

# Flora of Chiapas

PUBLISHED BY THE CALIFORNIA ACADEMY OF SCIENCES

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Part 4

ACANTHACEAE: *Thomas F. Daniel*

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April 18, 1995

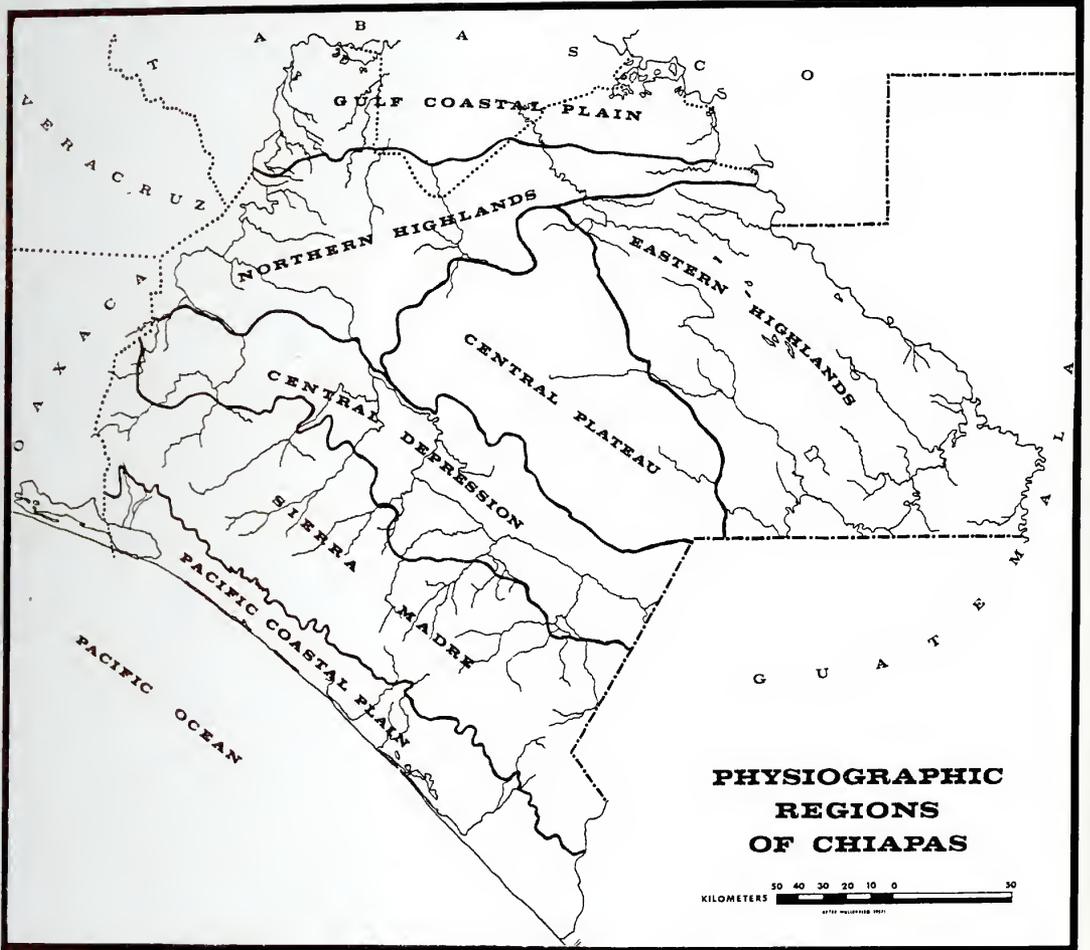


LIST OF FAMILIES FOR *FLORA OF CHILMAS* WITH NUMBER OF SPECIES KNOWN AT PRESENT  
(those listed in *Flora of Guatemala* are in parentheses)

|                  |           |                  |           |                  |           |
|------------------|-----------|------------------|-----------|------------------|-----------|
| Ferns & Allies   | 530 (650) | Usonocroaceae    | 31 (24)   | Oleaceae         | 18 (12)   |
| Fucifus          | 31 (23)   | Droseraceae      | 3 (1)     | Onagraceae       | 44 (46)   |
| Acuminiflora     | 31 (133)  | Rubiacaceae      | 9 (11)    | Ophiaceae        | 3 (1)     |
| Acerosae         | 2 (2)     | Blattinaceae     | 1         | Orchidaceae      | 514 (527) |
| Acuminosae       | 13 (12)   | Binoctarpaceae   | 9 (7)     | Orobanchaceae    | 1 (1)     |
| Azidoaceae       | 7 (3)     | Ericaceae        | 44 (35)   | Oxalidaceae      | 23 (17)   |
| Alismataceae     | 7 (7)     | Hrtocaulaceae    | 2 (13)    | Papaveraceae     | 9 (9)     |
| Arctiarchaeae    | 50 (46)   | Erythroraceae    | 8 (7)     | Passifloraceae   | 42 (42)   |
| Amoridaceae      | 22 (18)   | Euphorbiaceae    | 256 (212) | Pedaliaceae      | 1 (1)     |
| Amomaceae        | 30 (31)   | Fabaceae         | 703 (553) | Phytolaccaceae   | 11 (13)   |
| Apiaceae         | 59 (50)   | Fagaceae         | 39 (26)   | Piperaceae       | 106 (158) |
| Apocynaceae      | 65 (76)   | Flacourtiaceae   | 40 (31)   | Plantaginaceae   | 5 (4)     |
| Asclepiadaceae   | 18 (10)   | Garryaceae       | 2 (2)     | Platanaceae      | 1 (1)     |
| Asteraceae       | 106 (65)  | Gentianaceae     | 33 (35)   | Plantaginaceae   | 3 (3)     |
| Asteraceae       | 20 (22)   | Gerraniaceae     | 13 (7)    | Poaceae          | 461 (455) |
| Asteraceae       | 58 (18)   | Gesneriaceae     | 59 (57)   | Podostemaceae    | 3 (4)     |
| Asterochloaceae  | 17 (15)   | Haemodioraceae   | 1 (1)     | Polemoniaceae    | 10 (10)   |
| Asterophodaceae  | 37 (90)   | Haloragaceae     | 3 (3)     | Polygalaceae     | 30 (34)   |
| Asteraceae       | 553 (511) | Harnandidiaceae  | 2 (13)    | Polygonaceae     | 44 (55)   |
| Balanophoraceae  | 1 (1)     | Hernandiaceae    | 3 (3)     | Pontederiaceae   | 8 (8)     |
| Balsaminaceae    | 3 (2)     | Hippocastanaceae | 1 (2)     | Portulacaceae    | 7 (5)     |
| Bauhinaceae      | 5 (6)     | Hippocrateaceae  | 12 (3)    | Potamogetonaceae | 8 (7)     |
| Bertholon        | 1         | Hydrocharitaceae | 1 (3)     | Primulaceae      | 7 (5)     |
| Begoniaceae      | 45 (34)   | Hydrophyllaceae  | 10 (7)    | Proteaceae       | 2 (3)     |
| Berberidaceae    | 9 (13)    | Isocarpaceae     | 6 (4)     | Punicaceae       | 1 (1)     |
| Betulaceae       | 5 (6)     | Iridaceae        | 29 (22)   | Pyrolaceae       | 5 (4)     |
| Bignoniaceae     | 50 (56)   | Juglandaceae     | 4 (5)     | Quiinaceae       | (1)       |
| Bixaceae         | 1 (1)     | Junaceae         | 16 (10)   | Rafflesiaceae    | 4 (3)     |
| Bombacaceae      | 23 (34)   | Krameriaceae     | 2 (2)     | Ranunculaceae    | 21 (18)   |
| Boyagraceae      | 70 (55)   | Lacustraceae     | 1 (1)     | Resedaceae       | (2)       |
| Braconaceae      | 31 (34)   | Lamiaceae        | 121 (100) | Rhamnaceae       | 25 (22)   |
| Bromeliaceae     | 126 (177) | Lauraceae        | 96 (55)   | Rhizophoraceae   | 2 (2)     |
| Bronniaceae      | 1 (1)     | Lecythidaceae    | 1 (2)     | Rosaceae         | 78 (70)   |
| Burmanniaceae    | 5 (6)     | Lemnaceae        | 8 (7)     | Rubiaceae        | 280 (298) |
| Burseraceae      | 13 (12)   | Lemnaceae        | 2 (1)     | Rutaceae         | 42 (41)   |
| Burseraceae      | 1 (2)     | Leptobulariaceae | 9 (17)    | Salicaceae       | 8 (6)     |
| Burseraceae      | 1 (2)     | Liliaceae s.l.   | 124 (100) | Sapindaceae      | 64 (63)   |
| Calaceae         | 42 (50)   | Liliaceae        | 5 (4)     | Sapotaceae       | 41 (33)   |
| Callitricaceae   | 3 (2)     | Loasaceae        | 9 (6)     | Saxifragaceae    | 11 (8)    |
| Carapachaceae    | 76 (33)   | Loganiaceae      | 29 (24)   | Scrophulariaceae | 86 (95)   |
| Caricaceae       | 5 (6)     | Loranthaceae     | 43 (42)   | Simaroubaceae    | 14 (13)   |
| Capriaceae       | 31 (28)   | Lythraceae       | 47 (34)   | Solanaceae       | 150 (172) |
| Caprifoliaceae   | 34 (18)   | Magnoliaceae     | 5 (3)     | Staphyleaceae    | 4 (4)     |
| Caryaceae        | 9 (3)     | Malpighiaceae    | 56 (49)   | Sterculiaceae    | 34 (28)   |
| Caryophyllaceae  | 38 (36)   | Malvaceae        | 125 (95)  | Styracaceae      | 4 (3)     |
| Casuarinaceae    | 2 (1)     | Martiniaceae     | 18 (14)   | Symplocaceae     | 11 (10)   |
| Celastraceae     | 50 (27)   | Marcgraviaceae   | 6 (10)    | Tamaricaceae     | 2         |
| Celastraceae     | 1 (1)     | Masturiaceae     | 1 (2)     | Theaceae         | 15 (8)    |
| Chenopodiaceae   | 5 (3)     | Mayaceae         | 1 (1)     | Theophrastaceae  | 4 (6)     |
| Chimaphilaceae   | 1 (1)     | Melastomaceae    | 141 (154) | Thymelaeaceae    | 8 (6)     |
| Cistaceae        | 4 (3)     | Meliceae         | 37 (32)   | Tiliaceae        | 41 (25)   |
| Citriodaceae     | 16 (3)    | Meliosmaceae     | 3 (4)     | Tovariaceae      | 1 (1)     |
| Citriodaceae     | 29 (24)   | Menispermaceae   | 11 (11)   | Trigonaceae      | 2 (2)     |
| Conioperaceae    | 2 (2)     | Monimaceae       | 7 (3)     | Triuridaceae     | (3)       |
| Convolvulaceae   | 17 (14)   | Monepocaceae     | 2 (2)     | Tropaeolaceae    | 2 (2)     |
| Convolvulaceae   | 64 (40)   | Mossaceae        | 68 (64)   | Turneraceae      | 10 (7)    |
| Cornaceae        | 4 (5)     | Moringaceae      | 1 (1)     | Typhaceae        | 3 (2)     |
| Cornaceae        | 122 (144) | Muscaceae        | 21 (13)   | Ulmaceae         | 10 (10)   |
| Cornaceae        | 1 (1)     | Myricaceae       | 3 (3)     | Urticaceae       | 47 (55)   |
| Cornaceae        | 2 (2)     | Myrsinaceae      | 2 (5)     | Valerianaceae    | 14 (12)   |
| Crotaceae        | 31 (17)   | Myrsinaceae      | 61 (61)   | Verbenaceae      | 90 (70)   |
| Cucurbitaceae    | 56 (52)   | Myrtaceae        | 85 (96)   | Violaceae        | 29 (23)   |
| Cunoniaceae      | 2 (2)     | Najadaceae       | 1 (2)     | Vitaceae         | 19 (15)   |
| Cyclanthaceae    | 2 (3)     | Nyctaginaceae    | 31 (24)   | Vochysiaceae     | 2 (2)     |
| Cyperaceae       | 190 (185) | Nyssaceae        | 1         | Winteraceae      | 1 (1)     |
| Cyperaceae       | (1)       | Nymphaceae       | 4 (3)     | Xyridaceae       | 2 (3)     |
| Didymopetalaceae | 3 (3)     | Ochnaceae        | 10 (7)    | Zingiberaceae    | 14 (14)   |
| Dilleniaceae     | 8 (3)     | Clavaceae        | 10 (5)    | Zygophyllaceae   | 7 (5)     |

Total: 8248; 7749

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Map 1. Physiographic regions of Chiapas, Mexico (after Müllerried, 1957)

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**ACANTHACEAE**



**Poikilacanthus macranthus**  
Photograph by Thomas F. Daniel

## ACANTHACEAE

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Terrestrial (rarely aquatic) perennial herbs or shrubs, less often trees or twining (clockwise or counter-clockwise) perennial vines, vegetative and floral organs glabrous or pubescent with various types of eglandular (simple and compound), subglandular (i.e., lacking a conspicuous capitate gland at apex but apically enlarged), and glandular trichomes, often beset with cystoliths visible in epidermis (these absent in subfamilies Mendoncioideae, Nelsonioideae, and Thunbergioideae, and in some Acanthoideae). Young stems terete to quadrate-alate, nodes usually swollen, sometimes spinose with spines derived from reduced leaves, bracts, and/or bracteoles. Leaves opposite and decussate or sometimes quaternate (rarely alternate), simple, estipulate, sessile to petiolate, margin entire to spiny-toothed. Inflorescence in leaf axils (axillary) or terminating shoots (terminal), cymose (e.g., dichasia solitary in leaf axils) or thyrsoid (i.e., with the main axis indeterminate and with lateral axes determinate), the basic unit a variably reduced or expanded dichasium, dichasia borne in axils of leaves or bracts, alternate (= solitary) or opposite (= paired) at nodes, sessile or pedunculate, 1-many-flowered, when in axils of bracts then usually forming dichasiate spikes (i.e., dichasia and flowers sessile to subsessile), racemes (i.e., dichasia sessile to subsessile and flowers pedicellate), or thyrses (i.e., dichasia pedunculate), these inflorescences sometimes branched and then forming panicles. Bracts large and brightly colored or small and green, sometimes becoming spinose. Flowers sessile or pedicellate, usually subtended by 2 bracteoles, complete, bisexual, chasmogamous and often cleistogamous, rarely heterostylous. Calyx synsepalous, comprising 5 sepals, usually deeply 4-5-lobed (or entire to multi-lobed in Thunbergioideae and Mendoncioideae), lobes equal to unequal in length, sometimes partially or completely fused with one another and forming heteromorphic segments. Corolla sympetalous, comprising 5 petals, tube cylindric or funnellform (i.e., gradually or abruptly expanded distally into a  $\pm$  distinct throat), sometimes twisted  $180^\circ$  (i.e., corolla resupinate) or  $360^\circ$ , limb subactinomorphic to zygomorphic, commonly bilabiate with an upper lip (rarely suppressed, e.g., *Acanthus*) of 2 lobes and a lower lip of 3 lobes, corolla lobes imbricate (including cochlear and quincuncial) or contorted in bud. Stamens epipetalous, included in corolla tube or exerted from mouth of corolla, usually 2 or 4 and didynamous (rarely 5), filaments free or connate in pairs proximally, anthers 1-thecous or 2-thecous, thecae dehiscing by longitudinal slits (or sometimes with apical pores in Mendoncioideae), sometimes with basal or apical appendages, thecae of a pair parallel to perpendicular, collaterally attached to filament to superposed to widely separated by a modified connective, pollen extremely diverse, spheric to prolate, 2-many-aperturate (apertures simple or compound) or inaperturate, staminodes 0-3, comprising minute projections or sterile filaments. Nectariferous disk usually present around base of ovary, annular. Gynoecium 2-carpellate, ovary superior, generally 2-locular, placentation axile (or parietal in Nelsonioideae), ovules 2-many in each locule, style simple, terminal, filiform, included within corolla tube or exerted from mouth of corolla, stigma funnellform, 2-lobed, or with one lobe suppressed, 1 or both lobes sometimes recurved or recoiled. Fruit a loculicidal, explosively dehiscent, stipitate or estipitate, 2-valved capsule (Acanthoideae, Nelsonioideae, Thunbergioideae) or a fleshy drupe (Mendoncioideae), in capsular fruited taxa septa sometimes separating from inner wall of mature

capsule. Seeds 2–many in capsular fruited taxa, borne throughout capsule, only in proximal portion, or only in distal portion, each usually subtended by a prominent hook-shaped retinaculum (retinacula borne along septa; lacking or of different form in Nelsonioideae and Thunbergioideae), globose to lenticular, often asymmetrically notched at base, glabrous or pubescent, trichomes often hygroscopic or becoming mucilaginous when wet, surfaces smooth or variously ornamented, seeds 1–2 in drupaceous fruits (Mendoncioideae), lacking retinacula. ( $x = 7$ ).

The Acanthaceae comprise more than 4000 species in some 275 currently recognized genera distributed worldwide. Most taxa occur in the tropics and subtropics with major centers of diversity and richness in Indo-Malesia, Africa (including Madagascar), South America, and Mexico-Central America. Plants occur in most tropical habitats except those at very high elevations (i.e., above 3000 meters). About 12 genera, including the two largest, *Justicia* and *Ruellia*, are pantropical. More than 350 species in 40 genera, representing each of the four traditionally recognized subfamilies (Acanthoideae, Mendoncioideae, Nelsonioideae, and Thunbergioideae) occur in Mexico. Twenty-nine genera and 131 species of Acanthaceae are here included as native or naturalized in Chiapas. The following species are known only from cultivated plants in Chiapas: *Acanthus mollis* L., *Justicia brandegeana* Wassh. & L.B. Sm., *J. carnea* Lindl., and *Pachystachys lutea* Nees.

The following treatment is conservative, perhaps excessively so at times, in recognition of taxa. In cases where seemingly disparate specimens are included in a single species, a rationale is provided or referenced. Pollen characters are utilized in the key to genera and are sometimes included in the descriptions. In no case is a pollen character the sole basis for distinguishing genera in the key. These micro-characters are provided because classification of the Acanthaceae has been based in large part on differences in pollen.

Format of this treatment basically follows that of previous parts in the series. The same abbreviations of collectors names are utilized. New and previous abbreviations for collectors are provided in Appendix 1. Collections (except for those of Breedlove) are listed by the first named collector's abbreviation (except where abbreviations for joint collectors have been used previously), the collection number, and herbaria of deposit. Collections of D.E. Breedlove and Breedlove et al. are cited by number only. The first set of Breedlove's collections is at the California Academy of Sciences (in either CAS or DS) with available duplicates of Acanthaceae distributed primarily to (DUKE, ENCB, F, K, LL, MEXU, MICH, MO, NY, US). Specimens from the following herbaria have been consulted for this treatment: A, BM, C, CAS, CGE, CHAPA, CHIP, DAV, DS, DUKE, ENCB, F, G, GH, IBUG, K, L, LL, M, MA, MEXU, MICH, MO, MSC, NY, OXF, P, PH, POM, PR, PRC, RSA, TEX, U, UC, US, W, WIS.

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## KEY TO THE GENERA OF ACANTHACEAE IN CHIAPAS

- a. Fruit drupaceous; plants scandent; pollen 5- brevicolpate . . . . . 18. *Mendoncia*
- aa. Fruit capsular; plants not scandent (except sometimes in *Thunbergia*, an introduced genus); pollen otherwise.
- b. Capsule with a prominent sterile apical beak longer than the fertile globose base; calyx unlobed (annular) or unequally 10–17-lobed; plants scandent (except in cultivated *Thunbergia erecta*); pollen spiraperturate . . . . . 29. *Thunbergia*
- bb. Capsule lacking a prominent sterile apical beak (a beak, if present, considerably shorter than fertile portion of capsule); calyx 2–5-lobed; plants not scandent; pollen otherwise.
- c. Calyx 3-lobed; corolla 38–72 mm long, throat prominently saccate, forming a nectariferous pouch; pollen pantoporate, exine gemmate . . . . . 17. *Louteridium*
- cc. Calyx 2-, 4-, or 5-lobed; corolla throat subcylindric or distally ampliate (or if saccate, as in some *Stenostephanus*, then with corolla < 30 mm long); pollen otherwise.
- d. Calyx spathe-like, beaked in bud, comprising 2 large lobes, one apically entire to minutely 2-lobed, the other apically entire to minutely 3-lobed; capsule large (40–62 mm long) . . . . . 25. *Spathacanthus*
- dd. Calyx neither spathe-like, beaked in bud, nor comprising 2 large lobes; capsule smaller (except *Justicia borraerae*).
- e. Seeds irregularly shaped (often  $\pm$  blocky), borne on papilliform placentae, hooklike retinacula lacking; leaves alternate, usually clustered in basal rosettes or crowded at stem apices; inflorescence borne on scapes or peduncles covered with coriaceous and clasping scales; stigma touch-sensitive . . . . . 9. *Elytraria*
- ee. Seeds subglobose to lenticular, borne on hooklike retinacula; leaves opposite or quaternate, usually  $\pm$  evenly distributed along stems; inflorescence not borne on scaly peduncles or scapes; stigma not touch-sensitive.
- f. Calyx deeply 4-lobed, lobes heteromorphic with outer (anterior and posterior) lobes larger than inner (lateral) lobes, anterior lobe apically 2-fid or 2-cleft; pollen 3-colporate, exine coarsely reticulate with luminae containing baculae, pilae, and/or gemmae.
- g. Corolla white with pink markings, 4.5–6 mm long, upper lip rugulate (i.e., with a stylar furrow); inflorescence cylindrical; capsule estipitate . . . . . 15. *Lepidagathis*
- gg. Corolla yellow or reddish, 24–80 mm long, upper lip lacking a rugula; inflorescence 4-sided or secund; capsule substipitate (i.e., solid basal portion up to 1.5 mm long).
- h. Inflorescence 4-sided; bracts opposite, all fertile; corolla bright yellow (drying dark purplish), upper lip 4-lobed, lower lip 1-lobed; stamens inserted near base of corolla tube; margins of bracts and calyx dentate . . . . . 2. *Barleria*
- hh. Inflorescence secund; bracts alternate, some sterile; corolla reddish, upper lip 2-lobed, lower lip 3-lobed; stamens inserted near middle of corolla tube; margins of bracts and calyx entire . . . . . 16. *Lophostachys*
- ff. Calyx deeply 5-lobed (sometimes 4-lobed in *Justicia*), lobes homomorphic (or if heteromorphic, then not with lobes as described above), anterior lobe apically entire; pollen otherwise.
- i. Fertile stamens 4.
- j. Anthers 1-theous; cystoliths absent; corolla imbricate in bud; pollen 3-colpate.

- k. Corolla white or pink, 9–19 mm long; stamens 1.5–3.2 mm long, thecae 1–1.8 mm long, filaments inserted in distal 1/3 of corolla tube, anthers included in or partially exerted from corolla tube.
  - l. Leaves quaternate; lobes of upper lip of corolla not more than 1/2 the length of upper lip, 1–2 mm long; anthers partially exerted from corolla tube . . . . . 11. *Holographis*
  - ll. Leaves opposite; lobes of upper lip of corolla more than 2/3 the length of upper lip, 2.5–8 mm long; anthers included in corolla tube . . . . . 26. *Stenandrium*
- kk. Corolla red, orange, or yellow, 30–74 mm long; stamens 26–65 mm long, thecae 3–8 mm long, filaments inserted in proximal 1/3 of corolla tube, anthers entirely exerted from corolla tube . . . . . 1. *Aphelandra*
- jj. Anthers 2-theccous; cystoliths present; corolla contorted in bud; pollen otherwise.
  - m. Inflorescence of densely bracted, elongate, 4-sided dichasiate spikes; placenta separating from mature capsule wall; pollen 3-syncolporate . . . 3. *Blechnum*
  - mm. Inflorescence otherwise; placenta remaining attached to mature capsule wall; pollen not 3-syncolporate.
    - n. Large shrubs to trees; calyx lobes overlapping one another; seeds glabrous; pollen loxodicolporate.
      - o. Corolla subcylindric; fertile stamens 2, staminodes 2 . . . 24. *Sanchezia*
      - oo. Corolla funnellform to subcampanulate; fertile stamens 4, staminodes 0 . . . . . 4. *Bravaisia*
    - nn. Herbs or small shrubs; calyx lobes not overlapping one another; seeds pubescent (at least around margin); pollen otherwise.
      - p. Thecae basally awned or mucronate; pollen 3-colporate, mesocolpia multi-striate with 4–15 pseudocolpi . . . . . 8. *Dyschoriste*
      - pp. Thecae lacking basal awns or mucros; pollen otherwise.
        - q. Corolla blue, pink, or red, 21–90 mm long, limb subactinomorphic (or at least the 5 lobes subequal in size); mature calyx tube not splitting between lobes; pollen 3-porate, exine coarsely reticulate . . . . . 23. *Ruellia*
        - qq. Corolla white, 7–8.5 mm long, limb zygomorphic (2 lobes of upper lip considerably smaller than lobes of lower lip); mature calyx tube often rupturing in weak hyaline regions between lobes; pollen 4-colporate, mesocolpia multi-striate with 3–6 pseudocolpi . . . . . 12. *Hygrophila*
- ii. Fertile stamens 2.
  - r. Anthers 1-theccous.
    - s. Leaf blades beset with pink spots; bracts (when present) usually petiolate, those of a pair heteromorphic with fertile ones larger than sterile ones; bracteoles in 2 pairs, outer pair partially connate, inner pair partially adnate to outer pair; corolla resupinate 180° (i.e., lower 3-lobed lip uppermost); pollen 3-colporate, 6- pseudocolpate . . . . . 13. *Hypoestes*
    - ss. Leaf blades entirely green; bracts sessile, those of a pair homomorphic; bracteoles in 1 pair, not connate; corolla not resupinate (i.e., lower 3-lobed lip, when evident, lowermost); pollen 2-porate with gemmate region encircling aperture . . . . . 27. *Stenostephanus*
  - rr. Anthers 2-theccous.
    - t. Androecium of 2 fertile stamens and 2 staminodes; flowers commonly heterostylous.
      - u. Corolla salverform, tube cylindric or (usually) tapered distally, limb subactinomorphic (if chasmogamous flowers absent, then with budlike cleistogamous flowers); anthers dehiscing toward each other (i.e., flower pleurotribal) . . . . . 22. *Pseuderanthemum*
      - uu. Corolla not salverform, tube subfunnellform (i.e., gradually expanded distally), limb usually strongly bilabiate; anthers dehiscing toward lower lip (i.e., flower nototribal).
        - v. Calyx 5–10.5 mm long, tube 2.5–5.5 mm long, lobes ovate to broadly triangular, 2.5–3.5 mm wide, abaxially glabrous . . . . . 6. *Chileranthemum*

- vv. Calyx 2-5 (-6.5) mm long, tube 0.3-1.2 mm long, lobes subulate to lanceolate to triangular, 0.3-1.3 mm wide, abaxially often pubescent . . . . . 20. *Odontonema*
- tt. Androecium of 2 fertile stamens and 0 staminodes; flowers never heterostylous.
- w. Stems hexagonal; inflorescence of axillary bracteate cymes bearing 1 or more sessile or pedunculate cymules; cymules consisting of 1 or more flowers subtended by an involucre of 2 or more pairs of bracteoles; outer pair of cymule bracteoles conspicuous and larger than inner pair(s); retinacula separating from inner capsule wall at maturity and protruding prominently from each valve of capsule, mature capsule conspicuously ruptured near base of head; corolla often resupinate 180° . . . . . 7. *Dicliptera*
- ww. Stems terete to quadrate-alate; inflorescence various but not as described above; cymules never present; flowers subtended by 1 pair of bracteoles; retinacula remaining attached to inner capsule wall at maturity or separating slightly near base of head (i.e., *Henrya* and *Tetramerium*) but not protruding prominently from each valve of capsule, mature capsule not or barely ruptured near base of head; corolla never resupinate.
- x. Upper lip of corolla rugulate (i.e., with a stylar furrow); stamens appressed to upper lip of corolla, anthers dehiscing toward lower lip (i.e., flower nototribal; see also *Mirandea* under alternate lead below); thecae collateral to superposed, sometimes one or both with a basal appendage; pollen lacking pseudocolpi.
- y. Leaves anisophyllous at a node; corolla pinkish purple, conspicuously arched (cobralike in bud), 55-75 mm long; thecae lacking basal appendages; pollen 5-porate, exine of discrete subcircular to polygonal insulae consisting of gemmate regions enclosed by thick, smooth walls . . . . . 21. *Poikilacanthus*
- yy. Leaves isophyllous at a node; corolla various but not with the combination of characteristics as above; thecae with or without basal appendages; pollen 2-4-porate (or -colporate), apertures flanked by 1 or more rows of insulae (and/or peninsulae), exine reticulate . . . . . 14. *Justicia*
- xx. Upper lip of corolla not rugulate (i.e., lacking a stylar furrow); stamens appressed to lower lip of corolla, anthers dehiscing toward upper lip (i.e., flower stenotribal; except in *Mirandea* with nototribal flowers); thecae collateral or nearly so, lacking basal appendages; pollen 6-pseudocolpate.
- z. Either bracts or bracteoles conspicuous, concealing calyx; capsule 3.5-7 mm long, 1.3-2.8 mm wide at widest expanse, septa with attached retinacula separating slightly from inner wall of mature capsule near base of head; seeds 0.8-2.5 mm long.
  - a'. Bracteoles fused, if at all, only at base for a distance up to 1 mm, not forming an involucre; bracts longer than bracteoles; seeds 4, lacking trichomes; pollen with colpi narrow, not or barely exceeding width of centrally positioned ora . . . . . 28. *Tetramerium*
  - aa'. Bracteoles fused along 1 side from base to near apex, forming a conspicuous involucre; bracts shorter than bracteoles; seeds 2, pubescent with stiff, interwoven, hygroscopic trichomes to 0.5 mm long; pollen with colpi broad, far exceeding width of centrally positioned ora . . . . . 10. *Henrya*
- zz. Neither bracts nor bracteoles conspicuous, not concealing calyx; capsule 10-15 mm long, 3.5-4.5 mm wide at widest expanse, septa with attached retinacula remaining attached to inner wall of mature capsule; seeds 3-4.5 mm long.

- b'. Corolla yellow, lacking colored markings on upper lip, lower-central lobe planar; stamens appressed to upper lip of corolla, anthers dehiscing toward lower lip (i.e., flower nototribal); style curved near apex . . . 19. *Mirandea*
- bb'. Corolla whitish with maroon markings on upper lip, lower-central lobe conduplicate-keeled; stamens appressed to, and partially enclosed by, lower-central lobe of corolla, anthers dehiscing toward upper lip (i.e., flower stenotribal); style straight near apex . 5. *Carlowrightia*

### 1. APHELANDRA

*Aphelandra* R. Br., Prodr. 1:475. 1810. — TYPE: *Aphelandra cristata* (Jacq.) R. Br. ex W.T. Aiton (≡ *Justicia cristata* Jacq.).  
*Hemisandra* Scheidw. Bull. Acad. Roy. Sci. Bruxelles 9:22. 1842. — TYPE: *Hemisandra aurantiaca* Scheidw. (≡ *Aphelandra aurantiaca* (Scheidw.) Lindl.).  
*Lagochilium* Nees in Mart. Fl. bras. 9:85. 1847. — LECTOTYPE: (Leonard 1953:127): *Lagochilium maximilianum* Nees.

Erect perennial herbs, shrubs, or small trees lacking cystoliths. Leaves opposite (in ours, elsewhere rarely alternate, ternate, or quaternate), subsessile to petiolate, blades often decurrent along petiole (petiolar wings excluded from leaf blade data in following descriptions), margin entire, sinuate, lobed, or dentate (entire to sinuate-crenate in ours). Inflorescence of terminal simple or branched usually densely bracteate dichasiate spikes; dichasia opposite, 1-flowered, sessile, subtended by a bract. Bracts opposite, usually subfoliose, green to brightly colored, often with nectaries on abaxial surface, margin entire or dentate. Flowers homostylous, sessile, subtended by 2 homomorphic bracteoles. Calyx deeply 5-lobed, lobes subequal to unequal in size. Corolla variously colored (mostly shades of red, orange, and yellow in ours), tube straight to curved, usually ± expanded distally, sometimes bearded within, throat indistinct (in ours), limb bilabiate, upper lip often conduplicate and enclosing stamens during anthesis, apically entire to 2-lobed, margin often flaring (i.e., with edge spreading outward) at base or sometimes for entire length of vertical sides, lower lip spreading to ± perpendicular to the upper lip to reflexed to recoiled, conspicuously 3-lobed or with lateral lobes much reduced to vestigial, corolla lobes imbricate in bud with upper lip innermost. Stamens 4, usually inserted in proximal 1/3 of corolla tube (at a point 0.14–0.33 (–0.40) the distance up the tube from the base in ours), didynamous with pairs inserted at slightly different positions in tube (posterior pair inserted up to 1 mm distal to anterior pair in ours), usually exerted from mouth of corolla, anthers 1-theous, thecae connivent (often in pairs), pairs presented at ± same height or with one pair extending beyond the other, thecae lacking basal appendages, dehiscing toward lower lip (i.e., flower nototribal); pollen generally subprolate to perprolate, 3-colpate, exine reticulate to verrucose to psilate; staminode usually present, consisting of a slender short filament, a small triangular projection, or a small callous region, inserted between posterior pair of stamens (i.e., dorsalmost in corolla tube, alternate with 2 fused lobes of upper lip of corolla). Style exerted from mouth of corolla, stigma symmetrically to asymmetrically funnelliform or shallowly to deeply 2-lobed, lobes unequal. Capsule estipitate to substipitate, ovoid to ellipsoid to subglobose, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4, homomorphic, flattened to subglobose. (x = 14).

A neotropical genus of about 175 species occurring from northwestern Mexico southeastward through regions of both wet and dry forests to southeastern Brazil (ca. latitude 28° S). The greatest concentrations of species are in the Andes of Colombia, Ecuador, Peru, and Bolivia. Twelve species occur in Mexico. Several species are cultivated for ornament.

REFERENCES: WASSHAUSEN, D.C. 1975. The genus *Aphelandra* (Acanthaceae). Smithsonian Contr. Bot. 18:1–157; McDADE, L. 1984. Systematics and reproductive biology of the Central American species of the *Aphelandra pulcherrima* complex (Acanthaceae). Ann. Missouri Bot. Gard. 71:104–165; DANIEL, T.F. 1991. A revision of *Aphelandra* (Acanthaceae) in Mexico. Proc. Calif. Acad. Sci. 47:235–274.

- a. Bracts with 2 submarginal clusters of padlike nectaries (up to 16 per cluster) on abaxial surface; lower-central lobe of corolla becoming recoiled, lateral lobes reduced to vestigial toothlike appendages up to 2.5 mm long and attached to upper lip . . . . . 4. *A. scabra*
- aa. Bracts without padlike nectaries on abaxial surface; lower-central lobe of corolla spreading to reflexed, lateral lobes conspicuous (5–25 mm long) and attached to lower lip.
  - b. Young stems somewhat flattened; bracts dentate with 7–15 teeth per side; corolla orange to yellowish . . . . . 1. *A. aurantiaca*
  - bb. Young stems terete to quadrate (or rarely somewhat flattened in *A. speciosa*); bracts entire or dentate with 1–2 teeth (sometimes inconspicuous) per side; corolla red or reddish (one collection of *A. heydeana* reported as orange-red with yellowish veins on lower lip).

- c. Inflorescence rachis glabrous; bracts arching away from rachis at maturity, abaxially glabrous, abruptly apiculate (to cirrhous) at apex, apiculum usually reflexed-coiled; corolla externally glabrous . . . . . 6. *A. speciosa*
- cc. Inflorescence rachis pubescent; bracts erect to spreading but not arched, abaxially pubescent (rarely nearly glabrate in *A. wendtii*), rounded to acute to acuminate to aristate to caudate at apex, apical portion sometimes spreading to reflexed, but lacking a reflexed-coiled apiculum; corolla externally pubescent.
  - d. Inflorescence appearing subcapitate (rarely elongate); bracts lanceolate to strap-shaped, 5–11 times longer than wide, gradually attenuate at apex; thecae 6.5–8.1 mm long (bracts 28–65 mm long, see below) . . . . . 7. *A. wendtii*
  - dd. Inflorescence elongate; bracts lance-ovate to ovate to elliptic to obovate-elliptic, 1.6–4 times longer than wide, rounded to acute to acuminate to caudate at apex; thecae 3–5.5 mm long (or if up to 7 mm long, as rarely in *A. heydeana*, then with bracts 14–26 mm long).
    - e. Bracts attenuate-caudate to caudate at apex, distal portion widely spreading to reflexed; thecae 5–7 mm long, all apically pubescent . . . . . 3. *A. heydeana*
    - ee. Bracts rounded to acute to acuminate at apex, distal portion erect; thecae 3–5.5 mm long, only 2, if any, apically pubescent.
      - f. Rachis viscid with conspicuous, glandular trichomes; seeds covered with apically branched or dendritic trichomelike papillae . . . . . 2. *A. gigantiflora*
      - ff. Rachis pubescent with eglandular trichomes only; seeds nearly smooth or covered with low rounded encrustations . . . . . 5. *A. schiedeana*

## 1. *Aphelandra aurantiaca* (Scheidw.) Lindl. Bot. Reg. 31:t. 12. 1845.

— *Hemisandra aurantiaca* Scheidw. Bull. Acad. Roy. Sci. Bruxelles 9:22. 1842. — NEOTYPE (Daniel 1991:248): Bot. Reg. 31:t. 12. 1845.

*Aphelandra acutifolia* Tafalla ex Nees in A. DC. Prodr. 11:299. 1847. — LECTOTYPE (Daniel 1991:248): Mexico, Oaxaca, Sierra S. Pedro Nolasco, Talea, etc., 1843–44, C. Jürgensen 648 (K ex hb. Hooker!; isoelectotypes: BM!, G!).

*Aphelandra aurantiaca* var. *roezlii* Ortgies ex L. Van Houtte, Fl. Serres Jard. Eur. 17:53. 1868, (as “*roezlii*”). — LECTOTYPE (Daniel 1991:248): Fl. Serres Jard. Eur. 17:t. 1741–1742. 1868.

*Aphelandra roezlei* Carrière, Rev. Hort. 44:100. 1872. — TYPE: none designated (see discussion in Daniel 1991).

ILLUSTRATIONS: Fl. Serres Jard. Eur. 1:239. 1845; Bot. Reg. 31:t. 12. 1845; Fl. Serres Jard. Eur. 17:t. 1741–1742; Fieldiana, Bot. 24(10):334, fig. 71. 1974; Mutis, Flora de La Real Expedición Botánica del Nuevo Reyno de Granada (1783–1816) 41:t. 54. 1992.

Mostly unbranched (monocaulous) perennial herbs to 1.2 m tall. Young stems somewhat flattened, glabrous or rarely sparsely pubescent with retrorse eglandular trichomes 0.1–0.3 mm long. Leaves petiolate, petioles to 35 mm long, blades ovate to ovate-elliptic to elliptic, 55–260 mm long, 25–115 mm wide, 1.7–3.8 (–6.3) times longer than wide, acuminate (to rounded-apiculate) at apex, rounded to abruptly or gradually attenuate-decurrent (sometimes nearly to node) at base, surfaces glabrous or with scattered trichomes along midvein on abaxial surface, margin entire to subcrenate. Spikes terminal (and sometimes in axils of distal leaves as well), elongate, up to 200 mm long (excluding flowers), 15–33 (–55) mm in diameter (excluding flowers) near midspike, rachis pubescent with erect to flexuose to antrorse eglandular and glandular (sometimes absent) trichomes 0.1–0.4 mm long. Bracts green or reddish (sometimes green with reddish coloration at margin and apex), sometimes spreading with age, lance-ovate to ovate-elliptic to elliptic,

15–37 mm long, 6–15 mm wide, 2.3–4.2 times longer than wide, acuminate and erect at apex, abaxial surface sometimes impressed punctate, pubescent with antrorse (near base of bract) to erect eglandular trichomes 0.05–0.2 mm long and glandular trichomes 0.05–0.2 mm long (the latter sometimes not evident on older bracts), proximal bracts sometimes also pubescent with antrorse to antrorsely appressed eglandular trichomes to 0.4 mm long, margin ciliate with eglandular trichomes to 0.4 mm long, dentate with 7–15 teeth per side, teeth 0.1–2 mm long. Bracteoles subulate to lance-subulate to lanceolate, 7–15 mm long, 0.5–2 mm wide, abaxial surface pubescent like bracts (although with glands often more conspicuous). Calyx (sometimes bilabiate with posterior 2 lobes fused nearly to apex) 10.5–16.5 (–19) mm long, lobes lanceolate to lance-subulate, abaxially pubescent like bracteoles. Corolla orange to reddish orange (often with yellow markings on inner surface of lips) or yellow, 50–63 mm long, externally pubescent with eglandular and glandular (often absent) trichomes 0.05–0.2 mm long, upper lip 17–25 mm long, entire to emarginate at apex, lobes (if present) rounded, up to 0.3 mm long at apex, margin flaring along most or all of the 2 vertical sides, lower lip  $\pm$  perpendicular to upper lip, 17–25 mm long, lateral lobes obovate to elliptic to ovate-elliptic, 9.5–15 mm long, 5–10.5 mm wide, lower-central lobe ovate-elliptic to elliptic to obovate, 14–25 mm long, 7–16 mm wide, 1.5–1.8 times longer and 1.4–2.2 times wider than lateral lobes. Stamens 39–51 mm long, filaments pubescent with eglandular trichomes throughout their length (more abundant distally than proximally), thecae 4–5 mm long, pairs presented at ca. same height, all apically and dorsally pubescent (sometimes sparsely so) with cobwebby trichomes; staminode reduced to a thickened callous. Style 45–57 mm long, pubescent (especially proximally, becoming less so distally) with eglandular trichomes, stigma unequally 2-lobed (often appearing obliquely funnelform), 1 lobe 0.4–1 mm long, the other lobe nearly obsolete or 0.1–0.2 mm long. Capsule 12.5–17 mm long, pubescent with erect to flexuose to retrorse to antrorse eglandular and glandular (at least on distal portion) trichomes 0.05–0.2 (–0.5) mm long. Seeds flattened, subcircular to somewhat squarish, 3.3–5.5 mm long, 2.8–4.5 mm wide, surfaces covered

with coarse mostly appressed and often apically bifurcate trichomelike papillae 0.05–0.2 mm long.  $n = 14$ . Flowering throughout the year; fruiting Nov–Mar.

Along streams and on slopes in Tropical Rain Forest, Lower Montane Rain Forest, and Montane Rain Forest; common in Northern Highlands and Eastern Highlands; 260–1700 m. Mex. (Ver., Oax., Tab., Chis.), Guat., Bel., Hond., C.R., Pan., S.A. (Col., Sur., Fr. Gui., Ecu., Peru, Bol., Braz.). CHIAPAS COLLECTIONS: *Mz 8484* (CAS, MEXU, NY); *Mz 13420* (MEXU); *Mz 13451* (CAS); *Mz 14813* (MEXU); *Mi 5661*; *N 3377*; *26116*; *26460*; *29788*; *31250*; *49151*; *57212*; *57256*; *71287*.

## 2. *Aphelandra gigantiflora* Lindau, Bull. Herb. Boissier 3:369. 1895.

— *Aphelandra schiedeana* var. *gigantiflora* (Lindau) D.N. Gibson, Fieldiana, Bot. 34:57. 1972. — LECTOTYPE (Daniel 1991:266): "Guatemala et Costarica," A. Warszewicz s.n. (GH!; isolectotype: POM!).

*Aphelandra padillana* Standl. J. Wash. Acad. Sci. 14:244. 1924. — TYPE: El Salvador, Ahuachapán, mountains near Ahuachapán, 1000 m, 9–27 Jan 1922, P. Standley 19972 (US!).

*Aphelandra gigantiflora* forma *lutea* Standl. & Steyerl. Publ. Field Mus. Nat. Hist., Bot. Ser. 23:237. 1947. — TYPE: Guatemala, Escuintla, barranca of Río Gavilán, NE of Escuintla, 720 m, 16 Mar 1941, P. Standley 89560 (F!).

ILLUSTRATIONS: Fig. 1; Daniel 1991:259, fig. 10.

Shrubs to 2.4 m tall. Young stems subquadrate to quadrate, sparsely to densely pubescent with erect to antrorse to antrorsely appressed eglandular trichomes 0.05–0.7 mm long. Leaves petiolate, petioles to 60 mm long, blades (lance-ovate to) ovate to elliptic, 40–255 mm long, 11–117 mm wide, 1.9–4.5 times longer than wide, acuminate to subfalcate at apex, (acute to) more or less abruptly to gradually attenuate-decurrent (often nearly or completely to node) at base, surfaces sparsely pubescent (especially along major veins) with antrorse eglandular trichomes, margin entire to subsinuate-crenate. Spikes terminal, elongate, up to 310 mm long (excluding flowers), 25–55 mm in diameter (excluding flowers) near midspike, rachis pubescent with erect to flexuose glandular and eglandular trichomes 0.1–1.2 mm long (viscid). Bracts reddish, ovate to elliptic to obovate-elliptic, 15–33 mm long, 6.5–21 mm wide, 1.6–3 times longer than wide, sometimes spreading with age, (rounded to) acute to acuminate and erect at apex, abaxial surface and margin pubescent like rachis and also with eglandular trichomes as short as 0.05 mm long, margin entire or dentate with 1–2 teeth per side, teeth 0.2–2.5 mm long. Bracteoles subulate to lanceolate, 8–20 mm long, 0.6–1.5 mm wide, pubescent like rachis. Calyx 11–17 mm long, lobes lanceolate to lance-subulate, abaxially pubescent like rachis. Corolla red, 55–74 mm long, externally pubescent like rachis, upper lip 16–29 mm long, entire to emarginate at apex, lobes (if present) rounded to subtriangular, 0.2–0.4 mm long, margin not flared or proximally flared, lower lip  $\pm$  perpendicular to upper lip or reflexed, 24–32 mm long, lateral lobes lance-linear to linear-elliptic, 7–17 mm long, 1–5.5 mm wide, lower-central lobe obovate, 19–31 mm long, 8–17 mm wide, 1.6–3.7 times longer and 3.1–8.6 times wider than lateral lobes. Stamens 45–65 mm long, filaments pubescent proximally and often distally with eglandular trichomes, thecae 3.5–5.3 mm long, presented at  $\pm$

same height or posterior pair extending up to 1 mm beyond anterior pair, posterior pair apically and dorsally pubescent with eglandular trichomes, anterior pair apically pubescent only or glabrous; staminode triangular or filamentous, 0.3–9 mm long, pubescent. Style 51–59 mm long, proximally pubescent with eglandular trichomes, distally pubescent or glabrous, stigma symmetrically funnellform to  $\pm$  2-lobed, 0.2–0.3 mm long. Capsule 17–21 mm long, pubescent with erect to flexuose eglandular trichomes 0.2–0.5 mm long. Seeds flattened, somewhat squarish, 3.7–5.5 mm long, 3–4.5 mm wide, surfaces covered with apically branched or dendritic trichomelike papillae to 0.2 mm long.  $n = 14$ . Flowering: Nov–Mar; fruiting: Jan–Mar.

Along streams and on slopes in Tropical Deciduous Forest and Pine Oak Forest; uncommon in NW Sierra Madre near Oaxaca border; 300–1400 m. Mex. (Oax., Chis.), Guat., Salv. CHIAPAS COLLECTIONS: *Cro 46289* (MO); *Mc s.n.* (F, MEXU); *Sor 18* (C); *23739*; *30561*; *56298*; *60161*; *70900*; *70938*.

Central American plants of *A. gigantiflora* differ from those occurring in southern Mexico in several minor features (Daniel 1991).

## 3. *Aphelandra heydeana* Donn. Sm. Bot. Gaz. (Crawfordsville) 18:210. 1893.

— TYPE: Guatemala, Santa Rosa, Chupadero, Oct 1892, E. Heyde & E. Lux 4037 (US!); isotypes: G!, GH!, K!, M!, MO!, NY!, P!, US!).

ILLUSTRATIONS: Bot. Gaz. (Crawfordsville) 18:t. 23. 1893; Daniel 1991:263, fig. 11.

