous, sometimes few and obscure; petioles 2-3 mm, glabrous or pubescent. Inflorescences cymose, 1-3 at each axil, 3- to many-flowered; peduncles 4-18 mm, glabrous or slightly pubescent, sometimes with a few resinous dots; bracteoles linear or lanceolate, ciliate; pedicels 5-8 mm, glabrous or slightly pubescent, often with resinous dots, especially at the top. Calyx 3-4 mm, the lobes ovate, apices acuminate, glabrous or sometimes with hairs along the midrib and with few or numerous resinous dots. Corollas 10-15 mm, red, the mouth slightly spreading, the upper lip emarginate, the lower lip tripartite, the lobes 2.5-3 × 1.5-2 mm, rounded at apex, with flat hairs on interior of median lower lobe and smaller similar hairs near insertion of stamens. Capsules 3-5.5 mm, (sub)globose, calyx persistent, its lobes little more than half as long as capsules. Flowering throughout the year. *Roadsides, forest clearings, savannas, shrubberies, etc.* T (*Matuda* 3524, F); Ch (*Matuda* 2088, LL); Y (*Gaumer* 403, MO); C (*Lundell* 1331, F); QR (*Gaumer* 23660, MO); B (*Gentle* 2248, GH, MICH, PA); G (*Christenhusz* 5577, BM); H (*Williams & Molina* 12252, F); ES (*Carlson* 789, F); N (*Maxon* 7434, US); CR (*Brenes* 232, F); P (*Dodge & Allen* 17324, MO). 0-1500 m. (Mexico, Mesoamerica, Colombia, Antilles.)

A poorly defined, very variable species. Several of the taxa synonymised above have characters that are unique, but all fall within the broad variability of the species. Further studies are needed to come to a satisfactory segregation of the groups in this complex.

**11. *Russelia standleyi*** Carlson, *Fieldiana, Bot.* 29(4): 257 (1957). Holotype: Guatemala, *Standley 77093* (F). Illustr.: not found.

Herbs to 1 m, sometimes with woody rootstock. Stems 6-angled, side branches 4-angled, the angles thickened, glabrous. Leaves opposite or ternate, 1-2.5 × 0.8-1.2 cm, the bases cuneate or truncate, the margins serrate with a few large teeth, ciliate, the apices acute or obtuse, both surfaces glabrescent, sparsely hairy in the midvein above and venation beneath, with a few large scattered resinous scales on both sides; petioles 2 mm, pubescent, Inflorescences 3-5-flowered; peduncles 5-18 mm, glabrous; pedicels 5-7 mm, glabrous. Calyx 3 mm, the lobes broadly ovate, the margins purple, the apex long-acuminate, glabrous, without glands. Corollas 10-12 mm, barbate within on ventral lobe. Capsules 4 mm, globose. Flowering September-November. *Along wet streams, on moist banks, in oak thickets, pine forests, G (Standley 77067, F); H (Molina R. & R. Molina 27862, F). (750-)900-1500 m. (Endemic.)*

**12. *Russelia ternifolia*** Kunth, *Nov. Gen. Sp. (quarto ed.)* 2: 359 (1817). Holotype: Mexico, Michoacán, *Kunth s.n.* (P). Illustr.: not found.

Shrubs, suffruticose. Stems and branches 4-6-angled, the angles slightly thickened, densely hirsute-pubescent. Leaves opposite or ternate, 5-6.2 × 3.3-5.2 cm, obovate or ovate, the bases truncate or cuneate and decurrent on the petiole, the margins coarsely serrate or serrate-crenate except at the base, the apices rounded or obtuse, hirsute on both surfaces, especially on the veins, not resinous-lepidote, tinged purple; petioles 4-5 mm, hirsute. Inflorescences cymose, axillary, solitary, many-flowered; peduncles 5-7 mm, hirsute-tomentose; bracteoles linear, hirsute-tomentose; pedicels 4 mm, filiform, tomentose. Calyx 2.5-3.5 mm, the lobes ovate, mucronate, the margins incumbent, puberulent. Corollas 8-10 mm, red, slightly wider at the top, glabrous outside, limb 4-lobed, the upper a little wider than the lower and slightly notched, the lobes rounded, the inner surface of the lower lip barbate. Capsules 3 mm, globose. Ch (*Purpus 6882, MO*). 1000-1300 m. (Mexico).

### 19. *Schistophragma* Benth. ex Endl.

By M.J.M. Christenhusz.

Annual herbs. Stems quadrangular. Leaves opposite, petiolate, entire or pinnatisect. Inflorescence a solitary flower in the leaf axils, ebracteate, the peduncle minute, pedicels longer. Calyx 5-partite, divided to the base, the lobes narrow, subequal. Corolla tubular, the mouth flaring, the lower lip fused, apex emarginate, the upper lip trilobate. Anthers 4, in 2 subequal pairs. Style dilated at the apex, entire. Fruit a linear, compressed, bisulcate, loculicidally dehiscent capsule. Seeds many, oblong, spirally striate. 2 spp. Southwest United States, Mexico, Mesoamerica, Colombia.

**1. *Schistophragma mexicanum*** Benth. ex Endl. in D. Dietr., *Syn. Pl.* 3: 513 (1843). Lectotype (designated by Christenhusz, 2010): Mexico, *Alaman s.n. ex Herbarium Benthamianum*, anno 1837 (K-000529076). Illustr.: Standley & Williams, *Fl. Guat., Fieldiana Bot.* 24: 397, t. 90 (1973). N.v.: Hierba maría (G).

*Conobea pusilla* (Benth.) Benth. & Hook., *Leucospora pusilla* (Benth) Benth & Hook., *Schistophragma pusillum* Benth., *Stemodia siliquosa* Sessé & Moc.

Herbs to c. 20 cm, small annual. Stems quadrangular, subalate, glabrous. Leaves simple to pinnatisect, mostly 0.8-1.6 × 2-4 mm, the segments linear, glabrous or scabrescent. Inflorescence axillary, 1-flowered. Calyx 2-4 mm, the lobes linear. Corolla 5-6 mm, violet to bluish-purplish. Stamens equal or didynamous, included. Capsule c. 10-15 × 0.9-1 mm, linear, bisulcate, apiculate. Seeds c. 1 mm, oblong-cylindrical. *Secondary vegetation, usually in open forests.* Ch (*Matuda 4434*, MO); Y (*Darwin 2292*, BM); C (*Cabrera C. 11893*, BM); G (*Martínez S. 23190*, BM); H (*Linares et al. 6651*, MO); N (*Stevens & Krukoff 9812*, MO); CR (*Tonduz 13790*, BM). 0-1050 m. (Mexico, Mesoamerica, Colombia.)

Note: *Schistophragma pusillum* is homotypic with *S. mexicanum*, but the latter name takes priority.

### 20. *Scoparia* L.

By M.J.M. Christenhusz.

Herbs or subshrubs. Stems 4- or 5-angular. Leaves opposite or whorled, margin entire or toothed, the lamina generally glandular punctate. Inflorescence of 1-3 axillary flowers; pedicels slender; bracteoles absent. Calyx 4- or 5-partite, free nearly to the base, one a little larger than the others, the lobes imbricate, ovate to lanceolate. Corolla subrotate, 4-lobed, the tube inconspicuous, densely hairy at throat, the lobes imbricate. Stamens 4, subequal, exserted; anther locules distinct, parallel or divergent. Ovary globose; style exserted, apically enlarged, truncate or emarginate. Fruit a septicidal and secondarily loculicidal, ovoid to globose capsule. Seeds small, numerous, foveolate. c. 20 spp. Tropical America, Africa, Asia and Australia.

Bibliography: Chodat, R. *Bull. Herb. Boissier sér. 2*, 8: 1-16; 85-89 (1908). Fries, R.E. *Ark. Bot.* 6(9): 1-31, t. 8 (1906); *Bull. Herb. Boissier sér. 2*, 8: 934-940 (1908).