Branched shrubs to 1 m tall. Young stems subterete, with blisterlike superficial projections (lenticels), pubescent with antrorsely appressed eglandular trichomes to 0.8 mm long or glabrate. Leaves petiolate, petioles to 70 mm long (naked portion to 15 mm long), blades ovate to ovate-elliptic, 30–150 mm long, 14–76 mm wide, 1.4–4 times longer than wide, (rounded to) acuminate at apex, abruptly attenuate-decurrent (sometimes to node) at base, surfaces sparsely pubescent with antrorse to antrorsely appressed eglandular trichomes or glabrate, margin entire to subsinuate. Spikes terminal (and sometimes in axils of distal leaves as well), more or less elongate, up to 70 mm long (excluding flowers), 19–35 mm in diameter (excluding flowers) near midspike, rachis densely pubescent with antrorse to antrorsely appressed eglandular trichomes 0.5–1.5 mm long. Bracts green (sometimes with a darker coloration distally), conduplicate, lance-ovate to obovate-elliptic, 14–26 mm long, 3.5–9 mm wide, 2.2–4 times longer than wide, distal portion widely spreading to reflexed, attenuate-caudate to caudate at apex, abaxial surface and margin pubescent with flexuose to appressed eglandular and glandular (sometimes inconspicuous) trichomes 0.1–1.5 mm long, margin dentate with 1–2 teeth (rarely obscure or absent, some always present in an inflorescence) per side, teeth 0.2–3.2 mm long. Bracteoles subulate to lance-subulate, 7–11 (–14) mm long, 0.8–2 mm wide, abaxial surface pubescent with mostly antrorse eglandular trichomes. Calyx 9–13 mm long, lobes lanceolate, abaxially inconspicuously pubescent with antrorse eglandular trichomes to 0.2 mm long. Corolla orange-red (with yellow veins on lower lip) to red, 49–68 mm long, externally pubescent with glandular and eglandular trichomes to 1.5 mm long, upper lip 19–27 mm long, entire at apex, margin flared proximally or along most of the vertical sides, lower lip  $\pm$  perpendicular to upper lip, 18–28 mm

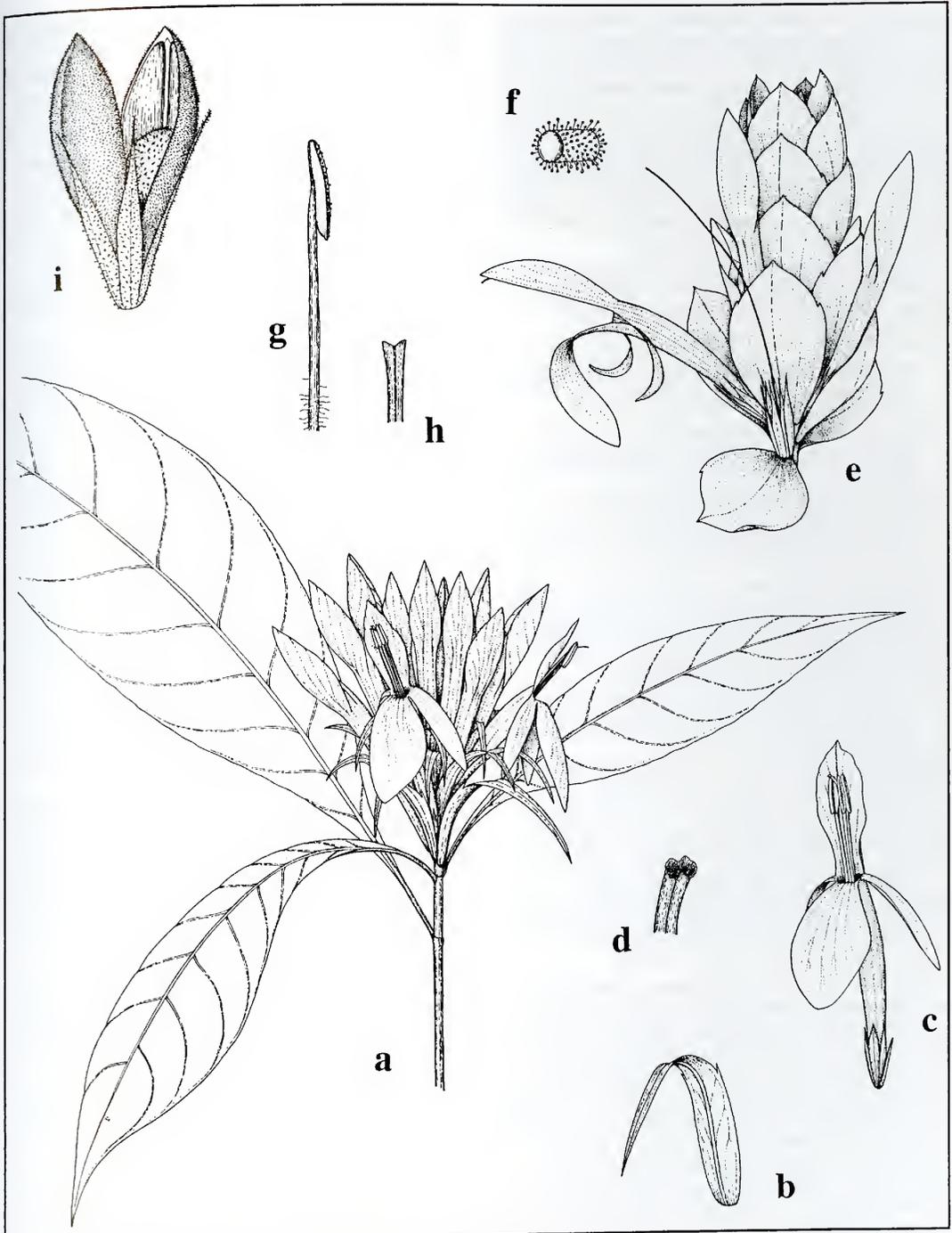


FIGURE 1. *Aphelandra wendtii* T.F. Daniel (a-d) and *A. gigantiflora* Lindau (e-i). a, habit (28856 and 47343),  $\times 0.5$ ; b, bract (47343),  $\times 1.1$ ; c, flower with one bracteole, (52540),  $\times 0.8$ ; d, distal portion of style with stigma (22247),  $\times 9$ ; e, spike (60161),  $\times 0.9$ ; f, spike rachis (60161),  $\times 2.5$ ; g, stamen (Croat 46289),  $\times 3.8$ ; h, distal portion of style with stigma (Croat 46289),  $\times 11$ ; i, calyx, capsule, and seed (Croat 46289),  $\times 1.8$ . Drawn by Mary Ann Tenorio.

long, lateral lobes linear to oblanceolate, 5–16 mm long, 0.5–5 mm wide, lower-central lobe elliptic to obovate, 17–27 mm long, 8–18 mm wide, 1.6–4.5 times longer and 3.6–28 times wider than lateral lobes. Stamens 44–50 mm long, filaments pubescent with eglandular trichomes throughout or distally glabrous, thecae 5–7 mm long, pairs presented at ca. same height, all apically (and posterior pair dorsally) pubescent with cobwebby eglandular trichomes; staminode absent. Style 50–60 mm long, sparsely pubescent with eglandular trichomes throughout, stigma symmetrically funnelliform, 0.2–0.3 mm long. Capsule not seen. Flowering: Sep–Dec.

Pine-Oak Forest; rare in SE Sierra Madre near Guatemala border; 1060–1675 m. Mex. (Chis.), Guat., Salv. CHIAPAS COLLECTIONS: *F 3341* (CAS, CHAPA, ENCB); *65803*.

#### 4. *Aphelandra scabra* (Vahl) Sm. in Rees, *Cycl.* 39(1):*Aphelandra* n. 3. 1818.

— *Justicia scabra* Vahl, Enum. 1:120. 1804. — TYPE: "Habitat in America meridionali," without collector (C!, photo at US!).

*Aphelandra deppeana* Schldt. & Cham. Linnaea 5:96. 1830. — TYPE: Mexico, Veracruz, Hacienda de la Laguna [ca. 15 mi S of Jalapa], Sep, C. *Schiede 119* (B, destroyed, photos at F!, NY!, US!).

*Justicia rostrata* Bertol. Novi Comment. Acad. Sci. Inst. Bononiensis 4:406. 1840. — TYPE: Guatemala, Escuintla, Escuintla, 1836, *J. Vellasquez s.n.* (BOLO, microfiche!).

*Aphelandra haenkeana* Nees in A. DC. Prodr. 11:298. 1847. — LECTOTYPE (Daniel 1991:246): Mexico, Veracruz, Cordillera de Veracruz, Mirador, Tacuapan, près des ruisseaux, Jun–Oct 1840, *H. Galeotti 909* (K!; isoelectotypes BR!, G!, P!, US!, W!).

*Aphelandra pectinata* Willd. ex Nees in A. DC. Prodr. 11:297. 1847. — LECTOTYPE (McDade 1984:145): Colombia, Córdoba, mouth of the Río Sinú, *H. Cuming 1099* (K!).

*Aphelandra fulgens* Decne. Rev. Hort. ser. 3, 1:21. 1847. — TYPE: Mexico, Veracruz, Mirador, Sep 1842, *A. Ghiesbreght 57* (P!, photo at US!; isotype P!).

ILLUSTRATIONS: Fieldiana. Bot. (n.s.) 18:3, fig. 1. 1986; Mutis, Flora de La Real Expedición Botánica del Nuevo Reyno de Granada (1783–1816) 41:t. 53. 1992.

Branched shrubs to 3.6 m tall. Young stems subterete to quadrate-sulcate, often with scattered blistery tubercles on the surface, pubescent with (flexuose to) retrorse to retrorsely appressed to antrorse to antrorsely appressed eglandular trichomes 0.3–1 mm long (at least some antrorse trichomes always present, sometimes restricted to near inflorescence), becoming glabrate. Leaves subsessile to petiolate, petioles to 35 mm long, blades ovate to elliptic to obovate, 50–260 mm long, 19–103 mm wide, 1.4–4.1 times longer than wide, (rounded to) acute to acuminate at apex, gradually to more or less abruptly attenuate-decurrent (often to node) at base, surfaces pubescent with cauline type trichomes (adaxial surface often sparsely so or glabrate), margin entire to sinuate-crenate. Spikes terminal (and often in axils of distal leaves as well), elongate, up to 210 mm long (excluding flowers), 8–25 mm in diameter (excluding flowers) near midspike, rachis pubescent with antrorse eglandular trichomes 0.2–0.9 mm long. Bracts green, often tinged with red or orange, often spreading with age, ovate to elliptic to obovate, 7–18 mm long, 3–7 mm wide, 1.6–2.8 times longer

than wide, acuminate and erect or occasionally somewhat spreading at apex, abaxial surface pubescent with antrorse to antrorsely appressed eglandular trichomes 0.05–1 mm long and with 2 clusters of padlike nectaries near margin (one on each side), nectaries (1–) 3–10 (–16) per cluster, elliptic to circular in outline, 0.2–0.8 mm long, margin ciliate with straight to flexuose eglandular trichomes to 1.2 mm long, coarsely dentate with (1–) 3 teeth per side, teeth 0.3–3 mm long. Bracteoles lance-subulate to lanceolate, 5–12 mm long, 0.8–1.9 mm wide, abaxial surface pubescent like bracts. Calyx 6–12 mm long, lobes lanceolate, abaxially sparsely pubescent with trichomes like those of bracts concentrated near distal portion of midvein. Corolla dull red to red-orange, 30–45 mm long, externally pubescent with eglandular trichomes 0.05–2 mm long, upper lip 9–14 mm long, 2-lobed at apex, lobes triangular, 2–8 mm long, margin not flaring, lower lip 12–17 mm long, lateral lobes appearing attached to upper lip, reduced and often inconspicuous, erect to slightly spreading, triangular to linear 0.2–2.5 mm long, 0.3–1 mm wide, lower-central lobe recurved or recoiled, lance-ovate to elliptic, 10–15 mm long, 3–5.5 mm wide, 7.3–24 times longer and 2.8–8 times wider than lateral lobes. Stamens 26–32 mm long, filaments proximally pubescent with eglandular trichomes, distally glabrous, thecae 3–4.4 mm long (including a short (0.05 mm) spurlike basal appendage that is sometimes present), anterior pair extended up to 1 mm beyond posterior pair, all 4 apically and dorsally sparsely pubescent with cobwebby or flexuose eglandular trichomes, often becoming glabrate; staminode absent. Style 29–36 mm long, glabrous, stigma asymmetrically funnelliform, 0.3–0.7 mm long. Capsule 11–17.5 mm long, glabrous, shiny, often punctate-pitted. Seeds somewhat flattened, subcircular to subtriangular, 3.5–5.3 mm long, 3.3–4.5 mm wide, surfaces pubescent with simple to bifurcate to dendritic trichomes 0.05–0.1 mm long (sometimes becoming very sparse or the surfaces glabrate),  $n = 14$ . Flowering: throughout the year; fruiting: Jan–Apr.

Along streams, on slopes, on ridgetops, and in disturbed habitats (e.g., roadsides, cafetals) in Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, Evergreen Seasonal Forest, Tropical Deciduous Forest, wet Savannah, and Pine-Oak Forest; usually common, known in all physiographic regions; 60–1500 m. Mex. (Tam., Ver., Gro., Oax., Tab., Camp., Yuc., Q.Roo, Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., S.A. (Col., Ven., Guy., Sur., Braz.). CHIAPAS COLLECTIONS: *And 4224* (DUKE, MICH, US); *AV 151* (MEXU); *Arm V30* (F); *Cb 6199* (NY); *Co 5025* (CAS, TEX); *Dan 1282* (CAS, MICH); *Dan 5867* (CAS); *Dan 6204* (CAS); *Da 30143* (CAS, DUKE); *De 799* (DS, MEXU); *X&S X-301* (DS); *Hi 5* (MICH); *La 2024* (DS, US); *Lu 17855* (LL, MO); *Mc H5* (US); *Mc s.n.* (F, NY); *Mc s.n.* (NY); *Mc s.n.* (NY); *Mz 6917* (WIS); *Mz 7430* (MEXU, NY); *Mz 10438* (CAS); *Mz 10726* (CAS); *Mz 15146* (CAS); *Mz 16769* (CAS); *EM 151* (MICH, MO, US); *EM 6162* (F, LL, MO); *EM 6198* (LL, MO); *Me 561* (NY, US); *Pa 887* (CAS); *QVU 46* (U); *Te 7071* (MEXU); *T 1395* (DS, F, MICH, US); *T 2950* (DS, DUKE, NY, US); *T 3076* (DS, DUKE, MICH, NY); *T 3106* (DS, DUKE, F); *T 3211* (DS, MICH, NY); *Ve 816* (BM); *V&S 72-29* (DS); *7609*; *13351*; *13879*; *20154*; *20667*; *22544*; *27476*; *28299*; *30734*; *33349*; *46596*; *47219*; *49152*; *52486*; *53638*; *56376*; *65534*; *66976*; *70400*; *70668*.

*Justicia rostrata* is included in the synonymy of this species for the first time. Gibson (1974) indicated that this name might apply to a species of *Ruellia*. Examination of the microfiche of the holotype leaves little doubt

that the latter is a specimen of *A. scabra*. It has the dentate bracts with nectaries and unusual corolla form characteristic of the species.

##### 5. *Aphelandra schiedeana* Schldl. & Cham. Linnaea 5:95. 1830.

— *Lagochilium schiedeana* (Schldl. & Cham.) Nees in Mart. Fl. bras. 9:87. 1847. — LECTOTYPE (Daniel 1991:269): Mexico, Veracruz, Hacienda de la Laguna, Barranca de Tioselo, Oct 1828, *C. Schiede 118* (M!; isoelectotypes: BM!, OXF!, W!).

ILLUSTRATION: none found.

Shrubs to 2.3 m tall. Young stems subterete to quadrate, pubescent with antrorse appressed eglandular trichomes 0.2–0.6 mm long, becoming glabrate, mature stems often with blisterlike projections. Leaves petiolate, petioles to 45 mm long, blades lance-elliptic to elliptic, 43–220 mm long, 9–60 mm wide, 2.7–5.8 times longer than wide, acuminate to subfalcate at apex, gradually to abruptly attenuate-decurrent (sometimes nearly to node) at base, surfaces sparsely pubescent with cauline type trichomes, becoming glabrate, margin entire to subcrenate. Spikes terminal, elongate, up to 115 mm long (excluding flowers), 20–40 mm in diameter (excluding flowers) near midspike, rachis pubescent with erect to flexuose to antrorse eglandular trichomes 0.2–0.4 mm long. Bracts reddish, green tinged with red, or entirely green, sometimes spreading with age, ovate to elliptic to obovate-elliptic, 11–30 mm long, 3.5–18 mm wide, 1.6–2.4 times longer than wide, rounded (and often slightly emarginate) to acute (to acuminate at base of spike) and erect at apex, abaxial surface puberulent with eglandular and glandular (often absent) trichomes < 0.05–0.2 mm long and often with some longer antrorse eglandular trichomes mostly along midvein, margin entire, ciliate with eglandular trichomes to 0.5 mm long. Bracteoles subulate to lance-subulate, 6–14.5 mm long, 1–2 mm wide, abaxial surface pubescent with erect to antrorse (or flexuose along margin) eglandular trichomes (rarely with a few inconspicuous, glandular trichomes as well) to 0.6 mm long. Calyx 9–15 mm long, lobes lanceolate, abaxially pubescent like bracteoles. Corolla reddish, 41–70 mm long, externally pubescent with glandular and eglandular trichomes 0.2–0.9 mm long, upper lip 16–26 mm long, entire to emarginate at apex, lobes (if present) subtriangular, 0.2–1 mm long, margin not flared or proximally flared, lower lip  $\pm$  perpendicular to upper lip, 18–28 mm long, lateral lobes linear to linear-lanceolate, 7.5–15 mm long, 1–3.7 mm wide, lower-central lobe obovate, 17–28 mm long, 6–14.5 mm wide, 1.8–2.4 times longer and 2–6.1 times wider than lateral lobes. Stamens 37–53 mm long, filaments nearly glabrous to pubescent throughout with eglandular trichomes, thecae 3–5.5 mm long, posterior pair extending up to 2.5 mm beyond anterior pair, posterior pair dorsally and often apically pubescent with cobwebby trichomes, anterior pair glabrous; staminode not evident or triangular and 0.2 mm long. Style 38–58 mm long, glabrous or pubescent with eglandular trichomes, stigma symmetrically funnelliform, 0.2–0.4 mm long. Capsule 13–22 mm long, densely pubescent with erect to retrorse eglandular trichomes 0.1–0.3 mm long. Seeds flattened, somewhat squarish, 4–6 mm long, 3.5–4.5 mm wide, surfaces nearly smooth or irregularly covered with low rounded encrustations. Flowering: Jul–Mar; fruiting: Dec–Apr.

Montane Rain Forest, Evergreen Cloud Forest, and Pine Oak Forest, sometimes cultivated for ornament; uncommon in Central Plateau and Sierra Madre; 900–2460 m. Mex. (Ver., Oax., Chis.), Guat., Salv. CHIAPAS COLLECTIONS: *X&S X-302* (DS); *Lm 3876* (US); *La 419* (DS, F, US); *EM 126* (GH, LL, MEXU, MICH, MO, US); *EM 3955* (GH, MEXU, MICH, MO); *EM 5211* (F, LL, MEXU, MO, US); *EM 6100* (F, LL, MEXU, MO, US); *EM 18219* (MEXU); *EM 18454* (DS, F); *EM 18470* (F, MEXU); *Mi 5158* (MEXU); *T 2087* (DS, ENCB, F, LL, MICH, US); *7367*; *49662*; *53401*; *55761*.

##### 6. *Aphelandra speciosa* Brandege, Univ. Calif. Publ. Bot. 6:196. 1915.

— TYPE: Mexico, Chiapas, Finca Mexiquito, Jul 1913, *C. Purpus 6995* (UC!; isotypes: see Daniel 1991).

ILLUSTRATION: none found.

Shrubs to 4 m tall. Young stems terete to quadrate or somewhat flattened, glabrous or sparsely pubescent with antrorse eglandular trichomes 0.2–0.3 mm long. Leaves petiolate, petioles to 135 mm long, blades ovate-elliptic to elliptic to obovate-elliptic, 135–340 mm long, 32–140 mm wide, 1.8–4.9 times longer than wide, acuminate to subfalcate at apex, (acute to) gradually attenuate at base, surfaces glabrous or nearly so, margin entire. Spikes terminal, elongate, up to 210 mm long (excluding flowers), 30–70 mm in diameter (excluding flowers) near midspike, rachis glabrous. Bracts reddish, arching away from rachis, elliptic to obovate, 26–45 (–55) mm long, 15–30 mm wide, 1.3–2.1 times longer than wide, abruptly apiculate (to cirrhous) at apex with apiculum usually reflexed-coiled (except on lowermost bracts) and often breaking off, abaxial surface glabrous, margin sparsely ciliate with erect to flexuose eglandular and glandular trichomes 0.1–0.5 mm long or becoming glabrate, entire or rarely irregularly and inconspicuously dentate with 1–2 teeth (0.1–0.3 mm long) per side. Bracteoles lanceolate, 9–18 mm long, 1.7–2.8 mm wide, abaxial surface glabrous. Calyx 12–17 mm long, lobes linear to lanceolate, abaxially glabrous. Corolla red, 55–62 mm long, externally glabrous, upper lip 17–22 mm long, entire at apex, margin apparently flared along most of the vertical sides, lower lip apparently somewhat reflexed, 19–27 mm long, lateral lobes obovate, 10–14 mm long, 4.5–5.5 mm wide, lower-central lobe elliptic 19–26 mm long, 10–14 mm wide, 1.7–2 times longer and 2.8–2.9 times wider than lateral lobes. Stamens 45–55 mm long, filaments proximally pubescent with eglandular trichomes, distally glabrous, thecae 6–8 mm long, pairs presented at ca. same height, apically glabrous, posterior pair often dorsally pubescent; staminode 15 mm long, pubescent. Style 54–58 mm long, glabrous, stigma symmetrically funnelliform, 0.2–0.3 mm long. Capsule 18–23 mm long, glabrous, punctate-pitted. Seeds somewhat flattened, subelliptic, 5.2–7.5 mm long, 4.2–5.5 mm wide, surfaces covered with subclavate papillae, these prominent on immature seeds and becoming less so or mostly restricted to margin on mature seeds. Flowering: May–Oct, Jan; fruiting: Mar, Jul–Oct.

Montane Rain Forest; uncommon in SE Sierra Madre near Guatemala border; 900–1800 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *HTG 11* (DS); *HTG 16* (DS); *HM 2354* (MEXU); *EM 17656* (DS, F, MEXU); *P 6995* (A, BM, F, GH, MO, NY, US); *QVU 105* (U).

7. *Aphelandra wendtii* T.F. Daniel, Proc. Calif. Acad. Sci. 47:260. 1991.

— TYPE: Mexico, Veracruz, Mpio. Hidalgotitlán, Zona de Uxpanapa, along rd. to Poblado 10, NE of La Laguna and E of Rfo Cuevas, 15 Oct 1988, T. Daniel & T. Wendt 5813 (CAS!; isotypes: C!, CHAPA!, DUKE!, ENCB!, K!, MEXU!, MICH!, MO!, US!).

ILLUSTRATIONS: Fig. 1; Daniel 1991:259, fig. 10.

Branched shrubs to 3 m tall. Young stems terete to quadrate, sparsely pubescent with (flexuose to) antrorse to antrorsely appressed eglandular trichomes 0.4–1 mm long, soon glabrate. Leaves petiolate, petioles to 40 mm long, blades ovate-elliptic to elliptic, 120–280 mm long, 34–100 mm wide, 1.9–5.6 times longer than wide, acuminate to subfalcate at apex, gradually to somewhat abruptly attenuate-decurrent (often to node) at base, surfaces sparsely pubescent with cauline type trichomes to glabrate, margin entire to sinuate-crenate. Spikes terminal, subcapitate (rarely elongate), to 70 (–180) mm long (excluding flowers), 40–80 mm in diameter (excluding flowers) near mid-spike, rachis pubescent with antrorse eglandular trichomes to 1 mm long. Bracts green, lanceolate to strap-shaped, 28–58 (–65) mm long, 5–12 mm wide, 5–11 times longer than wide, distal portion conspicuously spreading or reflexed, gradually attenuate at apex, abaxial surface pubescent with flexuose to antrorsely appressed eglandular trichomes to 1 mm long and sometimes with shorter erect to flexuose glandular trichomes or nearly glabrate, margin ciliate with trichomes like those of abaxial surface, dentate with 1 (–2) teeth (sometimes obscure or absent) per side, teeth 0.2–3 (–4.5) mm long. Bracteoles subulate to lance-subulate, 9.5–16 mm long, 0.5–1.5 mm wide,

pubescent like bracts. Calyx 11–16.5 mm long, lobes lanceolate, abaxially pubescent with antrorse eglandular trichomes to 0.3 mm long. Corolla red, 55–74 mm long, externally pubescent with glandular and eglandular trichomes to 1.5 mm long, upper lip 20–32 mm long, entire to emarginate (with rounded lobes 1–2.5 mm long) to irregularly toothed (with 1–2 coarse teeth along distal margin) at apex, margin flared to reflexed proximally, lower lip  $\pm$  perpendicular to upper lip, 17–35 mm long, lateral lobes obovate to elliptic, 17–25 mm long, 5–7.5 mm wide, lower-central lobe obovate to elliptic to subcircular, 23–34 mm long, 9–19 mm wide, 1.1–1.4 times longer and 2–2.5 times wider than lateral lobes. Stamens 45–62 mm long, filaments pubescent proximally or throughout with eglandular trichomes, thecae 6.5–8.1 mm long, pairs presented at ca. same height or posterior pair extending up to 1 mm beyond anterior pair, all 4 apically (and posterior pair dorsally) pubescent with cobwebby eglandular trichomes; staminode 0.3–1.8 mm long, pubescent. Style 53–65 mm long, pubescent with eglandular trichomes throughout, stigma symmetrically funnelliform, 0.2–0.3 mm long. Capsule 19–20 mm long, glabrous. Seeds flattened, subcircular to subelliptic in outline, 4–4.5 mm long, 3.2–3.5 mm wide, surfaces covered with stiff often apically branched or barbed trichomelike papillae. Flowering: Jul–Jan; fruiting: Dec.

Along streams and on slopes in Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, and Evergreen Seasonal Forest; uncommon in Northern Highlands, Eastern Highlands, and Central Plateau; 140–1200 m. Mex. (Ver., Tab., Chis.). CHIAPAS COLLECTIONS: *Ham 15650* (CAS, MO); *Hu 2413* (CAS, MO); *M&M 959* (LL); *Mz 23976* (CAS); *N 3302* (US); *Re 297* (MICH); *To 2081* (MEXU); *TW 2336* (CAS); *22121*; *22247*; *26524*; *28856*; *46900*; *47343*; *48406*; *52540*; *57214*;

## 2. BARLERIA

*Barleria* L. Sp. pl. 636. 1753, nomen cons. prop. — LECTOTYPE (Green in Hitchcock and Green, International Botanical Congress, Cambridge (England), 1930: Nomenclature. Proposals by British Botanists. 169. 1929): *Barleria cristata* L. *Barleriopsis* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:133. 1855. — TYPE: not designated.

Mostly erect perennial herbs and shrubs with cystoliths. Nodes sometimes with spines (i.e., reduced leaves of sterile shoots) in leaf axils (not present in ours). Leaves opposite, petiolate, margin entire. Inflorescence of mostly terminal bracteate dichasia spikes (in ours) or heads or of variously configured dichasia in leaf axils; dichasia opposite, 1-flowered, sessile, subtended by a bract (in ours) or leaf. Bracts (in ours) opposite, green to brownish, venose, margin subdentate to dentate. Flowers homostylous, sessile (in ours), subtended by 2 homomorphic bracteoles. Calyx 4-lobed, lobes heteromorphic, anterior and posterior lobes outermost and larger than the inner and narrower lateral lobes, anterior lobe comprising 2 partially fused lobes, apically emarginate to 2-lobed. Corolla (in ours) yellow, tube cylindrical to slightly expanded distally, throat indistinct, limb bilabiate, upper lip deeply 4-lobed, lower lip 1-lobed, corolla lobes  $\pm$  homomorphic, imbricate in bud with lower lip (i.e., anterior lobe) innermost. Stamens 2 (in ours) or 4 and didynamous (shorter pair sometimes minute, but fertile), inserted near base of corolla tube (in ours); elsewhere also at base of throat), exerted from mouth of corolla, anthers 2-theous, thecae equal in size, parallel to subsagittate, equally inserted on filament, lacking basal appendages, dehiscing toward upper lip (in ours; i.e., flower stenotribal); pollen spheric to prolate, 3-porate to 3-colporate, exine reticulate; staminodes 1–3, comprising minute projections or sterile stamens. Style exerted from mouth of corolla, stigma entire to 2-lobed. Capsule substipitate, subellipsoid to ovoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 2–4, homomorphic, lenticular, pubescent with appressed hygroscopic trichomes. ( $x = 20?$ )

A genus of 80–120 species (or with some estimates as high as 250 species) occurring mostly in the Paleotropics. Only one species, *B. oenotheroides* (previously known as *B. micans*), is indigenous to the New World. Numerous species are cultivated for ornament and several of these can persist or become naturalized.

REFERENCE: DANIEL, T.F. 1995. New and reconsidered Mexican Acanthaceae. VI. Chiapas. Proc. Calif. Acad. Sci. 48:253–282.

1. *Barleria oenotheroides* Dum. Cours. Bot. cult., ed. 2, 2:561. 1811.

— TYPE: based on plants cultivated in Europe from an unknown source. The disposition of Dumont de Courset's herbarium and types remains unknown. Because Heine (Fl. west trop. Africa, ed. 2, 2:420. 1963) adopted this name, it is likely that he saw type material.

- Eranthemum cristatum* Humb. & Bonpl. ex Link, Jahrb. Gewächsk. 1(3):46. 1820. — *Barleria micans* Nees in Benth. Bot. voy. *Sulphur* 146. 1846, non *Barleria cristata* L. (1753). — *Barleriopsis micans* (Nees) Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:134. 1855. — TYPE: Colombia, Bolivar, Turbaco, 1800, A. von Humboldt & A. Bonpland (B-W, microfiche!).
- Barleria discolor* Nees in Benth. Bot. voy. *Sulphur* 146. 1846. — *Barleriopsis discolor* (Nees) Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:134. 1855. — LECTOTYPE (designated here): Costa Rica, Puntarenas, "Nicoya," A. Sinclair s.n. (K ex hb. Hook.!; isolectotype: K ex hb. Benth.!).
- Barleriopsis glandulosa* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:134. 1855. — TYPE: Costa Rica, Puntarenas, "ved La Barranca," Mar 1847, A. Oersted 10621 (C!).
- Barleriopsis glandulosa* var. *breviflora* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:134. 1855. — TYPE: Nicaragua (?), "imellem Sapo og Tortuga ved Nicaragua Sö," Mar 1847, A. Oersted s.n. (C!).
- Barleriopsis micans* var. *brachystachya* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:134. 1855. — SYNTYPES: Mexico, Veracruz, "ved Mirador," Nov 1841, F. Liebmann 10617 (C!); "ved Zacuapan," Nov 1841, F. Liebmann 10618 (C!; isosynotype: K!); "ved Mirador," Mar 1842, F. Liebmann 10620 (C!).
- Justicia lutea* Sessé & Moç. Pl. nov. Hisp. 3. 1887. — TYPE: Mexico, Morelos, "Quahunahuacae et Ayacapitlae anfractibus" [Cuernavaca and Yecapixtla], Oct, Ic. Fl. Mex. 5 (cited in the manuscript of Pl. nov. Hisp. but omitted from the printed version) and specimen no. 374 in the Sessé and Moçino herbarium at MA pertain to *B. oenotheroides*.
- ILLUSTRATIONS: Fig. 2; Contr. U.S. Natl. Herb. 1:350, fig. 9. 1895; Hutchinson and Dalziel, Fl. W. trop. Afr., ed. 2, 2:420, fig. 304. 1963; Fieldiana, Bot. 24(10):341, fig. 73. 1974; Ann. Missouri Bot. Gard. 65:180, fig. 3. 1978.

Perennial herbs or shrubs to 2 m tall. Young stems subquadrate, evenly pubescent with straw-colored or golden ascendant-appressed eglandular trichomes (0.2–) 0.5–1.6 mm long. Leaves petiolate, petioles to 45 mm long, blades lanceolate to ovate to elliptic, (30–) 70–335 mm long, (7–) 15–110 mm wide, 2.3–5.5 times longer than wide, acuminate to falcate at apex, attenuate at base, surfaces sparsely pubescent with cauline type trichomes. Inflorescence of terminal (and sometimes axillary from distalmost node) densely bracteate 4-sided sessile spikes to 15 cm long (excluding flowers), 2–5 cm wide (excluding flowers) near midpoint, rachis pubescent like young stems. Bracts ovate to ovate-elliptic, 15–35 mm long, 6–19 mm wide, proximalmost bracts often somewhat larger, abruptly acuminate near

apex, abaxial surface usually prominently venose and pubescent with cauline type trichomes and sometimes with glandular trichomes to 0.5 mm long as well, margin subdentate to dentate (teeth to 0.5 mm long), ciliate with bristlelike trichomes up to 2.5 mm long. Bracteoles subulate to linear-subulate to oblanceolate to lance-elliptic, 11–20 (–23) mm long, 1–3 (–4.5) mm wide, pubescent like bracts or sometimes with glandular trichomes to 0.3 mm long when bracts are entirely eglandular. Flowers sessile. Calyx with anterior and posterior lobes ovate to ovate-elliptic to obovate-elliptic, 17–35 mm long, 8–20 mm wide, pubescent like bracteoles, margin dentate with large (to 2.5 mm long) teeth terminated by bristlelike trichomes, anterior lobe apically 2-dentate, lateral lobes lance-linear to lanceolate, 8–18 mm long, 1–2.2 mm wide, pubescent with bristlelike trichomes as well as inconspicuous glands 0.05–0.3 mm long. Corolla yellow, usually turning purplish on drying, 35–65 (–80) mm long, externally pubescent with mostly glandular trichomes to 0.3 mm long (rarely nearly glabrous), tube cylindrical (or very slightly expanded distally), 18–37 mm long, upper lip 16–45 mm long, lobes 10–24 mm long, 4.5–13 mm wide, lower lip 10–41 mm long, 5–17 mm wide. Stamens 2, inserted near base of corolla tube, 28–60 mm long, filaments distally glabrous, proximally pubescent, thecae 3.5–9 mm long; staminodes 3, 1–4 mm long, pubescent. Style 30–60 mm long, glabrous, stigma linear, 1–3 mm long. Capsule 12–20 mm long, glabrous, stipe to 1.5 mm long, head ellipsoid. Seeds 4, subelliptic, 4.5–6.5 mm long, 4–5.5 mm wide.  $n = 20$ . Flowering Sep–Feb; fruiting Nov–Jan.

Along streams, on slopes, and in disturbed habitats (e.g., roadsides, cafetals, etc.) in Tropical Rain Forest, Montane Rain Forest, Evergreen Seasonal Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common in Northern Highlands, Eastern Highlands, Central Plateau, Central Depression, and Sierra Madre; 200–1380 m. Mex. (Sin., Dgo., S.L.P., Nay., Jal., Cma., Mich., Méx., Mlos., Ver., Gro., Oax., Tab., Yuc., Q. Roo, Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., S.A. (Col., Ven., Guy.). CHIAPAS COLLECTIONS: *Cro* 46280 (CAS); *Da* 29716 (CAS, MEXU); *F3272* (CAS); *Hd* 66 (CAS); *He* 315 (CAS); *La* 2805 (DS, MEXU); *Mz* 16958 (CAS); *EM* 159 (MEXU); *Pa* 886 (CAS); *QVU* 46 (U); *Te* 7069 (MEXU); *T* 3241 (DS); *Ve* 994 (MEXU); *Ve* 4319 (MEXU); *V&S* 14 (DS); *V&S* 70-14 (DS); *X&S* 315 (MEXU); 14058; 20176; 21915; 30234; 30540; 30932; 33133; 37559; 37971; 38662; 41530; 42355; 46744; 53664; 71076; 71185.

This is the only species of the genus native to the New World where it has long been known by the name *B. micans*. Daniel (1995) treated it as conspecific with *B. oenotheroides* from tropical west Africa. Synonyms based on types from Africa include *B. flava* J. Jacq. and *B. senegalensis* Nees.

In most specimens the bracts, bracteoles, and large calyx lobes are eglandular. In several specimens (e.g. *Breedlove & Thorne* 30234) the bracts, bracteoles, and large calyx lobes are conspicuously glandular-pubescent. Such specimens occur throughout the range of the species in Mexico and resemble others of *B. oenotheroides* in all other characteristics. They are treated as a sporadic glandular form.

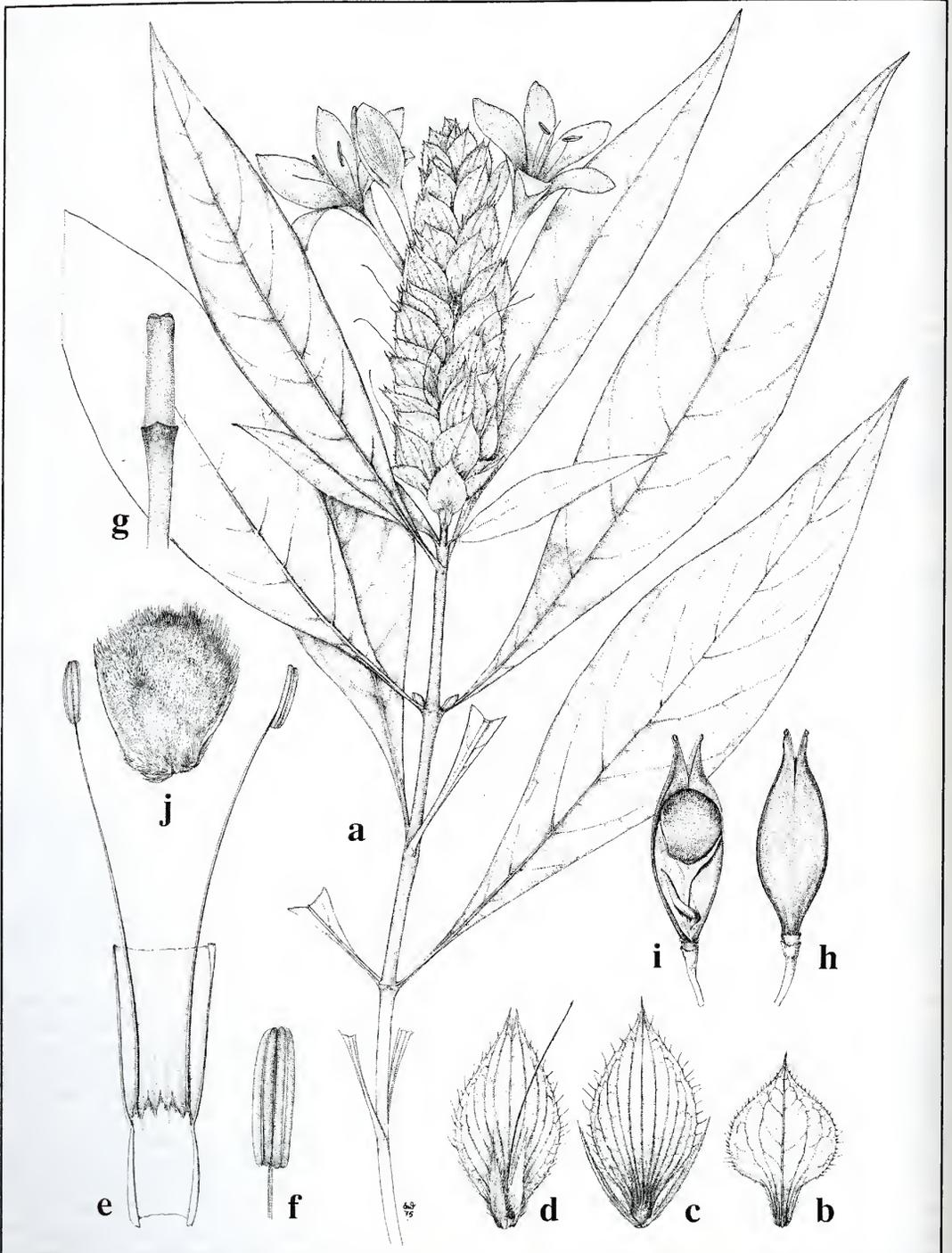


FIGURE 2. *Barleria oenotheroides* Dum. Cours. (a–g from McVaugh & Koelz 708, h–j from McVaugh 16024). a, habit,  $\times 0.5$ ; b, bract,  $\times 1$ ; c, bracteoles and posterior lobe of calyx,  $\times 1$ ; d, anterior and lateral lobes of calyx and gynoecium,  $\times 1$ ; e, proximal portion of corolla tube split open showing stamens and staminodes,  $\times 1.5$ ; f, distal portion of stamen,  $\times 3.5$ ; g, distal portion of style with stigma,  $\times 10$ ; h, capsule,  $\times 2$ ; i, view of interior of capsule with seed,  $\times 2$ ; j, seed,  $\times 5$ . Drawn by Karin Douthit. Copyright reserved to University of Michigan Herbarium, used with permission.

## 3. BLECHUM

*Blechnum* P. Browne, Civ. nat. hist. Jamaica 261. 1756. — TYPE: *Ruellia blechnum* L. (= *Blechnum pyramidatum* (Lam.) Urb.).

Spreading to decumbent to erect perennial herbs or shrubs with cystoliths. Leaves opposite, petiolate, margin entire to crenate to ± dentate. Inflorescence of mostly terminal densely bracteate dichasiate spikes; dichasia opposite, 1–3-flowered, sessile to subsessile (i.e., peduncles to 1 mm long), subtended by a bract (or sometimes a distal leaf). Bracts opposite, green, margin entire (in ours; elsewhere also dentate-crenate). Flowers homostylous, sessile, subtended by 2 homomorphic bracteoles. Calyx deeply 5-lobed, lobes homomorphic or subequal in length. Corolla white to blue to purplish, tube expanded distally into a distinct throat, limb subregular and ± equally 5-lobed to subbilabiate with upper lip 2-lobed and lower lip 3-lobed, corolla lobes contorted in bud. Stamens 4, didynamous, inserted distal to midpoint of corolla tube, at or near base of throat, included in corolla tube or barely exerted from mouth of corolla, anthers 2-theous, thecae equal in size, parallel, equally inserted, lacking basal appendages, dehiscent toward lower lip (i.e., flower nototribal); pollen spheric to subspheric, 3-colporate, syncolpate, exine finely to coarsely reticulate; staminodes 0. Style included in corolla tube, stigma 2-lobed or with only 1 lobe prominent or evident. Capsule substipitate, ellipsoid, retinacula present, septa with attached retinacula separating from inner wall of mature capsule. Seeds 8–12, homomorphic, lenticular, beset with hygroscopic trichomes on and near margin. ( $x = 17$ ).

A genus of less than 10 species native to tropical America. *Blechnum pyramidatum*, a weedy species, has become naturalized in the Paletropics. The two species treated here are the only ones known from Mexico.

REFERENCE: DANIEL, T.F. 1995. New and reconsidered Mexican Acanthaceae. VI. Chiapas. Proc. Calif. Acad. Sci. 48:253-282.

- a. Calyx 5–7.5 mm long; corolla 30–45 mm long, externally pubescent with glandular and eglandular trichomes, limb 15–28 mm in diameter; stamens 8–14 mm long, filaments pubescent (at least proximally) with eglandular trichomes, thecae 2.5–3.5 mm long, pubescent with glandular trichomes; style 24–31 mm long; capsule 10–12.5 mm long . . . . . 1. *B. grandiflorum*  
 aa. Calyx 2.5–5 mm long; corolla 10–20 mm long, externally pubescent with eglandular trichomes only, limb 4–11 mm in diameter; stamens 1.5–5 mm long, filaments glabrous, thecae 1–1.6 mm long, glabrous; style 6–13 mm long; capsule 5.5–7 mm long . . . . . 2. *B. pyramidatum*

1. *Blechnum grandiflorum* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:168. 1855.

— *Ruellia mirandana* Ramamoorthy & Hornelas, Pl. Syst. Evol. 159:161. 1988, not *Ruellia grandiflora* Kunth (1876). — TYPE: Nicaragua, Nueva Segovia, “Bjerget Pantasma,” 4000 ft, Jan 1848, A. Oersted 10632 (C, photos at F!, US!; probable isotype: K!).

ILLUSTRATION: none found.

Erect perennial herbs to 1.9 m tall. Young stems quadrate-sulcate, striate, bifariously pubescent with erect to retrorse eglandular and sometimes glandular trichomes 0.1–0.5 mm long or glabrate. Leaves petiolate, petioles to 60 mm long, blades ovate to lance-ovate, 30–140 mm long, 12–65 mm wide, 1.9–3.9 times longer than wide, acuminate to falcate at apex, acute to attenuate at base, surfaces glabrous or pubescent along major veins with antrorse eglandular trichomes, margin entire to sinuate. Inflorescence of terminal pedunculate densely bracteate 4-sided dichasiate spikes to 9 cm long (including peduncle and excluding flowers), 2–4 cm in diameter (excluding flowers) near midspike, peduncles to 10 mm long, pubescent like young stems or like rachis, rachis ± evenly pubescent with flexuose to antrorse eglandular trichomes 0.1–0.3 mm long; dichasia opposite, sessile, 1 (–2)-flowered. Bracts imbricate, sessile to petiolate, petioles (if present) to 3.5 mm long, blades ovate to elliptic to circular, 11–27 mm long, (5.8–) 10–21 mm wide (proximalmost pair sometimes foliose and larger), acute to acuminate

to caudate at apex, surfaces inconspicuously pubescent with erect to flexuose eglandular and glandular trichomes 0.05–0.2 mm long, margin ciliate with antrorse eglandular trichomes to 0.5 mm long and often with stiff eglandular trichomes 0.5–1.5 mm long. Bracteoles petiolate, lance-elliptic to elliptic to oblanceolate, 7–17 mm long, 1.4–6 mm wide, pubescent like bracts, secondary bracteoles (if present) linear, smaller than bracteoles. Flowers sessile. Calyx 5–7.5 mm long, lobes homomorphic, lance-subulate to linear-lanceolate, 3.5–6 mm long, abaxially pubescent with eglandular and glandular (sometimes absent) trichomes. Corolla white (with purplish markings) to lavender to reddish, 30–45 mm long, externally pubescent with flexuose glandular and eglandular trichomes 0.1–0.7 mm long, tube 24–34 mm long, 3–6 mm in diameter near midpoint, throat 13–18 mm long, limb subregular, 15–28 mm in diameter, upper lip 8–11 mm long, lobes 6.5–7 mm long, 5–8 mm wide, lower lip 9–11 mm long, lobes 5.5–11 mm long, 4–11 mm wide, all lobes subcircular to broadly elliptic. Stamens included in corolla tube, longer pair 11–14 mm long, shorter pair 8–11 mm long, filaments pubescent (at least proximally) with eglandular trichomes, thecae 2.5–3.5 mm long, dorsally pubescent with glandular trichomes; pollen coarsely reticulate. Style 24–31 mm long, pubescent throughout with eglandular trichomes, stigma unequally 2-lobed, 1–2.8 mm long, 1 or both lobes often coiled. Capsule 10–12.5 mm long, pubescent with erect to flexuose to retrorse eglandular trichomes 0.2–0.5 mm long, stipe 1–1.5 mm long, head ± broadly ellipsoid, 9–11 mm long. Seeds 12, 2.5–3.7 mm long, 2.1–3.1 mm wide, surfaces smooth and lacking trichomes, margin with a conspicuous band of

hygroscopic trichomes. Flowering Dec–May; fruiting Jan–May.

Along streams and on slopes and ridgetops in Lower Montane Rain Forest, Montane Rain Forest, Evergreen Seasonal Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common in Northern Highlands and Central Plateau; 560–1360 m. Mex. (Chis.), Guat., Hond., Nic. CHIAPAS COLLECTIONS: *Br 874* (CAS); *Ga 210* (MEXU); *Mi 2619* (MEXU); *Mi 6866* (MEXU); *Mi 7459* (MEXU); *QVU 473* (U); *Rey 416* (MEXU); *Rey 452* (MEXU); *S&S 2123* (K, MEXU, US); *T 2215* (DS, ENCB, US); *T 3473* (DS, US); *T 9617* (CAS); 8835; 23850; 23874; 31543; 49054; 50544; 68261.

Use: leaves are boiled and the resulting solution is taken orally for coughing (*Brett 874*).

Daniel (1995) discussed the generic position of this species.

## 2. *Blechnum pyramidatum* (Lam.) Urb. Fedde Repert. Spec. Nov. Regni Veg. 15:323. 1918.

— *Barleria pyramidata* Lam. Encycl. 1:380. 1785. — TYPE: Santo Domingo, an illustration of Plumier (Pl. amer. 2:t. 42, fig. 3. 1756) was cited; specimens, if any exist, not seen.

*Ruellia blechnum* L. Syst. nat. ed. 10, 2:1120. 1759, as “blechnu.” — *Blechnum brownei* Juss. Ann. Mus. Natl. Hist. Nat. 9:270. 1807. — *Blechnum blechnum* (L.) Millsp. Publ. Field Columbian Mus., Bot. Ser. 2:100. 1900. — SYNTYPES: illustrations of Sloane (Voy. Jamaica 1:t. 109, fig. 1. 1707) and Plumier (Pl. amer. 2:t. 42, fig. 3. 1756) were cited; see Daniel 1995.

ILLUSTRATIONS: Fig. 3; Ann. Mus. Natl. Hist. Nat. 9:t. 21, fig. 2. 1807; Contr. U.S. Natl. Herb. 31:61, fig. 22. 1951; Fieldiana, Bot. 24(10):343, fig. 74. 1974; Hsieh and Huang in Li et al., Flora Taiwan 4:626. 1978; Correll and Correll, Flora Bahama Archipelago, 1346, fig. 586. 1982; Proctor, Flora Cayman Islands, 715, fig. 228. 1984; Howard, Flora Lesser Antilles 6:362, fig. 156. 1989.

Spreading to erect perennial herbs to 9 (–15) dm tall. Young stems quadrate to ± bisulcate, pubescent with flexuose to retrorse to antrorse to antrorsely appressed eglandular (and occasionally a few glandular) trichomes 0.1–1.5 mm long, trichomes at first ± evenly disposed and soon concentrated in or restricted to 2 lines. Leaves (plants sometimes leafless during anthesis) petiolate, petioles to 50 mm long, blades ovate to elliptic, 20–120 mm long, 10–70 mm wide, 1.5–3.5 times longer than wide, acute to acuminate at apex, (truncate to) rounded to acute to attenuate at base, surfaces pubescent with flexuose to antrorsely appressed eglandular trichomes, margin entire to crenate. Inflorescence of axillary or terminal subsessile to pedunculate densely bracteate 4-sided dichasiate spikes to 11 (–18) cm long (including peduncles and excluding flowers),

1–3 cm in diameter (excluding flowers) near midspike, peduncles to 13 (–37) mm long, pubescent like young stems, rachis evenly pubescent with erect to flexuose to ascendant-appressed eglandular (and sometimes a few glandular) trichomes 0.05–0.5 mm long; dichasia opposite, sessile to subsessile (i.e., borne on peduncles to 1 mm long), 1–3-flowered, sometimes present in distal pair or several pairs of leaves proximal to spike axis. Bracts imbricate, sessile to petiolate, petioles (if present) to 2.5 mm long, blades broadly ovate to cordate, 8–19 (–30) mm long, (4–) 5.5–14 (–20) mm wide (proximalmost pair sometimes foliose and larger), acute at apex, abaxial surface pubescent with erect to subflexuose to appressed eglandular (and occasionally with a few glandular) trichomes, margin ciliate with straight to flexuose eglandular trichomes 0.1–2 mm long. Bracteoles sessile to petiolate, ovate to lance-ovate to lance-elliptic to oblanceolate, 4.5–11 mm long, 1–4.5 mm wide, abaxial surface pubescent like bracts, secondary bracteoles (if present) linear to subulate, smaller than bracteoles. Flowers sessile. Calyx 2.5–5 mm long, lobes homomorphic, subulate, 2–3.8 mm long, abaxially pubescent with eglandular trichomes. Corolla white to blue, 10–20 mm long, externally pubescent with flexuose eglandular trichomes to 0.3 mm long, tube 7.5–13 mm long, 1.8–3.3 mm in diameter near midpoint, throat 3.5–6 mm long, limb subregular to subbilabiate, 4–11 mm in diameter, upper lip 1.5–6 mm long, lobes 1.5–6 mm long, 1–4.5 mm wide, lower lip 1.5–6 mm long, lobes 1.5–5.5 mm long, 1–6 mm wide, all lobes broadly subelliptic to subcircular. Stamens included in corolla tube or barely exerted from mouth of corolla, longer pair 2.5–5 mm long, shorter pair 1.5–3 mm long, filaments glabrous, thecae 1–1.6 mm long, glabrous; pollen finely reticulate. Style 6–13 mm long, pubescent with distal-pointing eglandular trichomes, stigma with only 1 lobe evident, linear (sometimes coiled), 0.5–1.2 mm long. Capsule 5.5–7 mm long, pubescent with erect to flexuose eglandular trichomes 0.1–0.3 mm long, stipe 0.4–0.5 mm long, head ellipsoid, 5–6.5 mm long. Seeds 8–12, 1.5–2 mm long, 1.3–1.7 mm wide, surfaces smooth or with short and stiff often glandlike protuberances, margin conspicuously enlarged with a ring of hygroscopic trichomes that become a jellylike mass when wet. ( $n = 17$ ). Flowering and fruiting Nov–May.

Disturbed habitats (e.g., roadsides, cafetals, sidewalks, etc.) in Tropical Rain Forest, Evergreen Seasonal Forest, and Tropical Deciduous Forest; common (often weedy) in Northern Highlands, Eastern Highlands, Central Plateau, Central Depression, and Sierra Madre; 150–1380 m. U.S. (Florida), Mex. (Son., Tam., Sin., S.L.P., Nay., Jal., Qro., Hgo., Cma., Mich., Méx., Mlos., Pue., Ver., Gro., Oax., Tab., Camp., Yuc., Q.Roo, Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Guy., Sur., Fr. Gui., Peru), Old World tropics (presumably introduced). CHIAPAS COLLECTIONS: *Cro 40612* (MEXU); *Cro 64973* (CAS); *Dan 5015* (CAS); *Dan 6199* (CAS); *La 2831* (DS); *Mz 3184* (MEXU); *Mz 11636* (CAS); *Mz 18135* (CAS); *EM 2678* (MEXU); *Pa 1851* (CAS); *QVU 63* (U); *Ve 789* (MEXU); *Ve 1357* (MEXU); 7621; 23448; 23767; 33379; 33986; 50317; 67001; 68230; 70856.

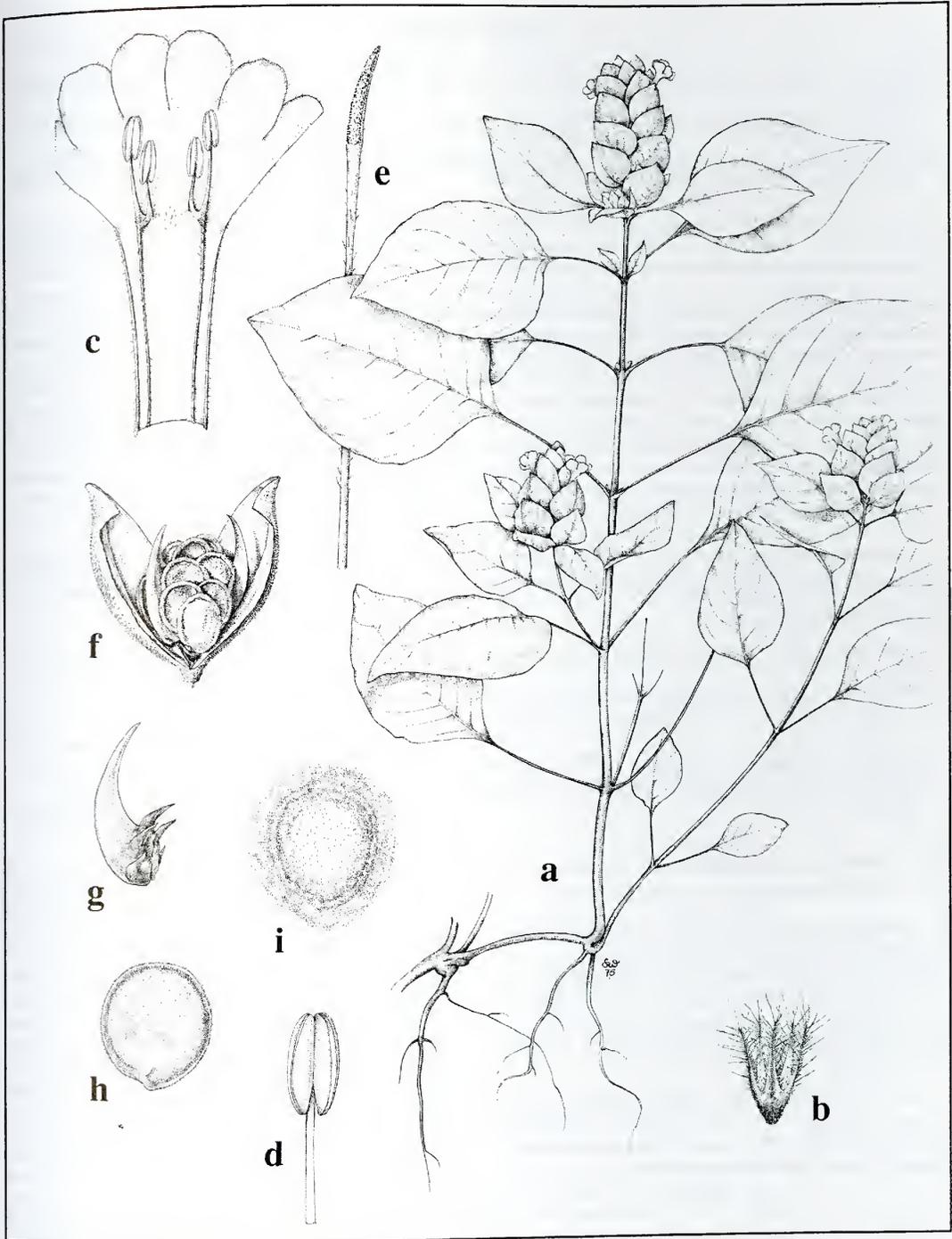


FIGURE 3. *Blechum pyramidatum* (Lam.) Urb. (a–e from McVaugh 25206, f–i from McVaugh 23550). a, habit,  $\times 0.5$ ; b, calyx,  $\times 5$ ; c, corolla split open showing stamens,  $\times 5$ ; d, distal portion of stamen,  $\times 10$ ; e, style,  $\times 10$ ; f, capsule with walls partially removed to show seeds,  $\times 5$ ; g, septum with attached retinacula,  $\times 7.5$ ; h, seed (dry state),  $\times 10$ ; i, seed (moistened state),  $\times 10$ . Drawn by Karin Douthit. Copyright reserved to University of Michigan Herbarium, used with permission.

## 4. BRAVAISIA

- Bravaisia* DC. Biblioth. Universelle Genève 17:132. 1838. — TYPE: *Bravaisia floribunda* DC. (= *Bravaisia integerrima* (Spreng.) Standl.).
- Androcentrum* Lem. Fl. Serres Jard. Eur. 3:242. 1847 (Jun). — TYPE: *Androcentrum multiflorum* Lem. (= *Bravaisia integerrima* (Spreng.) Standl.).
- Onychacanthus* Nees in A. DC. Prodr. 11:217. 1847 (Nov). — LECTOTYPE (Leonard 1951:45): *Onychacanthus cumingii* Nees in A. DC. (= *Bravaisia integerrima*).

Shrubs to small or medium-sized trees with multiple trunks and usually with numerous stilt roots, cystoliths present. Leaves opposite, petiolate, usually somewhat leathery, margin entire to sinuate-crenate, usually somewhat revolute. Inflorescence of short dichasiate spikes or thyrses that form terminal panicles; dichasia opposite (to alternate), usually 1-flowered, sessile or pedunculate, subtended by a bract (or terminal dichasia subtended by 2 bracts). Bracts opposite, green, relatively small, margin entire. Flowers homostylous, sessile (rarely pedicellate), subtended by 2 homomorphic bracteoles. Calyx deeply 5-lobed, lobes homomorphic (or sometimes unequal in length), imbricate. Corolla white, bluish white, or pinkish, tube expanded distally, usually into a distinct throat, limb bilabiate, upper lip 2-lobed, lower lip 3-lobed, corolla lobes contorted in bud. Stamens 4, didynamous, inserted at base of corolla throat, included in corolla tube or exerted from mouth of corolla, anthers 2-theous, thecae equal to subequal in size, parallel, equally inserted, awned at base with a single subulate projection, dehiscing toward lower lip (i.e., flowers nototribal); pollen compressed spheric, loxodicolporate (i.e., colporus and striations of one hemisphere perpendicular to those of the other hemisphere, see Daniel 1988), exine striate-foveolate; staminodes 0. Style exerted from mouth of corolla, stigma unlobed, usually coiled or curved. Capsule estipitate or substipitate, ovoid to ellipsoid to obovoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 1–4, homomorphic, sublenticular to lenticular, surfaces smooth and shiny, lacking trichomes.

A neotropical genus of three species occurring from central Mexico and Cuba southward to Colombia and eastern Venezuela. Mexico and Guatemala are the only countries from which all species are known.

REFERENCE: DANIEL, T.F. 1988. A systematic study of *Bravaisia* DC. (Acanthaceae). Proc. Calif. Acad. Sci. 45:111–132.

- a. Bracteoles apiculate to caudate at apex; corolla purplish or pinkish with yellow markings, 27–47 mm long, externally pubescent; inflorescence spicate (dichasia sessile); calyx lobes mucronate to apiculate at apex . . . . . 1. *B. grandiflora*
- aa. Bracteoles rounded to acute at apex; corolla white with brown and yellow markings, 15–25 mm long, externally glabrous; inflorescence thyrsoid (dichasia borne on peduncles 1–13 mm long); calyx lobes rounded to acute at apex . . . . . 2. *B. integerrima*

1. *Bravaisia grandiflora* Donn. Sm., Bot. Gaz. (Crawfordsville) 33:255. 1902.

— TYPE: Guatemala, Alta Verapaz, “in silvis ad Sachicha,” Apr 1901, *H. von Tuerckheim* 7924 (US!).

*Bravaisia proxima* S.F. Blake, Contr. Gray Herb. 52:96. 1917.  
— TYPE: Belize, upper Moho River, 16 Mar 1907, *M. Peck* 730 (GH!).

ILLUSTRATIONS: Fieldiana, Bot. 24(10):346, fig. 75. 1974; Proc. Calif. Acad. Sci. 45:125, fig. 6. 1988.

Shrubs to understory trees to 9 m tall, trunk to 20 cm in diameter, bark light-colored, smooth. Young stems glabrous or sparsely pubescent with flexuose to retrorsely or antorsely appressed eglandular trichomes to 1.4 mm long. Leaves petiolate, petioles to 40 mm long, blades elliptic to obovate, 30–190 mm long, 10–75 mm wide, 2.1–4.5 times longer than wide, attenuate at base, acuminate to acute (sometimes aristate) at apex, surfaces glabrous or pubescent along veins on abaxial surface. Inflorescence spicate, rachis pubescent with flexuose to ascendant-appressed sometimes golden eglandular trichomes 0.1–1.1 mm long; dichasia 1–5 (commonly 3) per spike, sessile. Bracts petiolate or narrowed at or near base and abruptly expanding into a lanceolate to narrowly elliptic to oblanceolate blade, proximalmost sometimes ovate to elliptic and distalmost

sometimes widest at base and narrowed distally, 2.5–15 (–23) mm long, 1–8 mm wide, abaxial surface pubescent like rachis proximally, often glabrous distally. Bracteoles triangular to orbiculate to somewhat squarish, 3–8 mm long, shorter than calyx, 1.5–4 mm wide, prominently apiculate to caudate at apex, abaxial surface pubescent like rachis (often only sparsely so), margin ciliate (at least near the apex) with mostly erect eglandular trichomes 0.05–0.5 mm long. Flowers sessile. Calyx 5–10.5 mm long, lobes obovate to elliptic, 5–10 mm long, mucronate to apiculate at apex, abaxially densely puberulent with ascendant eglandular trichomes 0.05–0.2 (–0.5) mm long, margin densely ciliate with erect to flexuose eglandular trichomes to 1 mm long. Corolla purplish or pinkish with yellow markings in throat, 27–47 mm long, externally pubescent with eglandular trichomes 0.3–0.7 mm long, tube 20–30 mm long, narrow proximal portion 6–13 mm long, throat 12–22 mm long, 7.5–13 mm in diameter near midpoint, limb 22–40 mm in diameter, lobes 7–18 mm long, margin ciliate. Stamens included in corolla tube or longer pair slightly exerted from mouth of corolla, shorter pair 9–14 mm long, longer pair 11–19 mm long, thecae 3–4.5 mm long (including basal awn), pubescent with flexuose or twisted eglandular trichomes. Style 20–29 mm long, glabrous. Capsule (based on extralimital material) ovoid, 10 mm long, glabrous. Seeds not seen. Flowering Feb–Mar; fruiting Jun (extralimitaly).

Along streams and forest edges in Tropical Rain Forest; rare in Eastern Highlands (known only from Agua Azul); 300–320 m. Mex. (Chis.), Guat., Bel. CHIAPAS COLLECTIONS: *Dan 4998* (ASU, CAS, DUKE, ENCB, F, K, MEXU, MICH, MO, NY, TEX, US); *Ven 20001* (CAS); 49859.

The above description has been augmented with data from Central American specimens.

## 2. *Bravaisia integerrima* (Spreng.) Standl. Contr. U.S. Natl. Herb. 23:1335. 1926.

— *Amasonia integerrima* Spreng. Syst. veg. 2:765. 1825.  
— TYPE: Colombia, “ad. fl. Magdalen. Bertero” (fide protologue); “ex Amer. meridionali h. Bertero Mr Balb. 1822” (G-DC!), see Daniel (1988).

*Barleria anomala* Spreng. Syst. veg. 2:828. 1825. — TYPE: Colombia, “ad. fl. Magdalen.” (fide protologue). This name presumably belongs in synonymy here. DeCandolle (Prodr. 9:240. 1845) included it under his *Bravaisia floribunda*. Based on the type locality, it would appear probable that the type of this name is also the type of *Amasonia integerrima* (see above), which was published simultaneously.

*Bravaisia floribunda* DC. Biblioth. Universelle Genève 17:132. 1838. — TYPE: Venezuela, Caracas, *J. Vargas s.n.* (G-DC!; isotype K!).

*Androcentrum multiflorum* Lem. Fl. Serres Jard. Eur. 3:242. 1847. — TYPE: Mexico, Oaxaca, Tututepeque and Lacs de Tututepeque, Apr, May, *H. Galeotti 510M* (BR!, F!, GH!, MO!, NY!, UC!, US!), see Daniel (1988).

*Onychacanthus cumingii* Nees in A. DC. Prodr. 11:217. 1847. — LECTOTYPE (Leonard 1951:46): Mexico, without locality, *M. Sessé & J. Moçoiño s.n.* (G!; isolectotypes: BM!, P!), see Daniel (1988).

*Onychacanthus speciosus* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:131. 1855. — LECTOTYPE (Daniel 1888:120): Costa Rica, Puntarenas, La Barranca near Puntarenas, Feb 1847, *A. Oersted 10624* (C!).

*Onychacanthus arboreus* H. Karst. Fl. Columb. 2:111. 1865. — TYPE: Venezuela, “habitat regiones montuosas calidas Venezuelae in provincia Caracas prope oppida Victoria et San Sebastian observata.” The illustration provided in the protologue pertains to *B. integerrima*. The location of Karsten’s herbarium is unknown. The only specimen I have seen that may represent type material of this species has label data as follows: Prov. Caracas, Valle de Aragua, *H. Karsten s.n.* (W!). La Victoria and San Sebastian both occur in the state of Aragua, ca. 50–70 km SW of Caracas.

ILLUSTRATIONS: Fig. 4; Karsten, Fl. Columb. 2:t. 159. 1865; Contr. U.S. Natl. Herb. 31:47, fig. 17. 1951; Ann. Missouri Bot. Gard. 65:186, fig. 15. 1978.

Trees to 20 (–40) m tall, numerous stilt or prop roots often present around the base, main trunk divided at or above the base into several prominent trunks, bark light gray to dark gray-

brown, sometimes mottled, smooth or slightly warty, crown spreading, often somewhat rounded. Young stems glabrous, farinose-puberulent with eglandular trichomes to 0.05 mm long, or pubescent with flexuose to antrorsely appressed or retrorsely appressed eglandular trichomes 0.1–0.5 mm long, youngest growth sometimes densely pubescent with flexuose to appressed eglandular trichomes up to 1.5 mm long. Leaves petiolate, petioles to 90 mm long, blades ovate to elliptic to broadly elliptic to obovate-elliptic, 30–305 mm long, 11–157 mm wide, 1.4–3.6 times longer than wide, rounded to acute to attenuate at base, (rounded to) acute to acuminate at apex, surfaces glabrous or with scattered eglandular trichomes along veins on abaxial surface. Inflorescence thyrsoid, rachis densely pubescent with eglandular trichomes 0.05–0.5 (–1) mm long; dichasia (3–) 6–10 (–20) per thyrs, borne on peduncles (1–) 1.5–6 (–13) mm long. Bracts linear to linear-subulate to triangular to ovate, proximalmost rarely petiolate, 2–14 mm long, 0.7–4 mm wide, abaxial surface pubescent like rachis. Bracteoles linear to triangular to suborbicular, 1.6–5 mm long, shorter than calyx, 1–2.5 mm wide, rounded to acute at apex, abaxial surface pubescent like rachis or glabrous, margin ciliate with straight to flexuose eglandular trichomes to 0.3 mm long. Flowers sessile (or borne on pedicels to 2 mm long). Calyx 3–10 mm long, lobes sometimes unequal in length, ovate to elliptic to suborbicular to obovate-elliptic, 2–8 mm long, rounded to acute at apex, abaxially pubescent like bracteoles or glabrous. Corolla white with brown and yellow markings on inner surface of lower lip, 15–22 mm long, externally glabrous, tube 9–12 mm long, narrow proximal portion 1.7–3.2 mm long (often not well differentiated from throat), throat 5.5–10 mm long, 5.5–11 mm in diameter near midpoint, limb 17–27 mm in diameter, lobes 6–12 mm long, margin sparsely ciliate. Stamens exerted from mouth of corolla, shorter pair 7–9 mm long, longer pair 9–11 mm long, thecae 2.1–3.2 mm long (including basal awn), sparsely pubescent to glabrous. Style 7–13 mm long, glabrous (rarely sparsely pubescent near base with eglandular trichomes to 0.7 mm long and occasionally with stipitate glands up to 0.1 mm long as well). Capsule ellipsoid to obovoid, 5–13 mm long, glabrous at maturity (rarely sparsely pubescent near apex when immature). Seeds 3–5 mm long, 2.8–4 mm wide, 0.5–1.2 mm thick. Flowering and fruiting Feb–May.

Along streams and forest edges, and in swampy areas in Tropical Rain Forest and Evergreen Seasonal Forest; uncommon in Gulf Coastal Plain, Eastern Highlands, and Pacific Coastal Plain; 0–200 m. Mex. (Jal., Cma., Mich., Ver., Gro., Oax., Tab., Chis.); Guat., Hond., Salv., Nic., C.R., Pan., Antill. (Trinidad only), S.A. (Col., Ven.). CHIAPAS COLLECTIONS: *G-P 711* (MEXU); *G-Q 3496* (ENCB, MICH); *Mz 11652* (CAS, MEXU); *Mz 11743* (MEXU); *Mz 11987*; *Mz 18384* (CAS, MEXU); *EM 16218* (MEXU, US).

The above description and phenologies have been augmented using specimens from adjacent regions of Mexico and Central America.

## 5. CARLOWRIGHTIA

*Carlowrightia* A. Gray, Proc. Amer. Acad. Arts 13:364. 1878. nomen cons. — LECTOTYPE (Bremekamp, Ind. Nom. Gener. Card 01197. 1956): *Carlowrightia linearifolia* (Torr.) A. Gray ( $\equiv$  *Schaueria linearifolia* Torr.).

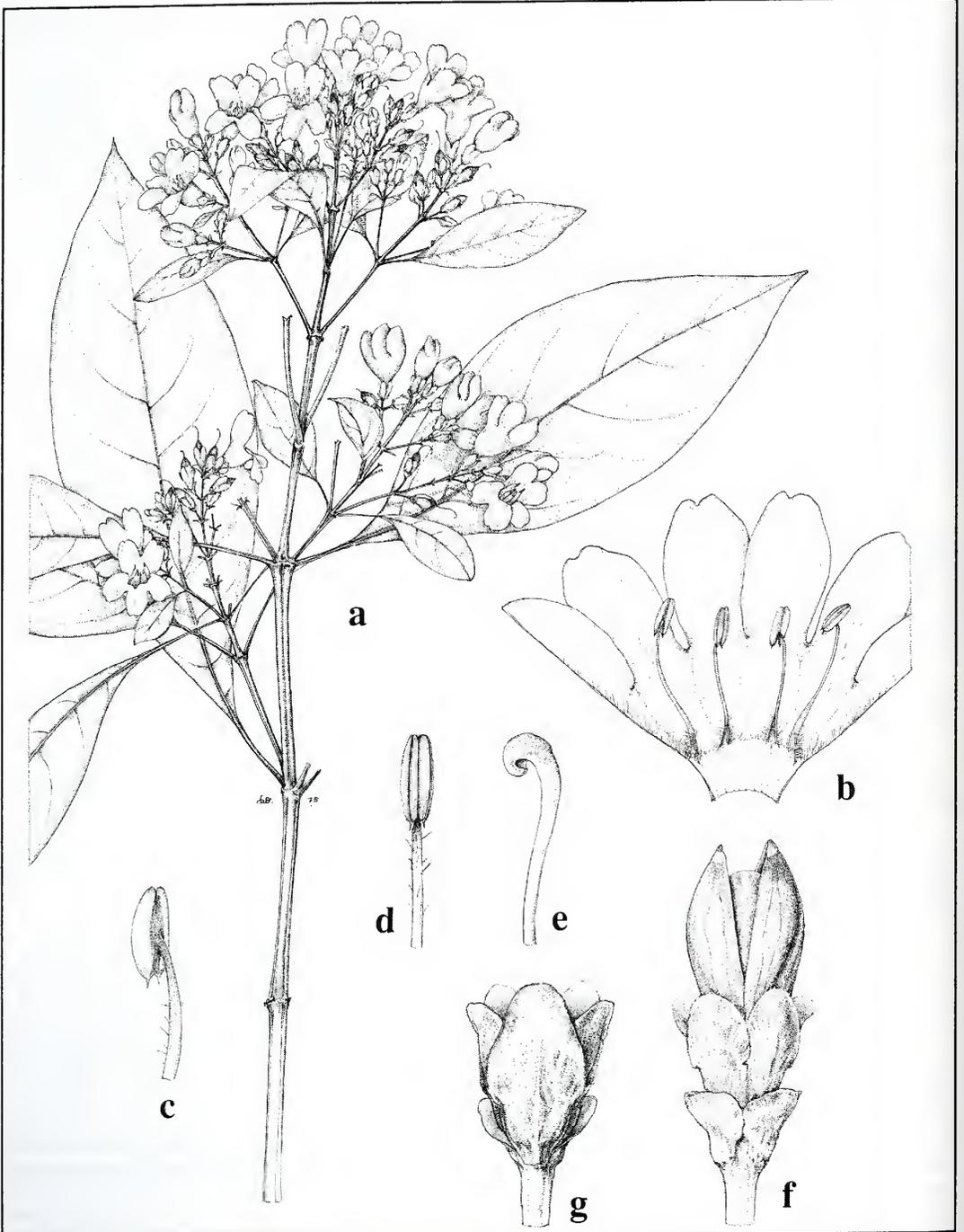


FIGURE 4. *Bravaisia integerrima* (Spreng.) Standl. (McVaugh 22884). a, habit,  $\times 0.5$ ; b, corolla split open showing stamens,  $\times 2$ ; c, distal portion of anther (indehiscent side),  $\times 5$ ; d, distal portion of anther (dehiscent side),  $\times 5$ ; e, distal portion of style with stigma,  $\times 5$ ; f, peduncle, bracteoles, calyx, and capsule with seed,  $\times 3.5$ ; g, peduncle, bracteoles, and calyx (opposite side of f),  $\times 3.5$ . Drawn by Karin Douthit. Copyright reserved to University of Michigan Herbarium, used with permission.

*Cardianthus* Nees & Schauer in A. DC. Prodr. 11:331. 1847. nomen rej. — TYPE: *Cardianthus neesianus* Schauer ex Nees. (= *Carlowrightia neesiana* (Schauer ex Nees) T.F. Daniel)  
*Croftia* Small, Fl. s.e. U.S. 1088. 1903, (not *Croftia* King & Prain, 1896). — TYPE: *Croftia parvifolia* (Torr.) Small (= *Schaueria parvifolia* Torr.).

Erect to spreading or decumbent perennial herbs or shrubs with cystoliths. Older stems with epidermis exfoliating. Leaves opposite (in ours, elsewhere rarely subopposite), sessile or petiolate, margin entire (to sinuate). Inflorescence of dichasia in leaf axils, or, more commonly, of dichasiate spikes, racemes, thyrses, or panicles; dichasia alternate or opposite, 1–3 (or more)-flowered, sessile or pedunculate, subtended by a leaf or bract. Bracts and bracteoles small, green, inconspicuous, margin entire. Flowers homostylous, sessile or pedicellate, subtended by 2 homomorphic bracteoles. Calyx deeply 5-lobed, lobes homomorphic. Corolla white to cream to rose-purple to blue, usually with yellow and maroon or purple markings on upper lip, tube cylindrical to subcylindric, shorter than limb, throat indistinct, limb pseudopapilionaceous (in ours, elsewhere also bilabiate to subactinomorphic), upper lip comprising 2 fused lobes, (entire to) emarginate at apex, lower lip consisting of 2 similar lateral lobes and a lower-central lobe that is either conduplicate-keeled and enclosing stamens and distal portion of style during anthesis (in ours) or similar in form to lateral lobes, corolla lobes imbricate in bud. Stamens 2, inserted in distal portion of corolla tube, exerted from mouth of corolla, anthers 2-theous, thecae equal in size, parallel or subsagittate, subequally inserted on filament, lacking basal appendages, dehiscing toward upper lip of corolla (i.e., flowers stenotribal); pollen prolate to subspheric, 3-colporate, 6-pseudocolpate, pseudocolpi 2 per mesocolpium, exine reticulate; staminodes 0. Style exerted from mouth of corolla, stigma 2-lobed. Capsule stipitate, head flattened (in ours) to nearly spheric, circular to ovate-elliptic in outline, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 2–4, homomorphic (in ours) or heteromorphic, flat (in ours) to concavoconvex, surfaces and margin smooth or variously ornamented, lacking trichomes. ( $x = 18$ ).

Twenty-four species are recognized in this New World genus. They occur from the southwestern United States (California, Arizona, New Mexico, and Texas) throughout Mexico to northwestern Costa Rica and disjunctly to southwestern Ecuador. With 23 species, Mexico is the center of diversity for *Carlowrightia*.

REFERENCES: DANIEL, T.F. 1983. *Carlowrightia* (Acanthaceae). Fl. Neotrop. Monogr. 34:1–116; DANIEL, T.F. 1988. Taxonomic, nomenclatural, and reproductive notes on *Carlowrightia* (Acanthaceae). Brittonia 40:245–255.

## 1. *Carlowrightia arizonica* A. Gray, Proc. Amer. Acad. Arts 13:364. 1878.

— TYPE: United States, Arizona, Pinal Co., near Camp Grant, 1867, *E. Palmer* 165 (GH!).

*Carlowrightia cordifolia* A. Gray, Proc. Amer. Acad. Arts 21:406. 1886. — TYPE: Mexico, Chihuahua, mountains above Batopilas, 1885, *E. Palmer* 224 (GH!; isotypes: K!, NY!, US!).

*Justicia alba* Sessé & Moc. Pl. nov. Hisp. 4. 1887, not of earlier authors. — TYPE: Mexico, Michoacán, "in montibus á Tepalcatepeque Coahuayanam versus interjectis," Jan 1791, *M. Sessé et al.* (specimen either lost or mislabeled, see Daniel 1983).

*Carlowrightia glabrata* Fernald, Bot. Gaz. (Crawfordsville) 20:536. 1895. — LECTOTYPE (Daniel, Fl. Neotrop. Monogr. 34:76. 1983): Mexico, Sinaloa, Villa Unión, Jan 1893, *F. Lamb* 420 (GH!; isolecotypes: DS!, F!, G!, MO!, MSC!, NY!, US!).

*Carlowrightia californica* Brandegee, Zoe 5:172. 1903. — TYPE: Mexico, Baja California Sur, Comondú, 22 Mar 1889, *T. Brandegee s.n.* (UC!).

*Carlowrightia californica* var. *pallida* I.M. Johnston, Proc. Calif. Acad. Sci. ser. 4, 12:1169. 1924. — TYPE: Mexico, Baja California, San Esteban Island, 20 Apr 1921, *I. Johnston* 3195 (CAS!; isotypes: GH!, US!).

*Carlowrightia mucronata* Leonard, Kew Bull. 1938:66. 1938. — TYPE: Mexico, Guerrero, Coyuca, 24 Jan 1934, *G. Hinton* 5533 (K!; isotypes: F!, G!, GH!, MO!, NY!, TEX!, US!).

*Carlowrightia coyucana* Leonard, Kew Bull. 1938:67. 1938. — TYPE: Mexico, Guerrero, Distr. Coyuca, Pungarabato, 7 Jun 1934, *G. Hinton* 6129 (K!; isotypes: G!, GH!).

*Carlowrightia costaricana* Leonard in Standl. Publ. Field Mus. Nat. Hist., Bot. Ser. 18:1206. 1938. — TYPE: Costa Rica, Guanacaste, vicinity of Lfano, 360 m, 15 Jan 1926, *P. Standley & J. Valerio* 44890 (US!).

ILLUSTRATIONS: Fig. 5; Fieldiana, Bot. 24(10):350, fig. 77. 1974.

Shrubs to 1.3 m tall. Young stems subquadrate to terete, pubescent with retrorse to retrorsely appressed eglandular trichomes 0.1–0.7 mm long, trichomes mostly concentrated in 2 lines. Leaves petiolate, petioles to 25 mm long, blades lance-ovate to ovate to elliptic, 15–80 mm long, 7–41 mm wide, 1.8–4 times longer than wide, acute to rounded to subcordate at base, rounded to acute to acuminate to subfalcate at apex, surfaces pubescent with eglandular trichomes. Inflorescence of slender or stout axillary and terminal dichasiate spikes to 15 cm long, these sometimes collectively forming terminal panicles, rachis either pubescent with  $\pm$  evenly disposed retrorse eglandular trichomes 0.05–0.1 mm long or pubescent with  $\pm$  evenly disposed retrorse eglandular trichomes 0.1–0.3 mm long, erect conspicuously glandular trichomes 0.05–0.2 mm long, and erect eglandular and subglandular (i.e.,  $\pm$  swollen distally but not conspicuously glandular) trichomes to 0.05 mm long; dichasia borne along 1 side of rachis, 1 (–2)-flowered, sessile. Bracts subulate, 2–4.5 mm long, 0.5–0.7 mm wide, abaxial surface pubescent with antrorse eglandular trichomes 0.1–0.2 mm long and erect eglandular to subglandular trichomes to 0.05 mm long. Bracteoles subulate, 1.5–4 mm long, 0.3–0.5 mm wide, abaxial surface pubescent like bracts and sometimes with conspicuous glandular trichomes 0.05–0.2 mm long as well.

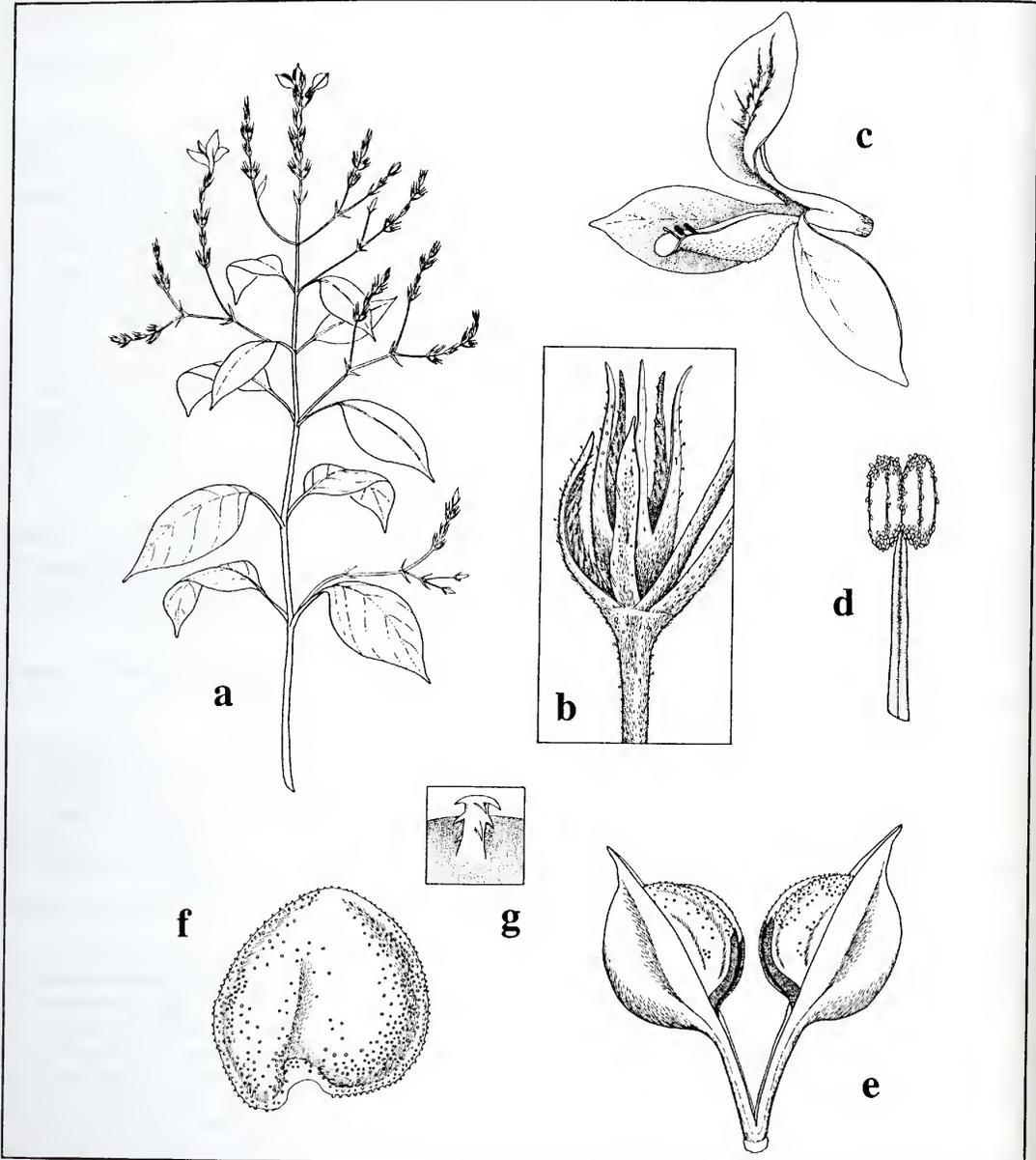


FIGURE 5. *Carlwrightia arizonica* A. Gray (a-c, e-g from 48715, d from 42338). a, habit,  $\times 0.5$ ; b, inflorescence node with calyx,  $\times 7.5$ ; c, flower with calyx removed,  $\times 2.4$ ; d, stamen,  $\times 13$ ; e, capsule,  $\times 4.5$ ; f, seed,  $\times 7$ ; g, barbed tubercle from seed,  $\times 85$ . Drawn by Ellen del Valle.

Flowers sessile. Calyx 1.5–5 mm long, lobes subulate to triangular-subulate, 1–4 mm long, abaxially pubescent like bracteoles. Corolla cream with a maroon chevron on upper lip, 11–16 mm long, externally pubescent (where exposed in bud) with flexuose eglandular trichomes to 0.2 mm long, tube cylindrical, 1.5–4 mm long, upper lip spatulate, 9–11 mm long, 3–5 mm wide, entire, lower lip 9.5–13 mm long, lateral lobes ovate-elliptic to elliptic, 9–11 mm long, 3.5–5.5 mm wide, lower-central lobe conduplicate-keeled, 7.5–10 mm long, 2.4–4 mm wide. Stamens 5–7.5 mm long, filaments proximally pubescent

with eglandular trichomes, thecae 0.9–1.4 mm long. Style (4.5) 9–11 mm long, glabrous, stigma 0.1 mm long, lobes not evident. Capsule 10–12 mm long, glabrous, stipe 4–6 mm long, head subcircular, 4–4.3 mm across at widest point. Seeds 4, 4–4.5 mm long, 3.7–4 mm wide, at least 1 surface covered with subconic tubercles, margin dentate with similar tubercles. ( $n = 18$ ). Flowering and fruiting Nov–Feb.

Dry slopes and flats in Evergreen Seasonal Forest and Tropical Deciduous Forest; common in Central Depression; 500–900 m. U.S. (California, Arizona, Texas), Mex. (Baja C., Baja

C.S., Son., Chih., Coah., Sin., S.L.P., Nay., Jal., Cma., Mich., Méx., Pue., Gro., Oax., Chis.), Guat., Bel., C.R. CHIAPAS COLLECTIONS: *Cb* 3837 (CAS); *Kr* 1075 (MSC); *Lm* 3826a (PH); *Lav* 4588 (TEX); *Mi* 5679 (MEXU); *Mi* 6818 (MEXU); *Pa* 1413 (CAS); 22855; 42338; 48715; 56859.

This widespread and highly variable species is represented in Chiapas by two rather distinctive forms. One (e.g., *Breedlove* 22855, *Lavin et al.* 4588, *Miranda* 5679) has short (0.1–0.3 mm long) cauline trichomes

and long (up to 15 cm) slender spikes with eglandular rachises. The other form (e.g., *Breedlove* 42338, *Cabrera & de Cabrera* 3837, *Palacios E.* 1413) has longer (0.4–0.7 mm) cauline trichomes and short (up to 7 cm long) stout spikes with glandular rachises. Daniel (1983) discussed numerous forms of this variable species.

## 6. CHILERANTHEMUM

*Chileranthemum* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:166. 1855. — TYPE: *Chileranthemum trifidum* Oerst.  
*Trybliocalyx* Lindau, Bull. Herb. Boissier, ser. 2, 4:328. 1904. — TYPE: *Trybliocalyx pyramidatus* Lindau (= *Chileranthemum pyramidatum* (Lindau) T.F. Daniel).

Shrubs with cystoliths. Older stems with epidermis often exfoliating. Leaves opposite, subsessile to petiolate, margin entire to subsinuate. Inflorescence of expanded dichasia in leaf axils or a terminal raceme or thyse of contracted or expanded dichasia; dichasia opposite (to alternate), 1–3 (or more)-flowered, sessile or pedunculate, subtended by a leaf or bract. Bracts and bracteoles small, green, ± inconspicuous, margin entire. Flowers heterostylous, pedicellate, subtended by 2 homomorphic bracteoles. Calyx 5-lobed, lobes homomorphic, equal to or longer than tube. Corolla purplish or pinkish with white or yellowish area covered or outlined with dark spots on lower lip, internal surface of limb pubescent with sessile to stipitate glands, tube subcylindric or ± expanded distally, 0.5–1.3 times as long as limb, throat indistinct to ± distinct, limb bilabiate, upper lip 2-lobed, lower lip 3-lobed, corolla lobes imbricate in bud. Stamens 2, inserted near middle or in distal half of corolla tube, those of pin flowers included in corolla tube or slightly exerted from mouth of corolla, those of thrum flowers exerted, anthers 2-theous, thecae ± equal in size, parallel, subequally inserted, lacking basal appendages, dehiscing toward lower lip (i.e., flowers nototribal); pollen spheric to prolate, 3-colporate, 6-pseudocolpate, pseudocolpi 2 per mesocolpium, exine reticulate; staminodes 2, inserted near base of filaments, short. Style of pin flowers exerted from mouth of corolla, style of thrum flowers included in corolla tube, stigma subfunneliform to 2-lobed. Capsule stipitate, head ellipsoid (usually with a slight medial constriction), retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4, homomorphic, lenticular, lacking trichomes.

A genus of three species restricted to Mexico and Guatemala. Generic boundaries among *Chileranthemum* and several of its close relatives (e.g., *Odontonema* and *Oplonia*) are not very satisfactory.

REFERENCE: DANIEL, T.F. 1995. New and reconsidered Mexican Acanthaceae. VI. Chiapas. Proc. Calif. Acad. Sci. 48:253–282.

### 1. *Chileranthemum pyramidatum* (Lindau) T.F. Daniel, Proc. Calif. Acad. Sci. 48:258. 1995.

— *Trybliocalyx pyramidatus* Lindau, Bull. Herb. Boissier, ser. 2, 4:401. 1904. — TYPE: Guatemala, Huehuetenango, “prope Nenton,” Sep 1896, *C. Seler & E. Seler* 3276 (B, destroyed).

*Jacobinia albicaulis* Brandegee, Univ. Calif. Publ. Bot. 4:386. 1913. — *Trybliocalyx albicaulis* (Brandegee) D.N. Gibson, Fieldiana, Bot. 32:176. 1970. — TYPE: Mexico, Veracruz, near Baños del Carrizal, Aug 1912, *C. Purpus* 6049 (UC!; isotypes: BM!, F!, GH!, MO!, US!).

*Clerodendrum standleyi* Moldenke, Geogr. distr. Verben. 76. 1942. — TYPE: Guatemala, Zacapa, near divide on road between Zacapa and Chiquimula, 500–600 m, 9 Oct 1940, *P. Standley* 73793 (NY; isotype: F!).

*Chileranthemum violaceum* Miranda, Ann. Inst. Biol. México 21:315. 1950. — TYPE: Mexico, Oaxaca, barrancas SE de Cuicatlán, cercanas al camino a Reyes Pápalo, 1100–1300 m, 18 Sep 1948, *F. Miranda* 4710 (MEXU!; isotype: MEXU!).

ILLUSTRATIONS: Fig. 6; Ann. Inst. Biol. México 21:316, fig. 3. 1950; Fieldiana, Bot. 24(10):460, fig. 107. 1974.

Shrubs to 1.8 m tall. Young stems subquadrate to quadrate-sulcate, pubescent (or some internodes often nearly glabrous) with flexuose to retrorse eglandular trichomes 0.1–0.5 mm long, trichomes evenly disposed to concentrated in 2 lines, older internodes becoming glabrate and often with exfoliating bark. Leaves subsessile to petiolate, petioles to 13 mm long, blades ovate to elliptic to obovate to oblanceolate, 25–115 mm long, 14–44 mm wide, 1.7–3.7 times longer than wide, acute to acuminate at apex, attenuate to long-attenuate at base, surfaces pubescent (especially along major veins) with flexuose to antrorse eglandular trichomes to 0.6 mm long, margin entire. Inflorescence a terminal pedunculate open dichasiate thyse (sometimes reduced to a raceme) to 150 mm long (including peduncle and excluding flowers), 20–55 mm in diameter (excluding flowers) near midpoint of fertile portion, peduncles to 28 mm long, pubescent like young stems, rachis nearly glabrous to pubescent with flexuose eglandular trichomes 0.1–0.2 mm long; dichasia opposite, 1–3-flowered, pedunculate, peduncles 5–20 mm long, glabrous or pubescent like rachis, central flower

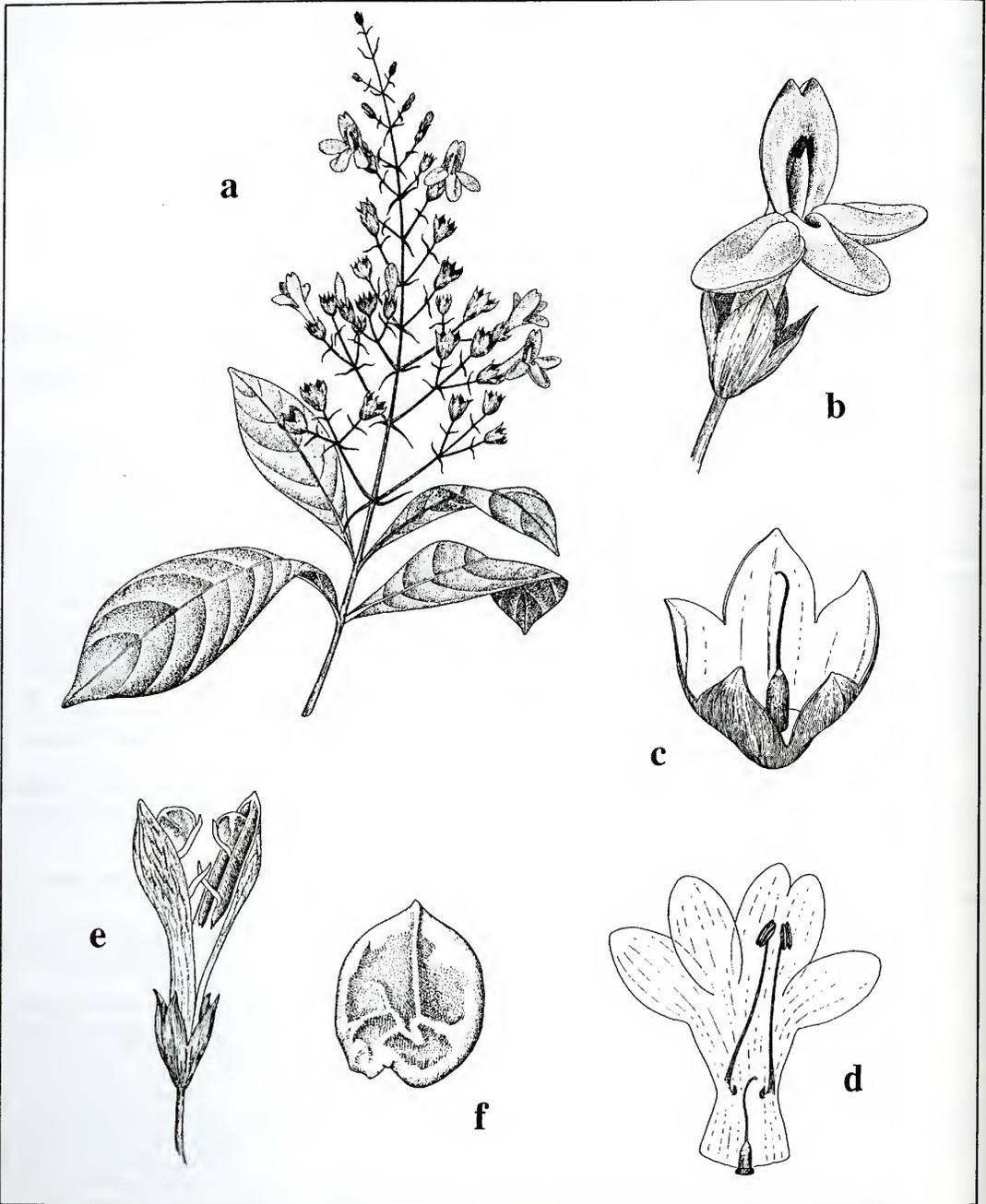


FIGURE 6. *Chileranthemum pyramidatum* (Lindau) T.F. Daniel (a–d from 69747, e–f from 70767). a, habit,  $\times 0.5$ ; b, flower,  $\times 2$ ; c, calyx and gynoecium,  $\times 2.5$ ; d, corolla split open showing androecium and gynoecium,  $\times 2$ ; e, capsule,  $\times 1.5$ ; f, seed,  $\times 4.3$ . Drawn by Ellen del Valle.

pedicellate, pedicels 4–7 mm long, glabrous or pubescent like peduncles, lateral flowers (if present) pedunculate and pedicellate. Bracts triangular-subulate to subulate to lance-subulate, 1.5–4.5 mm long, 0.4–0.8 mm wide (proximalmost pair sometimes subfoliose and larger), abaxial surface glabrous or pubes-

cent with a few eglandular trichomes. Bracteoles and secondary bracteoles (if present) triangular-subulate to subulate, 1–4 mm long, 0.3–0.5 mm wide, abaxial surface glabrous or pubescent like bracts. Calyx rose-pink, campanulate, 5–10.5 mm long, tube 2.5–5.5 mm long, lobes ovate to broadly triangular, 3–6.5

mm long, 1–2 times longer than tube, 2.5–3.5 mm wide, abaxially glabrous or sparsely pubescent with flexuose (or sometimes crinkled) eglandular trichomes to 0.3 mm long. Corolla rose-pink with white area on lower lip, 15–25 mm long, externally glabrous (although margins of lobes ciliolate), internally pubescent with glandular trichomes, tube subcylindric, 8–11 mm long, 2.2–3 mm in diameter near midpoint, upper lip 7–11 mm long, lobes 2–3.6 mm long, 3–3.3 mm wide, lower lip 7–14 mm long, lobes 6–12 mm long, 3–5.7 mm wide. Stamens of thrum flowers 9–10.5 mm long, stamens of pin flowers 4 mm long, filaments glabrous, thecae 2–2.5 mm long; staminodes 0.7–1 mm long. Style of thrum flowers 3.6–5 mm long, style of pin flowers 10.5–11 mm long, recurved at apex, pubescent with

flexuose eglandular trichomes, stigma bowl-shaped, 0.2 mm long, obscurely 2-parted. Capsule 19–27 mm long, glabrous, stipe 8–10 mm long, head 11–17 mm long. Seeds 5.6–7.5 mm long, 5.4–6.2 mm wide, surfaces glabrous, margin entire. Flowering Sep–Oct; fruiting Oct.