1. Calyx lobes 5, acute; corolla yellow; basal leaves generally pinnatifid.

**1. S. annua**

1. Calyx lobes 4, obtuse or rounded; corolla white; basal leaves generally dentate (or biserrate), not pinnatifid.

**2. S. dulcis**

**1. Scoparia annua** Schltld. & Cham., *Linnaea* 6: 375 (1831). Holotype: Mexico, *Schiede & Deppe s.n.* (HAL). Illustr.: not found. N.v.: Culantrillo, falso epasote (ES).

Herbs to 30 cm, erect annual. Stems ribbed, angular, glabrous. Leaves usually whorled, 0.8-2(-3.5) × 0.3-0.6 cm, the basal ones ovate, pinnatifid, the upper ones oblanceolate, the bases attenuate, the margin crenate-dentate to subentire, usually deeply lobed, the apices tridentate, rounded-obtuse to short-acute; petioles 0-3 mm. Inflorescence of solitary axillary flowers, usually several per node; pedicels 0.5-1.5 cm. Calyx 5-partite, 1-3 mm, the apices acute. Corolla 2-2.5 × 3.5-4.5 mm, yellow. Capsule 2.5-3.5 mm, ovoid-ellipsoid. Flowering and fruiting throughout the year. *In humid shrubbery, along river banks and on sand bars.* G (Standley & Williams 1973); H (*Proctor 38933*, BM); ES (*Sandoval 122*, MO); N (*Moreno 25147*, BM). 80-1000 m. (Mexico, Mesoamerica, Venezuela, Bolivia, Brazil [Pará], Paraguay, Curaçao.)

**2. *Scoparia dulcis* L., *Sp. Pl.* 1: 116. 1753.** Lectotype (designated by Sutton, 1993): *Herbarium van Royen* (L-921.348-49). Illustr.: D'Arcy, *Fl. Panama, Ann. Missouri Bot. Gard.* 66: 250, t. 18. (1979). N.v.: Escobeta, mastuerzo (G), culantrillo, culantro montes (ES), bun tajpla (H), escoba (N).

*Capraria dulcis* (L) Kuntze, *Gratiola micrantha* Nutt., *Scoparia grandiflora* Nash, *S. ternata* Forssk.

Herbs to 1.5 m, erect annual or suffrutescent perennials. Stems ribbed to narrowly winged, glabrous or puberulent-ciliate at nodes. Leaves 0.9-5.3 × 0.2-1.5 cm, rhomboid-obovate to linear-oblong, the bases cuneate, the margins dentate above middle, sometimes slightly biserrate or subentire, the apices obtuse, glabrous, usually glandular punctate; petioles 0-1 cm. Inflorescences of (1-)2(-3) axillary flowers; pedicel 4-7 mm. Calyx 4-partite, 1.5-2 mm, ovate-oblong, the margin ciliate, the apices obtuse or rounded. Corolla 2-2.5 × 3-4 mm, white, sometimes somewhat purple in the throat, the lobes 2-3 mm, the margins erose-denticulate, the apices obtuse. Capsule 2-4 mm, ovoid-globose, usually 4-sulcate. Flowering and fruiting throughout the year. *Pantropical weed of disturbed places, fields, gardens, roadsides, etc.* T (*Chan & Puch 6575*, MO); Ch (*Martínez S. 7798*, MO); QR (*Carnevali et al. 6594*, MO); B (*Whitefoord 1151*, BM); G (*Contreras 9882*, MO); H (*Nelson & Hernández R. 170*, MO); ES (*Calderón Velásquez s.n.*, MO); N (*Nelson 5380*, BM); CR (*Khan et al. 913*, BM); P (*Folsom 2916*, BM). 0-1400 m. (United States [Louisiana, Mississippi], Mexico, Mesoamerica, Colombia, Venezuela, Guyana, Suriname, French Guiana, Ecuador, Galapagos, Peru, Bolivia, Brazil, Paraguay, Argentina, Antilles, Palaeotropics.)

## **21. *Sibthorpia* L.**

*Willichia* L.

By M.J.M. Christenhusz.

Creeping or viny herbs, usually rooting at the nodes. Leaves alternate, long-petiolate, reniform, lobate, the lobes rounded, palmately veined. Inflorescence of solitary flowers in the leaf axils, long-pedicellate. Calyx 4-lobed, campanulate, the lobes united into a tube at the base. Corolla 4-lobed, subrotate, red, yellow, violet, white or greenish-white. Stamens (3-)4(-5), equal, arising from near the corolla base, exserted. Stigma solitary, capitate. Fruit a broadly ovoid to compressed globose loculicidal

capsule, obcordate at apex. Seeds reticulate. 5 spp. Temperate Europe, Asia, Macaronesia, North America, Andes.

**1. *Sibthorpia repens* (L.) Kuntze, *Revis. Gen. Pl.* 3(2): 239 (1898). *Willichia repens* Mutis ex L., *Mant. Pl.* 2: 558 (1771). Lectotype (designated by Hedberg, 1955): *Mutis 62 in Herb. Linn. No. 475.4* (LINN!). Illustr.: Standley & Williams, *Fl. Guat., Fieldiana Bot.* 24: 402, t. 92 (1973). N.v.: Yerba culebra (G).**

*Sibthorpia pichinchensis* Kunth, *S. retusa* Kunth, *S. rotundifolia* (Ruiz & Pav.) Edwin, *S. triandra* Suess., *Veronica rotundifolia* Ruiz & Pav.

Herbs, creeping, prostrate. Indument white pilose, especially on the petioles and pedicels. Stems filiform, rooting at the nodes. Petioles 0.5-4 cm, leaf blades 0.5-2 × 0.5-2.5 cm, orbicular-reniform, crenate to crenately lobed, often tinged reddish abaxially. Inflorescence solitary flowers sprouting from the leaf axils at the nodes. Pedicels 0.3-1(-2.5) cm. Calyx 1.5-3 mm, campanulate, pilose, the lobes more than half the length of the calyx. Corolla 1.8-3 mm, dark red to dark violet, sometimes pink, white or greenish. Stamens (3-)4, yellowish or purplish to brown. Stigma capitate-depressed. Capsule 1.5-2.5 mm, broadly ovoid, laterally compressed, pilose. Seeds 0.5-0.7 mm, blackish brown to black. *Shaded cloud forests, often in moist places, also in pastures and other disturbed sites at high elevation.* Ch (*Hampshire et al.* 578, BM); G (*Christenhusz 5306*, BM); H (*Clewell & Hazlett 3986*, MO); ES (*Linares & Martínez 2377*, MO); CR (*Davidse et al.* 28958, MO); P (*Klitgaard et al.* 821, BM). 1350-3200 m. (Mexico, Mesoamerica, Colombia, Venezuela, Ecuador, Peru, Bolivia, Chile, Argentina.)

Note: It is not certain that the Mutis specimen was in Linnaeus' possession when the name was published, but there are no other original elements for the name. In any event, Hedberg's choice has priority over that of Hampshire (in Jarvis et al., *Regnum Veg.* 127: 99. 1993) who proposed a neotype (*Stafford et al.* 361, BM) from Chiapas.

## **22. *Stemodia* L., *nom. cons.***

*Stemodiocra* P.Browne

By M.J.M. Christenhusz.

Herbs, sometimes suffrutescent. Leaves opposite or whorled, petiolate or sessile, pinnately veined. Inflorescences of solitary axillary floweris or in terminal racemes or spikes; bracteoles 2 or absent. Calyx 5-parted nearly to the base, the lobes more or less equal, lanceolate-linear. Corolla bilabiate, the upper lip emarginate or entire, the lower lip trilobate, pilose or glabrous within. Stamens 4, didynamous, included. anthers 2-celled, the cells distinct, separated on short arms of the connective. Style forked. Fruit a septicidal, secondarily loculicidal capsule. Seeds numerous. 30-56 spp., pantropical, most diverse in the Neotropics.

Bibliography: D'Arcy, W.G. *Ann. Missouri Bot. Gard.* 66: 252-262 (1979). Minod, M. *Bull. Soc. Bot. Genève* 10: 155-252 (1918). Turner, B.L. & Cowan, C. *Phytologia* 74: 61-103 (1993); *Phytologia* 75: 281-324 (1993).