On slopes in Pine-Oak Forest; rare (known only from near La Trinitaria) in SE Central Plateau; 1230–1300 m. Mex. (Ver., Oax., Chis.), Guat. CHIAPAS COLLECTIONS: 27655; 69747; 69789; 70767; 70774.

The variation within this species was discussed by Daniel (1995).

## 7. DICLIPTERA

*Dicliptera* Juss. Ann. Mus. Natl. Hist. Nat. 9:267. 1807, nomen conserv. — TYPE: *Dicliptera chinensis* (L.) Juss. (= *Justicia chinensis* L.).

*Diapedium* K.D. Koenig, Ann. Bot. 2:189. 1805 ("1806"), nomen rej. — TYPE: *Diapedium chinense* (L.) K.D. Koenig (= *Justicia chinensis* L.).

*Solenochasma* Fenzl in J. Jacq. Ecl. pl. rar. 2:1. 1844. — TYPE: *Solenochasma assurgens* (L.) Fenzl (= *Justicia assurgens* L.).

*Dactylostegium* Nees in Mart. Fl. bras. 9:162. 1847. — TYPE: *Dactylostegium sparsiflorum* Nees.

Erect to spreading or decumbent perennial herbs or shrubs with cystoliths. Young stems ± distinctly 6-angled in cross-section. Leaves opposite, petiolate, margin entire to subsinuate. Inflorescence of axillary cymes (= modified dichasia ?) bearing 1 or more, bracteolate cymules; cymes alternate or opposite, subtended by paired bracts, sessile or pedunculate in leaf axils or in axils of inflorescence bracts forming a terminal spikelike thyse or panicle of thyrses; cymules sessile or pedunculate, comprising an involucre of several pairs of bracteoles, outermost pair usually conspicuous and larger than inner, often hyaline, pair(s), cymule bracteoles of a pair equal or unequal in size. Flowers 1–several per cymule, homostylous, sessile. Calyx deeply 5-lobed, usually reduced (shorter than outer cymule bracts in ours) and hyaline, lobes equal to subequal. Corolla often resupinate (i.e., tube twisted 180°) in ours (elsewhere sometimes twisted 360°), pink to purple, red, or whitish (elsewhere also blue), often with pink to purple markings in ours, tube cylindrical to gradually expanded distally but lacking a distinct throat (in ours), limb bilabiate, upper lip entire to emarginate, lower lip entire to shallowly 3-lobed (normal position of lips reversed when corolla resupinate), corolla lobes imbricate in bud. Stamens 2, inserted in proximal or distal ½ of corolla tube, exerted from mouth of corolla or rarely included in corolla tube, anthers 2-theous, thecae equal to subequal in size, parallel to perpendicular, equally to unequally inserted on filament, lacking basal appendages (in ours; elsewhere rarely with lower theca minutely appendaged at base), dehiscent toward lower lip (i.e., flower nototribal) in species with corollas either not resupinate or twisted 360°, dehiscent toward upper lip (i.e., flower stenotribal) in species with resupinate corollas; pollen perprolate to prolate, 3-colporate, 6-pseudocolpate, pseudocolpi 2 per mesocolpium, exine reticulate; staminodes 0. Style exerted from mouth of corolla or rarely included in corolla tube, stigma 2-lobed, lobes equal. Capsule substipitate to stipitate, head ellipsoid to obovoid, retinacula present, septa with attached retinacula separating elastically and rising from inner wall of mature capsule. Seeds 2–4, homomorphic, lenticular. ( $x = 40$  in New World taxa;  $x = 13$  or 15? in Old World taxa)

Although about 300 species have been described from tropical and temperate regions of the world, the number of species usually given is about one-half that number or fewer. The genus is in need of critical taxonomic study. About 15 species occur in Mexico.

- a. Corolla red or orangish (or pinkish in *D. anomala*), not resupinate, 24–46 mm long; anthers dehiscent toward lower lip (i.e., flower nototribal).
  - b. Calyx 2.5–3.2 mm long; inflorescence of ± spikelike axes forming a leafy panicle; cymes sessile to subsessile (i.e., borne on peduncles to 1 mm long); cymules sessile to subsessile; outer cymule bracteoles rounded-to truncate-mucronate at apex, mucro (0.05–) 0.1–0.3 mm long; inner cymule bracteoles 3–5 mm long, 0.6–0.8 mm wide; corolla externally eglandular . . . . . 4. *D. sexangularis*
  - bb. Calyx 5–9.5 mm long; inflorescence of cymes borne in leaf axils, these clustered or forming an open terminal thyse or panicle of thyrses; cymes pedunculate with peduncles 3–105 mm long; cymules pedunculate with peduncles 3–73 mm long; outer cymule bracteoles acute to attenuate at apex, emucronate; inner cymule bracteoles 6–13 mm long, 1–3.5 mm wide; corolla externally glandular (rarely in *D. sciadephora* with only eglandular trichomes).

- c. Cymes forming an open terminal thyrse or panicle of thyrses; outer cymule bracteoles linear to linear-lanceolate to oblanceolate, 1.5–3 mm wide; calyx 5–9 mm long; corolla red or orangish, 27–36 mm long; thecae 1.4–1.8 mm long . . . . . 3. *D. sciadephora*
- cc. Cymes solitary or clustered in leaf axils; outer cymule bracteoles broadly ovate to ovate-elliptic, 5–21 mm wide; calyx 8–9.5 mm long; corolla pinkish, 40–46 mm long; thecae 1.7–2.5 mm long . . . . . 1. *D. anomala*
- aa. Corolla pink, white, or purple, resupinate, 10–26 mm long; anthers dehiscing toward upper lip (i.e., flower stenotribal).
- d. Inner cymule bracteoles 2–4 mm long, 0.3–0.6 mm wide; calyx 1.7–3 mm long; outer cymule bracteoles spine-nose-aristate at apex with mucros 1.5–3 mm long; style glabrous . . . . . 5. *D. unguiculata*
- dd. Inner cymule bracteoles 6–10 mm long, 1–1.7 mm wide; calyx 5–6.5 mm long; outer cymule bracteoles acute and emucronate or rounded- to truncate- to emarginate-mucronate at apex with mucros to 0.3 mm long; style pubescent with eglandular trichomes.
- e. Cymes clustered in axils of leaves or bracts forming a dense spikelike thyrse; paired bracts subtending cymes 3.5–6 mm wide; outer cymule bracteoles rounded- to truncate- to emarginate-mucronate at apex with mucros to 0.3 mm long; corolla 16–26 mm long, externally glandular . . . . . 2. *D. membranacea*
- ee. Cymes 1–2 in leaf axils, not forming a dense spikelike thyrse; paired bracts subtending cymes 0.9–1.5 mm wide; outer cymule bracteoles acute and emucronate at apex; corolla 10–13 mm long, externally eglandular . . . . . 6. *D. sp.*

**1. *Dicliptera anomala* Leonard, Proc. Biol. Soc. Wash. 52:163. 1939.**

— TYPE: Mexico, Veracruz, Fortuño, on the Coatzacoalcos River, 30–50 m, Mar 1937, *L. Williams 8308* (F).

ILLUSTRATION: none found.

Perennial herbs to 1 m tall. Young stems subhexagonal to hexagonal, pubescent with retrorse (to flexuose) eglandular trichomes 0.2–0.6 mm long, trichomes evenly disposed or becoming concentrated in 2 lines, those on youngest growth densely matted. Leaves petiolate, petioles to 50 mm long, blades ovate, 33–160 mm long, 16–83 mm wide, 1.6–2.6 times longer than wide, acute to acuminate at apex, acute to rounded to truncate at base, surfaces sparsely pubescent with eglandular trichomes, trichomes becoming restricted to major veins on larger leaves. Inflorescence of 1–2 pedunculate cymes from leaf axils, cymes opposite, often appearing as axillary or terminal clusters, peduncles 3–14 mm long, pubescent like young stems or pilose and glandular-pubescent as well (see definitions of these below), paired bracts subtending cymes usually reflexed to recurved, lanceolate, 4–9 mm long, 1–3.2 mm wide, abaxial surface and margin pubescent with erect to flexuose subglandular to glandular and eglandular trichomes 0.05–0.4 mm long (glandular-pubescent), margin also ciliate with silky-flexuose eglandular trichomes 1–2 mm long (pilose); cymules usually 3 per cyme, pedunculate, peduncles 3–6 mm long, pubescent with erect (often ± silky) eglandular trichomes 1–2 mm long and an understory of glandular and subglandular trichomes 0.05–0.1 mm long. Outer cymule bracteoles broadly ovate to ovate-elliptic, 13–30 mm long, unequal, one 1.4–1.8 times longer than the other, 5–21 mm wide, acute and emucronate at apex, abaxial surface glandular-pubescent (usually including both subglandular to glandular and prominently glandular trichomes, prominent glands especially conspicuous on adaxial surface), proximal portion of abaxial surface, midvein, and margin pilose as well, longer bracteole flat to ± conduplicate (prominently conduplicate and spathe-like in extralimital material). Inner cymule bracteoles lanceolate, 9–13 mm long, 1.5–3.5 mm wide, abaxial surface pubescent like outer cymule bracteoles. Calyx 8–9.5 mm long, abaxially pubescent with subglandular to prominently glandular trichomes to 0.1 mm long, lobes

lance-subulate, 4.5–6.5 mm long. Corolla not resupinate, pinkish, 40–46 mm long, externally pubescent with flexuose eglandular and glandular trichomes 0.05–0.3 mm long, tube 27–32 mm long, 4.4 mm in diameter near midpoint, upper lip 13–14 mm long, ± entire at apex, lower lip 13–14 mm long, 3-lobed at apex, lobes 0.6 mm long. Stamens 22–26 mm long, inserted in distal 1/2 of corolla tube several mm proximal to mouth, filaments distally pubescent with eglandular trichomes, thecae 1.7–2.5 mm long, equal in size, subperpendicular to perpendicular, unequally inserted (overlapping by 1 mm) to superposed (gap to 0.2 mm long), dehiscing toward lower lip. Style 45 mm long, pubescent with eglandular trichomes, stigma 0.3 mm long, lobes not evident. Capsule (based on extralimital material) stipitate, 12 mm long, pubescent with erect mostly glandular trichomes 0.05–0.2 mm long, stipe 3 mm long. Seeds (based on extralimital material) 4–4.2 mm long, 3.5–3.6 mm wide, surfaces covered with sparse retrorsely barbed papillae. Flowering Jan.

Known from a region dominated by Tropical Deciduous Forest; uncommon in Central Depression; elevation unknown. Mex. (Ver., Oax., Chis.). CHIAPAS COLLECTIONS: *Lm 3826* (US); *Mi 5144* (MEXU); *Mi 5932* (MEXU); *Mi 6821* (MEXU).

**2. *Dicliptera membranacea* Leonard, J. Wash. Acad. Sci. 31:102. 1941.**

— TYPE: Guatemala, Escuintla, between Río Jute and Río Pantaleón on road between Escuintla and Santa Lucía Cotz, 540–720 m, 24 Jan 1939, *P. Standley 63524* (US!; isotype: F!).

ILLUSTRATION: J. Wash. Acad. Sci. 31:103, fig. 6. 1941.

Erect perennial herbs to 1.5 m tall. Young stems hexagonal, sparsely pubescent with antrorse to antrorsely appressed to erect to flexuose to retrorse to retrorsely appressed eglandular trichomes 0.2–0.5 mm long, trichomes ± evenly disposed to ± concentrated on ridges, distal nodes sometimes also with an understory of erect subglandular trichomes to 0.05 mm long. Leaves petiolate, petioles to 75 mm long, blades ovate to ovate-elliptic, 23–90 mm long, 13–50 mm wide, 1.6–3.3 times longer than wide, acute to acuminate at apex, subattenuate to attenuate

at base, surfaces sparsely pubescent with flexuose to antrorse eglandular trichomes, becoming glabrate. Inflorescence of sessile or pedunculate cymes clustered in leaf axils or in axils of reduced leaves or inflorescence bracts distally, forming a dense spikelike thyrse to 120 mm long, 25 mm in diameter near midpoint, cymes 3–5 per axil, alternate (or sometimes opposite when in axils of bracts), often  $\pm$  secund, peduncles to 3 mm long, pubescent like young stems, inflorescence bracts subfoliose, ovate, 8–20 mm long, 3–5.5 mm wide, pubescent like leaves, paired bracts subtending cymes elliptic to ovate to obovate, 6–15 mm long, 3.5–6 mm wide, abaxial surface sparsely pubescent with erect to antrorse to antrorsely appressed eglandular trichomes to 0.5 mm long, margin  $\pm$  ciliate with erect to flexuose to antrorse eglandular trichomes to 1 mm long; cymules usually 3 or more per cyme, sessile to pedunculate, peduncles to 2.5 mm long. Outer cymule bracteoles obovate to subelliptic, 7.5–12.5 mm long, subequal, one 1.1–1.3 times longer than the other, 2.5–6 mm wide, rounded- to truncate- to emarginate-mucronate at apex, mucro 0.05–0.3 mm long, abaxial surface pubescent like that of paired bracts subtending cymes, adaxial surface pubescent with erect subglandular to eglandular trichomes 0.05–0.1 mm long, margin ciliate with flexuose eglandular trichomes to 1 mm long. Inner cymule bracteoles oblanceolate to lance-elliptic, 6–10 mm long, 1–1.7 mm wide, abaxial surface pubescent like outer cymule bracteoles or sometimes with inconspicuous subglandular trichomes 0.05–0.1 as well. Calyx 5–6.5 mm long, lobes lance-subulate, 3.5–4 mm long, abaxially pubescent with an understorey of erect subglandular to glandular trichomes and an overstorey with trichomes like those of inner cymule bracteoles. Corolla resupinate, white proximally, pink distally, 16–26 mm long, externally pubescent with flexuose eglandular trichomes to 0.4 mm long and an understorey of erect glandular trichomes to 0.1 mm long (glandular-pubescent), tube 8–15 mm long, 1.5–2.7 mm in diameter near midpoint, upper lip 8–12 mm long, 3-lobed, lobes to 0.3 mm long, lower lip 8.5–12 mm long, entire. Stamens inserted in proximal or distal 1/2 of corolla tube, 9.5–20 mm long, filaments pubescent with eglandular trichomes, thecae 1–1.5 mm long,  $\pm$  equal in size, parallel, unequally inserted (overlapping by up to 0.3 mm) to superposed (gap to 0.1 mm long), dehiscing toward upper lip. Style 15–16 mm long, proximally pubescent with eglandular trichomes, distally glabrous, stigma lobes equal, 0.3–0.4 mm long. Capsule substipitate, 6–7 mm long, glandular-pubescent, stipe 1 mm long. Seeds 2.8–3 mm long, 2–2.2 mm wide, surfaces covered with subconic papillae bearing retrorse barbs. Flowering Jan–Mar; fruiting Mar.

Lower Montane Rain Forest and Tropical Deciduous Forest; uncommon in Sierra Madre; 800–900 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *And 5575* (MICH); *EM 2105* (MEXU, MICH, US); *Ve 1103* (BM); *Ve 1301* (MEXU); *Ve 4394* (CAS).

### 3. *Dicliptera sciadephora* Donn. Sm. Bot. Gaz. (Crawfordsville) 23:13. 1897.

— TYPE: Guatemala, Huehuetenango, Jacaltenango, 3500–5400 ft. 18–19 Dec 1895, *E. Nelson 3584* (US!; isotypes: GH!, US!).

*Dicliptera vulcanica* Leonard, J. Wash. Acad. Sci. 33:71. 1943. — TYPE: Guatemala, San Marcos, NW slopes of Volcán Tajumulco, vic. of town of Tajumulco, between

town and Loma Buena Vista, 2300–2800 m, 28 Feb 1940, *J. Steyermark 36861* (F!).

ILLUSTRATION: Fig. 7.

Shrubs to 2 m tall. Young stems hexagonal, (nearly glabrous to) sparsely to densely pubescent with retrorsely appressed to flexuose to antrorse to antrorsely appressed eglandular trichomes 0.2–1 mm long, trichomes evenly disposed or sometimes  $\pm$  concentrated in 2 lines. Leaves petiolate, petioles to 50 mm long, blades ovate to broadly ovate, 14–145 mm long, 9–68 mm wide, 1.3–3.9 times longer than wide, acute to acuminate at apex, truncate to rounded to acute at base, surfaces pubescent with eglandular trichomes or glabrate. Inflorescence of pedunculate cymes from leaf axils, these often collectively forming an open terminal thyrse or panicle of thyrses to 30 cm long, cymes sometimes more than 1 per axil, peduncles (4–) 20–105 mm long, pubescent with cauline type trichomes or with a mixture of appressed eglandular trichomes to 0.6 mm long (sometimes absent) and erect glands to 0.3 mm long, or nearly glabrous, paired bracts subtending cymes lance-subulate to triangular, 1.5–6 mm long, 0.7–1.5 mm wide (rarely becoming foliose and to 30 mm long and 10 mm wide), sometimes caducous, abaxial surface and margin pubescent with antrorsely appressed eglandular trichomes to 0.3 mm long; cymules 3 (–5) per cyme, pedunculate, peduncles 5–73 mm long, pubescent like cyme peduncles. Outer cymule bracteoles linear to linear-lanceolate to oblanceolate, 5–15 mm long, subequal to unequal in length, one 1–1.5 times as long as the other, 1.5–3 mm wide, acute to attenuate and emucronate at apex, abaxially, adaxially, and marginally pubescent with antrorse eglandular trichomes and erect glandular trichomes (sometimes inconspicuous or not evident) 0.1–0.4 mm long. Inner cymule bracteoles lanceolate, 6–13 mm long, 1–2 mm wide, pubescent like outer cymule bracteoles or with glands more numerous, margins sometimes hyaline. Calyx 5–9 mm long, lobes lanceolate, 3–6 mm long, abaxially pubescent like inner cymule bracteoles (or with the glands less conspicuous). Corolla not resupinate, red or orange, 27–36 mm long, externally pubescent with erect to flexuose eglandular and usually glandular trichomes 0.1–0.4 mm long, tube 19–24 mm long, 3–5 mm in diameter near midpoint, upper lip 8–12 mm long, emarginate, lobes 0.2 mm long, lower lip 3-lobed, 7–12.5 mm long, lobes 0.5–0.7 mm long. Stamens inserted in distal 1/2 of corolla tube several mm proximal to mouth, 16–19 mm long, filaments pubescent with eglandular trichomes, thecae 1.4–1.8 mm long, equal to subequal in size, unequally inserted (overlapping by up to 1 mm) to superposed (gap to 0.2 mm long), parallel to perpendicular, dehiscing toward lower lip. Style 28–32 mm long, glabrous, stigma lobes (often not evident) 0.2 mm long. Capsule substipitate to stipitate, 9–11 mm long, externally pubescent with erect to flexuose eglandular and glandular trichomes 0.1–0.2 mm long, stipe 1.5–2.5 mm long. Seeds 2.2–3.5 mm long, 2–2.8 mm wide, surfaces papillose with conical papillae bearing barbs. ( $n = 40$ ). Flowering Dec–Apr; fruiting Jan–Mar.

Evergreen Seasonal Forest, Tropical Deciduous Forest, Pine-Oak Forest; common in Northern Highlands, Central Plateau, Central Depression, and Sierra Madre; 100–1725 m. Mex. (Chis.), Guat., Nic. CHIAPAS COLLECTIONS: *And 5565* (MICH, MO); *Dan 5026* (CAS, MEXU); *De 975* (CAS, IBUG, MEXU, US); *Mag 1103* (MO); *Mi 5106* (MEXU); *Mi 6868* (MEXU, US); *R&B 20128* (DS, MICH, US); *Te 6464* (CAS, MEXU); *T 9675* (CAS); *9049*; *24701*; *49061*; *49624*; *49927*; *56311*.

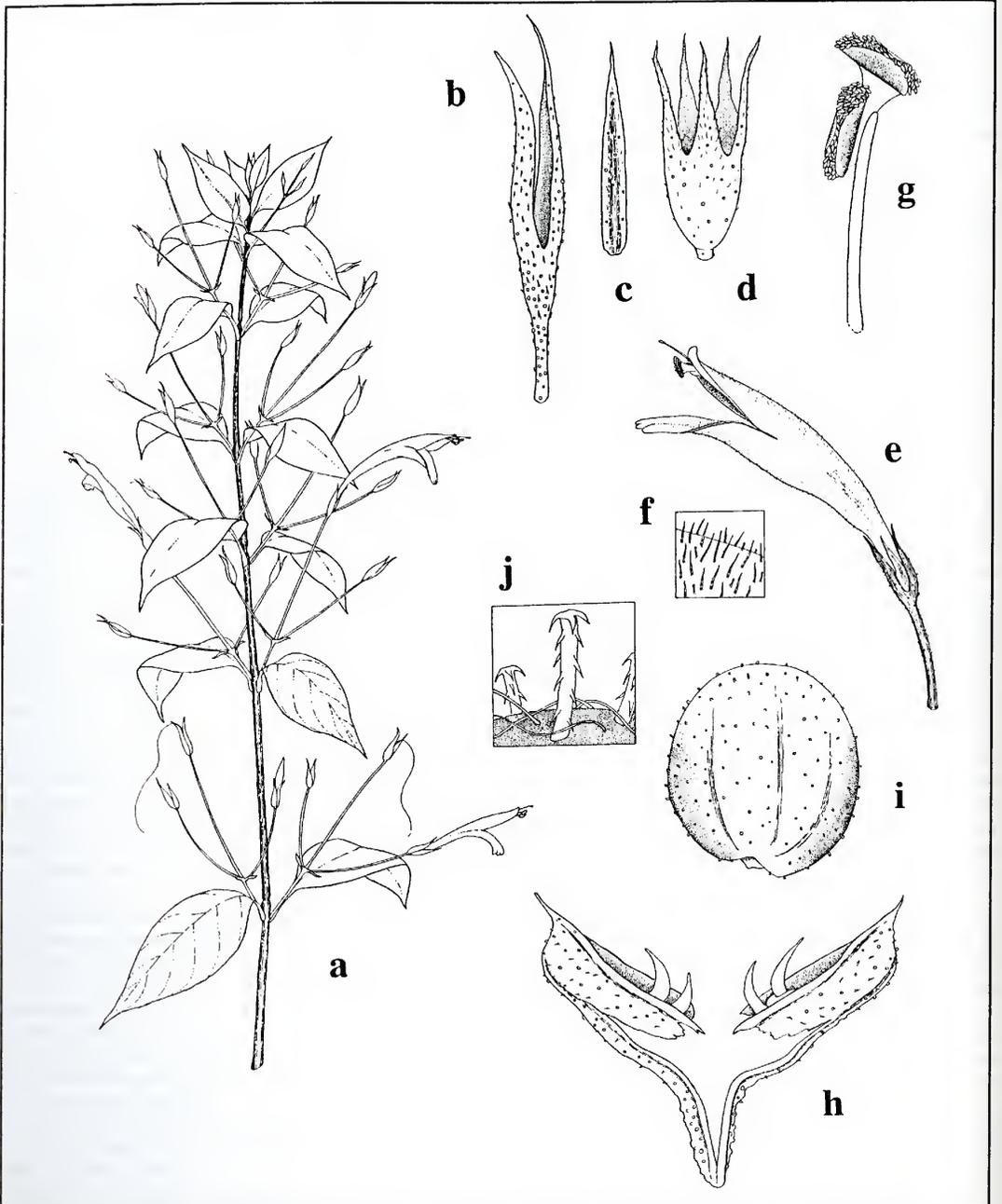


FIGURE 7. *Dicliptera sciadephora* Donn. Sm. (Daniel & Bartholomew 5026). a, habit,  $\times 0.5$ ; b, outer bracteoles,  $\times 3.9$ ; c, inner bracteole,  $\times 3.6$ ; d, calyx,  $\times 5$ ; e, flower,  $\times 1.3$ ; f, surface of corolla,  $\times 7.5$ ; g, stamen,  $\times 8.8$ ; h, capsule,  $\times 4.3$ ; i, seed,  $\times 10$ ; j, surface of seed,  $\times 88$ . Drawn by Ellen del Valle.

There is considerable variation in the type, density, and distribution of pubescence among the collections of *D. sciadephora*. In Chiapas, the three collections with the greatest density of glandular trichomes on young stems and leaves and with glandular peduncles all are from elevations below 1000 meters in a region of west-

ern Chiapas about 100 km northwest of Cañón del Sumidero, the nearest locality from which other collections of *D. sciadephora* have been made. All other Mexican collections are from central Chiapas at elevations above 1000 meters. They have less densely pubescent young stems and leaves and conspicuously

glandular (except *Anderson & Anderson 5565*) peduncles.

#### 4. *Dicliptera sexangularis* (L.) Juss. Ann. Mus. Natl. Hist. Nat. 9:269. 1807.

— *Justicia sexangularis* L. Sp. pl. 1:16. 1753, as "sexangular." — *Diapedium sexangulare* (L.) Kuntze, Revis. gen. pl. 2:485. 1891. — TYPE: Linnaeus cited phrase names from "Anm. herb. 274," "Hort. cliff. 10," and "Pluk. alm. 142. t. 279." He further noted that plants came from Veracruz and Jamaica. There is a Houston specimen at LINN and in the Hort. Cliff. Herbarium at BM (p. 10, genus 12, sp. 3) there is a specimen of *J. sexangularis*. There is also a Houston specimen of this species from Veracruz in the general herbarium at BM.

*Justicia assurgens* L. Syst. nat. ed. 10, 2:850. 1759. — *Dicliptera assurgens* (L.) Juss. Ann. Mus. Natl. Hist. Nat. 9:269. 1807. — *Solenochasma assurgens* (L.) Fenzl in J. Jacq. Ecl. pl. rar. 2:1. 1844. — *Diapedium assurgens* (L.) Kuntze, Revis. gen. pl. 2:485. 1891. — *Dactylostegium assurgens* (L.) Bremek. Recueil Trav. Bot. Néerl. 35:162. 1938. — TYPE: "Brown. jam. t. 2. f. 1."

*Dicliptera vahliana* Nees in A. DC. Prodr. 11:489. 1847. — SYNTYPES: specimens from Colombia, Haiti, Cuba, the Bahamas, and Carolina were cited by Nees.

*Dicliptera mollis* Nees in A. DC. Prodr. 11:490. 1847. — SYNTYPES: Mexico, Veracruz, Zacuapan, Feb 1838, *J. Linden 1081* (K!); isosynotype: MICH!; Veracruz, cordillera, 3000 ft, Jun–Oct 1840, *H. Galeotti 930* (K!); Oaxaca, cordillera de Oaxaca, 5000–6000 ft, Nov–Apr 1840, *H. Galeotti 923* (K!).

ILLUSTRATIONS: J. Jacquin, Ecl. pl. rar. 2:t. 101. 1844; Fieldiana, Bot. 24(10):355, fig. 79. 1974; Correll and Correll, Flora Bahama Archipelago, 1347, fig. 587. 1982.

Perennial herbs to 1 m tall. Young stems hexagonal with 6 prominent ridges, pubescent with antrorse to antrorsely appressed eglandular trichomes 0.2–0.8 mm long, trichomes concentrated on or restricted to ridges (erect glandular and/or subglandular trichomes 0.05–0.3 mm long sometimes also present distally and ± evenly disposed). Leaves petiolate, petioles to 20 mm long, blades ovate, 13–98 mm long, 6–50 mm wide, 1.7–2.6 times longer than wide, acute to acuminate at apex, rounded to acute at base, surfaces pubescent with eglandular trichomes. Inflorescence of axillary and terminal ± spikelike axes (or panicles of ± spikelike axes) forming a terminal leafy panicle to 60 cm long, rachis of spikelike axes pubescent with eglandular trichomes like those of young stems (although sometimes ± evenly disposed) and erect glandular trichomes 0.05–0.3 mm long, often with an understorey of erect subglandular trichomes 0.05–0.2 mm long as well, cymes sessile to subsessile (i.e., borne on peduncles to 1 mm long), 1 (–2) in axil of an inflorescence bract, alternate (and ± secund) or rarely opposite at nodes of spikelike axes, sometimes cymes accompanied by a short-pedunculate secondary cyme (or modification thereof) subtended by secondary subulate bracteoles and bearing 1–5 cymules, paired bracts subtending cymes subulate to lance-elliptic, 2–3.5 mm long, 0.5–0.9 mm wide, sometimes subfoliose and larger near base of spike, abaxial surface and margin pubescent like rachis; cymules 1 (or up to 5 on secondary cymes) per cyme, sessile to subsessile (secondary cymules

subsessile or borne on peduncles to 8 mm long). Outer cymule bracteoles linear to oblanceolate to obovate to hourglass-shaped, 5–10.5 mm long, subequal to unequal in size, one 1.2–1.5 times longer than the other, 0.8–4 mm wide, rounded to truncate-mucronate at apex, abaxial and adaxial surfaces and margin pubescent like rachis, mucro (0.05–) 0.1–0.3 mm long. Inner cymule bracteoles lanceolate, 3–5 mm long, 0.6–0.8 mm wide, abaxial surface pubescent like rachis or with larger glands less conspicuous and shorter subglandular trichomes (0.05–0.1 mm long) more numerous. Calyx 2.5–3.2 mm long, lobes lanceolate, 1.6–2.2 mm long, abaxially pubescent like inner cymule bracteoles. Corolla not resupinate, red, 24–30 mm long, externally pubescent with erect to flexuose eglandular trichomes 0.2–0.4 mm long, tube 16–18 mm long, 2.8–3 mm in diameter near midpoint, upper lip 7–11.5 mm long, entire, lower lip 6.5–11 mm long, 3-lobed, lobes 0.5–0.7 mm long. Stamens 12–17 mm long, inserted in distal 1/2 of corolla tube several mm proximal to mouth, filaments pubescent with eglandular trichomes, thecae 1.8–2.7 mm long, subequal in size, parallel to subsagittate, equally inserted, dehiscing toward lower lip. Style 21–29 mm long, sparsely pubescent with eglandular trichomes proximally, stigma lobes equal, 0.2 mm long. Capsule substipitate to stipitate, 4.5–6.5 mm long, externally pubescent with erect to flexuose glandular and eglandular trichomes 0.1–0.3 mm long, stipe 1–1.5 mm long. Seeds 1.8–2.5 mm long, 1.6–2 mm wide, surfaces covered with conic papillae bearing retrorse barbs. ( $n = 40$ ). Flowering Nov–Apr; fruiting Nov–May.

Often in disturbed habitats in Evergreen Seasonal Forest and Tropical Deciduous Forest; common in Northern Highlands, Central Plateau, Central Depression, and Sierra Madre; 660–1100 m. U.S. (Florida, Texas), Mex. (Tam., S.L.P., Qro., Hgo., Pue., Ver., Oax., Camp., Yuc., Q. Roo, Chis.), Guat., Bel., Hond., Salv., Pan., Antill., S.A. (Col., Ven., Sur., Fr. Gui., Braz.). CHIAPAS COLLECTIONS: *Br 665* (CAS); *Br 811* (CAS); *Cro 64812* (CAS); *Lm 3906* (US); *Mi 2639* (MEXU); *Pa 3* (CAS); *T 2042* (DS); *33746*; *41577*; *42265*; *66998*; *68229*.

Local names: "majk'a akante" (Tzeltal, *Brett 811*); "yaxal wamal" (Tzeltal, *Brett 665*).

Uses: leaves and stems boiled and taken orally for diarrhea (*Brett 665*).

The inflorescence is particularly complex with many modifications evident. It appears that the solitary cymule that is always present at a node (but often accompanied by secondary cymes or another cymule) actually terminates the shoot and subsequent growth is sympodial.

Hemsley (1882) noted that *D. assurgens* probably was the same as *D. sexangularis*, and Gibson (1974) treated them as a single species but utilized the name *D. assurgens*. Additional synonyms were cited by Lindau (Symb. antill. 2(2):228–229. 1900) and Bremekamp (Fl. Suriname 4(2):231. 1938.).

#### 5. *Dicliptera unguiculata* Nees in Benth. Bot. voy. Sulphur 149. 1846.

— TYPE: Ecuador, Guayas, Guayaquil, 1841, *A. Sinclair & R. Hinds s.n.* (K!).

ILLUSTRATIONS: Steyermark and Huber, Flora Avila, 195, fig. 22b. 1978; Fieldiana, Bot. (n.s.) 18:7, fig. 5. 1986.

Decumbent to erect perennial herbs to 1 m tall. Young stems hexagonal-ridged, evenly pubescent with flexuose to retrorse eglandular trichomes 0.5–1.4 mm long, becoming glabrate with age. Leaves (plants often leafless or nearly so during anthesis) petiolate, petioles to 15 mm long, blades ovate to ovate-elliptic, 12–68 mm long, 6.5–32 mm wide, 1.8–2.5 times longer than wide, acuminate to aristate at apex, acute to subattenuate at base, surfaces pubescent (especially along major veins) with flexuose to antrorse eglandular trichomes, margin ciliate with similar trichomes. Inflorescence of axillary cymes, these often clustered at the branch apices in axils of distal leaves and in axils of much reduced leaves or inflorescence bracts forming dense  $\pm$  spikelike thyrses to 75 mm long and 14–25 mm in diameter (measured flat) near midpoint, cymes opposite, sessile or subsessile (i.e., borne on peduncles to 1.5 mm), 1 per axil, inflorescence bracts often caducous, subsessile to petiolate, broadly to narrowly elliptic to narrowly elliptic-lanceolate, 6–18 mm long, 1–5 mm wide, spinose-aristate at apex, abaxial surface pubescent like leaves, paired bracts subtending cymes lance-subulate to subulate, 3–7 mm long, 0.3–0.8 mm wide, abaxial surface pubescent with flexuose to antrorse eglandular trichomes 0.2–0.5 mm long, margin eciliate or ciliate with trichomes like those of abaxial surface; cymules usually 3 per cyme, sessile. Outer cymule bracteoles obovate to oblanceolate to spatulate, 5–15 mm long, unequal, one 1.3–1.6 times longer than the other, 2–7 mm wide, spinose-aristate at apex with a mucro 1.5–3 mm long, abaxial surface and margin pubescent with erect to flexuose to antrorse eglandular trichomes 0.5–1.5 mm long, adaxial surface pubescent with erect to antrorse eglandular trichomes to 0.3 (–1) mm long and usually with inconspicuous glandular and subglandular trichomes 0.1–0.2 mm long as well. Inner cymule bracteoles hyaline (at least along margin), lance-subulate, 2–4 mm long, 0.3–0.6 mm wide, abaxial surface pubescent with eglandular and subglandular trichomes. Calyx 1.7–3 mm long, lobes lance-subulate, 1.2–1.8 mm long, abaxially pubescent like inner cymule bracteoles. Corolla resupinate, rose-pink, 12–17 mm long, externally pubescent with glandular and eglandular trichomes 0.1–0.5 mm long, tube cylindrical, 6.5–9 mm long, 0.8–1.2 mm in diameter near midpoint, upper lip 3-lobed, 5.5–8.5 mm long, lower lip entire, 5.5–9 mm long. Stamens inserted near apex of corolla tube just proximal to mouth, 6–8.5 mm long, filaments sparsely pubescent with glandular and eglandular trichomes, thecae 0.8–1.3 mm long, equal in size, subparallel to subperpendicular, unequally inserted (overlapping by 0.1–0.5 mm), dehiscent toward upper lip. Style 11–15 mm long, glabrous, stigma 0.2 mm long, lobes often not evident. Capsule substipitate, 3–4.8 mm long, externally pubescent with erect or recurved eglandular trichomes 0.4–0.6 mm long, stipe 0.6–1 mm long. Seeds 1.2–1.6 mm long, 1–1.6 mm wide, surfaces covered with subconic papillae bearing retrorse barbs. Flowering and fruiting Dec–May.

Usually in disturbed habitats in Pine-Oak Forest; uncommon in Central Plateau and Sierra Madre; 1100–1760 m. Mex. (Ver., Oax., Chis.), Guat., Hond., Salv., Nic., C.R., S.A. (Ven., Ecu., Peru). CHIAPAS COLLECTIONS: *Br* 817 (CAS); *SC* 339 (CAS); 49743; 50130; 67433.

Local names: “sbok me’el” (Tzeltal, *Sántiz* C. 339); “tzotzit’ wamal” (Tzeltal, *Brett* 817).

Uses: a plaster of crushed leaves is applied to the head as a treatment for tongue infections (*Sántiz* C. 339) and chills or fever (*Brett* 817).

## 6. *Dicliptera* sp.

ILLUSTRATION: none found.

Perennial herbs to 4.5 dm (or more ?) tall. Young stems hexagonal-ridged, soon becoming subquadrate,  $\pm$  evenly pubescent (or with trichomes concentrated along ridges or sometimes appearing  $\pm$  bifarious) with retrorse to retrorsely appressed eglandular trichomes 0.2–0.4 mm long. Leaves petiolate, petioles to 20 mm long, blades ovate to elliptic, 26–105 mm long, 11.5–37 mm wide, 2.3–3.9 times longer than wide, acuminate at apex, acute to attenuate at base, surfaces pubescent (especially along midvein) with mostly antrorse eglandular trichomes. Inflorescence of 1–2 pedunculate cymes from leaf axils, often accompanied by a pedunculate compound cyme of 3 pedunculate cymes, cymes alternate or opposite, peduncles to 9 mm long, evenly pubescent with flexuose to retrorse eglandular trichomes, paired bracts subtending cymes lanceolate to linear to narrowly elliptic to oblanceolate, 5–7.3 mm long, 0.9–1.5 mm wide, abaxial surface sparsely pubescent with a few antrorse eglandular trichomes to 0.2 mm long, margin eciliate or with a few inconspicuous antrorse eglandular trichomes to 0.1 mm long, bracts subtending compound cymes similar to bracts subtending cymes or slightly larger; cymules 3–5 per cyme, subsessile to pedunculate, peduncles to 2.5 mm long. Outer cymule bracteoles 6–9.5 mm long, 1.5–3 mm wide, subequal to unequal, one 1.1–1.3 times longer than the other, the longer obovate, the shorter linear to lance-linear, both acute and emucronate at apex, abaxial surface and margin pubescent with erect to antrorse eglandular trichomes 0.1–0.3 mm long, adaxial surface pubescent with erect eglandular trichomes 0.05–0.1 mm long. Inner cymule bracteoles lanceolate, 7–8 mm long, 1 mm wide, abaxial surface pubescent like outer cymule bracteoles. Calyx 5.5–6 mm long, lobes subulate, 4.3–5 mm long, abaxially pubescent like cymule bracteoles. Corolla “purple,” resupinate, 10–13 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.4 mm long, tube cylindrical, 5.5–7 mm long, 1.5–1.6 mm in diameter near midpoint, lips 4–6.5 mm long. Stamens 4.5–5 mm long, inserted in distal 1/2 of corolla tube, filaments pubescent with eglandular trichomes, thecae 1–1.2 mm long, equal in size, parallel, unequally inserted (overlapping by 0.7 mm), dehiscent toward upper lip. Style 9 mm long, pubescent with eglandular trichomes, stigma 0.2 mm long, lobes not evident. Capsule not seen. Flowering Feb.

Pine-Oak Forest; rare in Northern Highlands; ca. 1600 m. Mex. (Chis.), see discussion. CHIAPAS COLLECTION: 8936.

Specimens of *Breedlove* 8936 from the vicinity of Jitotol were annotated in 1970 by Gibson as “*Dicliptera* aff. *sumichrasti* Lindau ? (but bracts not ciliate).” Among specimens from Guatemala annotated by Gibson as *D. sumichrasti*, our collection appears to most closely resemble *von Tuerckheim* 8256 from the department of Alta Verapaz. That collection differs from *Breedlove*’s collection primarily by its outer cymule bracteoles with the margin pilose-ciliate and the adaxial surface sparsely glandular. Specimens from Veracruz resembling a photo of the type of *D. sumichrasti* differ from *Breedlove* 8256 by their oblanceolate- to obovate-spatulate outer cymule bracteoles with the apex truncate- to rounded-mucronate and externally glandular corollas. *Dicliptera antidysenterica* Molina from Honduras was included as a synonym of *D. sumichrasti* by

Gibson (1974). It differs from *Breedlove 8936* by its somewhat larger, adaxially glandular, pilose-ciliate, and apically rounded-apiculate outer cymule bracteoles and white corollas. A superficially similar species from southern Central America, *D. imbricata* Leonard, differs from *Breedlove 8936* by its generally sessile to shorter pedunculate cymes and its outer cymule bracteoles with the adaxial surface glandular, the margin pilose-ciliate, and the apex rounded- to truncate-mucronate.

Although I cannot include the Chiapan collection within a known species at present, I am hesitant to describe it as a new one based on a single collection that lacks fruits. Numerous other specimens from elsewhere in southern Mexico (e.g., Oaxaca) also defy placement in existing taxa. Presumably, the proper disposition of *Breedlove 8936* will become evident following comprehensive studies of *DiCLIPTERA* in Mexico and Central America.

## 8. DYSCHORISTE

*Dyschoriste* Nees in Wall. Pl. asiat. rar. 3:75, 81. 1832. — LECTOTYPE (Britton & Brown, Ill. fl. n. U.S., ed. 2, 3:240. 1913): *Dyschoriste depressa* Nees.  
*Calophanes* D. Don in Sweet, Brit. fl. gard. ser. 2, 2:t. 181. 1833. — TYPE: *Calophanes oblongifolia* (Michx.) D. Don in Sweet (= *Ruellia oblongifolia* Michx.).  
*Linostylis* Fenzl ex Sond. Linnaea 23:94. 1850. — TYPE: *Linostylis ovata* Sonder.

Decumbent to erect perennial herbs with cystoliths. Leaves opposite, sessile or petiolate, margin entire to crenate. Inflorescence of dichasia in leaf axils throughout plant or restricted to axils of distal leaves or bracts and forming a spicate or capitate thyrse; dichasia alternate or opposite, 1-many-flowered, sessile to pedunculate, subtended by a leaf or bract. Bracts (if present) opposite, green, margin entire. Flowers homostylous, sessile to subsessile (in ours), subtended by 2 homomorphic bracteoles. Calyx 5-lobed, tube often as long as or longer than lobes during anthesis, regions between lobes usually subhyaline, often splitting nearly to base in fruit, lobes equal to subequal in length, usually somewhat setaceous. Corolla blue to blue-purple to white (in ours, elsewhere also pinkish purple, red, and yellow), tube gradually or abruptly expanded distally into a  $\pm$  distinct throat, limb subactinomorphic to bilabiate, upper lip 2-lobed, lower lip 3-lobed, corolla lobes contorted in bud. Stamens 4, didynamous, filaments connate in pairs (i.e., a long and a short stamen connate) proximally, inserted at or near base of throat of corolla, exerted from mouth of corolla (at least longer pair and usually with at least a portion of anthers of shorter pair also), anthers 2-theous, thecae equal in length, parallel to subsagittate, equally inserted, appendaged at base with awns or stout trichomes (in ours, elsewhere sometimes unappendaged at base), dehiscing toward lower lip (i.e., flower nototribal); pollen subprolate to prolate, 3-colporate, mesocolpia multi-striate with 4–15 pseudocolpi of irregular lengths, colpi often very short (often shorter than pseudocolpi), exine minutely verrucate; staminodes 0. Style exerted from mouth of corolla, stigma unequally 2-lobed, 1 lobe greatly reduced, rudimentary, or sometimes not evident. Capsule substipitate, subellipsoid to ellipsoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 2–4, homomorphic, lenticular, covered with appressed hygroscopic trichomes. ( $x = 15$ ).

A genus of approximately 75 species occurring in tropical and warm-temperate regions of America, Africa, and Asia. The genus is best developed in the New World where it has a discontinuous distribution from the southern United States southward through Mexico and Central America to northern Argentina. Major concentrations of species are found in west-central and southern Mexico and southeastern Brazil. The actual number of Mexican species is likely fewer than the 22 presently recognized. *Dyschoriste* is a complex genus whose species offer few characters for their recognition. Kobuski's (1928) treatment of the American species is now outdated and inadequate both for delimiting and identifying taxa.

REFERENCE: KOBUSKI, C.E. 1928. A monograph of the American species of the genus *Dyschoriste*. Ann. Missouri Bot. Gard. 15: 9–91.

- a. Young stems and leaves, bracteoles, calyx, and external surface of lower lip of corolla pubescent with glandular and eglandular trichomes . . . . . 2. *D. hirsutissima*
- aa. Young stems and leaves, bracteoles, calyx, and external surface of lower lip of corolla pubescent (if at all) with eglandular trichomes only.
  - b. Corolla 21–27 mm long, limb 13–18 mm in diameter; calyx 13–18 mm long; longer pair of stamens 10.5–11.5 mm long; style 17–23 mm long . . . . . 3. *D. ovata*
  - bb. Corolla 9–17 mm long, limb 5–11 mm in diameter; calyx 7.5–14 mm long; longer pair of stamens 3.7–5 mm long; style 7–12.5 mm long.
    - c. Dichasia usually crowded near shoot apex and appearing as a terminal subcapitate cluster; leaves obvovate to oblanceolate to elliptic; calyx lobes 1.8–4.5 times longer than tube . . . . . 1. *D. capitata*
    - cc. Dichasia  $\pm$  evenly distributed along distal portion of shoot, often appearing as dense axillary verticels; leaves ovate; calyx lobes 1–1.7 times longer than tube . . . . . 4. *D. quadrangularis*

1. *Dyschoriste capitata* (Oerst.) Kuntze, Revis. gen. pl. 2:486. 1891.

— *Calophanes capitatus* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:121. 1855. — TYPE: Mexico, Oaxaca, without specific locality, May 1842, F. Liebmann 10648 (C!; isotype: US!).

*Dyschoriste skutchii* Leonard, J. Wash. Acad. Sci. 33:70. 1943. — TYPE: Guatemala, Chimaltenango, near Tecpán, 2100 m, 22 Jul 1933, A. Skutch 474 (US!).

*Dyschoriste oaxacensis* Kobuski, Ann. Missouri Bot. Gard. 15:43. 1928. — TYPE: Mexico, Oaxaca, Las Sedas, 6200 ft, 19 Jul 1897, C. Pringle 6712 (MO; isotypes: F!, GH!, K!, MEXU!, US!).

ILLUSTRATION: Fig. 8.