1. Flowers subsessile, the pedicels < 1 mm; leaves not noticeably punctate.

2. Leaves petiolate, basally cuneate; stigmas erect or slightly bent; plants mostly less than 15 cm; leaves mostly less than 10 mm. **5. S. verticillata**

2. Leaves subsessile, basally auriculate and seeming to clasp the stem; plants often more than 15 cm; basal leaves mostly more than 10 mm.

3. Corollas 5-8 mm, pubescent. Stems herbaceous, leaves membranaceous.

**1. S. durantifolia**

3. Corollas 2.5-4.8 mm, glabrous. Stems woody at base, leaves leathery.

**3. S. maritima**

1. Flowers long pedicellate, the pedicels more than 5 mm; leaves copiously glandular punctate beneath.

4. Leaves mostly less than 15 mm; corolla less than 9 mm. **2. S. jorullensis**

4. Leaves mostly more than 15 mm; corolla more than 9 mm.

**4. S. peduncularis**

**1. Stemodia durantifolia** (L.) Sw., *Observ. Bot.* 240 (1791). *Capraria durantifolia* L., *Syst. Nat. (ed. 10)*: 1116 (1759). Type: Jamaica, not designated. See discussion by Nicolson (in *Taxon* 24: 652. 1975) and by Turner & Cowan (in *Phytologia* 74: 73. 1993; 75: 287. 1993), who erroneously treated Sloane material (BM), unseen by Linnaeus, as the lectotype. Illustr.: Standley & Williams, *Fl. Guat., Fieldiana Bot.* 24: 404, t. 93 (1973).

*Capraria oppositifolia* L., *Conobea verticillaris* Spreng., *Phaelypaea erecta* P. Br., *Scrophularia subhastata* Vell., *Stemodia arizonica* Pennell, *S. berteroana* Benth., *S. bissei* Tzvelev, *S. ehrenbergiana* Schltld., *S. erecta* (P.Br.) Minod, *S. subhastata* (Vell.) Benth., *S. verticillaris* (Spreng.) Link, *Stemodiocras berteroana* (Benth.) Kuntze, *S. durantifolia* (L.) Morong, *S. subhastata* (Vell.) Kuntze.

Herbs to c. 1 m, erect. All parts viscid-glandular. Stems much-branched, quadrangular. Leaves sessile, 3-8.5 × 0.7-2 cm, oblanceolate to lanceolate, the bases attenuate, abruptly expanded into the auriculate base, the margins coarsely serrate, the apices acute-apiculate, the leaves of the branches smaller, lanceolate, hispid along the veins. Inflorescences spicate, glandular-pubescent; bracts lanceolate, amplexicaul, margins serrate; pedicels 0-1.2 mm, bracteoles 2, subtending the calyx, ciliate. Calyx 3.5-5.5 mm, the lobes narrowly lanceolate, the apices acuminate. Corolla 5-8 mm, blue to lavender, the throat yellow, pubescent inside. Capsule 3.5-4.2 mm, ovoid-ellipsoid, the tips recurved when dehiscent. Flowering throughout the year. *Wet places along stream banks and ruderal places.* T (*Novelo R. & Ramos V. 2619*, MO); Ch (*Martínez S. 11003*, MO); Y (*Chan 7175*, MO); C (*Lundell 1372*, MO); QR (*Pitzer & Misquez 2607*, MO); B (*Whitefoord 10184*, BM); G (*Contreras 9522*, MO); H (*Blackmore & Chorley 3764*, BM); ES (*Rosales 2630*, BM); N (*Davidse et al. 30802*, MO); CR (*Hammel 19990*, MO); P (*McDaniel 10322*, MO). 0-1500 m. (SW United States, Mexico, Mesoamerica, South America, Antilles.)

**2. *Stemodia jorullensis*** Kunth, *Nov. Gen. Sp. Pl.* 2: 358 (1817). Type: Mexico, *Humboldt & Bonpland s.n.* (P). Illustr.: not found.

*Lendneria ageratifolia* (C. Wright) Pennell, *L. angulata* (Oerst.) Pennell, *Stemodia ageratifolia* C. Wright, *S. angulata* Oerst., *S. micrantha* Brandegee, *Stemodiocras angulata* (Oerst.) Kuntze.

Herbs, small prostrate. Stems simple or much-branched, short-villous. Leaves 0.6-3 × 0.4-2.3 cm, broadly ovate, the bases cuneate, the margins crenate-dentate, the apices rounded, glabrous to sparsely pubescent, petiole 2-12 mm. Inflorescences of solitary flowers in the leaf axils, pedicels 6-20 mm, bracteoles absent. Calyx 3.5-6 mm, equal or the posterior lobe longer, linear to narrowly lanceolate, apices acute or obtuse, hispid. Corolla 7-9 mm, white or creamy white, sometimes tinged pink, the throat often yellowish, pubescent inside. Capsule 3-5 mm, narrowly ovoid, acute, the tips reflexing in dehiscence. Flowering throughout the year. *Moist places along river*

*banks and disturbed areas, gardens, lawns, roadsides, etc.* Ch (Purpus 6806, BM); ES (Sandoval 238, MO); N (Moreno 5237-b, BM); CR (Wilbur 38034, MO); P (Kirkbride Jr & Bristan 1569, MO). 0-900 m. (Mexico, Mesoamerica, Colombia, Venezuela, Colombia, Peru.)

**3. *Stemodia maritima* L., *Syst. Nat. (ed. 10) 2: 1118 (1759)*. Lectotype (designated by Sutton in Jarvis et al., 1993): *Browne s.n. in Herb. Linn No. 797.1 (LINN)*. Illustr.: not found.**

Herbs to 80 cm, erect suffrutescent. All parts glandular-pubescent. Stems much-branched, quadrangular. Leaves sessile, 0.7-2.2 × 0.1-0.8 cm, (ob-)lanceolate, the bases auriculate-cordate, the margins coarsely dentate, the apices acute. Venation obscure, blades hispid. Inflorescences or axillary subsessile flowers, bracteoles 2, subtending the calyx, ciliate. Calyx 3-4 mm, the lobes narrowly lanceolate, the apices acuminate. Corolla 2.5-4.8 mm, blue to lavender, the throat yellow, glabrous inside. Capsule 3-4 mm, ovoid. Flowering throughout the year. *Beaches near the sea, cays*. C (Chan 4927, MO); QR (Cowan 5102, MO); B (Nee & Atha 46868, MO). 0-2 m. (Southern United States, Mexico, Mesoamerica, Caribbean South America, Antilles).

**4. *Stemodia peduncularis* Benth., *Prodr.* 10: 382 (1846)**. Lectotype (designated by Turner, 1993): Mexico, Veracruz, *Linden 1098 (K)*. Illustr.: D'Arcy, *Fl. Panama, Ann. Missouri Bot. Gard.* 66: 257, t. 19. (1979).

*Anetanthus parviflorus* (Hook. & Arn.) Benth. & Hook. ex Jackson, *Dicyrta parviflora* (Hook. & Arn.) Seem., *Stemodiocra peduncularis* (Benth.) Kuntze, *Trevirania parviflora* Hook. & Arn.

Herbs or subshrubs to 1.5 m, erect or scrambling. Stems quadrangular, pubescent with weak short whitish hairs, spreading by stolons and sometimes rooting at the lower nodes. Leaves 1-7 × 0.8-4 cm, ovate, the bases truncate or cuneate, the margins coarsely crenate-dentate, the apices obtuse, sparsely pubescent, glandular beneath; petioles 0.7-1.5 cm. Inflorescences of axillary clustered flowers, 2-4 per node; peduncles 0.5-2(-4) cm, ebracteolate, pubescent. Calyx 6-8 mm, pubescent and glandular punctate as the leaves. Corolla 1.2-1.5 cm, white, lilac, blue or pink with fine crimson lines inside, the tube pubescent. Capsule 6-7 mm, ovoid. *Flowering throughout the year. Mixed montane cloud forests, ravines, roadsides*. Ch (Matuda 2962, MO); B (Whitefoord 9313, BM); G (von Türckheim II 1656, MO); H (Evans

1140, MO); N (*Sandino & Sáenz 3075*, BM); CR (*Skutch 4188*, MO); P (*Wilbur 11017*, MO). 500-2200 m. (Mexico, Mesoamerica.)