Erect to spreading to decumbent perennial herbs to 3.5 dm tall. Young stems quadrate to quadrate-sulcate, pubescent with flexuose to retrorse eglandular trichomes 0.1–1.4 mm long, trichomes evenly disposed or concentrated in 2 lines. Leaves sessile to petiolate, petioles to 5 mm long, blades elliptic to obovate to oblanceolate, 8–28 mm long, 2–14 mm wide, sometimes reduced in size distally and becoming bractlike, 1.5–4 times longer than wide, rounded to acute at apex, attenuate at base, surfaces mostly glabrous, margin entire. Inflorescence of dichasia in axils of distal leaves, these usually crowded at or near shoot apex and appearing subcapitate; dichasia opposite or alternate, 1–3 (rarely more)-flowered, sessile to subsessile (i.e., peduncles to 1.5 mm long). Bracteoles subfoliose to foliose, oblanceolate to spatulate, 7–24 mm long, 0.8–7 mm wide, abaxial surface glabrous or with a few antrorse eglandular trichomes to 0.4 mm long, margin usually ciliate with flexuose to antrorse eglandular trichomes to 1 mm long, secondary bracteoles (if present) similar to bracteoles except usually smaller, not conspicuously curved. Flowers sessile to subsessile. Calyx 7.5–14 mm long, tube 2–4 mm long, lobes subulate-setaceous, 5–10 mm long, 1.8–4.5 times longer than tube, abaxially pubescent with antrorse to flexuose eglandular trichomes to 0.5 (–1.5) mm long, margin ciliate with flexuose eglandular trichomes to 1.5 mm long. Corolla bluish, 11–17 mm long, externally pubescent with flexuose eglandular trichomes to 0.3 mm long, tube expanded near midpoint, 7–12 mm long, 1.2–2 mm in diameter near midpoint, limb subactinomorphic to subbilabiate, 6–11 mm in diameter, upper lip 3–5 mm long, lobes 2.3–3.5 mm long, 2–3 mm wide, lower lip 3–5 mm long, lobes 2.3–4.3 mm long, 2.3–4 mm wide. Stamens with longer pair 4–5 mm long, shorter pair 3.2–4 mm long, thecae parallel to subsagittate, 1–1.7 mm long (including basal appendage), often with an apical elongation, awned at base, awns pointed, 0.2–0.3 mm long. Style 8–12.5 mm long, pubescent with eglandular trichomes, stigma 0.7–1.6 mm long, only 1 lobe evident, often recurved. Capsule 6–9.5 mm long, glabrous, stipe 0.5–1.5 mm long, head ellipsoid to hourglass-shaped. Seeds 4, 2–2.5 mm long, 1.1–1.6 mm wide. Flowering and fruiting Apr–Aug, Nov.

Grassy and rocky slopes, along ridges, and in disturbed habitats in Pine-Oak Forest; common in Northern Highlands and Central Plateau; 1470–2280 m. Mex. (Oax., Chis.), Guat., Hond., Nic. CHIAPAS COLLECTIONS: *Es 2010* (MEXU); *GL 19* (CAS); *GL 416* (CAS); *GE 1567* (MEXU); *Ha 15941* (ASU); *La 1002* (DS, MEXU, US); *Lo 442* (CAS); *SR 989* (CAS); *T 9904* (CAS); *Z 161* (DS); 6002; 10407; 10502; 26151; 51259; 51391; 51441; 51697.

Local names: “ch’aj momol” (Tzotzil, *Santíz R. 989*); “k’ux wamal” (Tzeltal, *López P. 442*); “k’uxubel wamal” (Tzeltal, *Gómez L. 19*), “morado wamal” (Tzeltal, *Gómez L. 416*).

Uses: a quarter of a handful of the entire plant is boiled and administered by bathing for edema (*Gómez L. 416*); crushed roots are mixed with cloves and garlic and used as a wash for paralysis of the fingers (*Santíz R. 989*); a handful of the entire plant is boiled in one-half a liter of water and trickled into the eyes for eye problems (*López P. 442*); leaves ground in water and trickled into the eyes for eye problems (*Gómez L. 19*).

Our plants are identical to those treated by Gibson (1974) as *D. skutchii*. Gibson noted that *D. skutchii* probably represented a southerly extension of a species already described from Mexico. Leonard (J. Wash. Acad. Sci. 33: 70. 1943) noted that *D. skutchii* was related to *D. capitata* but differed from that species by its oval or subcircular leaves and in its puberulous stems (vs. leaves obovate and stems pubescent with longer and more spreading trichomes in *D. capitata*). The status and interrelationships of the Mexican species are still unclear at the present time but material of *D. skutchii* seems hardly distinct from Kobuski’s *D. oaxacensis* which he separated from *D. capitata* by the absence of an apical elongation of the anther. Material of *D. capitata* from Oaxaca that resembles the type has denser pubescence on the calyx than that found on more easterly and southerly specimens. The relationships of this species with the more northerly *D. microphylla* and *D. decumbens* remain problematic.

2. *Dyschoriste hirsutissima* (Nees) Kuntze, Revis. gen. pl. 2:486. 1891.

— *Calophanes hirsutissimus* Nees in A. DC. Prodr. 11:109. 1847. — TYPE: Mexico, “supra Hacienda de Guadalupe,” Dec. C. Ehrenberg 1223 (B, destroyed; fragment and photo: MO).

*Calophanes bilabiatus* Seem. Bot. voy. *Herald*. 324. 1856. — *Dyschoriste bilabiatus* (Seem.) Kuntze, Revis. gen. pl. 2:486. 1891. — TYPE: Mexico, “Cerro de Pinal,” Dec 1848, B. Seemann 1513 (K!).

ILLUSTRATION: Seemann, Bot. voy. *Herald*, t. 65. 1856.

Erect to decumbent perennial herbs or shrubs to 1.5 m tall. Young stems quadrate to quadrate-subulate, pubescent with flexuose to retrorse eglandular and erect glandular trichomes 0.5–1 mm long, trichomes ± evenly disposed or concentrated on angles, mature stems becoming glabrate. Leaves petiolate, petioles to 25 mm long, blades ovate to elliptic, 17–80 mm long, 8–41 mm wide, 1.7–2.9 times longer than wide, acuminate at apex, acute to subattenuate at base, surfaces pubescent with flexuose to erect eglandular and glandular (at least when young) trichomes to 0.5 mm long, margin subcrenate to crenate to bluntly dentate. Inflorescence of dichasia in leaf axils ± throughout plant; dichasia alternate or opposite, 1–3 (or more)-flowered, subsessile to pedunculate, peduncles to 3 mm long. Bracteoles sometimes subfoliose, lance-linear to lanceolate to lunate to oblanceolate to obovate, 2–10 mm long, 0.3–5 mm wide, abaxial surface and margin pubescent with flexuose to

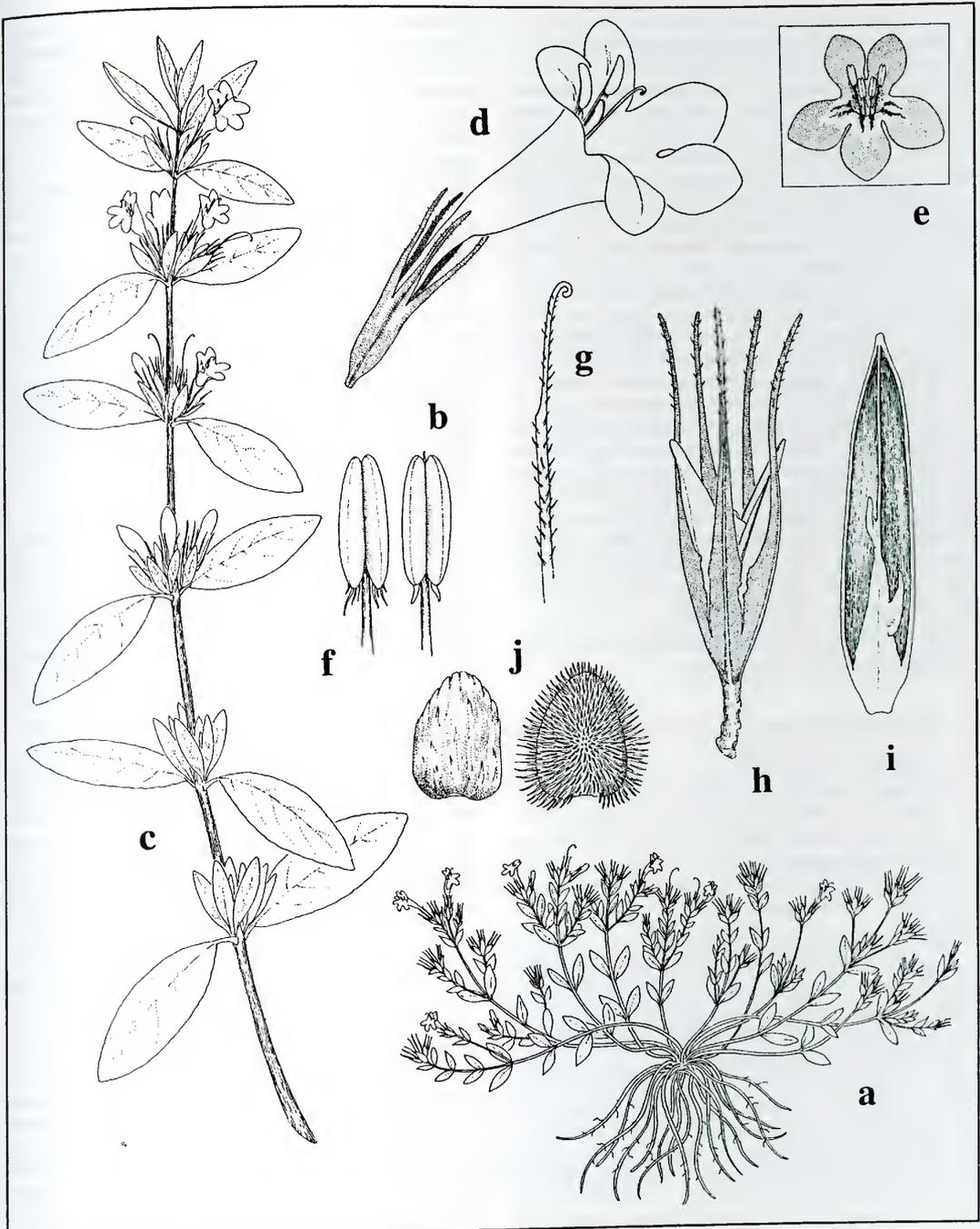


FIGURE 8. *Dyschoriste capitata* (Oerst.) Kuntze (a-b) and *D. ovata* (Cav.) Kuntze (c-j). a, habit (6002), × 0.4; b, anther (26151), × 13; c, habit (52053), × 0.5; d, side view of flower (46563), × 2.4; e, head-on view of flower (46563), × 1.5; f, anther (46563), × 9.5; g, distal portion of style with stigma (52053), × 15; h, calyx and capsule (54566), × 3.3; i, capsule valve (54566), × 5; j, seeds (54566): dry state (left), moistened state (right), × 6. Drawn by Ellen del Valle.

erect eglandular and glandular trichomes 0.2–0.5 mm long (glandular-pubescent), secondary bracteoles similar to bracteoles except usually smaller, straight to conspicuously curved (i.e., lunate). Flowers sessile, secondary flowers sometimes borne on secondary peduncles to 2 mm long. Calyx 8–14 mm long, tube 3.5–5 mm long, lobes lance-subulate, 4–10 mm long, 1.3–1.5 times longer than tube, abaxially and marginally glandular-pubescent. Corolla purple with dark purple markings on lower lip, 13–22 mm long, externally pubescent with flexuose eglandular and glandular (at least on lower lip) trichomes to 0.5 mm long, tube expanded distal to midpoint, 12–15 mm long, 1.2–1.6 mm in diameter near midpoint, limb subbilabiate, 9.5–13 mm in diameter, upper lip 5.5–6.5 mm long, lobes 3.5–5 mm long, 1.9–3 mm wide, lower lip 5–6.8 mm long, lobes 4.5–5.5 mm long, 2–3.5 mm wide. Stamens with longer pair 4.5–8 mm long, shorter pair 3–6 mm long, thecae parallel, 2–2.5 mm long (including basal appendage), awned at base, awn pointed, 0.3–0.7 mm long. Style 12–15 mm long, pubescent with eglandular and glandular (at least proximally) trichomes, stigma 0.7–1 mm long, only 1 lobe evident. Capsule 9–11 mm long, glabrous proximally, apically pubescent with inconspicuous glandular trichomes, stipe 1–1.5 mm long, head ellipsoid. Seeds 4, 2.5–3 mm long, 1.7–2 mm wide. ( $n = 30$ ). Flowering Jan.

Along stream in Evergreen Seasonal Forest; rare (known from a single locality) in Sierra Madre; ca. 1000 m. Mex. (Son., Chih., Sin., Nay., Jal., Hgo., Cma., Mich., Méx., Mlos., Gro., Oax., Chis.). CHIAPAS COLLECTION: 31275.

The above description has been augmented by data from additional Mexican specimens.

### 3. *Dyschoriste ovata* (Cav.) Kuntze, Revis. gen. pl. 2:486. 1891.

— *Ruellia ovata* Cav. Icon. 3:28. 1795. — *Calophanes ovatus* (Cav.) Nees in A. DC. Prodr. 11:108. 1847. — TYPE: based on plants cultivated in Madrid of Mexican origin (see discussion).

ILLUSTRATIONS: Fig. 8; Cavanilles, Icon. 3:t. 254. 1795, see discussion; Fieldiana, Bot. 24(10):361, fig. 80. 1974.

Erect to spreading perennial herbs to 5 dm tall. Young stems quadrate to quadrate-sulcate, pubescent (sometimes sparsely so or with trichomes mostly restricted to nodes) with flexuose to retrorse eglandular trichomes 0.5–1 mm long, trichomes usually concentrated along angles, sometimes  $\pm$  evenly disposed. Leaves subsessile to petiolate, petioles to 5 mm long, blades ovate to lance-ovate to elliptic, 20–40 mm long, 6–16 mm wide, 2.5–4 times longer than wide, acute at apex, acute to subattenuate at base, surfaces pubescent with flexuose to antrorse eglandular trichomes to 0.7 mm long, margin entire to subrenate. Inflorescence of dichasia usually appearing as verticils in leaf axils throughout plant; dichasia opposite or alternate, 1 to several per axil, 1-many flowered, subsessile to pedunculate, peduncles to 2 mm long. Bracteoles foliose, obovate to oblanceolate to elliptic to lance-elliptic, 9–25 mm long, 2–11 mm wide, abaxial surface and margin pubescent like leaves, secondary bracteoles similar to bracteoles except smaller, not conspicuously curved. Flowers sessile to subsessile. Calyx 13–18 mm long, tube 3.5–4.5 mm long, lobes subulate-setaceous, 7.5–14 mm long, 1.7–3.5 times longer than tube, abaxially and marginally glabrous or pubescent with antrorsely

appressed to flexuose eglandular trichomes to 0.5 mm long. Corolla blue (rarely white), 21–27 mm long, externally pubescent with flexuose eglandular trichomes to 0.3 mm long, tube expanded at or just distal to midpoint, 16–17 mm long, 1.8–2.6 mm in diameter near midpoint, limb 13–18 mm in diameter, upper lip 7–9 mm long, lobes 4.5–5.5 mm long, 4–5 mm wide, lower lip 8–11 mm long, lobes 5–6.5 mm long, 3.3–5.7 mm wide. Stamens with longer pair 10.5–11.5 mm long, shorter pair 9–9.5 mm long, thecae parallel, 1.9–2.3 mm long (including basal appendage), either awned at base (awn pointed, to 0.2 mm long) or basal appendage sometimes consisting of 1–3  $\pm$  stout trichomes to 0.4 mm long. Style 17–23 mm long, pubescent with eglandular trichomes, stigma 1–2 mm long, only 1 lobe evident, often recurved. Capsule 10–11.5 mm long, glabrous, stipe 1–1.7 mm long, head ellipsoid. Seeds 4, 2.5–3 mm long, 1.3–2.4 mm wide. Flowering and fruiting Jul–Nov.

Slopes and ridges in Evergreen Seasonal Forest and Pine-Oak Forest; common in Central Plateau and Sierra Madre; 915–1675 m. Mex. (Mich., Mlos., Ver., Gro., Chis.), Guat. CHIAPAS COLLECTIONS: SC 659 (CAS); 6293A; 6320; 40039; 46563; 52053; 54566; 65678; 71040.

Local name: “yaxal nich” (Tzeltal, *Sántiz C. 659*).

Uses: roots and leaves are boiled and a small glass of the solution is taken orally for diarrhea (*Sántiz C. 659*).

Although his description is not very diagnostic, the illustration provided by Cavanilles in the protologue appears to be a species of *Ruellia* rather than *Dyschoriste*. At MA there are two specimens labeled as *Ruellia ovata* in Cavanilles herbarium. Both appear to represent the same species of *Ruellia*. They differ from our species of *Dyschoriste* by their glandular bracteoles, calyces, and corollas; longer (43–45 mm) corollas; anthers that lack basal appendages; spherical pollen; and capsules with about 10 seeds. One sheet (MA 215065) contains three sprigs and two labels. The labels reveal that a portion of the material on the sheet was collected from the Royal Botanical Garden in 1808 and that another portion was collected there in 1824. Both of these collections were made subsequent to Cavanilles protologue. This entire sheet was annotated as the lectotype of *R. ovata* by C. R. Broome in 1982. The other sheet (MA 215065) bears a label stating, “*Ruellia ovata* l con tab 254–Mexico.” It is not known whether this specimen represents type material.

Bentham (Pl. hartw. 89. 1842) was apparently the first to suggest that this species belonged to *Calophanes* (= *Dyschoriste*). This was based on collections from Guatemala and Texas with basally mucronate anthers that were merely referred to Cavanilles species. Nees (A. DC. Prodr. 11:108. 1847) studied the specimens referred to by Bentham and effected the transfer of this species to *Calophanes*. Apparently neither Bentham nor Nees studied specimens (if any existed) from MA. Interestingly, there is a specimen of a species of *Dyschoriste* in Bentham’s herbarium at K labeled “*Ruellia ovata* sp. nova de Mexico.”

Placement of the species described above in either *Calophanes* or *Dyschoriste* has been accepted since the middle of the nineteenth century. Although it is apparent that the name *R. ovata* likely does not apply to this or

any other species of *Dyschoriste*, I choose to perpetuate the misapplication of this name until such time as a thorough study of *Dyschoriste* will determine whether a name is already available for our species or if a new one must be provided for it.

4. *Dyschoriste quadrangularis* (Oerst.) Kuntze, Revis. gen. pl. 2:486. 1891.

— *Calophanes quadrangularis* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:120. 1855. — TYPE: Mexico, Potrero de Consoquitla, Nov 1841, F. Liebmann 10649 (C!; isotypes: C!, K!, US!). ILLUSTRATION: none found.

Erect to spreading perennial herbs to 4 dm tall. Young stems quadrate to quadrate-subulate, pubescent with flexuose to retrorse eglandular trichomes 0.5–1.4 mm long, trichomes at first ± evenly disposed soon mostly concentrated on angles. Leaves subsessile to petiolate, petioles to 7 mm long, blades ovate, 17–58 mm long, 8–22 mm wide, 1.5–2.6 times longer than wide, acute to acuminate at apex, truncate to acute to attenuate at base, surfaces pubescent with flexuose to antrorse eglandular trichomes to 1 mm long, margin entire to crenate. Inflorescence of dichasia in leaf axils ± evenly distributed along distal portions of stems, often appearing as verticels; dichasia opposite, 3–many-flowered, sessile to subsessile (i.e., peduncles to 1 mm long). Bracteoles subfoliose to foliose, ovate to elliptic to obovate, 6–22 mm long, 1.4–9 mm wide, abaxial surface and

margin pubescent like leaves, secondary bracteoles subulate to linear to lanceolate to elliptic to oblanceolate, 1–15 mm long, 0.3–4 mm wide, not conspicuously curved. Flowers sessile to subsessile, secondary flowers sometimes borne on secondary peduncles. Calyx 8–13.5 mm long, tube 3.5–5 mm long, lobes subulate, 4–8.5 mm long, 1–1.7 times longer than tube, abaxially and marginally pubescent with flexuose eglandular trichomes to 1 mm long. Corolla bluish-purple, 9–14 mm long, externally pubescent with erect to flexuose eglandular trichomes to 0.4 mm long, tube expanded near midpoint, 7–7.5 mm long, 1–1.5 mm in diameter near midpoint, limb 5 mm in diameter, upper lip 2.5–2.7 mm long, lobes 1.9–2 mm long, 1.5–2 mm wide, lower lip 2.5–3.5 mm long, lobes 2.3 mm long, 1.5–2.2 mm wide. Stamens with longer pair 3.7–4.5 mm long, shorter pair 3–3.5 mm long, thecae parallel, 1.5–1.6 mm long (including basal appendage), awned at base, awn pointed, 0.3–0.5 mm long. Style 7–7.5 mm long, pubescent with eglandular trichomes and with inconspicuous glands at base, stigma 1–1.6 mm long, only 1 lobe evident. Capsule 7–9 mm long, glabrous (or with a few inconspicuous glands at apex, these soon disappearing), stipe 1.5–2 mm long, head ellipsoid. Seeds 4, 2–2.3 mm long, 1.3–1.5 mm wide. Flowering and fruiting Oct–Nov.

Evergreen Seasonal Forest and Tropical Deciduous Forest; rare in Northern Highlands and Central Plateau; 1000–1380 m. Mex. (N.L., Tam., S.L.P., Ver., Chis.), Guat., Hond., Salv., Nic. CHIAPAS COLLECTIONS: 55456; 70826.

The above description has been augmented by data from additional Mexican specimens.

9. ELYTRARIA

*Elytraria* Michx. Fl. bor.-amer. 1:8. 1803, nomen conserv. — TYPE: *Elytraria virgata* Michx. nomen illegit. (≡ *E. caroliniensis* (J.F. Gmel.) Pers.; *Tubiflora caroliniensis* J.F. Gmel.).

Acaulescent to caulescent, erect to spreading perennial herbs lacking cystoliths. Leaves alternate, mostly in basal rosettes or crowded at apices of branches, sometimes ± diffuse along stems, subsessile to petiolate, margin entire to crenate (in ours, elsewhere also pinnatifid). Inflorescence of scapose or pedunculate densely bracteate axillary and terminal dichasiate spikes, spikes slender, cylindric, simple or sometimes branched, scapes or peduncles covered with imbricate coriaceous clasping scales; dichasia alternate (spirally arranged), 1-flowered, sessile, subtended by a bract. Bracts alternate (spirally arranged), green or partially hyaline, coriaceous, sometimes apically toothed and/or winged. Bracteoles often mostly hyaline. Flowers homostylous, sessile, subtended by 2 homomorphic bracteoles. Calyx deeply 4-lobed, mostly hyaline, lobes heteromorphic, anterior and posterior lobes external, anterior lobe 2-dentate to ± deeply 2-cleft. Corolla pinkish or blue or white (in ours, elsewhere also yellow), often with colored markings near mouth, tube cylindric or slightly expanded near mouth, throat indistinct or evident only near mouth, limb bilabiate, upper lip 2-lobed, lower lip 3-lobed, corolla lobes often apically divided or 2-cleft, imbricate in bud. Stamens 2, inserted at or near apex of corolla tube, anthers partially exerted from mouth of corolla, 2-theous, thecae (covered by stigma during anthesis) equal in size, parallel, equally inserted, lacking basal appendages (at least in ours), dehiscing toward lower lip (i.e., flower nototribal); pollen prolate, 3-colpate, exine minutely verrucate to foveolate-reticulate; staminodes 0–2, minute. Style exerted from mouth of corolla, stigma unlobed, expanded, flat, subelliptic to subspatulate, folded over anthers during anthesis and straightening when touched (touch-sensitive) and gradually refolding. Capsule estipitate, subconic to ovoid, sometimes irregularly constricted proximally, retinacula absent, placentae minute, papilliform. Seeds numerous (up to 20 per capsule), irregularly shaped (often blocky or cubelike), lacking trichomes. ( $x = 11$  or 12?).

A genus of about 15 species occurring in the tropics and subtropics of both Old and New Worlds. The majority of species are American and four are known from Mexico.

- REFERENCE: LEONARD, E.C. 1934. The American species of *Elytraria*. J. Wash. Acad. Sci. 24:443–447.
- a. Plants acaulescent; leaves clustered at ground level, leaf apex subacute to rounded to submarginate; bracts lanceolate, 6–11 mm long, acuminate-aristate at apex, lacking lateral winglike teeth; bracteoles 4–7 mm long; calyx 6–8 mm long . . . . . 1. *E. bromoides*

- aa. Plants caulescent; leaves clustered at stem apices or sometimes  $\pm$  diffuse along stems, leaf apex acute to acuminate; bracts ovate to elliptic to hourglass-shaped to obovate, 3.3–6 mm long, 3-dentate at apex with lateral teeth large, winglike, and hyaline (at least in distal bracts, usually all bracts thusly dentate); bracteoles 2–3.5 mm long; calyx 2.5–4.5 mm long . . . . . 2. *E. imbricata*

1. *Elytraria bromoides* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:115. 1855.

— LECTOTYPE (designated here): Mexico, Veracruz, "Hac. de St'a. Barbara," Mar 1841, *F. Liebmann 10757* (C!).

*Tubiflora acuminata* Small, Fl. s.e. U.S. 1082, 1338. 1903. —

*Elytraria acuminata* (Small) Cory, Rhodora 38:407. 1936.

— TYPE: U.S., Texas, Corpus Christi, *Edwards 719b* (NY).

ILLUSTRATIONS: Oersted 1855:t. 3, figs. 20–25; Annual Rep. Missouri Bot. Gard. 6:t. 51. 1895; Wasshausen in Lundell, Fl. Texas 1(3):225, fig. 1. 1966.

Acaulescent perennial herbs to 1.5 dm tall from an elongate woody subterranean caudex or rhizome to 7 mm in diameter, caudex or rhizome densely pubescent with straw-colored silky mostly erect trichomes up to 2 mm long (pilose) or glabrate. Leaves clustered at apex of caudex or rhizome, subsessile to petiolate, petioles to 35 mm long (naked portion to 30 mm long), sparsely to densely pilose, blades elliptic to obovate to oblanceolate to spatulate, 19–150 mm long, 4.5–25 mm wide, 2.1–8.8 times longer than wide, subacute to rounded to subemarginate at apex, gradually attenuate at base (blade sometimes decurrent on petiole nearly to node), surfaces discolorous (adaxial dark green, abaxial pale green), sparsely pilose or pubescent with shorter coarser and more flexuose trichomes when young, often soon becoming glabrate, margin entire to irregularly sinuate-crenate. Peduncles 15–80 (–150) mm long, only rarely branching, scales lanceolate, 4–8 mm long (those near base of peduncle 2–3 mm long), 0.6–1.5 mm wide, aristate at apex, abaxial surface glabrous (or scabrous with coarse retrorse trichomes up to 0.05 mm long), margin hyaline, ciliate with trichomes to 0.7 mm long. Spikes 4–9 mm in diameter near midpoint, rachis ridged, sparsely pubescent with crinkled eglandular trichomes to 2 mm long (villous). Bracts lanceolate, 6–11 mm long, 1.7–2.5 mm wide, gradually acuminate-aristate at apex, abaxial surface glabrous, margin villous-ciliate, hyaline only near base. Bracteoles lanceolate to subulate, 4–7 mm long, 0.5–0.7 mm wide, abaxial surface often mostly hyaline except for green central portion (keel), villous along keel. Calyx 6–8 mm long, anterior lobe linear-lanceolate, 5–6.5 mm long, 0.7–1 mm wide, 2-lobed at apex with lobes 1–2 mm long, posterior and lateral lobes lance-ovate, 5.5–7 mm long, 1–1.6 mm wide, all lobes abaxially glabrous, margin villous-ciliate. Corolla pinkish-blue (or rarely nearly white), 6.5–14 mm long, externally glabrous, tube 3–9 mm long, upper lip 2–3.5 mm long, lobes 1.5–2.5 mm long, lower lip 3.5–6 mm long, lobes 2.5–4.5 mm long, lobes of lower lip apically cleft. Stamens 1.4–1.8 mm long, thecae 0.7–1 mm long. Style 3–8 mm long, glabrous, stigma 1.5 mm long, 0.8–1.2 mm wide, apex erose. Capsule 4–7 mm long, glabrous. Seeds 15–17, irregularly blocky, 0.5–1 mm long, surfaces roughened. ( $n = 12$ ). Flowering and fruiting Aug.

Trailside in Short-tree Savanna; rare in Northern Highlands; ca. 1000 m. U.S. (Texas), Mex. (Coah., N.L., Tam., S.L.P., Hgo., Ver., Yuc., Chis.), Guat. CHIAPAS COLLECTION: 27420.

The lectotype is selected from among the three syntypes cited by Oersted. The lectotype is mounted on the same sheet as *Liebmann 10758* but is clearly delimited from the latter. It is the most complete of the 3 collections at C.

The above description has been substantially amplified using data from specimens from surrounding regions.

2. *Elytraria imbricata* (Vahl) Pers. Syn. pl. 1:23. 1805.

— *Justicia imbricata* Vahl, Eclog. amer. 1:1. 1796. —

TYPE: not located, based on material from "herbario Marcegravi." In his Enum. pl. of 1804, Vahl cited a Marcegrav collection from Brazil and a collection of von Rohr from Santa Marta, Colombia. The latter collection in the Vahl herbarium at C pertains to our species.

*Verbena squamosa* Jacq. Pl. hort. schoenbr. 1:3. 1797. — *Tubiflora squamosa* (Jacq.) Kuntze, Revis. gen. pl. 2:500. 1891. — *Elytraria squamosa* (Jacq.) Lindau, Anales Inst. Fís.-Geogr. Nac. Costa Rica 8:299. 1895. — TYPE: unknown.

*Elytraria tridentata* Vahl, Enum. pl. 1:107. 1804, nomen illegit. (*Justicia imbricata* Vahl cited as synonym).

*Elytraria frondosa* Kunth, Nov. gen. sp. 2:234. 1817. — TYPE: Colombia, Bolívar, Turbaco, A. von Humboldt & A. Bonpland mss. n. 1481 (P-Bonpl.!)

*Elytraria fasciculata* Kunth, Nov. gen. sp. 2:235. 1817. — TYPE: Venezuela, "Caracas, au vallee de Aragua," A. Bonpland 739 (P-Bonpl.!; isotype: P!).

*Elytraria ramosa* Kunth, Nov. gen. sp. 2:235. 1817. — TYPE: Mexico, Guerrero, Acapulco, A. von Humboldt & A. Bonpland mss. n. 3877 (P-Bonpl.!). The specimen in the separated "Humboldt" herbarium is presumably the holotype. Several additional collections, some with the locality "Acapulco" and others with the number "3877" are located in the general herbarium at P. One of these was annotated as the holotype by Hossain. A collection of Bonpland with the number 3877 bears some of the additional information incorporated into the protologue (e.g., habitat and flower color). All specimens conform to *E. imbricata*.

*Elytraria scorpioides* Roem. & Schult. Syst. veg. 1:128. 1822. — TYPE: Colombia, Magdalena, Santa Marta, C. Bertero s.n. (TO?; isotype: MO).

*Elytraria apargiifolia* Nees in A. DC. Prodr. 11:65. 1847. — SYNTYPES: Argentina, Río La Plata, *J. Tweedie s.n.* (K ex hb. Hook.); Panama, without locality, *Lobl s.n.* (K ex hb. Hook.); "Panama et Columbia occidentalis," without locality, 1831, *H. Cuming s.n.* (K ex hb. Benth.).

*Elytraria microstachya* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:114. 1855. — TYPE: Mexico, Oaxaca, Playa de San Augustin, Oct 1842, *F. Liebmann 10759* (C!).

*Elytraria pachystachya* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:116. 1855. —

*Tubiflora pachystachya* (Oerst.) Kuntze, Revis. gen. pl. 2:500. 1891. — TYPE: Mexico, Oaxaca, Mazatlán pr. Tehuantepec, Nov 1842, *F. Liebmann 10760* (C!).

ILLUSTRATIONS: Fig. 9; Vahl, Icon. ill. pl. amer. 1:t. 1. 1798; Oersted 1855:t. 3, figs. 1–19, 26–27; Contr. U.S. Natl. Herb. 31:91, fig. 2. 1951; Fieldiana, Bot. 24(10):365, fig. 81. 1974; Ann. Missouri Bot. Gard. 65:198, fig. 10. 1978; Wiggins, Flora Baja California, 192, fig. 139. 1980; Desert Pl. 5:175, fig. 3c,d. 1984; Ezcurra in Cabrera, Flora Provincia Jujuy (Rep. Argentina) 9:316, fig. 129. 1993.

Cauliscent perennial herbs to 5 dm tall from a ± enlarged woody rootstock or base, woody base glabrous or sparsely pubescent with flexuose eglandular trichomes to 0.4 mm long. Stems subterete to sharply 3-angulate, sparsely pubescent with antrorse to flexuose eglandular trichomes 0.1–1 mm long or glabrate. Leaves usually clustered at stem apices, sometimes diffuse along stems, subsessile to petiolate, petioles to 60 mm long (naked portion to 20 mm long), pubescent with flexuose to crinkled eglandular trichomes to 0.8 mm long, blades elliptic to obovate, 26–135 mm long, 10–48 mm wide, 1.8–3.5 times longer than wide, acute to acuminate at apex, long attenuate at base (often tapered to node), surfaces concolorous or discolorous, adaxial surface pubescent with flexuose eglandular trichomes to 1.5 mm long, abaxial surface usually pubescent only along major veins, margin entire to subcrenate. Peduncles (5–) 10–200 mm long, often branching distally, scales lanceolate, 3–5.2 mm long, 1–1.8 mm wide, acuminate- to aristate-mucronate at apex, abaxial surface glabrous or scabrous along midvein with coarse retrorse eglandular trichomes to 0.05 mm long, margin subhyaline to hyaline, ciliate with flexuose to crinkled eglandular trichomes to 1 mm long. Spikes 5–7 mm in diameter near midpoint, rachis ridged, pubescent with crinkled eglandular trichomes to 1.5 mm long (villous). Bracts (including hyaline margin) ovate to elliptic to hourglass-shaped to obovate (central green portion elliptic to obovate), 3.3–6 mm long, 1.5–3 mm wide, usually 3-dentate at apex (sometimes entire with hyaline margin prominent near base but not at apex, at least

distalmost bracts 3-dentate), lateral teeth hyaline, winglike, central tooth awnlike, abaxial surface of bracts glabrous, bracteal margin usually villous-ciliate. Bracteoles subulate, 2–3.5 mm long, 0.3–0.7 mm wide, abaxial surface mostly hyaline except for green central portion (keel), villous along keel. Calyx 2.5–4.5 mm long, anterior lobe usually constricted proximally, linear-lanceolate, 2–4 mm long, 0.4–0.9 mm wide, 2-lobed at apex with lobes 0.1–0.5 mm long, posterior and lateral lobes lanceolate to lance-ovate to lance-elliptic, 1.9–4 mm long, 0.4–1.2 mm wide, all lobes abaxially glabrous, margin villous-ciliate (at least distally). Corolla blue and white, 3.8–7.5 mm long, externally glabrous, tube 2.5–5.3 mm long, upper lip 1–1.8 mm long, lobes 0.5–0.7 mm long, lower lip 1.3–3.1 mm long, lobes 1–3 mm long, central lobe largest, lobes of lower lip apically cleft. Stamens 1.2–1.3 mm long, thecae 0.6–0.7 mm long. Style 2.5–5 mm long, glabrous, stigma 1 mm long, 0.4–0.7 mm wide, apex suberose. Capsule 2.5–3.9 mm long, glabrous. Seeds 12–16, irregularly blocky, 0.3–0.6 (–0.9) mm long, surfaces minutely papillose. ( $n = 11, 12$ ). Flowering and fruiting throughout the year.

Dry and moist slopes and often weedy in disturbed habitats (e.g., roadsides) in Evergreen Seasonal Forest, Tropical Deciduous Forest, Thorn Woodland, and Pine-Oak Forest; common in Northern Highlands, Central Plateau, Central Depression, Sierra Madre, and Pacific Coastal Plain; 30–1350 m. U.S. (Arizona, Texas), Mex. (Baja C.S., Son., Chih., Coah., Sin., Zac., Nay., Jal., Cma., Mich., Méx., Ver., Gro., Oax., Camp., Yuc., Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Ecu., Peru, Bol., Braz., Arg.). CHIAPAS COLLECTIONS: *Da 29675* (MEXU); *La 325* (DS); *La 2015* (DS); *EM 17143* (MEXU); *EM 17176* (MEXU); *EM 17418* (MEXU); *Qu 44* (MEXU); *Rey 1453* (BM); *SI 3166* (MEXU); *Ste 25784* (CAS); *VS 2734* (MEXU); *T 2062* (DS); *T 3013* (DS); *T 3273* (DS, MEXU); *7703*; *13525*; *14193*; *22857*; *24276*; *28035*; *28274*; *31578*; *36582*; *38593*; *41782*; *42350*; *47031*; *47158*; *56877*; *69692*; *70933*; *71023*.

## 10. HENRYA

*Henrya* Nees ex Benth. Bot. voy. *Sulphur*, t. 49. 1845. — TYPE: *Henrya insularis* Nees ex Benth.

*Solenoruellia* Baill. Hist. pl. 10:445. 1891. — TYPE: *Solenoruellia galeottiana* Baill. (= *Henrya insularis* Nees ex Benth.).

Erect or spreading perennial herbs or shrubs with cystoliths. Older stems with epidermis exfoliating. Leaves opposite, subsessile to petiolate, petioles detaching at junction with stem, margin entire. Inflorescences of axillary and terminal stout to lax dichasiate spikes (to thyrses) collectively forming leafy terminal panicles; dichasia alternate or opposite, 1–3-flowered, sessile or short-pedunculate, subtended by a bract. Bracts opposite, green, usually less conspicuous than bracteoles, margin entire. Bracteoles oblanceolate to obovate, concavoconvex, fused from base to near apex along side adjacent to rachis, rounded to acute at apex, mucronate with a straight apical or dorsal erect or divergent pointed projection, secondary bracteoles, if present, much reduced. Flowers homostylous, sessile, subtended by 2 homomorphic bracteoles. Calyx deeply 5-lobed, lobes homomorphic or heteromorphic with posterior lobe reduced in size. Corolla white, cream, or yellow, with maroon, purple, yellow, and/or white markings on upper lip, externally glabrous, tube subcylindric to cylindric, shorter than limb, throat indistinct, limb pseudopapilionaceous, upper lip obovate to spatulate, 2-fid, lower lip 3-lobed, lateral lobes obovate, lower-central lobe obovate to broadly obovate and keeled, corolla lobes imbricate in bud. Stamens 2, inserted at or near mouth of corolla, exerted from mouth of corolla, anthers 2-theous, thecae subequal in size, parallel, equally to subequally inserted, lacking basal appendages, dehiscing toward upper lip (i.e., flower stenotribal); pollen prolate, 3-colporate, colpi broad (i.e., far exceeding width of centrally positioned ora), 6-pseudocolpate, pseudocolpi 2 per mesocolpium, exine reticulate; staminodes 0. Style exerted from mouth of corolla, glabrous, stigma 2-lobed, lobes triangular, equal, often inconspicuous. Capsule stipitate, head subspheric to broadly ellipsoid, retinacula present, septa with attached retinacula separating slightly from inner wall of mature capsule. Seeds 2, homomorphic, planoconvex, subcircular to subelliptic in outline, flat surface smooth to bumpy, convex surface and margin pubescent with hygroscopic trichomes (in ours, elsewhere also covered with stout branched or barbed tubercles). ( $x = 18$ ).

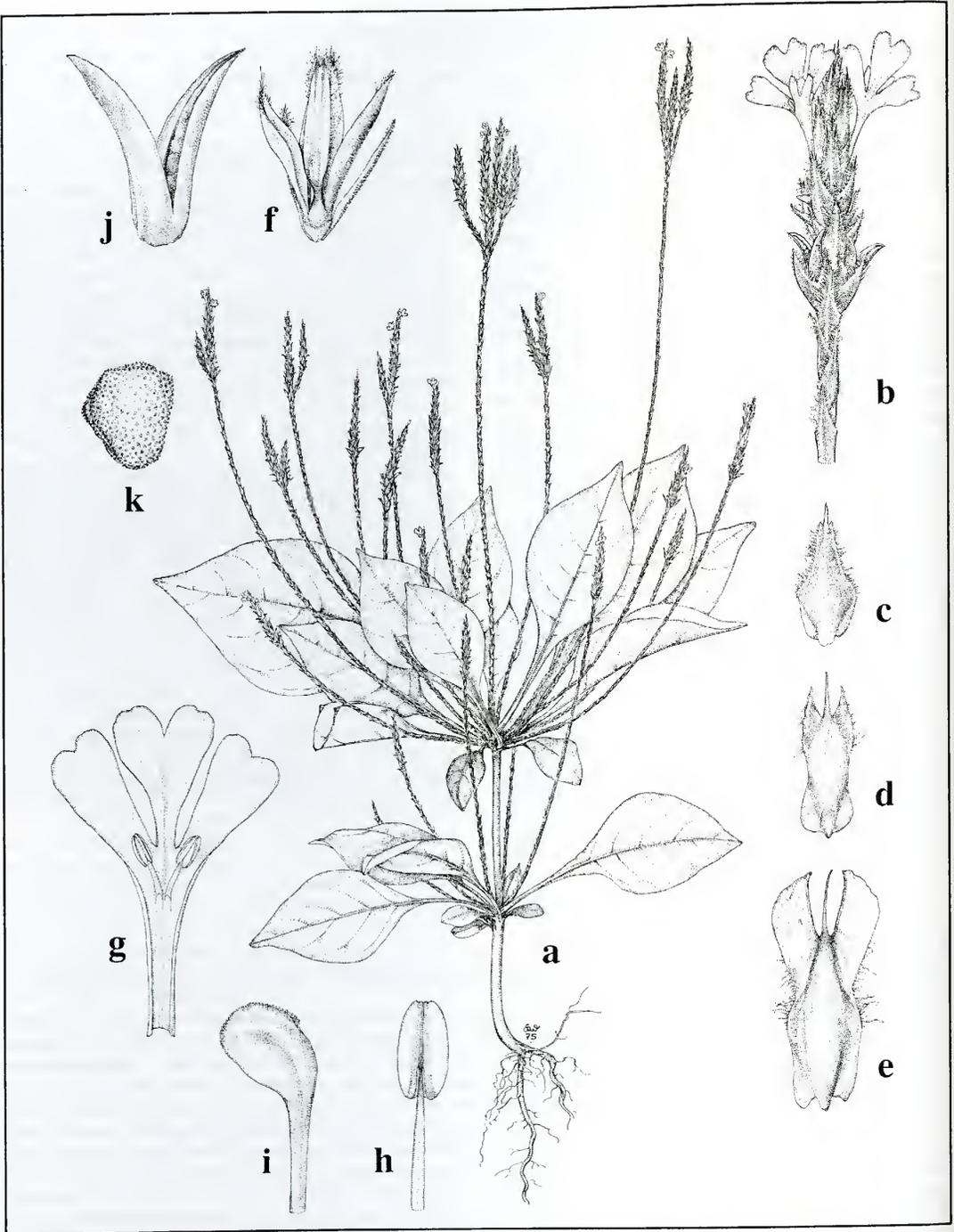


FIGURE 9. *Elytraria imbricata* (Vahl) Pers. (a–d, f–k from Feddema 2736, e from González 80-A). a, habit,  $\times 0.5$ ; b, inflorescence,  $\times 2.5$ ; c, bract from proximal portion of inflorescence,  $\times 5$ ; d, bract from distal portion of inflorescence,  $\times 5$ ; e, bract with typical winglike lateral teeth,  $\times 5$ ; f, bracteoles and calyx,  $\times 7.5$ ; g, corolla with upper lip removed showing stamens,  $\times 5$ ; h, stamen,  $\times 15$ ; i, distal portion of style with stigma,  $\times 15$ ; j, capsule,  $\times 10$ ; k, seed,  $\times 30$ . Drawn by Karin Douthit. Copyright reserved to University of Michigan Herbarium, used with permission.

*Henrya* comprises two species occurring in dry regions from the southwestern United States southward to Costa Rica. Both species occur in Mexico.

REFERENCE: DANIEL, T.F. 1990. Systematics of *Henrya* (Acanthaceae). Contr. Univ. Michigan Herb. 17:99–131.

1. *Henrya insularis* Nees ex Benth. Bot. voy. *Sulphur*, t. 49.1845.

— TYPE: Plate 49 of Bentham's *The Botany of the Voyage of H.M.S. Sulphur*, see Daniel (Taxon 38:265–270. 1989).

*Henrya barclayana* Nees in Benth. Bot. voy. *Sulphur* 149. 1846. — TYPE: Mexico, Colima, Manzanillo Bay, *G. Barclay s.n.* (K!).

*Henryacostata* A. Gray, Proc. Amer. Acad. Arts 21:406. 1886. — *Tetramerium costatum* (A. Gray) Millsp. Publ. Field Columbian Mus., Bot. Ser. 1:47. 1895. — TYPE: Mexico, Chihuahua, near Batopilas, Aug–Nov 1885, *E. Palmer 211* (GH!; isotypes: K!, LE!, MEXU!, NY!, PH!, US!).

*Solenoruellia galeottiana* Baill. Hist. pl. 10:445. 1891. — TYPE: Mexico, Veracruz, without specific locality, 2500 ft, Oct 1840, *H. Galeotti 7039* (P!).

*Henrya imbricans* Donn. Sm. Bot. Gaz. (Crawfordsville) 16:198. 1891. — TYPE: Guatemala, Amatitlán, Laguna Amatitlán, Feb 1890, *J. Donnell Smith 1923* (US!; isotypes: G!, GH!, K!, NY!, PH!, US!).

*Henrya grandifolia* Fernald, Bot. Gaz. (Crawfordsville) 20:537. 1895. — TYPE: Mexico, Sinaloa, Esquinapa, Jan 1895, *F. Lamb 505* (GH!).

*Henrya costata* A. Gray var. *glandulosa* Brandegee, Zoe 5:171. 1903. — LECTOTYPE (Daniel 1990:117): Mexico, Baja California Sur, Cape Region, Santa Anita, 1901, *C. Purpus 266* (UC!; isolectotypes: ARIZ!, MO!, US!).

*Tetramerium gualanense* B.L. Rob. & Bartlett, Proc. Amer. Acad. Arts 43:58. 1907. — *Henrya gualanensis* (B.L. Rob. & Bartlett) Happ, Ann. Missouri Bot. Gard. 24:553. 1937. — TYPE: Guatemala, Zacapa, Gualán, 18 Jan 1905, *C. Deam 397* (GH!; isotype: MICH!).

*Tetramerium flavum* Eastw. Proc. Amer. Acad. Arts 44:608. 1909. — *Henrya flava* (Eastw.) Happ, Ann. Missouri Bot. Gard. 24:550. 1937. — TYPE: Mexico, Durango, San Ramón, 21 Apr–18 May 1906, *E. Palmer 75* (GH!; isotypes: F!, GH!, K!, MO!, NY!, UC!, US!).

*Henrya brevifolia* Happ, Ann. Missouri Bot. Gard. 24:547. 1937. — TYPE: Mexico, Sonora, Las Durasnillas, 18 May 1892, *T. Brandegee s.n.* (UC!; isotypes: DS!, GH!, NY!, PH!, US!).

*Henrya conzattii* Happ, Ann. Missouri Bot. Gard. 24:560. 1937. — TYPE: Mexico, Oaxaca, Distr. Pochutla, Cerro de Apango de Hualulco, 20 Apr 1917, *C. Conzatti, B. Reko, & E. Makripinus 3152* (US!; isotype: MO!).

*Henrya donnell-smithii* Happ, Ann. Missouri Bot. Gard. 24:563. 1937. — TYPE: Guatemala, Santa Rosa, Río de Los Esclavos, Feb 1893, *E. Heyde & E. Lux 4559* (MO!; isotypes: F!, G!, GH!, K!, NY!, US!).

*Henrya laxa* Happ, Ann. Missouri Bot. Gard. 24:557. 1937. — TYPE: Mexico, Guerrero, Acapulco and vicinity, Oct 1894–Mar 1895, *E. Palmer 575* (MO!; isotypes: F!, GH!, K!, POM!, UC!, US!).

*Henrya longipes* Happ, Ann. Missouri Bot. Gard. 24:549. 1937. — TYPE: El Salvador, San Salvador, 1925, *S. Calderón 2283* (F!; isotype: US!).

*Henrya mephitica* Happ, Ann. Missouri Bot. Gard. 24:562. 1937. — TYPE: Mexico, Jalisco, San Sebastián, trail to Las Mesitas, 17 Mar 1927, *Y. Mexia 1864* (CAS!; isotypes: NY in part!, US!).

*Henrya ortegana* Happ, Ann. Missouri Bot. Gard. 24:552. 1937. — TYPE: Mexico, Sinaloa, Sind. San Juan, San Ignacio, Mar 1931, *J. Ortega 6868* (MO!; isotypes: CAS!, F!, MIN!).

*Henrya pilosa* Happ, Ann. Missouri Bot. Gard. 24:556. 1937. — TYPE: Mexico, Colima, near Manzanillo, 2–18 Mar 1891, *E. Palmer 1330* (US!; isotypes: GH!, K!, NY!, US!).

*Henrya puberula* Happ, Ann. Missouri Bot. Gard. 24:559. 1937. — TYPE: Guatemala, Amatitlán, Amatitlán, Feb 1928, *Morales 911* (F!; isotype: US!).

*Henrya reticulata* Happ, Ann. Missouri Bot. Gard. 24:566. 1937. — TYPE: El Salvador, Ahuachapan, vicinity of Ahuachapan, 9–27 Jan 1922, *P. Standley 20221* (US!; isotypes: GH!, NY!).

*Henrya rupicola* Happ, Ann. Missouri Bot. Gard. 24:564. 1937. — TYPE: Mexico, Jalisco, San Sebastián, trail to Las Mesitas, 17 Mar 1927, *Y. Mexia 1864* (MO!; isotypes: A!, DS!, F!, GH!, MICH!, MIN!, NY in part!, UC!).

*Henrya scorpioides* Nees var. *latifolia* Happ, Ann. Missouri Bot. Gard. 24:556. 1937. — TYPE: MEXICO, Veracruz, Barranca de Panoaya, Dec 1919, *C. Purpus 8495* (MO!; isotypes: GH!, NY!, UC!, US!).

*Henrya yucatanensis* Happ, Ann. Missouri Bot. Gard. 24:551. 1937. — TYPE: Mexico, Yucatán, vicinity of Ixamal, Jan–May 1895, *G. Gaumer 368* (MO!; isotypes: A!, CAS!, DS!, F!, GH!, K!, LE!, MICH!, NY!, PH!, UC!, US!).

ILLUSTRATIONS: Fig. 10; Bot. voy. *Sulphur*, t. 49. 1845; Fieldiana, Bot. 24 (10):375, fig. 85. 1974; Wiggins, Flora Baja California, 193, fig. 140. 1980; Desert Pl. 5:173, 174, fig. 2c.d. 1984.

Erect to spreading perennial herbs or shrubs to 1 m tall. Young stems terete to quadrate to quadrate-sulcate, evenly pubescent with erect to flexuose, glandular, subglandular, and eglandular trichomes 0.05–0.8 mm long (viscid) or with most or all of the trichomes only 0.05–0.1 mm long (glandular-puberulent) or rarely ± exclusively eglandular with trichomes 0.05–0.1 mm long (puberulent). Leaves (plants sometimes leafless during anthesis) petiolate, petioles to 40 mm long, blades ovate to broadly ovate to elliptic, 15–90 mm long, 7–52 mm wide, 1.4–3.6 times longer than wide, acuminate at apex, rounded to acute to subattenuate at base, surfaces viscid, glandular-puberulent, puberulent, or with trichomes soon becoming mostly or completely eglandular, sometimes glabrate at maturity. Inflorescence of axillary or terminal loosely to densely bracteate dichasiate spikes to 20 cm long, rachis viscid, glandular-puberulent, or puberulent. Bracts oblanceolate to elliptic to linear to lance-subulate, 2–10 mm long, shorter than (or rarely equaling) bracteoles, 0.6–2 (–3.3) mm wide, (proximalmost pair sometimes intergrading with leaves and somewhat larger), abaxial surface viscid (rarely puberulent). Bracteoles oblanceolate, 6.5–11 mm long, externally pubescent like bracts or with longer glandular trichomes present when similar long trichomes

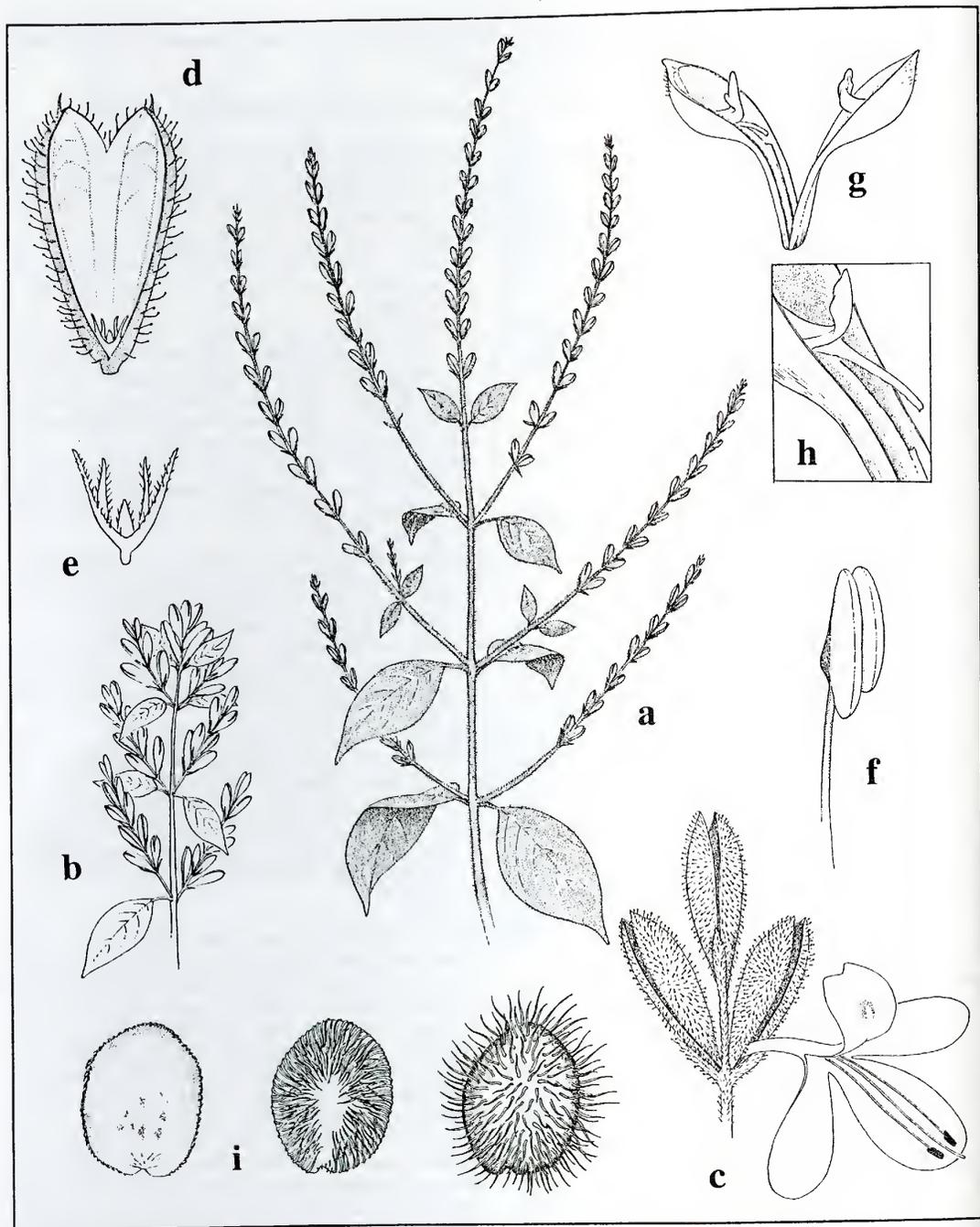


FIGURE 10. *Henrya insularis* Nees ex Benth. a, habit (31276),  $\times 0.5$ ; b, habit (49626),  $\times 0.5$ ; c, inflorescence (Daniel & Bartholomew 5027gh),  $\times 2.3$ ; d, bracteoles opened to show calyx (Ton 3897),  $\times 5$ ; e, calyx (Ton 3897),  $\times 11$ ; f, distal portion of stamen (Daniel & Bartholomew 5027gh),  $\times 14$ ; g, capsule (50470),  $\times 5$ ; h, septum and retinaculum in one capsule valve (50470),  $\times 8.5$ ; i, seeds (50470): flat surface in dry state (left), convex surface in dry state (middle), convex surface in moistened state (right),  $\times 8.5$ . Drawn by Ellen del Valle.

are absent or sparse on bracts, mucro apical to subapical, erect to reflexed, 0.1–0.8 mm long. Calyx 1–2 mm long, lobes lance-subulate to subulate, subequal, abaxially and marginally pubes-

cent with flexuose eglandular (and often erect glandular) trichomes 0.05–0.2 mm long. Corolla whitish to yellowish with reddish markings on upper lip, 10.5–16 mm long, tube 3.5–6

mm long, upper lip 5.5–8.5 mm long, 2.5 mm wide, lower lip 6.5–11.5 mm long, lobes 6.5–11 mm long, 2.4–6 mm wide. Stamens 6.5–9.5 mm long, thecae 1.5–2 mm long. Style 9–13 mm long, stigma lobes 0.2 mm long. Capsule 5.5–7.5 mm long, pubescent (sometimes sparsely so) with erect to retrorse eglandular trichomes (at least distally) 0.05–0.2 mm long. Seeds subelliptic, 1.4–2.5 mm long, 1.2–2 mm wide, surfaces often somewhat papillate, convex surface covered with stiff interwoven hygroscopic trichomes to 0.5 mm long. ( $n = 18$ ). Flowering and fruiting Dec–Apr.

On slopes, along streams, and in disturbed habitats (e.g., roadsides) in Seasonal Evergreen Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common, often weedy, in Northern Highlands, Central Depression, and Sierra Madre; 100–1600 m. U.S. (Arizona), Mex. (Baja C.S., Son., Chih., Tam., Sin., S.L.P., Nay, Jal., Aguasc., Gto., Cma., Mich., Méx., Ver., Gro., Oax., Yuc., Chis.), Guat., Hond., Salv., Nic., C.R. CHIAPAS COLLECTIONS: *Ban* 5534 (CAS); *MC* 2063 (UC); *Cro* 46283 (MO); *Cro* 63376 (CAS); *Dan* 5027 (CAS); *La* 179 (DS); *F* 283 (DS); *EM* 133 (MEXU, MICH, US); *EM* 5216 (CAS, F, MEXU, MO); *Mi* 6831 (MEXU); *Ne* 5514 (CAS); *QVU* 338 (U); *T* 3897 (DS); 9047; 9102; 23734; 23924; 30233; 31276; 49626; 50183; 50304; 50470; 56896; 66956; 66978.

This is a variable species with respect to the size of bracts and bracteoles and the type and distribution of trichomes. Plants with bracts mostly 5–8 mm long and bracteoles 9–11 mm long (e.g., *Breedlove* 50183) were tentatively treated as *H. imbricans* by Gibson (1974). Enough overlap exists between such plants and those with shorter bracts and bracteoles so as to preclude recognition of *H. imbricans*. Plants with bracts nearly as long as to as long as the bracteoles (e.g., *Breedlove* 50304) approach those treated by Gibson (1974) as *H. gualanensis*. Plants with minutely puberulent bracteoles were tentatively treated by Gibson (1974) as *H. puberula*. Some extremes of bracteole pubescence evident among Chiapan collections include: an understory of erect glandular and eglandular trichomes 0.05–0.1 mm long with an overstory of erect glandular trichomes 0.2–0.7 mm long (e.g., *Breedlove* 66978); erect to subflexuose glandular trichomes 0.2–0.6 mm long with the understory mostly or completely absent (e.g., *Breedlove* & *Smith* 31276); and erect eglandular and subglandular trichomes to 0.05 mm long without any overstory (e.g., *Croat* & *Hannon* 63376). See Daniel (1990) for a further discussion of these and other forms of *H. insularis*.

## 11. HOLOGRAPHIS

*Holographis* Nees in A. DC. Prodr. 11:728. 1847. — TYPE: *Holographis ehrenbergiana* Nees.

*Berginia* Harv. ex Benth. in Benth. & Hook. f. Gen. pl. 2:1096. 1876. — TYPE: *Berginia virgata* Harvey ex Benth. (= *Holographis virgata* (Harvey ex Benth.) T.F. Daniel).

*Pringleophytum* A. Gray, Proc. Amer. Acad. Arts 20:292. 1885. — TYPE: *Pringleophytum lanceolatum* A. Gray. (= *Holographis virgata* (Harvey ex Benth.) T.F. Daniel).

*Lundellia* Leonard, Wrightia 2:1. 1959. — TYPE: *Lundellia argyrea* Leonard (= *Holographis argyrea* (Leonard) T.F. Daniel).

Erect to spreading perennial herbs or shrubs lacking cystoliths. Leaves quaternate (in ours, elsewhere also opposite or rarely subopposite), sessile to petiolate, sometimes anisophyllous, margin entire (in ours, elsewhere also subsinate and spinose-dentate). Inflorescence of axillary or terminal dichasiate spikes (in ours, elsewhere also reduced to 2 flowers); dichasia opposite (in ours, elsewhere also alternate), 1-flowered, sessile, subtended by a bract. Bracts opposite (in ours, elsewhere also alternate), green or somewhat reddish, margin entire (in ours, elsewhere also spinose-dentate). Flowers homostylous, sessile, subtended by 2 homomorphic bracteoles. Calyx deeply 5-lobed, lobes homomorphic. Corolla greenish white to white to pinkish (in ours, elsewhere also yellow and purplish), often with colored nectar guides, long axis horizontally to vertically oriented, tube subcylindric to ± abruptly expanded distally into a throat, limb bilabiate, upper lip 2-lobed, lower lip 3-lobed, corolla lobes imbricate in bud. Stamens 4, inserted in distal 2/3 of corolla tube, equally inserted to ± didynamous, anthers slightly exerted from mouth of corolla, 1-theous, often connivent, pubescent, lacking basal appendages, dehiscing toward lower lip (i.e., flower nototribal); pollen prolate, 3-colpate, colpi often bifurcate near poles, exine foveolate to fossulate to fossulate-reticulate; staminode 1, borne between posterior pair of stamens, short. Style slightly exerted from mouth of corolla, stigma subfunneliform or 2-lobed, lobes equal or unequal. Capsule substipitate, ellipsoid to obovoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4 (or fewer by abortion), homomorphic, lenticular. ( $x = 13$ ).

A genus of 15 species restricted to, but occurring nearly throughout, the dry regions of Mexico.

REFERENCES: DANIEL, T.F. 1983. Systematics of *Holographis* (Acanthaceae). J. Arnold Arbor. 64:129–160; DANIEL, T.F. 1988. Three new species of *Holographis* (Acanthaceae) from Mexico. Proc. Calif. Acad. Sci. 46:73–81. 1988.

### 1. *Holographis parayana* Miranda, Anales Inst. Biol. Univ. Nac. México 24:94. 1953.

— TYPE: Mexico, Chiapas, arriba La Chacona, cerca de la carretera a San Fernando, unos 10 km NO de Tuxtla Gutiérrez, 7 Jan 1951, *F. Miranda* 6812 (MEXU!; isotypes: F!, MEXU!).

ILLUSTRATIONS: Fig. 11; Anales Inst. Biol. Univ. Nac. México 24:95, fig. 11. 1953.

Shrubs to 2.5 m tall. Young stems terete to subquadrate, evenly pubescent with ascendant to ascendant-pressed eglandular trichomes 0.1–0.5 mm long. Leaves quaternate, petiolate, petioles to 10 mm long, blades lance-ovate to ovate, 6–54

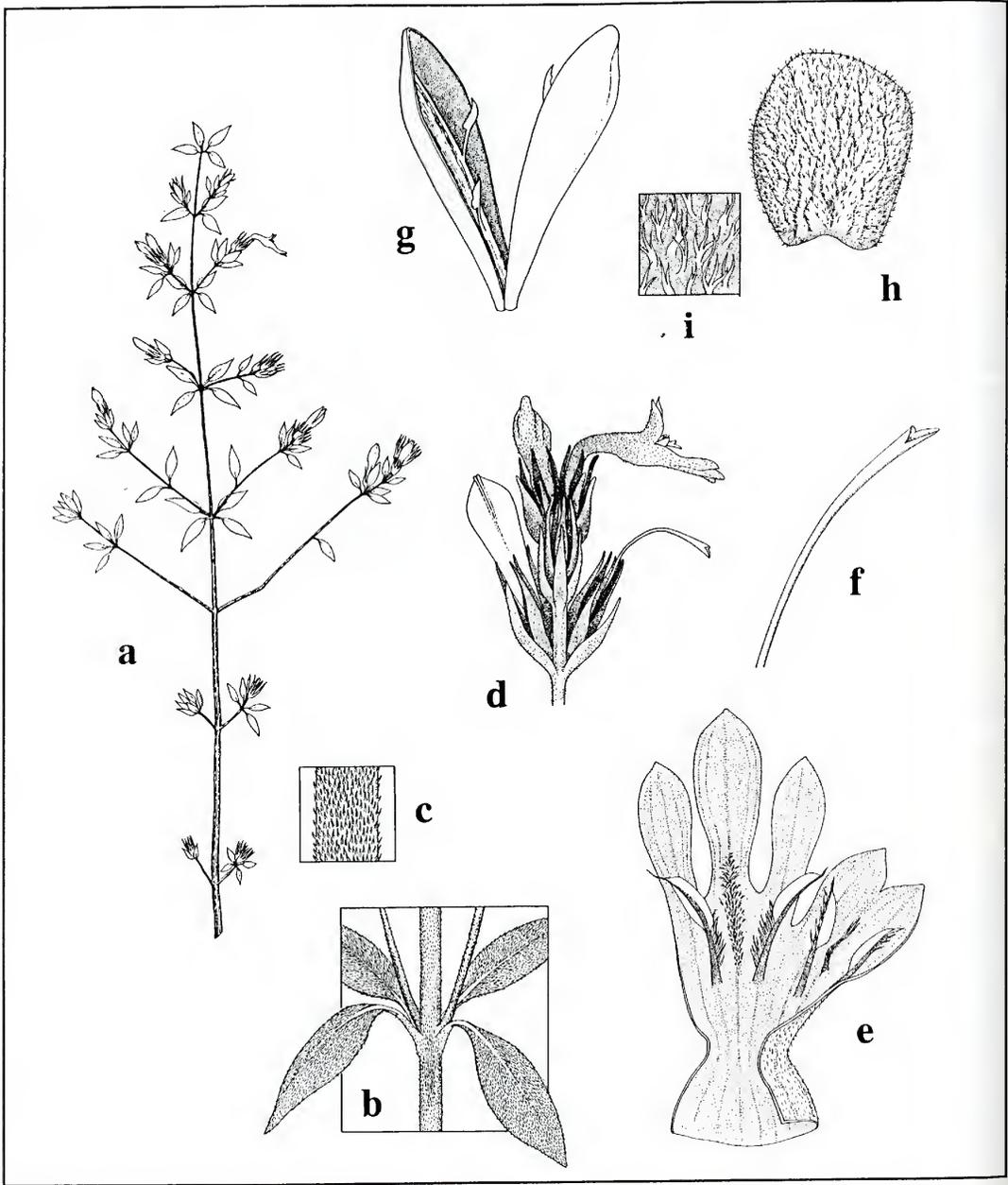


FIGURE 11. *Holographis parayana* Miranda (a-f from 50231, g-i from 50328). a, habit,  $\times 0.5$ ; b, vegetative node,  $\times 1.3$ ; c, cauline pubescence,  $\times 10$ ; d, inflorescence,  $\times 2.8$ ; e, corolla split open showing androecium,  $\times 5.5$ ; f, style with stigma,  $\times 9.3$ ; g, capsule,  $\times 2.6$ ; h, seed,  $\times 8.8$ ; i, surface of seed,  $\times 40$ . Drawn by Ellen del Valle.

(-75) mm long, 2-23 (-29) mm wide, 1.5-3.3 times longer than wide, acute (to acuminate) at apex, attenuate to acute to truncate at base, surfaces of young leaves evenly pubescent with erect to antrorse eglandular trichomes, abaxial surface often more densely so, surfaces of older leaves often with flexuose eglandular trichomes to 1 mm long mostly restricted to veins of abaxial surface, otherwise glabrate, margin entire, flat (or somewhat revolute on smaller leaves). Inflorescences of axillary and ter-

minal (at least appearing so) sessile to subsessile dichasiate spikes to 1 cm long, rachis pubescent with ascendant to flexuose eglandular trichomes 0.05-0.3 mm long, occasionally also with glandular trichomes to 0.1 mm long; dichasia opposite. Bracts triangular to lance-subulate, 1.5-4.5 mm long, 0.9-1.2 mm wide, abaxial surface pubescent like rachis or with erect to retrorse trichomes as well. Bracteoles triangular to lance-subulate, 1.5-4 mm long, equaling or shorter than subtending bract.

0.8–1 mm wide, abaxial surface pubescent like bracts. Calyx 2–5.5 mm long, lobes lance-subulate, pubescent like bracts. Corolla pinkish or white lined with pink or externally greenish white and internally white to light pink with darker pink markings, long axis horizontal during anthesis, 9–12 mm long, externally pubescent with erect to retrorse eglandular and often glandular trichomes 0.05–0.2 mm long, tube 3.5–6 mm long, expanded distally, upper lip 3–4 mm long, lobes 1–2 mm long, not more than 1/2 as long as upper lip, 1–1.5 mm wide, lower lip 4.8–6 mm long, lobes spatulate, 3–4.3 mm long, 1–2.5 mm wide. Stamens 3–3.2 mm long, inserted in distal 1/3 of corolla tube, filaments sparsely pubescent (anterior pair often more densely so), anthers partially exerted, 1.2–1.7 mm long; staminode 0.6–1 mm long, pubescent at apex. Style 4–6 mm

long, glabrous, stigma unequally 2-lobed, longer lobe 0.2–0.5 mm long, shorter lobe 0.05–0.1 mm long. Capsule 11–14.5 mm long, 4–5 mm in diameter, glabrous or sparsely pubescent with erect eglandular trichomes 0.1–0.2 mm long. Seeds subelliptic to subcircular, 2.7–3 mm long, 1.7–2.6 mm wide, pubescent with dendritic trichomes 0.1–0.3 mm long. ( $n = 13$ ). Flowering Dec–May; fruiting Mar–Jun.

Chiapas endemic: slopes in Tropical Deciduous Forest, Thorn Woodland, and Pine-Oak Forest; uncommon in Central Plateau and Central Depression; 700–1330 m. CHIAPAS COLLECTIONS: *Dan 6203* (CAS, K); *En 6851* (MEXU); *Mi 5874* (MEXU); *Mi 6827* (MEXU, US); *Mi 7209* (MEXU); 49084; 49602; 50150; 50231; 50328; 56263; 68227; 69078; 70769; 70846; 71006; 71318.

## 12. HYGROPHILA

*Hygrophila* R. Br. Prodr. 479. 1810. — TYPE: *Hygrophila angustifolia* R. Br.

Diffuse to erect often aquatic or hygrophilous perennial herbs with cystoliths. Nodes sometimes with spines from leaf axils. Leaves opposite, sessile to petiolate, either homomorphic (simple and entire) or heteromorphic (with pinnately divided basal or submerged leaves with filiform or linear, simple or forked segments and usually entire cauline or emergent leaves). Inflorescence of dichasia in leaf axils (these sometimes appearing as verticels) or forming a terminal thyrse; dichasia alternate or opposite, 1–many-flowered, sessile to subsessile (in ours). Flowers (in ours) homostylous, sessile, subtended by 2 homomorphic bracteoles. Calyx 5-lobed (or sometimes appearing 4-lobed with anterior pair partially connate), tube sometimes nearly as long as lobes, lobes equal to subequal. Corolla white (in ours, elsewhere also blue and purple), tube cylindrical proximally,  $\pm$  expanded distally into a throat, limb subregular to bilabiate, upper lip 2-dentate to 2-lobed, lower lip 3-lobed, corolla lobes contorted in bud. Stamens 4 and didynamous (in ours, elsewhere also 2 with 2 staminodes), inserted near or distal to midpoint of corolla tube, exerted from mouth of corolla (in ours), filaments sometimes basally connate in pairs, anthers 2-theous, thecae equal in length, parallel to sagittate, equally inserted, sometimes with a minute basal appendage, dehiscing toward lower lip (i.e., flower nototribal); pollen prolate to spheric to suboblate, 3–4(–5)-colporate, each mesocolpium with 2–5 pseudocolpi, pseudocolpi often unequal, exine rugulate to reticulate; staminode 0 (in ours). Style exerted from mouth of corolla, stigma unequally 2-lobed, 1 lobe sometimes greatly reduced or aborted. Capsule estipitate, linear-ellipsoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4–36, homomorphic, lenticular, covered with hygroscopic trichomes. ( $x = 16$ ).

A pantropical genus of 80–100 species, represented in Mexico by a widespread native species (occurring in Chiapas) and a naturalized exotic species, *H. polysperma* (Tamaulipas). *Hygrophila* sens. lat. includes numerous submerged aquatics, some of which are cultivated as decorative aquarium plants.

### 1. *Hygrophila costata* Nees, Pl. hort. bonn. icon. 2:7, t.3. 1824.

— TYPE: based on plants cultivated in the medical garden at Bonn; specimens, if any exist, not located. The description and figure in the protologue appear to pertain to our species.

*Hygrophila brasiliensis* (Spreng.) Lindau in Urban, Symb. antill. 2:183. 1900. — *Ruellia brasiliensis* Spreng. Syst. 2:822. 1825. — TYPE: Brazil, without locality or date, *F. Sellow s.n.*. Various Sellow collections from Brazil are extant at K that pertain to this species.

*Hygrophila guianensis* Nees in Benth., London J. Bot. 4:634. 1845. — TYPE: Guyana, Pirara, 1841–1842, *R. Schomburgk 2nd coll. 331* (291) (K!; isotypes: BM!, G photo at US!). The specimen at K is assumed to be the holotype. *Schomburgk 291* (K) from Guyana (“Essequibo”), collected in December 1841, also pertains to this species. The latter locality was cited by Nees (1847).

*Hygrophila conferta* Nees in Mart. Fl. bras. 9:21. 1847. — SYNTYPES: Brazil, Rio dos Indios, *J. Pohl 2113*, 5003 (W, photo at US!); São Paulo, Rio das Velhas, prope Fazenda da Piedade, *F. Sellow* (B, destroyed; isosynotype: K ex hb. Hook.!).

*Hygrophila rivularis* (Schltdl.) Nees in A. DC. Prodr. 11:87.1847. — *Ruellia rivularis* Schltdl. Linnaea 7:396. 1847. — TYPE: Mexico, Cuesta grande de Chiconquiaco, Sep 29, *C. Schiede 79* (presumably B, destroyed; isotypes: GOET–frag. at US!, W–photo at US!).

ILLUSTRATIONS: **Fig. 12**; Pl. hort. bonn. icon., t. 3. 1824; Contr. U.S. Natl. Herb. 31:59, fig. 21. 1951; Fieldiana, Bot. 24(10):378, fig. 86. 1974; Ann. Missouri Bot. Gard. 65:210, fig. 16. 1978; Ezcurra in Cabrera, Flora Provincia Jujuy (Rep. Argentina) 9:310, fig. 127. 1993;

Erect to spreading aquatic to subaquatic herbs to 1 m tall. Young stems quadrate-sulcate to hexagonal-ridged or becoming  $\pm$  flattened, internodes glabrous or pubescent with flexuose

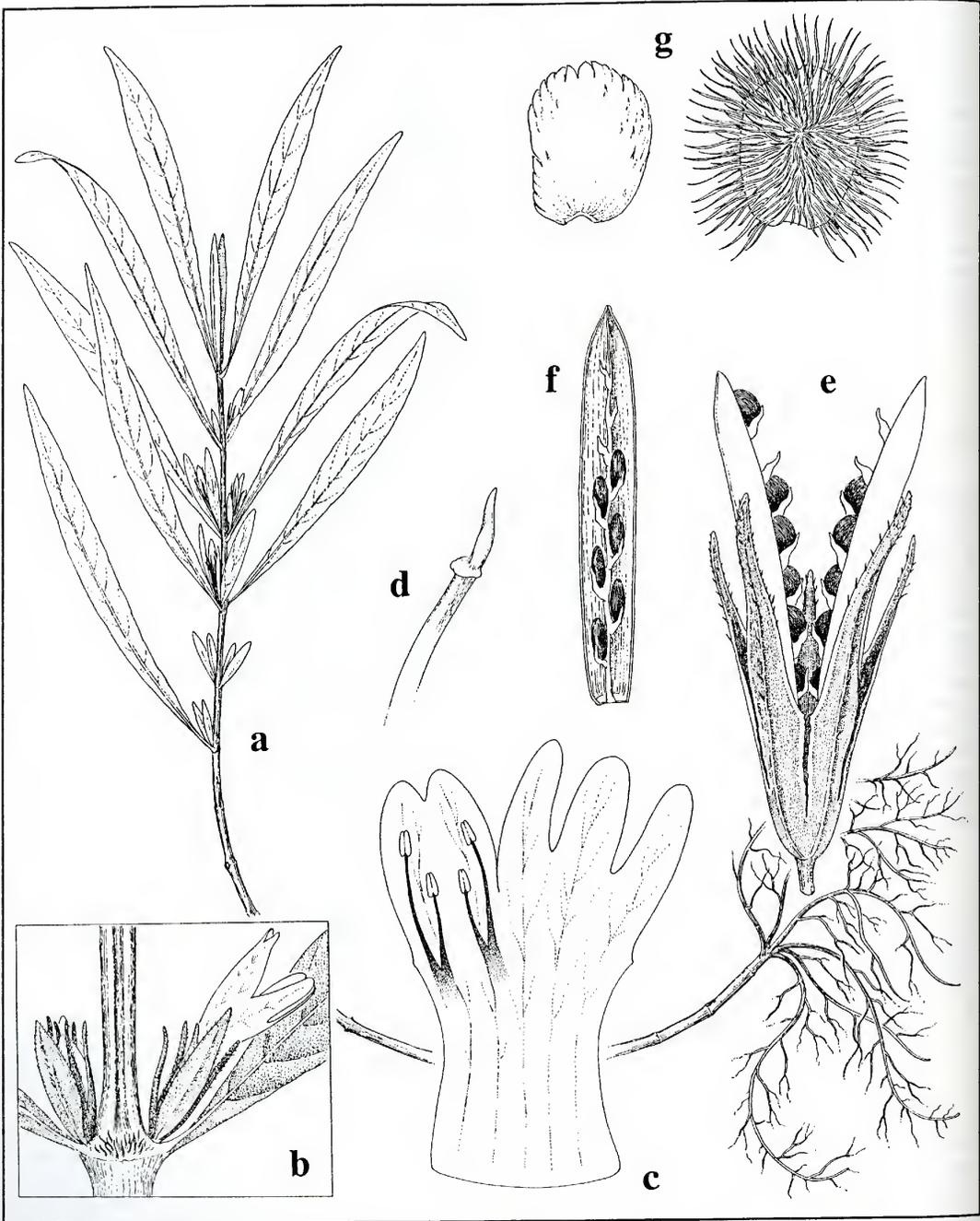


FIGURE 12. *Hygrophila costata* Nees. a, habit (Wendt 3527),  $\times 0.5$ ; b, node with flowers (Ventura & López 1354),  $\times 3.3$ ; c, corolla split open showing stamens (Wendt 3527),  $\times 6$ ; d, distal portion of style with stigma (Wendt 3109),  $\times 25$ ; e, calyx and capsule (Daniel & Butterwick 5884),  $\times 5.3$ ; f, capsule valve with seeds (Daniel & Butterwick 5884),  $\times 4.5$ ; g, seeds (Daniel & Butterwick 5884): dry state (left), moistened state (right),  $\times 22.5$ . Drawn by Ellen del Valle.

to antrorsely appressed eglandular trichomes 0.3–1 mm long, nodes usually pubescent with erect to flexuose eglandular trichomes up to 1 mm long. Leaves (proximal nodes often leafless) subsessile to petiolate, petioles to 25 mm long (naked

portion to 10 mm long), blades linear to narrowly elliptic, 15–175 mm long, 7–23 mm wide, 1.9–15.4 times longer than wide, acute to attenuate-tapering (often nearly to node) at base, acuminate at apex, surfaces and margin sparsely pubescent with

eglandular trichomes, margin entire to subcrenate. Inflorescence of dichasia in leaf axils, often appearing as verticels; dichasia opposite or alternate, 3-many-flowered, sessile to subsessile (i.e., borne on peduncles up to 1 mm long). Bracteoles and secondary bracteoles ovate-lanceolate to lanceolate to narrowly elliptic, 2-13 mm long, 0.6-2.5 mm wide, abaxial surface glabrous or with a few scattered eglandular trichomes (especially along midvein), margin ciliate. Flowers sessile to subsessile (i.e., with pedicels to 1 mm long). Calyx 5-lobed, 6-12 mm long, tube often rupturing in weak hyaline areas between lobes, lobes narrowly lanceolate, 1.3-3.3 times longer than tube, long-attenuate at apex, abaxial surface and margin glabrous or pubescent like bracteoles, margin hyaline. Corolla white, 7-11.5 mm long, externally pubescent with flexuose to retrorse eglandular trichomes 0.1-0.2 mm long, tube 4-7 mm long, proximal cylindrical portion of tube 2-4 mm long, throat 2-3 mm long, upper lip 2.8-4.5 mm long, lobes rounded, 0.3-1.2 mm long, 0.7-1 mm wide, lower lip 3-4.5 mm long, lobes linear to elliptic, 2.2-3 mm long, 0.8-1.5 mm wide. Stamens inserted near base of throat, longer pair 3-6 mm long, shorter pair 2.2-4 mm long, filaments proximally pubescent with

eglandular trichomes, thecae 0.8-1 mm long, lacking basal appendages. Style 3.5-6 mm long, glabrous, longer stigma lobe 0.5-0.6 mm long, shorter lobe 0.2 mm long or inconspicuous. Capsule 10-12 mm long, glabrous, retinacula 0.5-0.8 mm long. Seeds 16-20, subcircular in outline, 1.2-1.4 mm long, 0.8-1.1 mm wide. Flowering and fruiting Jan-Mar.

Aquatic or lacustrine habitat in "matorral"; rare in Pacific Coastal Plain; 0-100 m. Mex. (Ver., Gro., Oax., Chis.), Guat. Bel., Hond., Nic., C.R., Pan., Antill., S.A. (Col., Sur., Fr. Gui., Peru, Bol., Braz., Parag., Urug.). CHIAPAS COLLECTIONS: *Ve 908* (BM); *Ve 1354* (ENCB).

Many species have been recognized based on variation in leaf form (i.e., attachment, shape, size) in this complex. Additional synonyms are provided by Lindau (*Symb. antill.* 2:182-184. 1900), and other names will likely be added when their types have been studied.

The above description has been augmented by data from extralimital specimens.

### 13. HYPOESTES

*Hypoestes* Sol. ex R. Br. Prodr. 474. 1810. — TYPE: *Hypoestes floribunda* R. Br.

Spreading to erect perennial (in ours, elsewhere also annual) herbs or shrubs with cystoliths. Leaves opposite, petiolate, margin entire, sinuate, or dentate. Inflorescence of axillary or terminal dichasiate spikes or panicles of spikes or of dichasia in leaf axils, the latter sometimes appearing as verticels; dichasia alternate or opposite, 1-many-flowered, subtended by a leaf or bract, sessile to pedunculate. Bracts sometimes at least partially colored, opposite, margin entire (in ours). Bracteoles forming an involucre consisting of a partially connate outer pair and an inner pair free from each other but partially adnate to outer pair (in ours, elsewhere also with bracteoles neither connate nor adnate). Flowers homostylous, sessile (in ours), subtended by 2 pairs of bracteoles. Calyx 5-lobed, usually obscured by bracteoles, often  $\pm$  hyaline, lobes equal to subequal in length. Corolla resupinate 180°, rose-pink with white markings on lower lip (in ours, elsewhere also whitish, blue, purple, and red), tube subcylindrical to  $\pm$  abruptly expanded distally into a throat, limb bilabiate, upper lip (= true lower lip) 3-lobed, lower lip (= true upper lip) entire or 2-fid, corolla lobes imbricate in bud. Stamens 2, inserted near apex of corolla tube (in ours), exerted from mouth of corolla, anthers 1-theous, thecae lacking basal appendages, dehiscing  $\pm$  toward each other or  $\pm$  toward upper lip (i.e., flower  $\pm$  pleurotribal or  $\pm$  stenotribal); pollen prolate, 3-colporate, 6-pseudocolpate, pseudocolpi 2 per mesocolpium, exine reticulate; staminodes 0. Style exerted from mouth of corolla, stigma 2-lobed, lobes equal or unequal. Capsule stipitate, head subellipsoid (often with a slight medial constriction) to obovoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds (2-) 4, homomorphic, sublenticular. ( $x = 15$ ).

A paleotropical genus of 70 or more species that are much in need of revision. The Malagasy endemic, *H. phyllostachya*, is widely cultivated and has become naturalized in some regions of the Neotropics, including Mexico.

#### 1. *Hypoestes phyllostachya* Baker, J. Linn. Soc., Bot. 22:511. 1887.

— SYNTYPES: Madagascar, "central Madagascar," *R. Baron 4907* (K!; isosyntype: P!); Trabonji: Waldschatten, May 1880, *J. Hildebrandt 3444* (K!; isosyntype: P!).

ILLUSTRATIONS: Fig. 13; Fieldiana, Bot. (n.s.) 18:9, fig. 7. 1986.

Spreading perennial herbs to 6 (-10) dm tall. Young stems quadrate-sulcate (to hexagonal), pubescent (especially along edges) with antrorse to antrorsely subappressed eglandular trichomes 0.2-0.6 mm long, becoming glabrate. Leaves (intergrading into bracts distally) petiolate, petioles to 55 mm long, blades ovate, 31-105 mm long, 13-57 mm wide, 1.4-1.8 times longer than wide, acute at apex, rounded to truncate at base,

surfaces beset with pink irregularly shaped (often subcircular to elliptic) and sized (mostly 0.4-13 mm long) spots, surfaces and margin sparsely pubescent with cauline type trichomes. Inflorescence of axillary and terminal dichasiate spikes (collectively forming a terminal leafy panicle) or of dichasia in leaf axils, spikes to 21 cm long, sometimes branching from axils of bracts from near base of spike up to about midspike (i.e., becoming panicles), rachis of spikes pubescent like young stems or evenly pubescent with erect to flexuose eglandular and glandular trichomes 0.2-0.4 mm long; dichasia 1-several-flowered, sessile, alternate along spikes, alternate or opposite in leaf axils with 1-2 present per axil, dichasia in leaf axils sometimes accompanied by 1 or more axillary spikes. Bracts opposite, those of a pair heteromorphic, usually petiolate with petioles to 12 mm

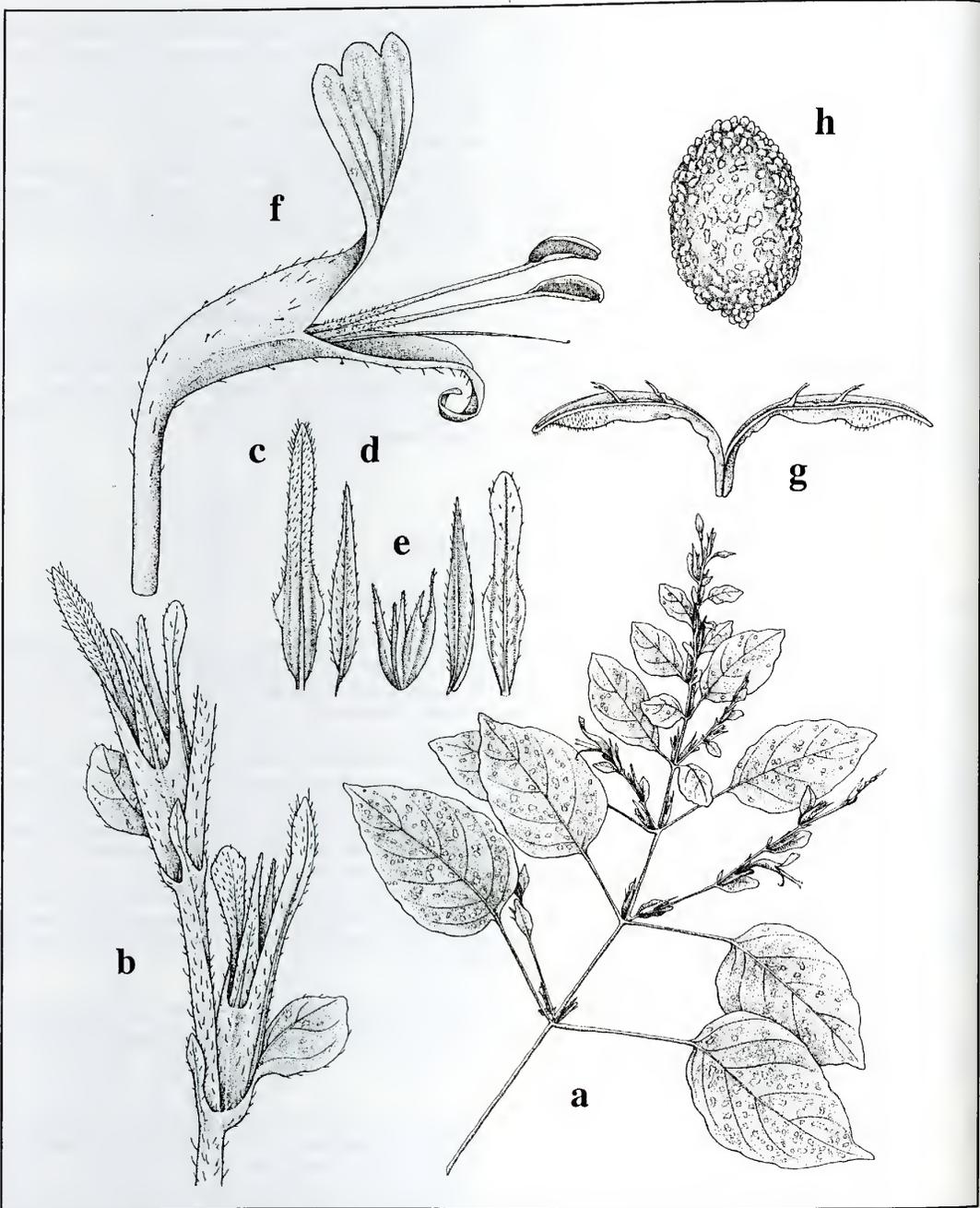


FIGURE 13. *Hypoestes phyllostachya* Baker. a, habit (McClintock s.n.),  $\times 0.4$ ; b, inflorescence nodes (Daniel & Almeda 6372),  $\times 3.5$ ; c, outer bracteoles (Daniel s.n.),  $\times 2.5$ ; d, inner bracteoles (Daniel s.n.),  $\times 2.5$ ; e, calyx (Daniel s.n.),  $\times 2.5$ ; f, flower with calyx removed (Daniel & Almeda 6372),  $\times 3.5$ ; g, capsule (Daniel & Almeda 6372),  $\times 3.5$ ; h, seed (Daniel & Almeda 6372),  $\times 15$ . Drawn by Jenny Speckels.

long, blades elliptic to subcircular, pubescent with erect to flexuose glandular and/or eglandular trichomes 0.1–1.2 mm long, fertile bracts larger than sterile ones, 6–45 mm long (including petioles), 5–21 mm wide, spotted like leaves, sterile bracts often inconspicuous, 2.3–12 mm long (including peti-

oles), 1–8.5 mm wide, 0.1–0.5 times as long as fertile bracts. Flowers subtended by 2 pairs of bracteoles, outer pair fused proximally for  $< \frac{1}{2}$  their length, 8–17 mm long, 1.5–2 mm wide, pubescent like bracts, one slightly (up to 2.5 mm) longer than the other, the longer one lanceolate, the shorter one lanceo-

late to  $\pm$  hourglass-shaped (i.e.,  $\pm$  constricted distal to middle), inner pair partially fused to outer pair,  $\pm$  equal in length, lanceolate, 11–13 mm long, 1.1 mm wide, externally pubescent like outer pair, additional pairs of bracteoles present if additional flowers present. Calyx 5-lobed, partially hyaline, 5–7 mm long, externally pubescent with glandular trichomes to 0.2 mm long, tube 2.5–3.5 mm long, lobes lance-subulate to subulate, 2–3.5 mm long, subequal. Corolla rose-pink with white markings on lower lip, 20–29 mm long, externally pubescent with erect to flexuose eglandular trichomes to 0.8 mm long, tube 10–14 mm long, expanded near or just distal to middle into a throat to 6 mm long and 2.3–3 mm in diameter (measured flat near midpoint), upper lip 9–15 mm long, reflexed, 3-lobed, lobes rounded 1.5 mm long, 1.8–2.3 mm wide, lower lip 8.5–12 mm long, recoiled, entire. Stamens 8–12 mm long, filaments rose-pink, sparsely pubescent proximally with glandular trichomes, thecae dark rose-pink, 1.7–2 mm long. Style 15–21 mm long, glabrous, stigma 0.4 mm long, unequally 2-lobed. Nectar disk

2-lobed, 1.3 mm high, enveloping proximal portion of ovary. Capsule 9–11 mm long, externally pubescent (at least distally) with erect to flexuose to retrorse eglandular (and sometimes glandular) trichomes 0.1–0.2 mm long. Seeds 4, subelliptic in outline, 1.5–2.2 mm long, 0.7–1.8 mm wide, surfaces tuberculate. ( $n = 15$ ). Flowering and fruiting Oct (and probably throughout year).

Introduced weed in flower bed; rare in Central Plateau (in Comitán); 1480 m. Mex. (Mich., Ver., Oax., Chis.), Hond., C.R., Old World. CHIAPAS COLLECTION: 70764.

This native of Madagascar is a commonly cultivated house plant in temperate regions and has become naturalized and weedy in parts of the American tropics. It was known previously in the nursery trade as *H. sanguinolenta* Hook. f., a name that refers to another species (with red veins) from Madagascar.

## 14. JUSTICIA

- Justicia* L. Sp. pl. 1:15. 1753, nomen cons. prop. — LECTOTYPE (Hitchcock in Hitchcock and Green, International Botanical Congress, Cambridge (England), 1930: Nomenclature Proposals by British Botanists. 116. 1929): *Justicia hyssopifolia* L.
- Dianthera* L. Sp. pl. 1:27. 1753. — TYPE: *Dianthera americana* L. (= *Justicia americana* (L.) Vahl).
- Beloperone* Nees in Wall. Pl. asiat. rar. 3:76. 1832. — LECTOTYPE (Graham 1988:609): *Beloperone amherstiae* Nees (= *Justicia brasiliiana* Roth).
- Rhytiglossa* Nees in Lindley, Nat. Syst. ed. 2, 444. 1836. — LECTOTYPE (Wasshausen in Lundell, Fl. Tex. 1(3):276. 1966): *Rhytiglossa origanoides* Nees.
- Stethoma* Raf. Fl. Tellur. 4:61. 1838. — TYPE: *Stethoma pectoralis* (Jacq.) Rafin. (= *Justicia pectoralis* Jacq.)
- Chaetothylax* Nees in Mart. Fl. bras. 9:153. 1847. — TYPE: *Chaetothylax tocaninus* Nees (= *Justicia tocantina* (Nees) V.A.W. Graham).
- Cyrtanthera* Nees in Mart. Fl. bras. 9:99. 1847. — LECTOTYPE (Leonard 1958:650): *Cyrtanthera magnifica* Nees (= *Justicia carnea* Lindl.)
- Sericographis* Nees in Mart. Fl. bras. 9:107. 1847. — LECTOTYPE (Leonard 1958:650): *Sericographis rigida* Nees (= *Justicia sericographis* V.A.W. Graham).
- Sarotheca* Nees in Mart. Fl. bras. 9:113. 1847. — LECTOTYPE (Graham 1988:612): *Sarotheca elegans* Nees (= *Justicia sarotheca* V.A.W. Graham).
- Jacobinia* Nees in Moric. Pl. Nouv. Am. 156. 1847. — TYPE: *Jacobinia lepida* Nees (= *Justicia lepida* (Nees) Wassh.).
- Calliaspidia* Bremek. Verh. K. Ned. Akad. Wet. II, 45:54. 1948. — TYPE: *Calliaspidia guttata* (Brandegee) Bremek. (= *Beloperone guttata* Brandegee; = *Justicia brandegeana* Wassh. & L.B. Sm.).
- Beloperonides* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:162. 1855. — TYPE: *Beloperonides macrantha* Oerst. (= *Justicia angustiflora* D.N. Gibson).
- Chaetothylopsis* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:163. 1855. — TYPE: *Chaetothylopsis micrantha* Oerst. (= *Justicia micrantha* (Oerst.) V.A.W. Graham).
- Chiloglossa* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:160. 1855. — TYPE: *Chiloglossa glabra* Oerst. (= *Justicia oerstedii* Leonard).
- Cyrtantherella* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:148. 1855. — TYPE: *Cyrtantherella macrantha* (Benth.) Oerst. (= *Justicia macrantha* Benth.).
- Siphonoglossa* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:159. 1855. — TYPE: *Siphonoglossa ramosa* Oerst. (= *Justicia ramosa* (Oerst.) V.A.W. Graham).
- Neohallia* Hemsl. Biol. cent.-amer., Bot. 2:519. 1882. — TYPE: *Neohallia borraerae* Hemsl. (= *Justicia borraerae* (Hemsl.) T.F. Daniel).
- Tabascina* Baill. Hist. pl. 10:445. 1891. — TYPE: *Tabascina lindenii* Baill. (= *Justicia tabascina* T.F. Daniel).
- Chaetochlamys* Lindau, Bull. Herb. Boissier 3:490. 1895. — LECTOTYPE (Graham 1988:604): *Chaetochlamys macrosiphon* Lindau (= *Justicia macrosiphon* (Lindau) V.A.W. Graham).
- Drejerella* Lindau in Urban, Symb. antill. 2:222. 1900. — LECTOTYPE (Graham 1988:607): *Drejerella origanoides* (Nees) Lindau (= *Adhatoda origanoides* Nees; = *Justicia alainii* Stearn).
- Ixtania* M.E. Jones, Contr. West. Bot. 15:151. 1929. — TYPE: *Ixtania acicularis* M.E. Jones (= *Justicia ixtania* T.F. Daniel).
- Psacodocalymma* Bremek. Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 45:55. 1948. — TYPE: *Psacodocalymma comata* (L.) Bremek. (= *Justicia comata* L.).
- Thalestris* Rizzini, Dusenja 3:189. 1952. — TYPE: *Thalestris graminiformis* Rizzini (= *Justicia comata* L.).