**5. *Stemodia verticillata*** (Mill.) Hassl., *Trab. Mus. Farmacol.* 21: 110 (1909).

*Erinus verticillatus* Mill., *Gard. Dict.* (ed. 8) no. 5 (1768). Holotype: Mexico, Veracruz, *Houston s.n.* (BM-000956463). Illustr.: not found.

*Capraria humilis* Sol., *Lendneria humilis* (Sol.) Minod, *L. verticillata* (Mill.) Britton, *Stemodia arenaria* Kunth, *S. humilis* (Sol.) Dawson, *S. parviflora* Aiton, *Stemodiocra verticillata* (Mill.) Kuntze.

Herbs to 16 cm, small decumbent or prostrate. Stems much branched, viscid-villous. Leaves 0.6-2.2 × 0.3-1.7 cm, ovate, the bases broadly cuneate, the margins crenate-dentate, the apices obtuse or rounded, glabrate; petioles 3-10 mm, villous. Inflorescences of solitary flowers in the upper leaf axils, pedicels and calyx glandular pubescent; pedicels 1-2.5 mm, without bracteoles. Calyx 2.7-4.2 mm, the lobes linear. Corolla 4-5 mm, 5-lobed, the lips equal, blue to violet or pink with purple stripes in throat, pubescent inside. Capsules 1.8-2.5 mm, subglobose to broadly ovoid. Flowering throughout the year. *Moist places along river banks and weedy places, road sides, yards, fields, etc.* Ch (*Breedlove 42457*, MO); B (*Liesner & Dwyer 1499*, MO); G (*Contreras 8028*, MO); H (*Hernández R. & Mancías 1065*, MO); ES (*Villacorta & Gonzáles 1101*, MO); N (*Moreno 983*, BM); CR (*Quesada 735*, MO); P (*Whitefoord & Eddy 395*, BM). 0-1100(-2500) m. (Mexico, Mesoamerica, South America, Antilles.)

This species is unusual for the genus because of the short connective arms on the stamens and the more regular 5-lobed corolla. It is easily mistaken for a species of *Bacopa*.

**23. *Tetranema*** Benth.

*Allophyton* Brandege

By M.J.M. Christenhusz.

Perennial, herbaceous or suffruticose, subcaulescent herbs. Stems rounded-quadrangular. Leaves opposite, essentially sessile, the bases attenuate to subamplexicaul, the margins subentire, dentate or crenate, glabrous or ciliate, the apices acute or obtuse. Inflorescence an axillary dichasial cyme, sometimes peduncles

shortened to resemble an umbel, bracteate. Flowers zygomorphic, pedicellate, pedicels at the base with bracteoles, these linear-lanceolate. Calyx green, 5 parted. Corolla bilabiate, tubular or infundibular, purple, blue, violet, red or white, adaxially hairy, upper lip bilobed, often fused, truncate or obtuse, lower lip trilobed. Fertile stamens 4, didynamous, sterile staminode 1, rudimentary, anthers basifixed. Ovary superior, bilocular; style erect, persistent. Fruit an ovoid glabrous, loculicidally dehiscent capsule. Seeds numerous, ovoid to quadrangular, reticulate. 6 spp., Mexico, Mesoamerica.

Bibliography: Christenhusz, M.J.M. *Phytotaxa* 14: 56-60 (2010). Grayum, M.H. & Hammel, B.E. The genus *Tetranema* (Scrophulariaceae) in Costa Rica with two new species. *Phytologia* 79(4): 269–280 (1995). Méndez-Larios, I. & Villaseñor, J.L. Revisión taxonómica del género *Tetranema* (Scrophulariaceae). *Acta Bot. Mex.* 32: 53-68 (1995).

1. Stamens included; corolla funnel-shaped, white with violet streaks to purple or blue.

2. Leaves in a pseudo-rosette, the internodes short ( $\leq 1$  cm).      **2. T. roseum**

2. Leaves along the stem, the internodes longer ( $\geq 3$  cm).      **4. T. michaelfayanum**

1. Stamens exerted from the throat but not exceeding the upper corolla lobe; corolla tubular, red or scarlet.

3. Plant 25-50 cm. Corolla lobes 2-4 mm,  $< 1/5$  the total corolla length; floral bracts c. 6-10 mm.      **3. T. megaphyllum**

3. Plants (35-)80-200 cm. Corolla lobes 11-13 mm,  $> 1/5$  the total corolla length; floral bracts 0.5-5 mm.

4. Corolla 2.6-3.5 cm, pubescent within in a band of flat, yellow hairs along the entire ventral surface and onto the lower lobe; inflorescence many-flowered (14-30 flowers), the peduncle purple; leaf apex rounded to short-acuminate.      **1. T. floribundum**

4. Corolla c. 4.9-5.5 cm, glabrous throughout or (rarely) pubescent on lower lobe and at mouth; inflorescence few-flowered (2-12 flowers), the peduncle green; leaf apex long-acuminate.      **2. T. gamboanum**

**1. Tetranema floribundum** Grayum & Hammel, *Phytologia* 79(4): 276. (1995). Holotype: Costa Rica, Hammel, Jiménez & Morales 20068 (INB!, isotypes: BM!, CR!, F!, MO!). Illustr.: Grayum & Hammel, *Phytologia* 79(4): t. 4. (1995).

Herbs (35-)80-200 cm, often rooting at the nodes. Stems elongated, densely matted-, arachnoid- or woolly-pubescent when young, internodes less to at least 15 cm. Leaves sessile, 21-23.5 × 9-13 cm, broadly elliptic to oblanceolate or spatulate, the bases acute to mostly concavely and abruptly attenuate, the margins coarsely serrate to undulate-toothed, the apices abruptly acute or short-acuminate, glabrous above except on the midrib at the very base, strigulose on the midrib and main veins below and minutely scaly throughout the abaxial leaf surface. Inflorescences cymose; peduncles 13-23 cm, purple, quadrangular, narrowly winged; bracts c. 15 mm, narrowly triangular, margins ciliate. Flowers (8-)14-30 per inflorescence, pedicellate; pedicels c. 10-20 mm, glabrous. Calyx lobes 2-4 mm, broadly ovate, the margins ciliate, the apices long-acuminate. Corolla 2.6-3.5 cm, tubular, red, gradually curved upward and distally expanded, glabrous outside, pubescent within, with a band of yellow hairs on the ventral surface of the tube across the median lower lobe, the lobes 4, c. 1-3 × 2.5-5.5 mm, lanceolate, the upper lobe (consisting of two fused lobes) emarginate, the lower 3 with rounded apices,. Stamens exerted from throat, but not beyond the upper corolla lobe, the staminode c. 5 mm. Style exerted, glabrous. Capsule c. 8 mm, ovoid. Flowering December to March. *Lower montane rain forests in the Cerro Turrubares, lithophytic. CR (Jiménez et al. 1155, BM). 1200-1600 m (Endemic.)*

**2. *Tetranema gamboanum*** Grayum & Hammel, *Phytologia* 79(4): 270 (1995). Holotype: Costa Rica, *Aguilar et al.* 2700 (INB; isotypes BM, CAS, CR, F, MEXU, MO, NY, US). Illustr.: Grayum & Hammel, *Phytologia* 79(4): t. 1-2 (1995).