Decumbent to erect perennial herbs, shrubs, or small trees with cystoliths. Leaves opposite, sessile to petiolate, margin entire to sinuate to crenate. Inflorescence of dichasia in leaf axils (or in axil of 2 partially fused bracts forming a cupulate involucre)

or of axillary or terminal dichasiate spikes, racemes, thyrses, or panicles; dichasia alternate or opposite, 1 (–3)-flowered, subtended by a leaf or a bract, sessile or pedunculate. Bracts alternate or opposite, green or brightly colored, prominent or inconspicuous, margin entire (in ours). Flowers homostylous, sessile or pedicellate, subtended by 2 homomorphic bracteoles. Calyx deeply 4–5-lobed, lobes equal or unequal in size, posterior lobe sometimes greatly reduced in flowers with 5 calyx lobes. Corolla greenish, white, yellow, orange, pinkish, red, or purplish, usually with white or colored markings (often restricted to lower lip), tube cylindrical to expanded distally, usually lacking a distinct throat, limb strongly zygomorphic, bilabiate, upper lip internally rugulate (i.e., with a styler furrow), entire to 2-lobed, lower lip 3-lobed, corolla lobes imbricate in bud. Stamens 2, inserted at various positions within corolla tube, exerted from mouth of corolla, anthers 2-theous (1 theca rarely sterile), thecae equal or unequal in length, equally inserted, unequally inserted (but overlapping for some portion of their length), or superposed (i.e., not overlapping), parallel to perpendicular, 1 or both with a basal appendage or appendages absent, dehiscent toward lower lip (i.e., flower nototribal); pollen subprolate to perprolate, 2–4-aperturate (varying from porate to colporate with distinctness of colpi sometimes questionable), apertures flanked on each side by 1–several rows of  $\pm$  circular insulae and/or peninsulae or by both a solid band of exine and a pseudocolpus, exine usually reticulate; staminodes 0 (although pubescent thickenings near attachment of filaments rarely present). Style exerted from mouth of corolla, stigma lobes indistinct to distinct, when distinct equal to unequal in length (1 lobe sometimes vestigial). Capsule stipitate, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 2–4, homomorphic, lenticular to globose. ( $x = 11, 14$ ).

*Justicia* is the largest genus of Acanthaceae with estimates of up to 600 species worldwide. It is also the largest genus of the family in Mexico with about 80 species there. Thirty-five species of *Justicia* are recognized as occurring in Chiapas. Morphological diversity in the genus is extensive and the above generic description is derived from North and Central American species only. The synonymy given above only includes genera in which North and Central American species have been routinely treated. A comprehensive generic account of *Justicia* that lists all generic synonyms is provided by Graham (1988). Features common to the genus on a worldwide basis are: upper lip of corolla rugulate, androecium of two 2-theous stamens and no staminodes, and a stipitate capsule with four (or fewer) seeds. Additional species of *Justicia* will undoubtedly be added to those already known from Chiapas. Several collections of uncertain taxonomic status are not fully treated but are discussed where appropriate in the species accounts below. Non-native species of *Justicia* that are cultivated in Chiapas include *J. carnea* Lindl. (Brazilian plume) and *J. brandegeana* Washh. & L.B. Sm. (shrimp plant).

REFERENCES: MEAGHER, M. 1974. Biosystematic investigations in the genus *Justicia* (Acanthaceae). Ph.D. Thesis, Univ. of South Florida; GRAHAM, V.A. 1988. Delimitation and infra-generic classification of *Justicia* (Acanthaceae). Kew Bull. 43:551–624; DANIEL, T.F. 1995. New and reconsidered Mexican Acanthaceae. VI. Chiapas. Proc. Calif. Acad. Sci. 48:253–282.

- a. Inflorescence of cupulate involucre formed by 2 bracts connate for (1/4–) 1/3–1/2 their length, fused proximal portion 15–35 mm long; capsule 44–52 mm long; seeds 8–10 mm long . . . . . 3. *J. borrererae*
- aa. Inflorescence of dichasia in leaf axils or of dichasiate spikes, racemes, thyrses, or panicles, bracts not connate; capsule 3–23 mm long; seeds 0.9–4 mm long.
  - b. Corolla 3–6 mm long; capsule 3–4 mm long; branches of panicles congested at nodes and appearing verticillate . . . . . 13. *J. comata*
  - bb. Corolla 6.5–70 mm long; capsule 5–23 mm long; branches of panicles (if present) neither congested at nodes nor appearing verticillate.
  - c. Corolla 6.5–13 mm long.
    - d. Bracts of a pair heteromorphic, fertile bracts conspicuously larger than sterile bracts; 2 pubescent staminodelike thickenings present near midpoint of corolla tube.
    - e. Young stems with trichomes concentrated in 2 lines; inflorescence of axillary dichasiate spikes; bracteoles 0.4–1 mm wide; style pubescent; seeds 4, covered with low rounded papillae or ridges; pollen 3-aperturate . . . . . 10. *J. chol*
    - ee. Young stems with trichomes restricted to 4 lines; inflorescence of (axillary and) terminal panicles of dichasiate spikes; bracteoles 1.2–2.2 mm wide; style glabrous; seeds 2, smooth; pollen 4-aperturate . . . . . 25. *J. nevlingii*
  - dd. Bracts of a pair homomorphic; staminodelike thickenings absent.
    - f. Dichasia borne in axils of leaves or subfoliose bracts; bracteoles spatulate, apically rounded to truncate (to subemarginate) . . . . . 24. *J. multicaulis*
    - ff. Dichasia borne in axils of bracts in a distinct inflorescence; bracteoles triangular-subulate to subulate to lanceolate to linear to oblanceolate, apically acute to attenuate.

- g. Corolla externally glabrous.
  - h. Leaves sessile or with a petiole to 1 mm long, blades linear to linear-oblongate, 1.5–4.8 mm wide; thecae glabrous; capsule 5–7 mm long . . . . . 20. *J. lindeniana*
  - hh. Leaves petiolate, petioles to 25 mm long, blades lance-ovate to ovate-elliptic to elliptic to subcircular to obovate-elliptic, 7–67 mm wide; upper theca pubescent; capsule 9–14 mm long . . . . . 5. *J. breviflora*
- gg. Corolla externally pubescent.
  - i. Calyx 5-lobed with lobes equal in size.
    - j. Inflorescence of loosely bracteate 1-sided lax spikes or panicles; dichasia alternate; bracts lance-subulate to subulate, 1.6–3.5 mm long, 0.4–1 mm wide; bracteoles 2–4 mm long, 0.3–0.5 mm wide; thecae of a pair superposed, 1–1.5 mm distant, glabrous . . . . . 6. *J. campechiana*
    - jj. Inflorescence of densely bracteate 4-sided stout spikes; dichasia opposite; bracts broadly ovate, 8–12 mm long, 5–9 mm wide; bracteoles 5.5–9 mm long, 1.2–2.2 mm wide; thecae of a pair unequally inserted but contiguous, pubescent with eglandular trichomes . . . . . 16. *J. herpetacanthoides*
  - ii. Calyx 4-lobed or 5-lobed with lobes conspicuously unequal (posterior lobe greatly reduced in size).
    - k. Thecae lacking basal appendages.
      - l. Bracts ovate to elliptic to subcircular to obovate to oblanceolate; petioles glandular . . . . . 7. *J. candelariae*
      - ll. Bracts subulate to lance-subulate; petioles eglandular.
        - m. Thecae of a pair parallel to subparallel, glabrous; capsule pubescent with glandular and eglandular trichomes.
          - n. Young stems uniformly pubescent; corolla 7.5–10 mm long, tube ± expanded distally; calyx 5-lobed with posterior lobe greatly reduced (4+1); plants of wet habitats . . . . . 26. *J. pectoralis*
          - nn. Young stems evenly pubescent; corolla 13–28 mm long, tube ± cylindrical; calyx 4-lobed with lobes equal; plants of dry habitats . . . . . 28. *J. ramosa*
        - mm. Thecae of a pair subperpendicular to perpendicular, upper theca dorsally pubescent with eglandular trichomes; capsule glabrous or pubescent with eglandular trichomes only . . . . . 5. *J. breviflora*
    - kk. Lower theca with a prominent bulbous basal appendage.
      - o. Corolla tube 1.1–1.2 mm in diameter near midpoint; abaxial surface of bracts and bracteoles glabrous; capsule 6.5–7 mm long, pubescence including glandular trichomes 0.05–0.1 mm long . . . . . 29. *J. rzędowskii*
      - oo. Corolla tube 2–4.5 mm in diameter near midpoint; abaxial surface of bracts and bracteoles pubescent; capsule 10–20 mm long, pubescence eglandular or including glandular trichomes ≥ 0.2 mm.
        - p. Corolla rose-pink with white markings, 7–11 mm long, lower lip 3–5.5 mm long; thecae 0.7–1.1 mm long, those of a pair superposed, 0.3–0.5 mm distant, glabrous; capsule 10–13 mm long . . . . . 27. *J. pringlei*
        - pp. Corolla greenish or yellowish white tinged with pink and with maroon markings, 12–21 mm long, lower lip 6.5–11 mm long; thecae 1.2–2.5 mm long, those of a pair unequally inserted but contiguous, dorsally pubescent; capsule 14–20 mm long . . . . . 30. *J. salviiflora*
- cc. Corolla 14–70 mm long.
  - q. Corolla 14–20 mm long.
    - r. Calyx 5-lobed with lobes equal in size.
      - s. Corolla white with greenish and maroon markings; calyx 3–5.5 mm long; bracts broadly ovate; thecae dorsally pubescent with eglandular trichomes, lower theca of a pair appendaged at base with an appendage 0.4–0.5 mm long; capsule 7–8.5 mm long; seeds lenticular, lacking trichomes, surfaces papillose . . . . . 16. *J. herpetacanthoides*
      - ss. Corolla lavender to purplish to reddish; calyx 7–12 mm long; bracts elliptic to obovate to spatulate; thecae glabrous, lower theca of a pair lacking a basal appendage or with an appendage to 0.1 mm long; capsule 10–18 mm long; seeds subspheric, pubescent with eglandular trichomes that exfoliate leaving a smooth shiny surface . . . . . 8. *J. carthagenensis*
    - rr. Calyx 4-lobed or 5-lobed with lobes conspicuously unequal (i.e., posterior lobe greatly reduced in size).

- t. Pubescence of young stems including an overstory of evenly disposed glandular and eglandular trichomes, eglandular trichomes 1.5–3 mm long; calyx 12–18 mm long; bracts 10–25 mm long . . . . . 11. *J. clinopodium*
- tt. Pubescence of young stems lacking an overstory as described above, eglandular trichomes to 1.5 mm long; calyx 2.5–12 mm long; bracts 1.5–6.5 mm long (rarely to 15 mm long in *J. salviiflora*).
- u. Thecae lacking basal appendages; capsule 8–14 mm long; seeds papillose to tuberculate but lacking barbed bristles.
- v. Bracts 0.3–0.7 mm wide; corolla tube 9–18 mm long, 0.7–0.9 mm in diameter near midpoint; thecae of a pair parallel, glabrous; capsule pubescent with glandular and eglandular trichomes . . . . . 28. *J. ramosa*
- vv. Bracts 0.8–1.6 mm wide; corolla tube 4–6.5 mm long, 1.1–3 mm in diameter near midpoint; thecae of a pair subperpendicular to perpendicular, upper theca dorsally pubescent with eglandular trichomes; capsule glabrous or pubescent with eglandular trichomes only . . . . . 5. *J. breviflora*
- uu. Lower theca with a prominent bulbous basal appendage; capsule 14–20 mm long; seeds with subconic barbed trichomelike bristles . . . . . 30. *J. salviiflora*
- qq. Corolla 21–70 mm long.
- w. Calyx 5-lobed with lobes equal to subequal in size or with posterior lobe slightly larger than others.
- x. Corolla externally glabrous.
- y. Bracts (other than proximalmost pair) subopposite to alternate, obovate-spatulate, (6) 7.5–16 mm long, 2–5.5 mm wide; bracteoles spatulate, (5.5–) 7.5–13.5 mm long . . . . . 18. *J. jitotolana*
- yy. Bracts opposite, triangular to subulate to lance-subulate to elliptic, 1–8 mm long, 0.5–1.5 mm wide; bracteoles triangular to subulate to ovate, 1–3 mm long.
- z. Corolla white, 21–26 mm long; stamens inserted near base of corolla tube . . . . . 14. *J. eburnea*
- zz. Corolla red or orange, 31–68 mm long; stamens inserted near apex of corolla tube.
- a'. Corolla 55–68 mm long, lower lip 25–27 mm long with lobes 2.5–4 mm long, 3.5–5 mm wide; dichasia pedunculate, peduncles 3–15 mm long; thecae crescent-shaped . . . . . 21. *J. macrantha*
- aa'. Corolla 31–55 mm long, lower lip 11–21 mm long with lobes 0.5–2.5 mm long, 0.8–1.7 mm wide; dichasia sessile to subsessile (i.e., peduncles to 1 mm long); thecae linear-ellipsoid.
- b'. Young stems glabrous; corolla red, externally glabrous; lower lip spreading (not recoiled); thecae dorsally pubescent with eglandular trichomes . . . . . 12. *J. colorifera*
- bb'. Young stems pubescent; corolla orange, externally pubescent only near base of tube with inconspicuous glandular trichomes to 0.1 mm long, lower lip recoiled; thecae glabrous . . . . . 32. *J. spicigera*
- xx. Corolla externally pubescent.
- c'. Corolla yellow to orange.
- d'. Corolla externally glabrous distally and pubescent only near base of tube with inconspicuous glandular trichomes to 0.1 mm long; lower lip recoiled . 32. *J. spicigera*
- dd'. Corolla externally pubescent with conspicuous eglandular (and often glandular) trichomes ± throughout; lower lip spreading (not recoiled).
- e'. Corolla cobra-like in bud (i.e., erect but prominently curved near apex so that distal portion of bud is horizontal); thecae lacking basal appendages . . . . . 1. *J. aurea*
- ee'. Corolla not conspicuously curved near apex in bud; thecae with basal appendages.
- f'. Bracts subulate to lance-subulate, 1.5–3 mm long, 0.4–0.7 mm wide; bracteoles subulate, 1.2–1.5 mm long; flowers pedicellate, pedicels 1.5–2.5 mm long . . . . . 35. *J. turipachensis*
- ff'. Bracts ovate to lanceolate to linear to elliptic to oblanceolate to obovate-elliptic, (4.5–) 7–22 mm long, (1.7–) 2–9.5 mm wide; bracteoles ovate to elliptic to linear to elliptic-oblanceolate, (4.5–) 5.5–19 mm long; flowers sessile.

- g'. Leaves sessile, usually  $\pm$  amplexicaulis at base; corolla yellow speckled with red, externally pubescent with glandular and eglandular trichomes . . . . . 23. *J. mirandae*
- gg'. Leaves (sessile to) petiolate, never amplexicaulis at base; corolla yellow or orange, externally pubescent with eglandular trichomes only.
- h'. Calyx (5-) 5.5-7.5 mm long, posterior lobe larger than others, ovate-elliptic to elliptic to obovate-elliptic, 1.5-2.8 mm wide; bracts opposite; seeds papillose but lacking trichomes . . . . . 15. *J. fimbriata*
- hh'. Calyx 8-9.5 mm long, posterior lobe similar to others, linear, 1-1.3 mm wide; bracts alternate; seeds covered with glandular and eglandular trichomes < 0.05 mm long . . . . . 4. *J. breedlovei*
- cc'. Corolla lavender to pink to red to purple.
- i'. Trichomes of young stems yellowish; bracts alternate; dichasia  $\pm$  secund; thecae dorsally pubescent with eglandular trichomes; capsule glandular . . . . . 19. *J. kanal*
- ii'. Trichomes of young stems not yellowish; bracts opposite; dichasia not secund; thecae glabrous; capsule lacking glandular trichomes.
- j'. Calyx 3.5-5 mm long; corolla red; thecae of a pair equally inserted; capsule glabrous; seeds tuberculate but lacking trichomes . . . . . 31. *J. soliana*
- jj'. Calyx 7-12 mm long; corolla mostly shades of pink or purple; thecae of a pair unequally inserted; capsule pubescent with eglandular trichomes; seeds pubescent with eglandular trichomes to 0.1 mm long (these sometimes exfoliating on mature seeds and revealing a shiny smooth surface).
- k'. Bracts heteromorphic, fertile bracts larger than sterile bracts; dichasia alternate; corolla tube 5-8 mm in diameter near midpoint; lower theca of a pair with a prominent basal appendage to 1 mm long; occurring in Tropical Deciduous Forest . . . . . 9. *J. caudata*
- kk'. Bracts homomorphic; dichasia opposite; corolla tube 1.5-4.5 mm in diameter near midpoint; lower theca of a pair lacking a basal appendage or with an inconspicuous appendage to 0.1 mm long; occurring in Tropical Rain Forest and Evergreen Seasonal Forest . . . . . 8. *J. carthagensis*
- ww. Calyx 4-lobed or 5-lobed with lobes conspicuously unequal (i.e., posterior lobe greatly reduced in size).
- l'. Lower theca of a pair with a  $\pm$  prominent basal appendage.
- m'. Bracts (other than proximalmost pair) subopposite to alternate; bracteoles spatulate, 1-3 mm wide . . . . . 18. *J. jitotolana*
- mm'. Bracts opposite; bracteoles subulate to lanceolate to linear, 0.3-1.2 mm wide.
- n'. Corolla 12-22 mm long, externally pubescent with eglandular trichomes only (nearly glabrous in *J. clinopodium*).
- o'. Young stem pubescence including an overstory of eglandular trichomes 1.5-3 mm long; corolla dark pink-purple with white markings, externally glabrous except for a few trichomes on lower lip; calyx 12-18 mm long; thecae glabrous; capsule 10-14 mm long, glabrous . . . . . 11. *J. clinopodium*
- oo'. Young stem pubescence including eglandular trichomes to 1.5 mm long; corolla greenish or yellowish white tinged with pink and with maroon markings, externally pubescent throughout; calyx 5.5-12 mm long; thecae dorsally pubescent; capsule 14-20 mm long, pubescent . . . . . 30. *J. salviiflora*
- nn'. Corolla 24-36 mm long, externally pubescent with glandular and eglandular trichomes.
- p'. Corolla white or yellowish; dichasia alternate (or opposite at proximalmost node only); bracts lanceolate to lance-subulate, 2-5 mm long, abaxially eglandular; thecae of a pair unequally inserted but contiguous, connective unbranched; capsule glabrous . . . . . 2. *J. bartlettii*
- pp'. Corolla dark pink-red with white markings; dichasia opposite; bracts linear to oblanceolate to obovate, 6-14 mm long, distal bracts abaxially glandular; thecae of a pair superposed (1.5-3 mm distant), borne on a branched connective; capsule glandular . . . . . 33. *J. teletheca*
- ll'. Thecae lacking basal appendages.

- q'. Calyx 5-lobed with posterior lobe greatly reduced; bracts lanceolate to lance-ovate, 1.6–2.5 mm wide . . . . . 34. *J. tianguensis*
- qq'. Calyx 4-lobed with lobes equal to subequal; bracts subulate to lance-subulate, 0.3–1 mm wide.
- r'. Corolla 13–28 mm long, tube 0.7–0.9 mm in diameter near midpoint; calyx 2.5–5 mm long; dichasia opposite, not secund; bracteoles 0.3–0.4 mm wide; thecae 0.8–1.3 mm long, those of a pair parallel; capsule 8–11 mm long . . . 28. *J. ramosa*
- rr'. Corolla 34–45 mm long, tube 2.3–5 mm in diameter near midpoint; calyx 5.5–18 mm long; dichasia alternate,  $\pm$  secund; bracteoles 0.6–1 mm wide; thecae 2–3 mm long, those of a pair subperpendicular to perpendicular; capsule 16–20 mm long.
- s'. Corolla red; calyx 11–18 mm long, lobes widest near middle; bracts 3–5 mm long, abaxially glabrous; capsule glabrous. . . . . 17. *J. inaequalis*
- ss'. Corolla pinkish orange; calyx 5.5–9 mm long, lobes widest at base; bracts 1.8–2.5 mm long, abaxially pubescent; capsule pubescent . . . 22. *J. madrensis*

1. ***Justicia aurea* Schltl. Linnaea 7:393. 1832, non *Justicia aurea* (Rose) Lindau (1897).**

— *Cyranthera aurea* (Schltl.) Nees in A. DC. Prodr. 11:329. 1847. — *Jacobinia aurea* (Schltl.) Hemsl. Diagn. pl. nov. mexic. 35. 1879, non *Jacobinia aurea* Hiern (1877–78). — TYPE: "in sepibus pagi Tioselo," 29 August, A. Schiede 75 (B?, destroyed or HAL?).

*Justicia vellasquezii* Bertol. Novi Comment. Acad. Sci. Inst. Bononiensis 4:406. 1840. — *Adhatoda vellasquezii* (Bertol.) Nees in A. DC. Prodr. 11:409. 1847, as "*velasquezii*." — TYPE: Guatemala, without locality, 1836, *J. Vellásquez s.n.* (BOLO, microfiche!).

*Justicia umbrosa* Benth. Pl. hartw. 79. 1841. — *Cyranthera umbrosa* (Benth.) Nees in A. DC. Prodr. 11:329. 1847. — *Adhatoda umbrosa* Nees in A. DC. Prodr. 11:406. 1847. — *Ecbolium umbrosum* Kuntze, Revis. gen. pl. 2:981. 1891. — *Jacobinia umbrosa* Blake, Contr. Gray Herb. 52:103. 1917. — TYPE: Guatemala, *T. Hartweg 552* (K ex hb. Benth.); isotypes: BM!, K ex hb. Hook.!).

*Cyranthera catalpaefolia* Nees, Bot. Mag. 75:t. 4444. 1849. — *Jacobinia catalpaefolia* (Nees) M. Gómez, Noc. Bot. Sistem. 80. 1893. — TYPE: description and illustration based on plants cultivated at K from materials sent from Honduras by McDonnell. (K!).

*Cyranthera densiflora* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:147. 1855. — TYPE: Costa Rica, Alajuela, monte Aguacate, ca. 1500 ft, Nov 1846, A. Oersted 10664 (C!); isotype: CAS!; probable isotype: K!).

ILLUSTRATIONS: Bot. Mag. 75:t. 4444. 1849; Biol. centr.-amer., Bot. 5:t. 68. 1888; Lindau 1895:348, fig. 139R; Fieldiana, Bot. (n.s.) 18:9, fig. 7. 1986.

Erect shrubs to 3 m tall. Young stems subquadrate to quadrate-fluted, often with conspicuous lenticels in 4 lines,  $\pm$  evenly pubescent with flexuose eglandular trichomes 0.1–1.5 mm long or densely and evenly pubescent with erect to flexuose to antrorse eglandular trichomes 0.05–0.2 mm long or appearing glabrous to somewhat scurfy but inconspicuously and  $\pm$  evenly pubescent with antrorsely appressed eglandular trichomes 0.05–0.2 mm long and sessile glandular trichomes < 0.05 mm long. Leaves petiolate, petioles to 70 mm long, blades ovate to elliptic, (100–) 153–410 mm long, (31–) 70–165 mm wide,

2–3.2 times longer than wide, acuminate at apex, acute to attenuate at base, surfaces and margin pubescent like young stems (especially along major veins), margin entire to subcrenate. Inflorescence of numerous dichasiate spikes, racemes, thyrses, or panicles from axils of distal leaves or bracts (= inflorescence bracts) forming a terminal densely-flowered panicle to 30 cm long (excluding flowers) and 2.5–6 cm in diameter (excluding flowers) near midpoint, spikes (or racemes or thyrses) opposite, 1–3 per axil, main rachis pubescent like young stems or evenly pubescent with an understory of inconspicuous glandular trichomes < 0.05 mm long and an overstory of erect to flexuose eglandular trichomes 0.05–0.2 mm long, inflorescence bracts sometimes dichamous, proximal ones (or those along main axis) subfoliose, to 35 mm long and 12 mm wide, distal ones (or those of lateral branches) triangular to linear to lanceolate to elliptic, 1–22 mm long, 0.5–5 mm wide, abaxial surface pubescent like rachis or with the eglandular trichomes antrorsely appressed; dichasia alternate or opposite, 1-flowered, 1 per axil, sessile to short-pedunculate, peduncles to 2.5 mm long. Bracts opposite, triangular to linear-lanceolate to linear-oblongate to elliptic, 1–23 mm long, 0.6–4.7 mm wide, abaxial surface pubescent like inflorescence bracts. Bracteoles triangular to linear-lanceolate, 0.6–21 mm long, 0.4–1.8 mm wide, abaxial surface pubescent like bracts. Flowers subsessile to pedicellate, pedicels to 1.5 mm long. Calyx 5-lobed, 3.5–8 mm long, lobes linear-lanceolate to lance-subulate, equal to subequal, 2.8–7.5 mm long, 0.9–1.3 mm wide, abaxially pubescent like bracts. Corolla yellow, coralike in bud (i.e., erect but prominently curved near apex so that distal portion of bud is horizontal), 48–70 mm long, externally pubescent (particularly densely so at apex of bud) with erect to flexuose eglandular and glandular trichomes to 0.5 mm long, tube 24–33 mm long, subcylindric, only slightly expanded distally, 2.5–3.7 mm in diameter near midpoint, upper lip 23–37 mm long, entire to emarginate at apex, lobes to 0.2 mm long, lower lip 16–35 mm long, lobes 1–2 mm long, 0.7–1 mm wide. Stamens inserted a few mm proximal to mouth of corolla, 27–35 mm long, filaments glabrous, thecae 2.5–3.5 mm long, subequal, parallel to subsagittate, subequally inserted, usually dorsally pubescent with eglandular trichomes, unappended at base; pollen 2-aperturate, apertures flanked on each side by 3  $\pm$  irregular rows of small insulae, exine  $\pm$  psilate. Style 47–65 mm long, glabrous, stigma subcapitate, 0.2–0.3 mm long, inconspicuously 2-lobed. Capsule 16–23 mm long, pubescent with erect eglandular (and a few glandular) trichomes to 0.05–0.2 mm long, stipe 6–11 mm long, head subellipsoid with a prominent

medial constriction, 10–12 mm long. Seeds 4, lenticular, 3–3.2 mm long, 2.5–3 mm wide, surfaces roughened with some  $\pm$  rounded or moundlike papillae evident, lacking trichomes. Flowering Sep–Apr; fruiting Nov–Dec, Mar.

Slopes in Montane Rain Forest, Evergreen Cloud Forest, Evergreen Seasonal Forest, and Pine-Oak Forest; common in Northern Highlands, Central Plateau, and Sierra Madre; 160–2000 m. Mex. (S.L.P., Jal., Mich., Ver., Oax., Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan. CHIAPAS COLLECTIONS: Cz 3694 (MEXU); F 3359 (CAS); G&H 156 (MEXU); HTG 2 (DS); He 848 (CAS); Mc s.n. (MEXU); Mz 8513 (MEXU); EM 161 (US); EM 1940 (DS, K, MEXU); EM 2074 (DS, K, MEXU, US); EM 4127 (MEXU); EM 17086 (MEXU); EM 30164 (MEXU); Mi 1750 (MEXU); P 6672 (BM, UC, US); Si 1071 (MEXU); T 3579 (DS, US); T 3831 (DS, US); Ve 400 (BM); 23788; 29496 (DS, MEXU); 40151; 42606; 48655; 50749; 53402; 56960; 65804; 69728.

Local names: “cresta de gallo” (*Matuda 17086*); “flor de San Rafael” (*Calzada et al. 3694*); “flor de Todos Santos” (*Calzada et al. 3694*).

Plants are commonly cultivated as hedgerows or for ornament at elevations down to near sea level and in other physiographic regions of Chiapas. The species is cultivated elsewhere in Latin America (e.g., Peru). Its wild occurrence in Mexican states other than those listed above (e.g., Hidalgo) is questionable.

## 2. *Justicia bartlettii* (Leonard) D.N. Gibson, *Fieldiana*, Bot. 34:66. 1972.

—*Beloperone bartlettii* Leonard, Publ. Carnegie Inst. Wash. 461:232. 1936. — TYPE: Belize, El Cayo, river bluffs, El Cayo, 14 Feb 1931, H. Bartlett 11477 (US!; isotype: MICH!).

*Justicia pilifera* D.N. Gibson, *Fieldiana*, Bot. 34:72. 1972. — TYPE: Guatemala, Petén, Parque Nacional de Tikal, KM 66 camino para El Remate, 13 Jan 1970, R. Tún Ortiz 1529 (F!; isotypes: BM!, US!).

ILLUSTRATION: Publ. Carnegie Inst. Wash. 461:232, fig. 18. 1936 (see discussion).

Shrubs to 2.5 m tall. Young stems subterete to subquadrate, pubescent with antrorse to upward pointing eglandular trichomes 0.2–1 mm long, trichomes concentrated in 2 lines. Leaves petiolate, petioles to 10 mm long, blades lance-ovate to ovate to elliptic, 38–175 mm long, 9–85 mm wide, 2.2–4.5 times longer than wide, (acute to) acuminate to subfalcate at apex, acute to attenuate at base, surfaces pubescent (especially along veins) with antrorsely appressed eglandular trichomes to 1 mm long, margin entire to subrenate. Inflorescence of axillary pedunculate dichasiate spikes, thyrses, or panicles to 55 mm long (including peduncles and excluding flowers), spikes (or thyrses or panicles) alternate or opposite at leaf nodes, 1–2 per axil, peduncles to 20 mm long, pubescent with erect to downward pointing to upward pointing eglandular trichomes to 0.8 mm long, rachis pubescent like peduncles, inflorescence bracts (i.e., bracts subtending panicle branches), if present, often subfoliose, 4–21 mm long, 1–6.5 mm wide, pubescent like leaves; dichasia alternate (or sometimes opposite at proximalmost node), 1-flowered, secund, 1 per axil, sessile or pedunculate, peduncles to 3 mm long. Bracts opposite, lanceolate to

lance-subulate, 2–5 mm long, 0.5–1.2 mm wide (the proximalmost pair sometimes larger), abaxial surface (especially midvein) and margin pubescent with antrorse to antrorsely appressed eglandular trichomes 0.2–1 mm long. Bracteoles lanceolate to lance-subulate, 2–5 mm long, 0.5–0.8 mm wide, abaxial surface pubescent like bracts. Flowers sessile to subsessile (i.e., borne on pedicels to 1 mm long). Calyx 4-lobed, 6–12 mm long, lobes lance-subulate, equal, 5–10 mm long, 0.8–1.2 mm wide, abaxially pubescent with erect to flexuose glandular (rarely inconspicuous or nearly absent) and eglandular trichomes 0.1–0.5 mm long (glandular-pubescent). Corolla white or yellowish, 24–36 mm long, externally glandular-pubescent, tube very gradually ampliate from near base, 13–20 mm long, 2.5–4.2 mm in diameter near midpoint, upper lip 10.5–16 mm long, entire to emarginate at apex, lobes 0.1–0.3 mm long, lower lip 10.5–18 mm long, lobes 1.5–3.5 mm long, 1–2.4 mm wide. Stamens inserted near apex of corolla tube, 12–17 mm long, filaments proximally pubescent with eglandular trichomes, thecae 1.7–2.1 mm long (including basal appendage), subequal, subparallel to subperpendicular, unequally inserted (overlapping by 0.7 mm), dorsally pubescent with eglandular trichomes, lower theca with a  $\pm$  bulbous basal appendage to 0.5 mm long; pollen 2-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 22–31 mm long, proximally pubescent with eglandular trichomes, stigma capitate, 0.2–0.3 mm long, minutely 2-lobed. Capsule 16–20 mm long, glabrous, stipe 6–8 mm long, head subellipsoid (usually with a slight medial constriction), 9–12 mm long. Seeds 4, lenticular, 2.5–3.5 mm long, 2.5–3.3 mm wide, surfaces and margin covered with conspicuous conic to trichomelike papillae. Flowering Oct–Apr; fruiting Oct–Apr.

Ridges and slopes in Tropical Rain Forest, Lower Montane Rain Forest, and Montane Rain Forest; common in Northern Highlands and Eastern Highlands; 220–900 m. Mex. (Oax., Chis.), Guat., Bel. CHIAPAS COLLECTIONS: Mz 8357 (F); Mz 8358 (F); Mz 11327 (CAS, F, MEXU); Mz 17738 (CAS, F, MEXU); Mz 18492 (MEXU); Mi 6865 (MEXU); 24245; 28826; 33291; 35286; 49236; 57665; 57832; 57936; 66321; 71260.

Glands are usually conspicuous on calyces but rarely (e.g., *Breedlove 28826*) they are inconspicuous or nearly absent.

Leonard’s (1936) illustration cited above shows a five-lobed calyx and Gibson (1974) also noted that this species has five calyx lobes. All specimens from Chiapas have four calyx lobes and I could only see four lobes on the type of *J. bartlettii*. Gibson (1972) used the name *J. pilifera* for Guatemalan plants resembling ours.

## 3. *Justicia borrerae* (Hemsl.) T.F. Daniel, *Proc. Calif. Acad. Sci.* 48:273. 1995.

—*Neohallia borrerae* Hemsl. *Biol. cent.-amer.*, Bot. 2:519. 1882. — TYPE: Mexico, Chiapas, Rancho de la Montaña, 6 leagues from Tuxtla, Nov 1864–70, A. Giesbreght 722 (K!; isotypes: BM!, GH!).

ILLUSTRATIONS: Fig. 14; *Fieldiana*, Bot. 24(10):414, fig. 93. 1974.

Shrubs to small trees to 7.5 m tall. Young stems quadrate, usually conspicuously constricted just above each node, internodes glabrous, nodes sometimes pubescent with some flexuose

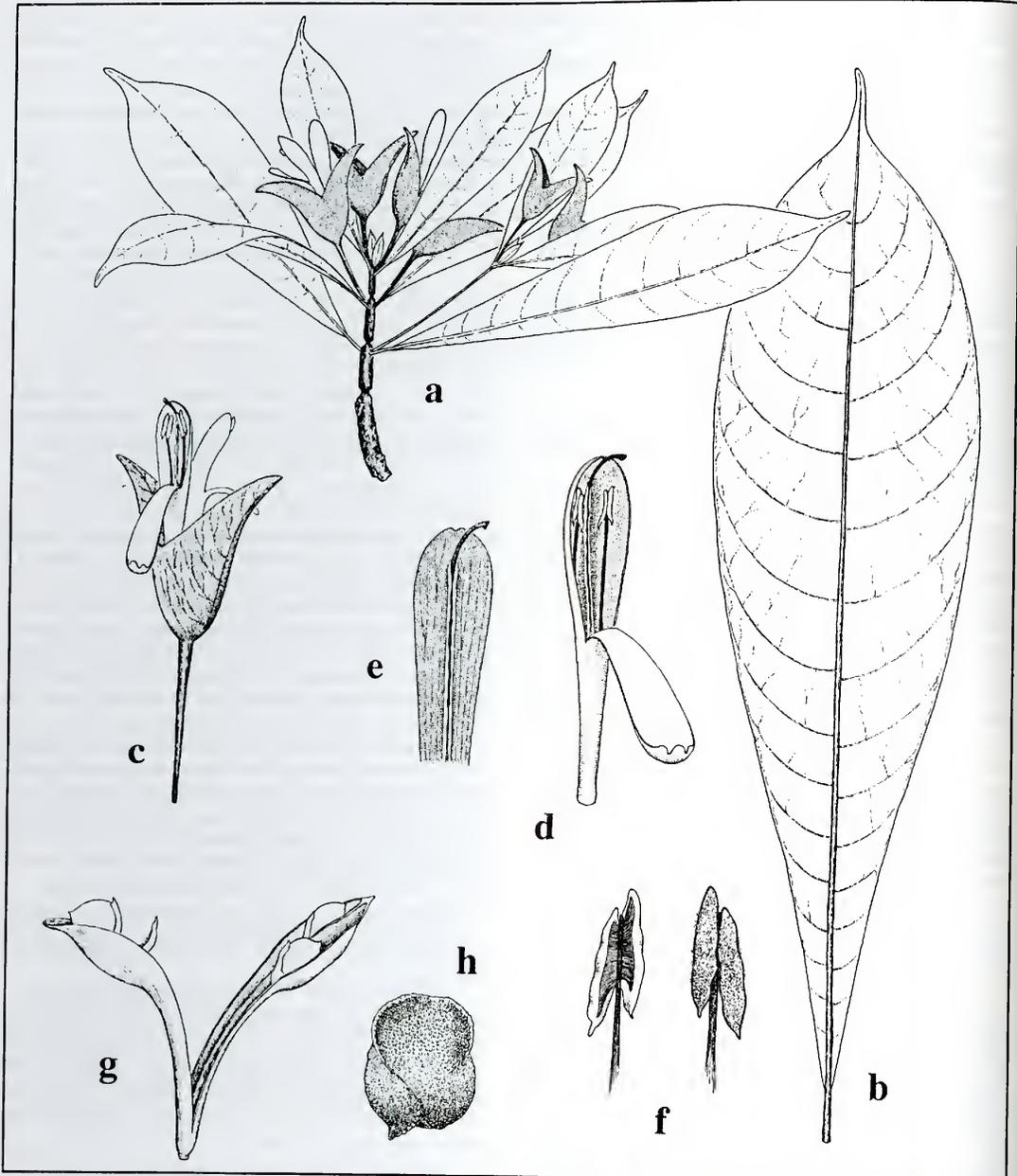


FIGURE 14. *Justicia borreriae* (Hemsl.) T.F. Daniel. a, habit (53530),  $\times 0.2$ ; b, leaf (Conzatti 3),  $\times 0.5$ ; c, inflorescence (53530),  $\times 0.5$ ; d, flower with calyx removed (35290),  $\times 0.8$ ; e, upper lip of corolla with style (35290),  $\times 1.3$ ; f, anthers (35290): nondehiscent side (left), dehiscent side (right),  $\times 3$ ; g, capsule (49330),  $\times 0.9$ ; h, seed (49330),  $\times 2.2$ . Drawn by Ellen del Valle.

glandular trichomes to 0.3 mm long. Leaves subsessile to petiolate, petioles to 35 mm long, blades obovate-elliptic to obovate to oblanceolate, 120–365 mm long, 28–123 mm wide, 2.6–6.3 times longer than wide, acuminate to acute-apiculate at apex, long-attenuate at base, surfaces glabrous, margin entire. Inflorescence of pedunculate cupulate black-purplish involucres 50–75 mm long from leaf axils, 1 per axil, opposite or alternate at nodes, peduncles stout, up to 90 mm long, involu-

cretes formed by 2 bracts connate for  $(\frac{1}{4}-)\frac{1}{3}-\frac{1}{2}$  their length, fused proximal portion 15–35 mm long (often unequally fused on the 2 sides), free distal lobes triangular-ovate, 30–56 mm long, 10–30 mm wide at base. Bracteoles linear-lanceolate, 18–25 mm long, 3.5–6.5 mm wide, abaxial surface glabrous. Flowers several per involucre. Calyx 5-lobed, 15–25 mm long, tube 12–14 mm long, lobes linear-lanceolate, unequal, 4–6 mm long, 1.8–3.3 mm wide, abaxially glabrous. Corolla yellowish

orange to reddish orange, 57–75 mm long, externally glabrous, tube  $\pm$  expanded distally, 30–45 mm long, 2.9–4 mm in diameter near midpoint, upper lip 25–40 mm long, entire to 2-lobed, lobes 0.2–2 mm long, lower lip 25–40 mm long, lobes rounded 0.5–3 mm long, 1.5–2 mm wide, central lobe often larger than lateral lobes. Stamens inserted near apex of corolla tube, 32–40 mm long, thecae 5–7.3 mm long (including basal appendage), unequal (lower theca longer than upper theca), subparallel to subsagittate, unequally inserted, glandular-pubescent, each theca with a  $\pm$  bulbous (sometimes inconspicuous) basal appendage to 0.5 mm long; pollen 2-aperturate, apertures flanked on each side by 1 row of insulae (these sometimes flanked by crenate peninsulae), exine reticulate. Style 64 mm long, glabrous, stigma subhemispheric, 0.3 mm long, minutely 2-lobed. Capsule 44–52 mm long, glabrous, stipe 25–30 mm long, head ovoid to ellipsoid, 19–24 mm long. Seeds 4, flattened, subcircular, 8–10 mm long, 6.7–8.8 mm wide, surfaces verrucose, distal portion of margin crenate. Flowering Aug–May; fruiting Nov–Apr.

Ridges, slopes, and along streams in Tropical Rain Forest, Lower Montane Rain Forest, and Montane Rain Forest; common in Northern Highlands, Eastern Highlands, and Sierra Madre; 120–1700 m. Mex. (Pue., Ver., Oax., Chis.), Guat. CHIAPAS COLLECTIONS: *Mz 18060* (TEX); *Mz 23966* (RSA, TEX); *EM 2404* (A, F, LL, MEXU); *EM 18611* (DS, F, MEXU); *Mi 1797* (MEXU); *Pa 1728* (CAS); *Te 7279* (MEXU); 20263; 30861; 35290; 49330; 53530.

Because the cuplike involucre collects water, the basal portion of the flower, especially the calyx is usually in some stage of decay on herbarium specimens. Better data on the calyx and bracteoles (and secondary bracteoles, if any) must await additional study.

#### 4. *Justicia breedlovei* T.F. Daniel, Proc. Calif. Acad. Sci. 48:258. 1995.

— TYPE: Mexico, Chiapas, Mpio. La Trinitaria, 10 km ENE of Dos Lagos above Santa Elena, 1170 m, 15 Dec 1981, *D. Breedlove 56242* (CAS!; isotypes: C!, CAS!, ENCB!, K!, MEXU!, MICH!, MO!, US!).

ILLUSTRATION: Fig. 15.

Shrubs to 1.2 m tall. Young stems quadrate to quadrate-sulcate, nodes pubescent with flexuose eglandular trichomes 0.3–0.6 mm long, internodes glabrous or bifariously pubescent for a few mm proximal to nodes with trichomes like those at nodes. Leaves turning  $\pm$  blackish on drying, petiolate, petioles to 25 mm long, blades elliptic to obovate-elliptic, (37–) 65–200 mm long, (17–) 21–53 mm wide, (2.2–) 3.1–4.6 times longer than wide, acuminate at apex, attenuate at base, surfaces glabrous, margin entire. Inflorescence of axillary and terminal pedunculate dichasiate spikes or panicles of spikes to 180 mm long (including peduncles and excluding flowers) from axils of leaves or bracts (= inflorescence bracts), axillary spikes or panicles alternate or opposite, 1 per axil, peduncles to 45 mm long, glabrous or pubescent like young stems, rachises of both spikes and panicles pubescent with antrorse to flexuose eglandular trichomes 0.2–0.7 mm long, trichomes restricted to or concentrated in 2 lines, inflorescence bracts foliose, elliptic to obovate, 10–30 mm long, 1–13 mm wide; dichasia alternate, 1-flowered, 1 per axil, sessile. Bracts alternate, apically tinged with reddish purple, ovate-elliptic to narrowly elliptic to elliptic to obovate-elliptic, 8–19 mm long, 2–9.5 mm wide, apically rounded to truncate (to emarginate), abaxial surface glabrous, margin  $\pm$  ciliate with antrorse eglandular trichomes to 0.7 mm long. Bracteoles colored like bracts, elliptic-oblongate, 5.5–

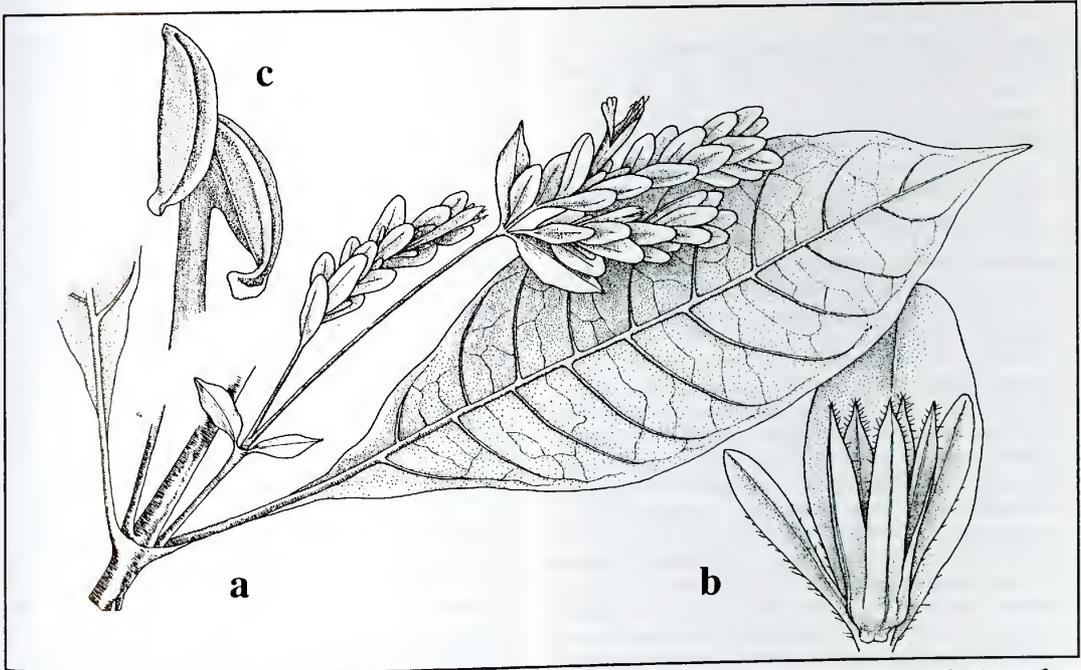


FIGURE 15. *Justicia breedlovei* T.F. Daniel (*Breedlove 56242*). a, habit,  $\times 0.5$ ; b, bract, bracteoles, and calyx,  $\times 3$ ; c, anthers,  $\times 10.5$ . Drawn by Jenny Speckels.

11 mm long, 1–2 mm wide, abaxial surface glabrous. Flowers sessile. Calyx 5-lobed, 8–9.5 mm long, lobes linear, equal, 7–8.5 mm long, 1–1.3 mm wide, abaxially glabrous. Corolla orange, 32–34 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.5 mm long, tube gradually expanded distally, 17–19 mm long, 2.5–3.6 mm in diameter near midpoint, upper lip 15–16 mm long, 2-fid at apex, lobes 0.3 mm long, lower lip 14–15.5 mm long, lobes 0.8–2 mm long, 0.7–1.5 mm wide. Stamens inserted near apex of corolla tube, 15–16 mm long, filaments proximally pubescent with sparse eglandular trichomes, thecae 2–2.3 mm long (including basal appendage), equal, subperpendicular to parallel, unequally inserted (i.e., overlapping by up to 1 mm) to superposed (i.e., contiguous), glabrous, both with a bulbous basal appendage to 0.3 mm long (appendage of lower theca larger than that of upper theca); pollen 3-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 29–32 mm long, pubescent with eglandular trichomes, stigma lobes 0.1 mm long, equal. Capsule 9.5 mm long, glabrous, stipe 2.5–3 mm long, head ellipsoid, 6.5–7 mm long. Seeds lenticular, 2.5 mm long, 2 mm wide, surfaces and margin covered with sparse glandular and eglandular trichomes < 0.05 mm long. Flowering and fruiting Dec.

Chiapas endemic: cliff faces in Montane Rain Forest; rare in border region between Central Plateau and Eastern Highlands; 1170 m.

### 5. *Justicia breviflora* (Nees) Rusby, Bull. Torrey Bot. Club 27:78. 1900.

— *Rhytiglossa breviflora* Nees in A. DC. Prodr. 11:352. 1847. — *Dianthera breviflora* (Nees) Hemsl. Biol. cent.-amer., Bot. 2:517. 1882. — TYPE: Mexico, Chiapas, without locality, Mar 1839–1840, *J. Linden 184* (K!; isotype: G, photos at F!, US!).

*Justicia vitzliputzli* Lindau, Bull. Herb. Boissier, ser. 2, 4:409. 1904. — TYPE: Mexico, Chiapas, Distr. Tuxtla, Hacienda Tetapa, 19 Feb 1896, *C. Seeler & E. Seeler 1966* (B, destroyed, photos at F!, US!).

*Dianthera peckii* S.F. Blake, Contr. Gray Herb. 52:97. 1917. — *Justicia peckii* (S.F. Blake) Standl. Field Mus. Nat. Hist., Bot. Ser. 12:369. 1936. — TYPE: Belize, Upper Moho River, 16 Mar 1907, *M. Peck 722* (GH!; isotype: K!).

*Dianthera riparia* S.F. Blake, Contr. U.S. Natl. Herb. 24:25. 1922. — TYPE: Guatemala, Izabal, trail from Los Amates to Izabal, 31 May 1919, *S. Blake 7800* (US!).

ILLUSTRATION: none found.