Herbs 100-200 cm. Stems elongate, strigulose when young, internodes to at least 11 cm. Leaves (sub-)sessile; petioles when present to c. 1 cm; Leaves 14-31 × 5-11 cm, elliptical to oblanceolate or spatulate, the bases attenuate, the margins ± coarsely serrate, the apices long-acuminate, glabrous above or with few, distant hairs along the mid-vein and major veins (especially proximally), pubescent along the veins below. Inflorescences cymose; peduncles 9-24 cm, green, quadrangular with the angles narrowly winged; bracts c. 0.5-2 mm, subulate to narrowly triangular, margins ciliate. Flowers c. 2-12 per inflorescence, pedicellate; pedicels c. 9-20 mm, glabrous. Calyx 3-6 mm, the lobes narrowly to broadly ovate, the apices cornute, the margins ciliate. Corolla c. 4.9-5.5 cm, tubular, scarlet, slightly curved upward and distally gradually expanded, glabrous throughout or with flat hairs at the basal lobe in the

mouth, the lobes 4, imbricate, 11-13 × 3-3.5 mm, the upper lobe (consisting of 2 fused lobes) emarginate, the 3 lower lobes obtuse to rounded at apices. Stamens exerted from the throat but not exceeding the upper corolla lobe, the staminode c. 1.5-2.0 mm. Style exerted, glabrous. Capsule c. 6-9 mm, subglobose-apiculate. Flowering December to April. *Premontane rain forests, lithophytic*. CR (*Herrera & Chacón 2644*, BM). 550-1000 m. (Endemic.)

**3. *Tetranema megaphyllum*** (Brandege) L.O. Williams, *Fieldiana, Bot.* 34(8): 131 (1972). *Allophyton megaphyllum* Brandege, *Univ. Calif. Publ. Bot.* 6: 62 (1914). Holotype: Mexico, Chiapas, *Purpus 6855* (UC-172562, isotypes: BM!, F!, MO!, NY, US). Illustr.: Méndez-Larios & Villaseñor. *Acta Bot. Mex.* 32: 64, t. 4 (1995).

Herbs 25-40 cm, suffruticose. Stems reduced, pubescent, internodes to 3.5 cm. Leaves (sub-)sessile; petioles when present to 1 cm. Leaves 10-35 × 4.5-10 cm, obovate to oblanceolate or spatulate-ovate, the bases attenuate, the margins crenate-dentate, the apices acuminate, glabrous above or with few, distant hairs along the mid-vein and major veins (especially proximally), sparsely pubescent along the veins below. Inflorescences cymose; peduncles 6-15 cm, green, quadrangular with the angles narrowly winged; bracts 6-7 mm, lanceolate. Flowers 3-10 per inflorescence, aggregated, pedicellate; pedicels 5-16 mm. Calyx 2-3 mm, the lobes ovate, the apices cornute. Corolla 2-3 cm, tubular, red, slightly curved upward and distally gradually expanded, glabrous throughout or with flat hairs at the basal lobe in the mouth, the lobes 4, imbricate, 4 × 4.5 mm, the upper lobe (consisting of 2 fused lobes) emarginate, the 3 lower lobes obtuse to rounded at apices. Stamens exerted from the throat but not exceeding the upper corolla lobe, the staminode c. 0.9 mm. Style exerted, glabrous. Capsule 6-8 mm, ovoid. Flowering December to June. Ch (*Purpus 7213*, BM) 300-700 m. (Endemic.)

**4. *Tetranema michaelfayanum*** Christenh., *Phytotaxa* 14: 57 (2010). Holotype: Honduras, *Evans 1354* (BM, isotype: MO). Illustr.: not found.

Herbs of at least 50 cm. Stems elongate, pubescent, internodes 3 cm or longer. Leaves subsessile to shortly petiolate, petioles when present to c. 1 cm. Leaves 11.5-19 × 3-5.5 cm, oblanceolate, the bases attenuate, the margins widely crenate, ciliate with bicellular trichomes, the apices acute to acuminate, glabrous above, willous on

the veins beneath. Inflorescences densely clustered, cymose, psuedo-umbellate; peduncles c. 12-16 cm, green, quadrangular with the angles narrowly winged, usually longer than the leaves; bracts 1.5-2 mm, linear. Flowers (4-)6-12, pedicellate; pedicels c. 5-10 mm. Calyx 3-5 mm, the lobes lanceolate, imbricate, the apices acuminate. Corolla c. 1.5 cm, infundibular, white with violet tube, bilabiate, the upper lip c. 4 mm, bilobed, the lobes partly fused, the lobes rounded, the lower lip c. 5-6 mm, trilobed, the middle lobe elliptic-ovate, the lateral lobes ovate. Stamens included, the short ones c. 4 mm, the long ones c. 5 mm, the staminode c. 3 mm. Style included. Capsule c. 5 mm, ovoid. Seeds subquadrangular, c. 4 mm. Flowering March. *Primary forests*. H (Evans 1354, MO) c. 1740 m. (Endemic.)

**5. *Tetranema roseum*** (M. Mart. & Galeotti) Standl. & Steyerl., *Publ. Field Mus. Nat. Hist., Bot. Ser.* 23(5): 235 (1947). *Episcia rosea* M.Mart. & Galeotti, *Bull. Acad. Roy. Sci. Bruxelles* 9(2): 39 (1842). Holotype: Mexico, Galeotti 1905 (BR, isotype K!). Illustr.: Standley & Williams, *Fl. Guat., Fieldiana Bot.* 24: 408-410, t. 94, 95 (1973).

*Allophyton evolutum* (Donn.Sm.) Pennell, *A. mexicanum* (Benth.) Pennell, *Tetranema cymosum* L.O.Williams, *T. evolutum* Donn.Sm., *T. mexicanum* Benth.

Herbs to 20 cm. Stems reduced, pubescent, internodes less than 1 cm. Leaves sessile, 9-15(-25) × 2-5(-8) cm, obovate, the bases attenuate, the margins subentire-sinuate to widely crenate, ciliate with bi- or multicellular trichomes, the apices obtuse to acute, glabrous above, pubescent throughout and especially on the veins beneath, green or tinged brightly purple below, the venation often tinged pink or purple. Inflorescences laxly cymose to contracted and nearly umbellate; peduncles 5-17 cm, as long as or shorter than the leaves, villose; bracts 2-4 mm, lanceolate to linear. Flowers 2-20, pedicellate; pedicels 3-5 mm. Calyx 2.5-5 mm, the lobes lanceolate to narrowly ovate, the apices acute-acuminate. Corolla 1.5-2.5 cm, infundibular, white to lilac or violet, with various streaks of blue and purple, occasionally pinkish or darker purple, bilabiate, the upper lip 4.5-6 mm, bilobed, truncate, the lobes fused nearly to the apex, or more free and fused only to the middle, the lower lip 6-10 mm, trilobed, the median lobe elliptic-ovate, the lateral lobes ovate, much smaller than the median lobe. Stamens included, the short ones 4-5 mm, the long ones 5-6 mm, the staminode 1-3 mm. Style 7-9 mm, included. Capsule 4-6 mm, ovoid. Flowering and fruiting throughout the year. *Lithophytic or on banks, usually in deep shade*. Ch (Croat 47845,

MO); B (*Monro et al. 3154*, BM); G (*Christenhusz 5433*, BM); H (*Yuncker 8738*, F). 300-1500 m. (Mexico [Puebla, Veracruz], Mesoamerica.)

Traditionally three taxa were recognised in this complex. *Tetranema evolutum* was distinguished by its multicellular cilia along the margin and laxe cymes, whereas *T. roseum* has bicellular cilia and pseudo-umbellate inflorescences. These characters are not consistent in combination and thus I opted for merging these species. Méndez-Larios & Villaseñor (1995) distinguished *T. evolutum*, *T. cymosum* and *T. roseum* based on corolla colour, resp. red, white and violet. All specimens I studied of *T. evolutum* list the colour as violet-purple or white with a violet or purple throat, not red. The type specimen of *T. cymosum* describes the corolla as ‘white, dull purple at base of tube with dull purplish spots on upper side’, which can be considered white, but seems not very different from other specimens from Guatemala. It does have a lax inflorescence and shorter stamens, but these characters may be phenotypic.

#### 24. *Uroskinnera* Lindl.

By M.J.M. Christenhusz.

Terrestrial shrubs or suffruticose perennial herbs. Stems and leaves pubescent to villous. Leaves opposite, dentate. Inflorescence a multiflorous, terminal or axillary raceme or spike. Flowers large, showy, sessile to short-pedicellate, bibracteolate. Calyx tubular-campanulate with 4-5 short teeth. Corolla tube elongate, dilated in the upper part, the limb spreading, 5-lobed, the lobes subequal, plane. Stamens 4, didynamous, included. Staminode 1, linear-clavate, shorter or longer than the stamens. Style elongate, with bifid stigma at apex. Fruit a globose, loculicidally dehiscent capsule, included in the persistent calyx, the valves entire. Seeds small, numerous, scrobiculate. 4 spp. Mexico, Guatemala.

1. Suffruticose perennial herb to c. 50 cm. Inflorescence spicate. Flowers pale yellow to greenish cream.

##### 1. *U. flavida*

1. Woody shrub to c. 150 cm. Inflorescence racemose. Flowers violet-purple to lilac.

##### 2. *U. spectabilis*

1. *Uroskinnera flavida* Lundell, *Bot. Mus. Leaflet*. 9(2): 68 (1941). Holotype: Mexico, Tabasco, *Matuda 3425* (MICH). Illustr.: not found.

Herbs to 50 cm, suffruticose perennial. Stems, branches, petioles and inflorescences appressed-pubescent. Leaves c. 10-15 × 6-9 cm, elliptic-oblong, the bases rounded to cordate, the margins finely crenate, the apices acute, rough-pilose above, densely soft-villous beneath; petioles to 8 cm. Inflorescence spicate, usually more or less terminal. Calyx 2-3 mm, cupular, white hirsute, shallowly 4-dentate, the teeth c. 1 mm, broadly triangular. Corolla c. 2 cm, creamy greenish to pale yellow, the lobes rounded, sparsely pubescent outside. Stamens glabrous. Stigma shallowly bifid. Ovary glabrous. Capsule c. 5 × 2.5 mm, ovate. T (*Cowan 2894*, MO). c. 80 m. (Endemic.)

**2. *Uroskinnera spectabilis*** Lindl., *Gard. Chron.* 1857: 36 (1857). Holotype: Guatemala, *Skinner 123*, ex Herb. Lindley (CGE-06787). Illustr.: Standley & Williams, *Fl. Guat., Fieldiana Bot.* 24(9): 412, t. 96 (1973).

*Uroskinnera watsonii* R.E.Schult.

Shrubs to 1.5 m. Stems, branches, petioles and inflorescences copiously woolly. Leaves 4-18 × 2.5-10 cm, elliptic to elliptic-oblong, the bases unequally rounded to subacute, the margins dentate or shallowly crenate, the apices acute, pilose and somewhat rough above, softly pilose below; petioles 1-8 cm. Inflorescence racemose, terminally or axillary. Calyx 5-7 mm, cupular, white-hirsute, 4-dentate, the teeth 2-3 mm, linear. Corolla 2-4 cm, violet-purple to lilac, the lobes triangular, acute, glabrous outside, sparsely glandular-hairy within. Stamens glabrous. Stigma deeply bifid. Ovary glabrous. Capsule 6 × 5 mm, ovate-globose. *Open pine forests*. G (*Tenorio L. 14580*, MO); ES (*Berendsohn 139*, MO, cult. jardin botanico). 50-600 m. (Endemic to Verapaz and Izabal, Guatemala).

An attractive ornamental plant that is sometimes cultivated in e.g. El Salvador, Guyana, Europe, Indonesia.

## 25. *Veronica* L.

*Beccabunga* Hill, *Besseyia* Rydb., *Chionohebe* B.G. Briggs & Ehrend., *Derwentia* Raf., *Detzneria* Schlechter ex Diels, *Hebe* Comm. ex Juss., *Heliohebe* Garn.-Jones,

*Odicardis* Raf., *Paederota* L., *Parahebe* W.R.B. Oliv., *Pocilla* Fourr.,

*Pseudolysimachion* (W.D.J. Koch) Opiz, *Pygmea* Hook.f., *Synthyris* Benth.

By M.J.M. Christenhusz..

Annual, biennial or perennial, terrestrial or aquatic herbs, shrubs or small trees. Stems erect, decumbent or prostrate. Leaves opposite, cauline (or in rosettes), entire, crenate, serrate or deeply lobed. Inflorescence in terminal or lateral racemes, bracts alternate, foliose or reduced. Flowers 4-merous, weakly bilabiate. Calyx deeply 4-parted, all equal or the anterior pair enlarged. Corolla irregularly 4-lobed, subrotate, the upper lobe largest, the lower lobe smallest, blue, violet, pink, lilac or white. Stamens 2, exserted, epipetalous. Stigma solitary, capitate. Fruit an ovoid, orbicular or emarginate to obcordate, strongly laterally compressed to subterete, loculicidal capsule. Seeds few to numerous, smooth to rugose. c. 450 spp. Mostly North Temperate, Australasia, a few in subtropics and on tropical mountains, and c. 10 cosmopolitan weeds.

Recent molecular studies have shown that the well-known horticultural genera *Chionohebe*, *Hebe*, *Paederota*, *Parahebe* and *Synthyris*, are embedded in *Veronica* (Albach & Meudt, 2010).

1. Plants woody, shrubs or small trees; leaves evergreen, entire (hebe, cultivated).

**1. *V. × andersonii***

1. Plants herbaceous, perennial or annual, sometimes woody at base, but then with serrate leaves (speedwell).

2. Flowers in terminal or axillary racemes; bracts all or at least the upper very different in shape from the foliage leaves, but the lower ones may sometimes be similar to them.

3. Plants perennial, often with non-flowering shoots and long rhizomes that are difficult to uproot due to the rooting nodes.

4. Inflorescences usually axillary; Leaf margins deeply dentate.

**5. *V. plebeia***

4. Inflorescences terminal; Leaf margins shallowly crenate. **7. *V. serpyllifolia***

3. Plants annual usually with a single root system, usually not rooting along the nodes and easy to uproot.

5. Plants pubescent with non-glandular hairs. Leaves ovate-orbicular.

**2. *V. arvensis***

5. Plants glabrous or when pubescent, the hairs glandular, these usually only found along the stems. Leaves oblanceolate to narrowly oblong. **3. *V. peregrina***

2. Flowers solitary in axils, or in short axillary racemes, the bracts very similar to the foliage leaves, but the upper often smaller than them.

6. Lobes of capsule with apices diverging at a right (c 90°) angle. Corolla 8 mm or more across.

**4. V. persica**

6. Lobes of capsule with apices more or less parallel or diverging at a narrow angle. Corolla 8 mm or less across.

7. Flowers in axillary racemes, sometimes also with a few solitary in the leaf axils; the stem nodes sometimes rooting.

**5. V. plebeia**

7. Flowers always solitary in the leaf axils; the stem nodes never rooting.

**6. V. polita**

**1. Veronica × andersonii** Lindl. & Paxton, *Paxton's Fl. Gard., Revis.* 2: t. 38 (1853). Type: Cultivated in New Zealand, *Anderson s.n.* (not located). Illustr.: not found. N.v.: Geronomo, verónica (Spanish), hebe (English).

*Hebe andersonii* (Lindl. & Paxton) Cockayne.

Shrubs, evergreen glabrous. Stems quadrangular, woody at base. Leaves 7-15 × 3.5-6 cm, the bases attenuate, the margins entire, the apices acute, leathery, glabrous (variegated in the specimen cited); petioles to 2 cm. Inflorescences terminal and axillary racemes, the flowers grouped pseudovercillately along the inflorescence rachis; bracts c. 5 × 1 mm, acuminate. Calyx deeply 4-parted, c. 2 mm, campanulate. Corolla shallowly 4 parted, white, the tube c. 1 cm, purplish inside, the lobes c. 5 mm. H (*Molina R. 34044*, MO).

A garden hybrid of *V. salicifolia* G.Forst. and *V. speciosa* R.Cunn. Many species, hybrids and cultivars of hebe are grown, but few species are known to naturalize. Most species and hybrids originate from New Zealand. Records of *V. salicifolia* (e.g. in *Fl. Guatemala*), may not always refer to the true species. There are many hybrids and cultivars available through horticultural trade and *V. salicifolia* has been used extensively in producing hardy garden varieties.

**2. Veronica arvensis** L., *Sp. Pl.* 1: 13 (1753). Lectotype (designated by Cramer in Dassanayake & Fosberg, 1981): Europe, *Herb. Linn. No. 26.58* (LINN). Illustr.: Britton & Brown, *Fl. N. U.S.* 3: 202 (1913).

*Veronica longiracemosa* Colenso.

Herbs, annual. Stems 2-30 cm, erect or ascending, simple or branched, with white multicellular hairs often concentrated in 2 lines. Leaves 0.5-1.6 × 0.1-1.4 cm, ovate-orbicular, the bases usually rounded, sometimes cordulate or attenuate, the margins coarsely crenate, the apices rounded to obtuse, hirsute, the lower ones short petiolate, the upper sessile. Inflorescence a many-flowered, terminal, lax raceme to 20 cm, the axes with multicellular hairs; bracts alternate, the lower ones narrowly ovate and sparsely crenate, upper ones narrowly elliptic and entire. Pedicel to 2 mm. Calyx 3-4 mm, 4-lobed, the lobes linear-lanceolate, the lower 2 longer than the upper 2. Corolla c. 2 mm, shorter than calyx, blue to blue-purple with white eye, the lobes orbicular to narrowly oblong. Stamens shorter than corolla. Style persistent, less than 1 mm. Capsule 2.5-3.5 × 3-4 mm, obcordate, strongly compressed, glabrous, margin glandular ciliate, apex notch very deep, the lobes rounded-obtuse. Flowering throughout the year. *Naturalized in grassy places, pastures, agricultural fields and along roads.* G (*Standley 58684*, F); CR (*Davidse et al. 26151*, BM); P (*Stevens 18238*, MO). 1550-3200 m. (Native to southern Europe and Anatolia, introduced as an agricultural weed and consequently naturalized in many parts of the world.)

**3. *Veronica peregrina* L., *Sp. Pl.* 1: 14 (1753).** Lectotype (designated by Fischer, 1997): Europe, *Herb. Linn. No. 26.67* (LINN). Illustr.: Britton & Brown. *Fl. N. U.S.* 3: 202 (1913).

*Veronica peregrina* L. var. *xalapensis* (Kunth) Pennell.

Herbs, annuals, often very branched at the base; main stems to 25 cm, erect, entirely glabrous or densely glandular pubescent. Leaves 1-2.5 × 0.2-0.6(-0.8) cm, sessile, the lower oblanceolate, the bases attenuate, the margin entire or irregularly coarsely dentate above the middle, the apices obtuse. Inflorescences of lax, elongated, terminal and axillary racemes to 20 cm in fruit; bracts narrowly oblong, similar to but slightly smaller than leaves; pedicel less than 2 mm. Calyx 3-4 mm, the lobes broadly linear to narrowly oblong. Corolla c. 2 mm across, white or pale blue, the lobes narrowly oblong to ovate. Capsule 3-4 mm, obcordate, strongly compressed, wider than long, margin short glandular ciliate, the apices conspicuously notched. Flowering August to April. *Wet sandy alluvium in river beds, sometimes also a weed in moist gardens, on waste lands and roadsides.* Ch (*Breedlove & Raven 8265*, BM); G (*Williams et al. 22899*, F); CR (); P (*Godfrey 67328*, MO). 1000-2200(-3000) m.

(Native to North America and northern Mesoamerica, since long naturalised in tropical America, and Eurasia.)

*Veronica peregrina* var. *xalapensis* refers to glabrous plants from Mexico, but the variety falls within the natural variability of the species. Some specimens from Mesoamerica are glabrous, some have hairy stems, making this distinction difficult to maintain.

**4. *Veronica persica*** Poir. in Lam., *Encycl.* 8: 542 (1808). Type: Iran, cultivated in the Jardin des Plantes, Paris, *Herb. Lamarck* (P). Illustr.: Holmgren & Molau, *Fl. Ecuador* 21: 139, t. 24 I-K (1984).

Herbs, annual or biennial. Stems 10-50 cm, diffusely branching and spreading along the ground to 20 cm upright, densely pubescent with multicellular hairs, often more densely so along 2 lines. Leaves 0.6-2(-3) × 0.5-1.6 cm, ovate-lanceolate to suborbicular, the bases cordulate to truncate, the margins obtusely crenate-dentate, the apices rounded to acute, sparsely pubescent on both surfaces; petiole 1-8 mm. Inflorescence a terminal, lax, elongated raceme; bracts foliose, alternate, petiolate, uppermost smaller than others; fruiting pedicel 1.2-4 cm, usually much longer than the bract. Calyx 5-10 × 2.5-4 mm in fruit, the lobes ovate-lanceolate, sparsely pubescent. Corolla 0.8-1.4 cm across, usually blue, the throat sparsely hairy, the lobes ovate to orbicular. Capsule 4-6 × 6-9 mm, obcordate, strongly compressed, apically notched at right to obtuse angle, the lobes obtuse, glandular hairy. Flowering September-May. *Naturalized in waste fields, gardens and lawns and along roadsides.* Ch (*Ton* 9898, MO); G (*Standley* 71457, F); CR (*Khan et al.* 327, BM); P (*D'Arcy* 5312, MO). 1260-2200 m (Native to Southwest Asia, and early agricultural weed and spread since the 19<sup>th</sup> century over large parts of the world.)

**5. *Veronica plebeia*** R. Br., *Prodr. Fl. Nov. Holl.* 435. (1810). Lectotype (designated by Christenhusz, 2010): Australia, Port Jackson, *Brown s.n.* (BM!). Illustr.: not found. N.v.: trailing speedwell (Australian English).

*Veronica deltoidea* Spreng., *V. elongata* Benth., *V. vitifolia* Sm. ex Walp.

Herbs, perennial. Stems trailing to 20 cm, sometimes rooting at the nodes, short-pubescent. Leaves 0.6-2 × 0.5-1.7 cm, deltate-ovate, the bases truncate to rounded or shallowly cordate, the margins irregularly coarsely incised-dentate, the apices acute; petiole 0.3-2 cm. Inflorescence an axillary single flower, or a short

bracteate raceme to 5 cm, 3-10-flowered; peduncle 5-35 cm; bracts 2-7.5 × 1-2 mm, elliptic, sessile, the bases attenuate, the margins entire, the apices acute; pedicels 2-7 mm. Calyx 3.4-7 × 5-7 mm in fruit, the lobes obovate, ciliate. Corolla 2-3.5 mm, pale lavender, violet or blue, the lobes orbicular. Capsule 2.5-4.5 × 4-6 mm, rounded-obcordate, strongly compressed, apically almost straight, emarginate, sparsely pubescent to glabrous. Flowering throughout the year. *Well established in pastures, along roadsides, and in areas cleared of forest, mainly in the Cordillera de Talamanca.* CR (Khan et al. 787, BM). 1400-3300 m (Australia, Tasmania naturalized elsewhere.)

Note: According to the protologue the description is based on material from '(J)' almost certainly referring to Port Jackson. There are three original specimens by Robert Brown in BM, one labelled 'Sydney, 1802', the other 'William's and Hunter's Rivers 1804', and the third labelled 'Port Jackson'. On the basis of the protologue I choose the latter as the lectotype for this species.

This Australian species was probably introduced with impure grass seeds (Vincent, 1989) to Japan, Hawaii and Costa Rica.

**6. *Veronica polita*** Fries, *Novit. Fl. Suec. Alt.* 5: 63 (1817). Holotype: Sweden, *Fries s.n.* (UPS). Illustr.: not found.

*Veronica didyma* Ten., *V. didyma* var. *lilacina* T.Yamaz.

Herbs, annual. Stems 10-30 cm, pubescent. Leaves 6-19 × 4-12 mm, opposite, ovate to suborbicular, the bases acute, the margin deeply bidentate, the apices obtuse; petiole 1-10 mm. Inflorescence of axillary flowers, the bracts similar to the other leaves. Fruiting pedicel 6-13 mm, equalling bract or slightly shorter, recurved. Calyx 4-6 × 2.5-4 mm, 4-lobed, the lobes elliptic to ovate, slightly dilated in fruit, puberulent. Corolla 4-7 mm across, rotate, usually blue, rarely whitish, the lobes orbicular to ovate. Capsule reniform, 3-4 × 4-6 mm, very slightly compressed, apically notched at an acute angle, the lobes rounded, densely glandular-pubescent, mixed with shorter eglandular hairs. Flowering February-October. *Rarely naturalized in agricultural fields.* CR (*Molina R.* 27373, F). c. 2000 m. (Native to southwest Asia and naturalized in most of the world.)

The stems and leaves are sweet and edible, and is in Asia used as salad. This species is included here based on a doubtful record from Costa Rica; almost all specimens previously recorded under this name are *V. plebeia*.

**7. *Veronica serpyllifolia* L.**, *Sp. Pl.* 1: 12 (1753). Lectotype (designated by Cramer in Dassanayake & Fosberg, 1981): Europe and North America, *Herb. Linn. No. 26.30* (LINN). Illustr.: Britton & Brown. *Fl. N. U.S.* 3: 202 (1913).

*Veronica humifusa* Dickson, *V. serpyllifolia* subsp. *humifusa* (Dickson) Syme, *V. serpyllifolia* var. *humifusa* (Dickson) Vahl, *V. tenella* All.

Herbs, perennial. Stems 10-30 cm, cespitose, creeping, often branched, villous with multicellular hairs, apically often with multicellular glandular hairs. Leaves 0.8-2 × 0.7-1.4 cm, ovate-orbicular to ovate-oblong, the bases attenuate, the margins shallowly crenate or rarely entire, the apices obtuse to rounded, the lower ones short petiolate, the upper sessile; petiole 0-4 mm. Inflorescence of terminal (or axillary) erect racemes, to 20 cm in fruit, 10-40-flowered, the axis with multicellular glandular hairs; bracts foliose, 2-4 × 1-2 mm, ovate-elliptic; pedicels 2-6 mm. Calyx 2-4 × 2-3 mm, the lobes lanceolate, the apices obtuse. Corolla c. 4 mm across, the colour variable from almost white with blue lines to solid blue, purple, or purplish red. Capsule 2.5-3 × 4-5 mm, subreniform, strongly compressed, the bases rounded to subtruncate, the margins glandular ciliate, the apices obtuse and notched. Flowering and fruiting throughout the year. *Wet areas in paramós, mountain meadows.* G (Williams et al. 22188, F); CR (Davidse et al. 23148, MO). 2400-3400 m. (Native to Eurasia and North America, widely distributed in north temperate zones and extending into (sub-)tropical mountain regions.)

## **Bibliography**

- Albach, D.C., H.M. Meudt, & B. Oxelman. 2005. Piecing together the "new" Plantaginaceae. *American J. Bot.* 92: 297-315.
- Albach, D.C. & H.M. Meudt. 2010. Phylogeny of *Veronica* in the Southern and Northern Hemispheres based on plastid, nuclear ribosomal and nuclear low-copy DNA. *Molecular Phylogenetics and Evolution* 54: 457-471.
- Bacigalupo, N.M. 1979. *Callitrichaceae*, in A. Burkart. *Fl. Il. Entre Rios* 6(5): 576-582.
- Carlson, M.C. 1957. Monograph of the genus *Russelia*, *Fieldiana, Bot.* 29: 231-292.

- Christenhusz, M.J.M. 2010. Nomenclatural corrections in Mesoamericanan Plantaginaceae and a new species of *Tetranema* from Honduras. *Phytotaxa* 14: 56-60.
- D'Arcy, W.G. 1979. Scrophulariaceae. in: Flora of Panama. *Ann. Missouri Bot. Gard.* 66: 173-272.
- Elisens, W.J. 1985. Monograph of the Maurandyinae (Scrophulariaceae-Antirrhinae). *Syst. Bot. Monogr.* 5: 1-97.
- Fassett, N.C. 1951. *Callitriche* in the New World. *Rhodora* 53: 137-155, 161-182, 185-194, 209-222.
- Fay, M.F., J.R. Bennett, K.W. Dixon & M.J.M. Christenhusz. 2010. Parasites, their relationships and the disintegration of Scrophulariaceae sensu lato. *Curtis's Botanical Magazine* 26 (4): 286-313.
- Ghebrehiwet, M., B. Bremer & M. Thulin. 2000. Phylogeny of the tribe Antirrhineae (Scrophulariaceae) based on morphological and *ndhF* sequence data. *Plant Syst. Evol.* 220: 223-239.
- Grayum, M.H. & B.E. Hammel. 1995. The genus *Tetranema* (Scrophulariaceae) in Costa Rica with two new species. *Phytologia* 79(4): 269-280.
- Hegelmaier, C.F. (1864). *Monogr. Callitriche*. i-v, 5-64, t. 1-4.
- Lansdown, R. & C. Jarvis. 2004. Linnaean names in *Callitriche* L. (Callitrichaceae) and their typification. *Taxon* 53(1): 169-172.
- Lansdown, R.V. 2008. *Water starworts of Europe*. BSBI Handbook No. 11. Botanical Society of the British Isles, London.
- Lansdown, R.V. 2009. Nomenclatural notes on *Callitriche* (Callitrichaceae) in North America. *Novon* 19: 364-369.
- Méndez-Larios, I. & J.L. Villaseñor. 1995. Revisión taxonómica del género *Tetranema* (Scrophulariaceae). *Acta Bot. Mex.* 32: 53-68.
- Miller, N.G. 2001. The Callitrichaceae in the southeastern United States. *Harvard Pap. Bot.* 5(2): 277-301.
- Minod, M. 1918. Contribution à l'étude du genre *Stemodia* et du groupe des Stémodiées en Amérique. *Bull. Soc. Bot. Genève, ser. II* 10: 155-252.
- Olmstead, R.G., C.W. de Pamphilis, A.D. Wolfe, N.D. Young, W.J. Elisens & P.A. Reeves. 2001. Disintegration of the Scrophulariaceae. *Amer. J. Bot.* 8: 348-361.

- Oxelman, B., P. Kornhall, R.G. Olmstead & B. Bremer. 2005. Further disintegration of Scrophulariaceae. *Taxon* 54: 411-425.
- Robinson, B.L. 1900. The genus *Russelia*, *Proc. Amer. Acad. Sci.* 35: 319-321.
- Smith, L.B. & J.M. Pires. 1956. An evaluation of *Benjaminia* Martius ex Benjamin. *J. Washington Acad. Sci.* 46: 86-86.
- Standley, P.C. & J.A. Steyermark. 1949. Callitrichaceae. In: Standley, P.C. & Steyermark, J.A. (Eds), Flora of Guatemala - Part VI. *Fieldiana, Bot.* 24(6): 171-172.
- Standley, P.C. & L.O. Williams. 1973. Scrophulariaceae. In: Standley, P.C. & Williams, L.O. (Eds), Flora of Guatemala - Part IX. *Fieldiana, Bot.* 24(9): 319-416.
- Stevens, P.F. 2008. *Angiosperm Phylogeny Website*. Version 9, June 2008 [and more or less continuously updated since], <http://www.mobot.org/MOBOT/research/APweb/> (2001 onwards).
- Tank, D.C., P.M. Beardsley, S.A. Kelchner & R.G. Olmstead, 2006. Review of the systematics of Scrophulariaceae s.l. and their current disposition. *Australian Syst. Bot.* 19: 289-307.
- Turner, B.L. 1992. A new species of *Stemodia* from Costa Rica. *Phytologia* 73: 251-254.
- Turner, B.L. & C. Cowan. 1993. A taxonomic overview of *Stemodia* (Scrophulariaceae) for North America and the Caribbean. *Phytologia* 74: 61-103.
- Turner, B.L. & C. Cowan. 1993. A taxonomic overview of *Stemodia* (Scrophulariaceae) for South America. *Phytologia* 75: 281-324.
- Turner, B.L. & C. Cowan. 1993. *Darcya* (Scrophulariaceae), a new genus from Central and South America. *Phytologia* 74: 267-270.
- Vincent, K.A. 1989. Several overlooked introduced Scrophulariaceae in tropical America. *Brittonia* 41: 385-387.