Perennial herbs to 1.3 m tall. Young stems subquadrate to quadrate-sulcate, unifariously or bifariously (sometimes both on different internodes of same plant) pubescent (sometimes with lines of pubescence discontinuous along internodes) with (antrorse to) retrorse eglandular trichomes 0.2–1 mm long or evenly pubescent with an understorey of antrorse to erect to retrorse eglandular trichomes 0.05–0.3 mm long and an oversory of antrorse to flexuose to retrorse eglandular trichomes 0.4–1 mm long (the layers sometimes  $\pm$  continuous), or evenly pubescent with a continuous covering of erect to subflexuose eglandular trichomes 0.3–1 mm long. Leaves (plants sometimes leafless or nearly so during anthesis) petiolate, petioles to 25 mm long, blades lance-ovate to ovate-elliptic to elliptic to subcircular to obovate-elliptic, (14–) 22–165 mm long, 7–67

mm wide, 1.1–4.5 (–6) times longer than wide, rounded (to rounded-apiculate) to acuminate to subfalcate at apex, (rounded to) attenuate at base, surfaces glabrous to pubescent only along major veins with antrorsely appressed eglandular trichomes or with abaxial surface  $\pm$  evenly (and sometimes densely) pubescent with flexuose eglandular trichomes, margin entire to sub-crenate. Inflorescence of axillary and terminal pedunculate dichasiate spikes to 225 mm long (including peduncles and excluding flowers), 3–9 mm in diameter near midpoint of fertile portion, axillary spikes alternate or opposite, 1 per axil, peduncles to 38 mm long, pubescent like young stems or with trichomes mostly antrorse, or with trichomes evenly disposed when they are disposed in lines on younger stems, rachis clearly visible, pubescent like peduncles (or the trichomes sometimes shorter, e.g., 0.1–0.2 mm long) or evenly pubescent with erect to subflexuose eglandular trichomes to 0.7 mm long; dichasia opposite, 1-flowered, 1 per axil, sessile. Bracts opposite, subulate, 2.5–6.5 mm long, 0.8–1.6 mm wide, abaxial surface glabrous or pubescent with (erect to flexuose to) antrorse eglandular trichomes 0.05–0.7 (–1) mm long. Bracteoles subulate, 1.9–5.5 mm long, 0.5–0.7 mm wide, abaxial surface glabrous or pubescent like bracts. Flowers sessile. Calyx 4–5-lobed, 3.3–9 mm long, 4 lobes equal to subequal, subulate to lance-subulate, 2.6–8.2 mm long, 0.5–1 mm wide, abaxially glabrous or pubescent like bracts, posterior 5th lobe (if present) vestigial (sometimes  $\pm$  trichomelike), 0.5–1.5 mm long. Corolla white with purplish markings to rose-pink to purplish, 9–17 mm long, externally (glabrous to) pubescent with erect eglandular trichomes 0.05–0.3 mm long, tube subcylindric to  $\pm$  expanded from base, 4–6.5 mm long, 1.1–3 mm in diameter near midpoint, upper lip 4–9 mm long, entire to emarginate to erose at apex, lobes to 0.2 mm long, lower lip 4–10.5 mm long, lobes 1.2–4.3 mm long, 1.2–4.9 mm wide. Stamens inserted near apex of corolla tube, 3.5–8 mm long, filaments glabrous or  $\pm$  glandular pustulate near base, thecae 0.5–1.4 mm long, equal, subperpendicular to perpendicular, unequally inserted (overlapping by 0.5–0.8 mm) to superposed (contiguous to 0.2 mm distant), lacking basal appendages, upper theca dorsally pubescent with eglandular trichomes; pollen 2-aperturate, apertures either flanked on each side by 1 row of insulae or lacking both insulae and pseudocolpi, exine reticulate. Style 7–11.5 mm long, glabrous or sparsely pubescent proximally or densely pubescent throughout with eglandular trichomes, stigma 0.2–0.7 mm long, only 1 lobe evident or also with a reduced lobe < 0.1 mm long. Capsule 9–14 mm long, glabrous or pubescent over entire surface with erect to flexuose eglandular trichomes 0.05–0.4 mm long, stipe 2.5–5 mm long, head ovoid to ellipsoid, 6.5–9.4 mm long. Seeds 4, sublenticular, 2.5–3.4 mm long, 1.5–2.6 mm wide, surfaces and margin covered with rounded tubercles when immature and appearing merely rugose or papillose when mature. Flowering Oct–May; fruiting Oct–May.

Ridges, slopes, and along streams in Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, Evergreen Cloud Forest, Evergreen Seasonal Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common in Northern Highlands, Eastern Highlands, Central Plateau, Central Depression, and Sierra Madre; 100–2000 m. Mex. (Jal., Ver., Gro., Oax., Tab, Chis.), Guat., Bel., Hond. CHIAPAS COLLECTIONS: *Bal s.n.* (US); *Cb 2693* (CAS); *Dan 5010* (CAS); *Dan 5023* (CAS); *Da 20492* (BM); *De 974* (CAS, US); *La 288* (DS, US); *La 823* (DS, F, MICH, US); *La 2818* (DS, US); *La 2966* (DS, US); *Mz 8592*

(CAS); *Mz* 11668 (CAS); *Mz* 11980 (MEXU); *Mz* 12102 (MEXU); *Mz* 17556 (K, CAS); *Mz* 17737 (CAS); *Mz* 17955 (CAS); *EM* 1910 (F, K); *My* 315 (K); *Ne* 5524 (CAS); *R&B* 20119 (DS, US); *So* 1717 (MICH, US); *S&S* 1966 (K); *Te* 6477 (CAS); *Ten* 5629 (CAS); 9610; 9996; 13437; 23056; 24158; 24572; 28371; 28821; 30306; 32008; 32583; 33322; 33908; 34484; 35357; 41147; 41538; 41584; 42601; 46742; 48654; 48876; 48943; 49807; 50689; 50820; 55232; 56924; 68245; 68976; 70892.

This species exhibits considerable variation with respect to pubescence of the stems, leaves, bracts, bracteoles, calyx, corolla, and capsule. There is also variation in the number of calyx lobes. Four lobes are usually present but in some forms of the species and on some specimens with four calyx lobes also present, there is a rudimentary fifth lobe in the posterior position (i.e., adjacent to the rachis). Two rather distinctive forms of the species occur in Chiapas. Plants with unifariously bifarious cauline pubescence; leaves with pubescence restricted to the major veins; bracts, bracteoles, and calyx glabrous or with trichomes 0.05–0.1 mm long; calyx either 4-lobed or 5-lobed with the posterior lobe greatly reduced; and ovaries and capsules glabrous occur throughout Chiapas. An extreme expression of this form (e.g., *Breedlove* 28821, 35357, *Breedlove & Davidse* 55232, *Daniel & Bartholomew* 5010) is well represented in the rain forests between Palenque and Ocosingo. It has mostly unifariously pubescent vegetative stems, peduncles, and rachises; glabrous and somewhat coriaceous leaf surfaces; somewhat more delicate inflorescences; consistently 5-lobed calyces with the posterior lobe greatly reduced; corolla tubes 1.1–1.5 mm (vs. 2–3 mm in all other specimens) in diameter; and thecae 0.5–0.9 mm (vs. 1–1.4 mm in all other specimens) long. A more pubescent form occurs in the Central Depression and in nearby regions of the Northern Highlands and Central Plateau of Chiapas. It has evenly disposed cauline pubescence (at least in the inflorescence); leaves with pubescence over the entire abaxial surface; bracts, bracteoles, and calyx pubescent with trichomes to 0.7 mm long; calyx consistently 4-lobed; and ovaries and capsules densely pubescent. Although these forms are usually readily distinguished, either intermediacy in the characteristics noted above (e.g., ovaries sparsely pubescent in *Breedlove* 23056) or random combinations of these characteristics (e.g., cauline pubescence in lines and ovaries densely pubescent in *Martínez S.* 8592) can be found in Chiapas. Additionally, some pubescence characters vary greatly within a form. For example, in the form with glabrous ovaries and capsules noted above, the external surface of the corollas varies from glabrous (e.g., *Tenorio L. et al.* 5629) to sparsely pubescent along the dorsal surface only (e.g., *Breedlove* 33322) to densely and evenly pubescent (e.g., *Breedlove* 42601). Also, while the number of calyx lobes varies only within the form with glabrous ovaries and capsules, there is sometimes variation on individual plants with both 4-lobed and 5-lobed calyces present. For these reasons, this assemblage with opposite 1-flowered dichasia, small flowers, and  $\pm$  per-

pendicular thecae (the upper theca dorsally pubescent) is treated as a single variable species that occurs in a wide array of habitats. Like other such Mexican Acanthaceae (e.g., *Carlowrightia arizonica*, *Henrya insularis*, and *Tetramerium nervosum*) the species combines character states that are useful elsewhere in the genus for distinguishing between species. Ultimate disposition of these forms must await study of the species from throughout its range, but based on the variation evident among specimens available from Chiapas, recognition of a single polymorphic species seems warranted.

*Justicia vitzliputzli* (according to the protologue) is based on plants with pubescent young stems, leaves, and rachises; 4-lobed calyces; and pubescent corollas. *Dianthera peckii* (based on the types observed) is based on plants with bifariously pubescent stems; leaf surfaces pubescent only along midvein; 4-lobed calyces; and glabrous or nearly glabrous corollas. *Dianthera riparia* (based on the holotype) is based on plants with bifariously pubescent stems and rachises; glabrous leaf surfaces; 5-lobed calyces with one lobe reduced in size; and glabrous corollas. *Rhytiglossa breviflora* (based on the holotype) is based on plants with bifariously pubescent stems; leaf surfaces pubescent only along the midvein; 5-lobed calyces with one lobe reduced in size; and glabrous corollas.

Gibson (1974) included *Rhytiglossa ovatifolia* Oerst. in the synonymy of this species. There are two syntypes, both collections of Liebmann, at C. A fragment of one of these (but which one remains unknown) at US reveals a plant that resembles *J. breviflora*.

## 6. *Justicia campechiana* Standl. ex Lundell, Publ. Carnegie Inst. Wash. 436:303. 1934.

— TYPE: Mexico, Campeche, Monterrey, 25 Dec 1931, C. Lundell 1126 (F!; isotypes: DS!, GH!, K!, LL, MICH!, UC!, US!).

ILLUSTRATION: Publ. Carnegie Inst. Wash. 461:227, fig. 15. 1936.

Perennial herbs to shrubs to 2 m tall. Young stems subterete to subquadrate, evenly pubescent with flexuose to antrorse eglandular trichomes 0.2–0.7 mm long. Leaves petiolate, petioles to 19 mm long, blades ovate-elliptic to elliptic to obovate-elliptic, 35–125 mm long, 13–37 mm wide, 2.2–3.4 times longer than wide, acuminate at apex, acute to attenuate at base, mature surfaces pubescent with flexuose to antrorse eglandular trichomes to 0.5 mm long, margin entire to undulate-crenate. Inflorescence of axillary pedunculate dichasiate spikes (or sometimes branched and thus becoming panicles) to 65 mm long, spikes (or panicles) alternate or opposite at nodes, 1 (–2) per axil, peduncles to 18 mm long, pubescent like young stems, rachis visible, pubescent like young stems; dichasia alternate, secund, 1-flowered, 1 per axil, sessile. Bracts opposite, lance-subulate to subulate, 1.6–3.5 mm long, 0.4–1 mm wide, abaxial surface pubescent with flexuose- antrorse to antrorsely appressed eglandular trichomes 0.2–0.3 mm long. Bracteoles lance-linear, 2–4 mm long, 0.3–0.5 mm wide, abaxial surface, pubescent like bracts. Flowers sessile to subsessile (i.e., borne on pedicels to 1 mm long). Calyx 5-lobed, 5.6–7.5 mm long,

lobes lanceolate, equal, 5.2–7 mm long, 0.8–1.5 mm wide, abaxially pubescent with erect to flexuose eglandular trichomes 0.1–0.5 mm long. Corolla color unknown, 11–12.5 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.5 mm long, tube subcylindric or gradually expanded from near base, 4.5 mm long, 2.5–3 mm in diameter near midpoint, upper lip 7–7.5 mm long, apically 2-lobed, lobes 0.7–0.8 mm long, lower lip 7–8 mm long, lobes 1.2–1.8 mm long, 1.3–2 mm wide, apically rounded. Stamens inserted near midpoint of corolla tube, 7.5–8 mm long, filaments pubescent with glandular trichomes, thecae 1.2–2 mm long (including basal appendage), subequal to unequal, subparallel to perpendicular, superposed (1–1.5 mm distant), glabrous, lower theca with a  $\pm$  bulbous basal appendage to 0.9 mm long; pollen 3-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 10–12 mm long, pubescent with eglandular trichomes, stigma 0.05 mm long,  $\pm$  flared, lobes not evident. Capsule 6.5–7 mm long, pubescent with erect to retrorse eglandular trichomes 0.1–0.3 mm long, stipe 2–3 mm long, head ellipsoid with slight medial constriction, 4–5 mm long. Seeds (immature) 4, tuberculate-bumpy. Flowering Dec–Jan; fruiting Apr.

Lower Montane Rain Forest and Montane Rain Forest; rare in Northern Highlands and Eastern Highlands; 550 m. Mex. (Camp., Q.Roo, Chis.), Guat., Bel. CHIAPAS COLLECTIONS: *En* 6839 (MEXU); *Mi* 5860 (MEXU); 50937.

Publication of this name is usually given as Publ. Carnegie Inst. Wash. 461:88 (1935) and the author as Standley, but Lundell's earlier publication fulfills all of the requirements of the Code for valid publication.

Miranda annotated his collection 5860 as a new hirsute form of *J. campechiana* which he never published. The type and all other known collections differ from Chiapan collections of *Justicia campechiana* by having the pubescence of the young stems, peduncles, and rachises bifariously disposed and antrorsely oriented; leaf surfaces glabrous; and abaxial surfaces of the bracts, bracteoles, and calyx glabrous or with a few antrorse eglandular trichomes. In all other characters, specimens from Chiapas resemble the other collections.

## 7. *Justicia candelariae* (Oerst.) Leonard, Publ. Carnegie Inst. Wash. 461:231. 1936.

— *Rhytiglossa candelariae* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:158. 1855. — *Dianthera candelariae* (Oerst.) Hemsl. Biol. cent.-amer., Bot. 2:517. 1882. — TYPE: Costa Rica, "in monte Candalaria," Feb 1847, A. Oersted 10683 (C!; isotypes: CAS!, US!; probable isotype: K!).

*Rhytiglossa mexicana* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854. 157. 1855. — *Dianthera mexicana* (Oerst.) Benth. & Hook. ex B.D. Jacks. Index kew. 1(2):742. 1893 and 2(4):719. 1895, non *Justicia mexicana* Rose (1895). — *Justicia strobiloglossa* V.A.W. Graham, Kew Bull. 43:602. 1988. — TYPE: Mexico, Veracruz, Hacienda de Jovo, May 1841, F. Liebmann 10685 (C!; isotype: CAS!, K!, US!).

*Tetramerium geniculatum* Brandege, Univ. Calif. Publ. Bot. 4:386. 1913. — TYPE: Mexico, Veracruz, Misantla, Aug

1912, *C. Purpus* 5956 (UC!; isotypes: F!, L!, MO!, NY!, US!).

*Justicia tuerckheimiana* Donn. Sm. Bot. Gaz. (Crawfordsville) 48:300. 1909. — TYPE: Guatemala, Alta Verapaz, Cubliguitz, 350 m, Jun 1903, H. von Tuerckheim 8726 (US!).

*Justicia chiapensis* Brandege, Univ. Calif. Publ. Bot. 6:194. 1915. — TYPE: Mexico, Chiapas, Cerro del Boquerón, Jun 1914, *C. Purpus* 7285 (UC!; isotypes: BM!, F!, US!).

ILLUSTRATIONS: Oersted 1855:t. 5, fig. 28; Fieldiana, Bot. (n.s.) 18:10, fig. 8. 1986.

Prostrate to decumbent to spreading to erect perennial herbs to 5 dm tall, often rooting at nodes. Young stems quadrate-sulcate to  $\pm$  flattened, pubescent with an understory of evenly or  $\pm$  bifariously disposed flexuose-retrorse to retrorsely appressed eglandular trichomes 0.1–0.7 mm long and an overstory (sometimes absent) of evenly disposed flexuose eglandular trichomes to 1.5 mm long, distally sometimes with scattered erect glandular trichomes to 0.1–0.2 mm long as well. Leaves subsessile to petiolate, petioles to 20 mm long, evenly pubescent with an understory of antrorse to antrorsely appressed eglandular trichomes 0.05–0.2 mm long and an overstory (sometimes absent) of flexuose eglandular trichomes to 1.7 mm long, abaxially pubescent with erect glandular trichomes to 0.3 mm long as well, blades ovate to elliptic to narrowly elliptic, 10–71 mm long, 5.5–30 mm wide, 1.3–4.3 times longer than wide, (rounded to) acute to acuminate at apex, rounded to acute to attenuate at base, surfaces and margin pubescent with cauline type trichomes (except the understory type trichomes becoming antrorse along major veins) or glabrate, midvein on abaxial surface sometimes glandular like petiole, margin entire to subcrenate. Inflorescence of terminal (and sometimes borne in axils of distalmost pair of leaves as well) pedunculate dichasiate spikes to 100 mm long (including peduncle and excluding flowers), 3–17 mm in diameter near midspike, peduncles to 50 mm long, pubescent like young stems and sometimes with glandular trichomes 0.1–0.4 mm long as well, rachis not visible to clearly visible near midspike, pubescent like peduncle or with erect to flexuose to antrorse eglandular and glandular trichomes 0.1–0.5 mm long; dichasia opposite, 1-flowered, 1 (–2) per axil, sessile to subsessile (i.e., borne on peduncles to 0.5 mm long). Bracts opposite, usually borne on petioles to 1.5 mm long, ovate to elliptic to subcircular to obovate to oblanceolate, 3–9.5 mm long, 0.8–5 mm wide, abaxial surface pubescent with erect to antrorse eglandular (and sometimes glandular) trichomes to 1 mm long (rarely nearly glabrous), margin (eciliate to) ciliate with flexuose eglandular (and sometimes glandular) trichomes to 1.5 mm long. Bracteoles linear-lanceolate to linear-elliptic to linear-oblanceolate, 2.3–6 mm long, 0.3–1.5 mm wide, abaxial surface pubescent like bracts (although often glandular when bracts are not). Flowers sessile. Calyx 5-lobed, 2.5–5.3 mm long, 4 lobes similar, subulate, equal, 2.2–4.8 mm long, 0.3–0.6 mm wide, abaxially pubescent with erect to flexuose to antrorse eglandular and glandular trichomes 0.1–0.5 mm long, posterior 5th lobe 0.9–2.5 mm long, 0.2–0.3 mm wide. Corolla white (sometimes flushed with maroon) with dark maroon markings on lower lip, 7–10.5 mm long, externally pubescent with erect to flexuose eglandular (and sometimes a few glandular) trichomes 0.05–0.4 mm long, tube subcylindric (or even  $\pm$  narrowed distally) to  $\pm$  expanded distally, 4–5.5 mm long, 1–1.5 mm in diameter near midpoint, upper lip 2–4.5 mm long, entire

to emarginate, lobes to 0.1 mm long, lower lip 2–5 mm long, lobes 0.8–2.3 mm long, 1–3 mm wide. Stamens inserted near apex of corolla tube, 2–2.5 mm long, filaments glabrous, thecae 0.4–0.6 mm long, subequal, parallel to subparallel, subequally inserted and separated by a broad connective, dorsally pubescent with eglandular trichomes, lacking basal appendages; pollen 2-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 4–6 mm long, distally glabrous, proximally pubescent with eglandular trichomes, stigma usually recurved, 0.2–0.3 mm long, 1 lobe obscure or vestigial. Capsule 5–6 mm long, pubescent with erect (distally) to retrorse (proximally) eglandular and glandular (sometimes inconspicuous or absent) trichomes 0.05–0.2 mm long, stipe 1.5–2 mm long, head subellipsoid with a medial constriction, 3.5–4 mm long. Seeds 4, plano-convex, 1.7–1.8 mm long, 1.4 mm wide, surfaces and margin papillose with rounded papillae.  $n = 14$ . Flowering Feb–Jun; fruiting Feb–Jun.

Tropical Rain Forest and Montane Rain Forests; uncommon in Northern Highlands, Eastern Highlands, and Sierra Madre; 300–1250 m. Mex. (Ver., Oax., Chis.), Guat., Bel., Hond., C.R. CHIAPAS COLLECTIONS: TCC 47 (MEXU); Mz 19841 (MEXU); 34181; 50578; 67008.

Gibson (1974) noted that *J. tuerckheimiana* might eventually prove to be synonymous with *J. candelariae* and her suspicion is substantiated by my studies. Specimens (including the type) from Chiapas, Belize, and Honduras identified as *J. tuerckheimiana*, exhibit the same range of character states as specimens (including the type) from Costa Rica identified as *J. candelariae*. The characters cited by Durkee (1986) for distinguishing *J. valerii* Leonard from *J. candelariae* in Costa Rica appear to be combined in various ways among the specimens from Chiapas. The presence, density, and location of glandular trichomes appear to be quite variable in this species and do not correlate with characters such as leaf length or bract width.

I include *J. chiapensis* within this species with some hesitation. The type from Chiapas and several similar specimens from Guatemala (e.g., *Skutch* 2009, F; *Standley* 66861, F; *Steyermark* 33237, F; *Williams et al.* 26042) annotated as *J. chiapensis* by Gibson differ from *J. candelariae* by their shorter understory cauline pubescence (i.e., 0.2–0.3 mm vs. 0.3–0.7 mm long), absence of overstory cauline pubescence, more diffusely bracteate spikes (i.e., rachis clearly visible vs. rachis not or but barely visible), smaller bracts (i.e., 3–4.5 mm vs. 4.5–9.5 mm long and 0.8–1.2 mm vs. 1.4–1.5 mm wide) that vary from elliptic to obovate to oblanceolate (vs. ovate-elliptic to elliptic), bracteal ciliation (sparsely, if at all, ciliate with trichomes 0.1–0.3 mm long vs.  $\pm$  densely ciliate with trichomes to 1 mm long), and shorter calyces (2.5–3.1 mm vs. 3–5.3 mm long). Two collections from Guatemala combine several of the putative differences noted above in various ways. *Steyermark* 37105 (F) has densely bracteate spikes with the rachis barely visible, only understory type trichomes on the stems, and bracts 4–5 mm long. *Steyermark* 37683 (F) has diffusely bracteate spikes with the rachis clearly visible, overstory type trichomes present on the stems, and bracts 4–4.5 mm long. Gibson (1974) noted that *J. chiapensis* was

very similar to *J. tuerckheimiana* and that it might eventually be shown to represent the same species. With the overlap of most character states noted above, the presence of plants that combine some of the presumed distinctions in various ways, and similar pollen among plants treated as each species, I prefer to recognize specimens of *J. chiapensis* as a smaller and more diffusely bracted form of *J. candelariae* until such time as a suite of consistent characters can be found to reliably distinguish them.

Interestingly, the rather unusual characteristic of having glandular pubescence on the petioles and midveins of leaves is evident on the types of *J. chiapensis*, *J. tuerckheimii*, *Rhytiglossa mexicana*, and *Tetramerium geniculatum*.

## 8. *Justicia carthagenensis* Jacq. Enum. syst. pl. 11. 1760.

— *Adhatoda carthagenensis* (Jacq.) Nees in A. DC. Prodr. 11:403. 1847. — *Ecbolium carthagenense* (Jacq.) Kuntze, Revis. gen. pl. 2:980. 1891. — TYPE: America (probably near Cartagena, Colombia). Specimens, if any exist, are unknown (cf. Stafleu, F. 1967. Introduction to Jacquin's Caribbean "Enumeratio," in N. Jacquin, Enum. syst. pl., Interdocumentation Co. 1967 reprint of 1760 ed. Zug, Switzerland).

*Justicia coryniforma* D.N. Gibson, Fieldiana, Bot. 34:67. 1972. — TYPE: Guatemala, Jutiapa, between Jutiapa and La Burrera, 800–850 m, 1 Nov 1940, P. Standley 75969 (F!).

ILLUSTRATIONS: Jacquin, N. Select. Stirp. Amer. Hist. Tab., t. 5. 1763; Bot. Reg. 10:t. 797. 1824; Correll and Correll, Flora Bahama Archipelago, 1351, fig. 589. 1982; Fieldiana, Bot. (n.s.) 18:10, fig. 8. 1986.

Erect to spreading perennial herbs or shrubs to 1 m tall. Young stems subquadrate to quadrate-multistriate to  $\pm$  flattened, ( $\pm$  evenly to) bifariously pubescent (often only along distal portion of internodes and sparsely so) with retrorse to retrorsely appressed eglandular trichomes 0.2–0.5 mm long, soon glabrate. Leaves petiolate, petioles to 14 mm long, blades linear to ovate to elliptic, 26–135 mm long, 3.2–40 mm wide, 2–26.6 times longer than wide, acute to acuminate at apex, acute to attenuate at base, surfaces glabrous or with antrorse eglandular trichomes along major veins, margin entire. Inflorescence of dichasia in axils of distal leaves or usually in axils of bracts forming a terminal sessile dichasiate spike to 60 mm long (excluding flowers), 12–25 mm in diameter near midpoint (excluding flowers), rachis pubescent with antrorse to flexuose to retrorse to retrorsely appressed eglandular trichomes 0.3–0.5 mm long, trichomes concentrated in 2 lines or  $\pm$  evenly disposed; dichasia opposite, 1 (–2) per axil, 1-flowered, sessile. Bracts opposite, proximal bracts often foliose, those near midspike petiolate, elliptic to obovate to spatulate, 9–16 mm long, 2.5–6.5 mm wide, apically acute to truncate, abaxial surface pubescent with antrorse to antrorsely appressed eglandular trichomes 0.1–0.3 mm long and usually with sparse to  $\pm$  dense erect to flexuose glandular trichomes 0.1–0.5 mm long (often restricted to distal portion of bract). Bracteoles oblanceolate to spatulate, 6–18 mm long, 0.8–6.5 mm wide, apically rounded

to truncate, abaxial surface pubescent like bracts. Flowers sessile to subsessile (i.e., pedicels to 0.5 mm long). Calyx 5-lobed, 7–12 mm long, lobes lanceolate, equal, 6.5–11 mm long, 1–1.5 mm wide, abaxially glabrous or with antrorse to antrorsely appressed eglandular trichomes 0.1–0.3 mm long, margin lighter colored than central portion. Corolla “lavender” to reddish to purplish, (14–) 17–34 mm long, externally pubescent with erect to flexuose to retrorse glandular and eglandular trichomes 0.1–0.3 mm long, tube (6–) 8–18 mm long, 1.5–4.5 mm in diameter, upper lip 7.5–13 mm long, entire to 2-lobed, lobes 1.3–2.3 mm long, lower lip 8–16 mm long, lobes 4.5–5 mm long, 3–6 mm wide. Stamens inserted in distal half of corolla tube, 9–15 mm long, filaments glabrous, thecae 1.9–2.3 mm long, subequal, subparallel, unequally inserted (overlapping by 1–1.5 mm), glabrous, lacking basal appendages or lower theca with a rounded appendage to 0.1 mm long; pollen 2-aperturate, apertures flanked on each side by 2 rows of insulae, exine reticulate. Style 13–22 mm long, proximally pubescent with eglandular trichomes, stigma 0.2 mm long, lobes not evident. Capsule 10–18 mm long, externally puberulent with erect to retrorse eglandular trichomes 0.05–0.2 mm long, stipe 3–8 mm long, head ovoid to subspheric to ellipsoid-obovoid (often with a slight medial constriction), 7–10 mm long. Seeds 4 (or fewer by abortion), subglobose, 3–3.5 mm long, 3–3.3 mm wide, 1.7–2 mm thick, surface covered with erect to appressed eglandular trichomes 0.05–0.1 mm long, these exfoliating and mature seed surface ± smooth and shiny. Flowering Sep–Feb; fruiting Nov, Feb.

Slopes, limestone ridges, sand dunes, along streams, and disturbed secondary growth in Tropical Rain Forest and Evergreen Seasonal Forest; uncommon in Eastern Highlands, Central Plateau, and Pacific Coastal Plain; 130–875 m. Mex. (Oax., Tab., Yuc., Q.Roo, Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Sur., Fr. Gui., Peru). CHIAPAS COLLECTIONS: *Lu 17846* (K, US); *EM 16931* (F); *QVU 26* (U); *Ve 666* (BM, MEXU); 7718; 34000; 49821.

Local name: “Pie de Pava” (*Matuda 16931*).

The above description includes data from some Central American specimens. Additional synonyms were cited by Bremekamp (in Pulle, Fl. Suriname 4(2):241. 1938) and Lindau (in Urban, Symb. antill. 2:235. 1900).

The *Matuda* collection cited above was included by Gibson (1972) in *J. corynimorpha*, a species that she distinguished from *J. carthagenensis* by its narrower leaves, clavate bracts, shorter calyces and corollas, and shorter capsules. Examination of specimens annotated and treated by Gibson as *J. corynimorpha* differ from those annotated and treated by her as *J. carthagenensis* by their lighter (lavender vs. rose-purple to reddish) and somewhat shorter (17–29 vs. 30–40 mm long) corollas, shorter (7–9.5 vs. 10–15 mm long) calyces, oblanceolate to spatulate (vs. linear to linear-oblanceolate) and apically rounded to truncate (vs. acute) bracteoles, shorter (1.9–2.3 vs. 2.7–3.3 mm long) thecae, and elliptic to obovate (vs. linear to ovate-elliptic) bracts. She subsequently noted (1974) that several collections from Yucatán, Nicaragua, Costa Rica, and the West Indies have bracts as in *J. corynimorpha* but leaves, corollas, and thecae as in *J. carthagenensis*. She also noted that the latter specimens resembled a photograph of the type of *Beloperone surinamensis* Miq. *Beloperone sur-*

*inamensis* was treated as a synonym of *J. carthagenensis* by Bremekamp (in Pulle, Fl. Suriname 4(2):241. 1938). The collection of Ventura and López from Chiapas cited above is similar to these latter collections. It has reddish corollas 30–34 mm long, calyces 10–11 mm long, oblanceolate to spatulate and apically rounded to truncate bracteoles, thecae 2 mm long, and spatulate bracts. Elsewhere within the range of this complex, there are plants (e.g., *Cabrera & Torres 960* from Quintana Roo) with narrow leaves (5.8–7 times longer than wide), “lilac” corollas 30–32 mm long, calyces to 14 mm long, and linear and apically acute bracts and bracteoles. Because of the overlap in some of the character states used to distinguish *J. corynimorpha* from *J. carthagenensis* and mixing among other character states, a single variable taxon is recognized in Chiapas. Leonard (1958) discussed similar variation among plants treated as *J. carthagenensis* in Colombia. This complex, like several others in *Justicia*, needs additional study (including field observations of corolla color, habitat, etc.) prior to distinguishing consistently recognizable taxa within it. For example, plants with very narrow leaves all appear to occur along streams and might merely represent an ecological form of the species. The distinctions between this broadened concept of *J. carthagenensis* and its relative, *J. caudata*, are summarized in the key above.

A collection (*Breedlove 28247*, DS) from Tropical Deciduous Forest of the Central Depression resembles both *J. carthagenensis* and *J. caudata* in its pollen and in numerous macromorphological characters. It differs from these species by its glabrous stems and terminal subcapitate thyrses (with the calyces not visible). It more closely resembles *J. carthagenensis* by its homomorphic bracts, bracteoles 8.5–10.4 mm long and 1.5–3 mm wide, and lower thecae that lack a prominent basal appendage. This collection is not treated herein.

## 9. *Justicia caudata* A. Gray, Proc. Amer. Acad. Arts 21:405. 1886.

— TYPE: Mexico, Chihuahua; near Batopilas, Aug–Nov 1885, *E. Palmer 189* (GH!; isotype: K!).

ILLUSTRATION: none found.

Erect to spreading perennial herbs or shrubs to 1 m tall. Young stems subterete to subquadrate, multi-striate, ± evenly pubescent with retrorse to retrorsely appressed to antrorse to antrorsely appressed eglandular trichomes 0.05–0.2 mm long or nearly glabrous. Leaves petiolate, petioles to 28 mm long, abaxially pubescent with antrorse to antrorsely appressed eglandular trichomes 0.05–0.2 mm long (sometimes sparse or absent) and erect glandular trichomes 0.05–0.2 mm long, blades ovate to ovate-elliptic, 30–120 mm long, 10–70 mm wide, 1.6–3.7 times longer than wide, acuminate at apex, acute to attenuate to abruptly attenuate at base, surfaces pubescent (mostly along major veins) with flexuose to antrorse eglandular trichomes to 1 mm long, margin entire. Inflorescence of dense axillary dichasiate spikes collectively forming a terminal leafy (proximally) to bracteate (distally) panicle to 15 cm long (excluding flowers), 5.5–8.5 cm in diameter near midpanicle, panicle rachis pubescent like young stems, inflorescence bracts (i.e.,

distally reduced leaves subtending axillary spikes), if present, subfoliose, ovate to lanceolate to narrowly elliptic, 18–30 mm long, 4–6.5 mm wide, pubescent like leaves, spikes opposite at nodes, 1–several per axil, sessile to subsessile (i.e., borne on peduncles to 1 mm long); dichasia alternate, 1-flowered, 1–3 per axil, sessile. Bracts opposite, heteromorphic, fertile bracts linear to oblanceolate to  $\pm$  strap-shaped, 10–20 mm long, 1–3.8 mm wide, rounded to acute at apex, abaxial surface pubescent with antrorse eglandular trichomes 0.05–0.2 mm long and distally with stipitate glandular trichomes to 0.2 mm long, margin ciliate with erect to flexuose to antrorse eglandular trichomes to 1 mm long, sterile bracts narrowly linear, 9–16 mm long, 0.3–0.8 mm wide, pubescent like fertile bracts except glands often lacking. Bracteoles linear to oblanceolate to strap-shaped, 12–18 mm long, 0.7–1.5 mm wide, abaxial surface pubescent like fertile bracts. Flowers sessile. Calyx 5-lobed, 8–11 mm long, lobes lanceolate, equal, 7–10 mm long, 1.2–2 mm wide, connivent apically in bud, abaxially pubescent with antrorse eglandular trichomes 0.05–0.2 mm long, margin conspicuously white-hyaline, ciliate. Corolla pink-purple with white markings on lower lip, 23–30 mm long, externally pubescent with mostly flexuose glandular and eglandular trichomes 0.1–0.3 mm long, tube expanded from a point several mm distal to base, 10–13 mm long, 5–8 mm in diameter near midpoint, upper lip 13–16 mm long, strongly arching toward lower lip, 2-fid at apex, lobes 0.3–0.9 mm long, lower lip 13–19 mm long, lobes 6.5–10 mm long, 5–9.5 mm wide. Stamens inserted near apex of corolla tube, 12–15 mm long, filaments glabrous (in ours, elsewhere sometimes glandular), thecae 1.8–3.5 mm long (including basal appendage), unequal, parallel, unequally inserted (overlapping by 0.2–0.7 mm), dorsally glabrous, lower theca with a bulbous basal appendage to 1 mm long; pollen 2-aperturate, apertures flanked by 2 rows of insulae, exine reticulate. Style 17–19 mm long, pubescent with eglandular trichomes proximally (or at least near base), glabrous distally, stigma 2-lobed, lobes equal, 0.2–0.3 mm long. Capsule 10.7–14 mm long, pubescent with erect to subflexuose eglandular trichomes 0.1–0.2 mm long, stipe 2.5–4 mm long, head subellipsoid to subglobose with a slight medial constriction, 7–10 mm long. Seeds 4, subglobose to sublenticular, 3.5 mm long, 3.7–3.8 mm wide, surface(s) and margin densely puberulent with eglandular trichomes to 0.05 mm long, margin entire.  $n = 14$ . Flowering and fruiting Aug–Nov.

Slopes in Tropical Deciduous Forest; common in Sierra Madre; 620–920 m. Mex. (Son., Chih., Sin., Zac., Jal., Hgo., Mich., D.F., Mlos., Pue., Gro., Oax., Chis.), Guat. CHIAPAS COLLECTIONS: *Dan 1280* (MICH); 13707; 28291; 36749; 60165; 64790; 64897; 70926; 70945.

I use Gray's name for this species because I have seen type material of that name and it agrees with Chiapan plants. I recognize, however, that the older name *J. furcata* Jacq. might apply to our species as well. Unfortunately, potential types of Jacquin's names are scattered among several European herbaria and I have not seen a specimen that might represent a type of *J. furcata*. While the description and figure in the protologue of *J. furcata* might apply to plants here treated as *J. caudata*, they conform equally well to *J. reflexiflora* Rich. Other names appear to apply to our species elsewhere in Mexico (e.g., *J. pacifica* (Oerst.) Hemsl.). Additional studies

will be necessary to sort out species and nomenclature in this complex.

#### 10. *Justicia chol* T.F. Daniel, Proc. Calif. Acad. Sci. 48:260. 1995.

— TYPE: Mexico, Chiapas, Mpio. Palenque, near Cascada Mizola S of Palenque on road to Ocosingo, 300 m, 26 Feb 1981, *D. Breedlove 49836* (CAS!; isotypes: C!, K!, MEXU!).

ILLUSTRATION: Fig. 16.

Perennial herbs to 6 dm tall. Young stems quadrate to quadrate-sulcate, pubescent with flexuose to antrorse eglandular trichomes 0.4–1 mm long concentrated in 2 lines, trichomes with maroon septa. Leaves petiolate, petioles to 35 mm long, blades ovate to ovate-elliptic, 28–110 mm long, 8–35 mm wide, 2.1–3.5 times longer than wide, acuminate at apex, attenuate at base, surfaces (especially midvein) and margin pubescent with cauline type trichomes, margin entire to crenate. Inflorescence of axillary pedunculate dichasiate spikes to 65 mm long (including peduncles and excluding flowers), 8–11 mm in diameter near midspike, spikes opposite or alternate at nodes, 1–2 per axil, peduncles to 6 mm long, pubescent like young stems or with trichomes  $\pm$  evenly disposed, rachis usually  $\pm$  visible near midspike, pubescent like peduncles; dichasia alternate, 1-flowered, 1 per axil, sessile. Bracts opposite, heteromorphic with fertile ones larger than sterile ones, fertile bracts subsessile or borne on petioles to 2 mm long, broadly obovate to spatulate to obdeltate, 4.5–8 mm long, 3.5–6 mm wide, rounded to truncate and often apiculate at apex, abaxial surface pubescent with cauline type trichomes along midvein and elsewhere pubescent with erect eglandular and glandular (sometimes inconspicuous) trichomes 0.1–0.3 mm long, margin ciliate with erect to flexuose glandular and eglandular trichomes to 2 mm long, sterile bracts linear (to sometimes obovate-spatulate near base of spike), 2–6 mm long, 0.2–3 mm wide, pubescent like fertile bracts. Bracteoles linear to linear-oblanceolate, 4.5–8 mm long, 0.4–1 mm wide, pubescent like bracts. Flowers sessile. Calyx 5-lobed, 2.5–3.5 mm long, lobes lance-subulate, equal, 2–3 mm long, 0.4–0.7 mm wide, abaxial surface and margin pubescent with flexuose to antrorse eglandular trichomes to 0.5 mm long. Corolla white to cream-yellow with maroon markings on lower lip, 8.5–11.5 mm long, externally pubescent with flexuose eglandular trichomes to 0.5 mm long, tube  $\pm$  expanded distally, 5.5–7 mm long, 1.4–2 mm in diameter near midpoint, upper lip 3–5 mm long, emarginate, lobes 0.1–0.2 mm long, lower lip 3–5.5 mm long, lobes 0.8–1.9 mm long, 0.8–2 mm wide. Stamens inserted near apex of corolla tube, 3.5–4.5 mm long, filaments very sparsely pubescent with flexuose eglandular trichomes, thecae 1–1.5 mm long (including basal appendage), subequal to unequal,  $\pm$  parallel, superposed (up to 0.5 mm distant), pubescent with eglandular trichomes, lower theca with a clublike basal appendage to 0.7 mm long, 2 staminodelike thickenings or protrusions of corolla with clusters of flexuose eglandular trichomes present near midpoint of corolla tube; pollen 3-aperturate, apertures flanked on each side by both a continuous band and a pseudocolpus, exine reticulate. Style 7–9 mm long, pubescent with eglandular trichomes, stigma subelliptic, 0.2 mm long, lobes not evident. Capsule 6–8 mm long, pubescent with flexuose to retrorse eglandular trichomes 0.1–0.4 mm long, stipe 2–3 mm long, head obovoid to subellipsoid

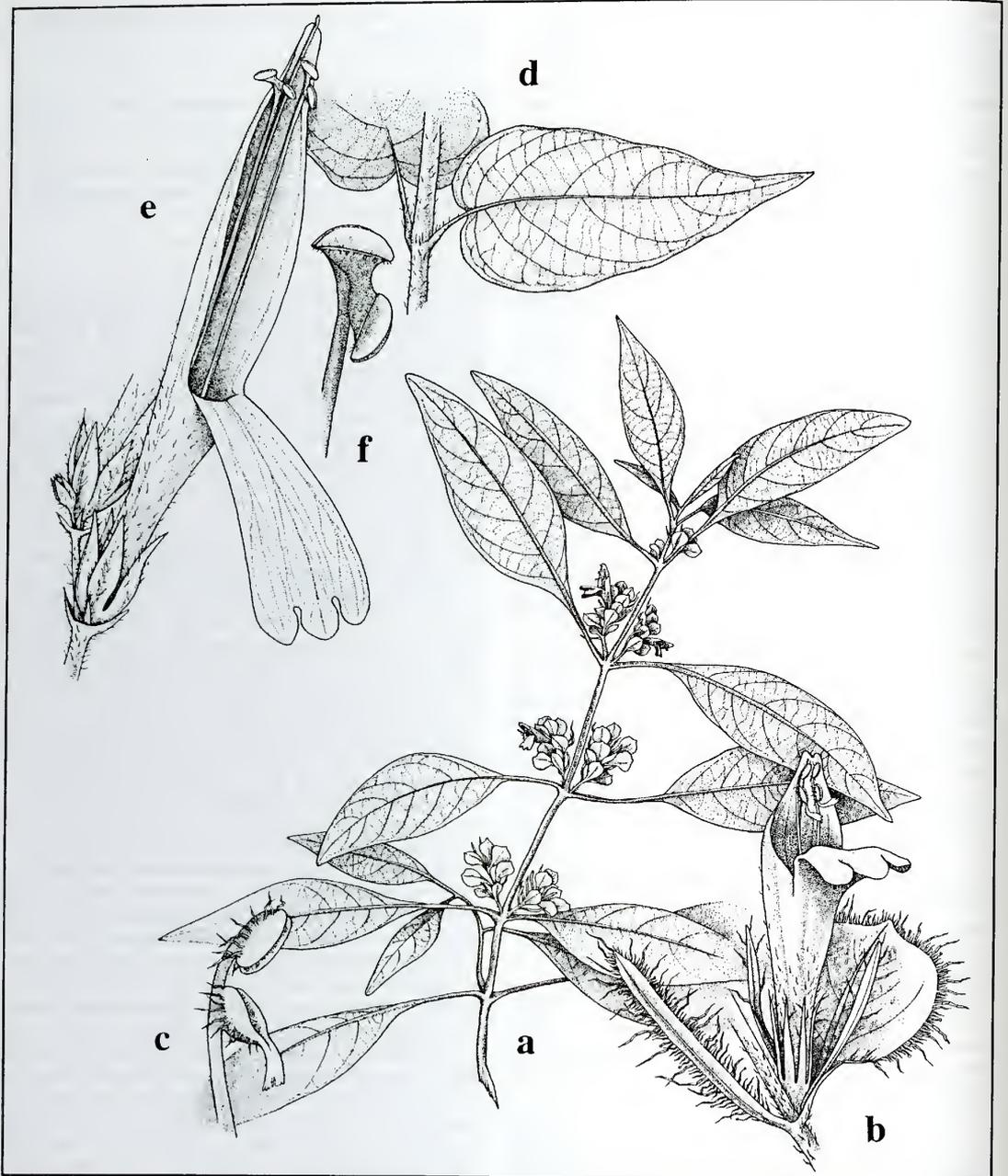


FIGURE 16. *Justicia chol* T.F. Daniel (49836; a-c) and *J. madrensis* (38656; d-f). a, habit,  $\times 0.6$ ; b, inflorescence node with flower,  $\times 5$ ; c, distal portion of stamen,  $\times 10$ ; d, vegetative node,  $\times 0.8$ ; e, inflorescence nodes with flower,  $\times 2$ ; f, distal portion of stamen,  $\times 6$ . Drawn by Jenny Speckels.

to ovoid, 4–5 mm long. Seeds 4, lenticular 1.3–1.6 mm long, 1–1.4 mm wide, surfaces and margin roughened with low rounded papillae or ridges, lacking trichomes. Flowering Feb–Jul; fruiting Feb, May–Jun.

Along streams in Tropical Rain Forest and Lower Montane Rain Forests; uncommon in Northern Highlands; 50–300 m. Mex. (Tab., Chis.). CHIAPAS COLLECTIONS: *Dan 5011* (CAS); *Da 20340* (CAS, MO); *McD 204* (DUKE); 35373; 49836.

**11. *Justicia clinopodium* A. Gray ex Greenm.**  
Proc. Amer. Acad. Arts 32:304. 1897  
(Jun).

— SYNTYPES: Mexico, Veracruz, Orizaba, 25 Aug 1866, *E. Bourgeau 2901* (GH!; isosyntypes: K!, L!, P!), Orizaba, Sep. *M. Botteri 609* (GH!; isosyntypes: BM!, K!, P!); Chiapas: without locality, 1864–1870, *A. Ghiesbreght 80* (GH!), *684* (GH!; isosyntypes: BM!, CAS!, F!, K!).

*Justicia patenti-ciliata* Lindau, Bull. Herb. Boissier 5:673. 1897 (Aug). — SYNTYPES: Mexico, Chiapas, without locality, *A. Ghiesbreght 684* (B?, destroyed; isosyntypes: BM!, CAS!, F!, GH!, K!); Veracruz, Orizaba, Sep. *M. Botteri 609* (B?, destroyed; isosyntypes: BM!, GH!, K!, P!); “in valle mexicana” (fide protologue), Veracruz, Orizaba (fide specimens), 25 Aug 1866, *E. Bourgeau 2901* (B?, destroyed; isosyntypes: GH!, K!, L!, P!).

ILLUSTRATION: none found.

Erect to spreading perennial herbs to 7 dm tall. Young stems subquadrate to quadrate-sulcate, pubescent with an understorey of flexuose-retorse glandular trichomes 0.3–0.9 mm long restricted to 2 vertical lines, and an overstorey of erect to flexuose evenly disposed glandular trichomes 1.5–3 mm long and ± inconspicuous erect to flexuose glandular trichomes 0.5–2 mm long. Leaves subsessile to petiolate, petioles to 6 mm long, blades broadly ovate to ovate to ovate-elliptic, (15–)20–72 mm long, (8–)14–31 mm wide, 1.3–3.4 times longer than wide, rounded to acute to subacuminate at apex, subacute to rounded to truncate to subcordate at base, surfaces and margin pubescent with cauline overstorey type trichomes and margin often with shorter antrorse glandular trichomes as well, margin entire to subcrenate. Inflorescence of terminal sessile or pedunculate dichasiate spikes to 110 mm long (including peduncles and excluding flowers), fertile portion 11–30 mm in diameter near midpoint, peduncles to 75 mm long, pubescent like young stems or with the glandular trichomes more numerous and conspicuous, rachis pubescent like peduncle; dichasia alternate or opposite, mostly 1-flowered, 1 per axil, sessile to subsessile (i.e., borne on peduncles to 1 mm long) in axils of bracts (and sometimes in axils of distal leaves as well). Bracts intergrading with leaves, opposite, ovate to lanceolate to linear-lanceolate, 10–25 mm long, 1.3–10 mm wide, abaxial surface pubescent like leaves or usually with the glandular trichomes more numerous and conspicuous. Bracteoles lance-linear to linear, 8–18 mm long, 0.8–1.2 mm wide, abaxial surface pubescent like bracts. Flowers sessile to subsessile (i.e., borne on pedicels to 1 mm long). Calyx 4-lobed, 12–18 mm long, lobes lance-subulate to lance-linear, subequal to ± unequal, 10–16.5 mm long, 1–1.2 mm wide, abaxially pubescent like bracts. Corolla dark pink-purple with white markings on lower lip, 14–22 mm long, externally glabrous except for a few flexuose glandular trichomes to 0.6 mm long on lower lip, tube cylindrical, 8–12 mm long, 2.8–4 mm in diameter, upper lip 4.5–9 mm long, emarginate to 2-lobed, lobes 0.2–1.2 mm long, 0.8–1.2 mm wide, lower lip 5–11 mm long, lobes 3.5–6.5 mm long, 2.5–7 mm wide. Stamens inserted near apex of corolla tube, 4–6 mm long, filaments glabrous, thecae 1.3–1.7 mm long (including basal appendage), subequal to unequal, subperpendicular to perpendicular, unequally inserted (overlapping by 0.3–0.6 mm) or superposed (up to 0.3 mm distant), glabrous, lower theca with a ± bulbous basal appendage to 0.2 mm long; pollen 2-aperture-

ate, apertures flanked on each side with a few isolated insulae but mostly with prominent peninsulae, exine reticulate. Style 11–15 mm long, glabrous, stigma subcapitate, asymmetric, 0.2–0.5 mm long, lobes not evident. Capsule 10–14 mm long, glabrous, stipe 3.5–6 mm long, head subellipsoid with a slight medial constriction, 6–9 mm long. Seeds 4, lenticular, subcircular to subreniform, 2.2–3 mm long, 2–3 mm wide, surfaces covered with retrorsely barbed trichomelike papillae.  $n = 12$ . Flowering and fruiting May–Dec.

Slopes and ridges in Pine-Oak Forests; common in Central Plateau; 1600–2400 m. Mex. (Méx., Gro., Ver., Chis.), Guat. CHIAPAS COLLECTIONS: *Bre 14417* (K); *Dan 5873* (CAS); *G 684* (CAS); *GL 92* (CAS); *GL 601* (CAS); *La 1903* (DS); *Lo 520* (CAS); *Lo 583* (CAS); *Mi 4996* (MEXU); *Mi 8568* (MEXU); *RS 74128* (MICH); *SR 344* (CAS); *SR 984* (CAS); *SR 1048* (CAS); *Te 7905* (MEXU); *12107*; *14792*; *37279*; *41133*; *46038*; *47048*; *52468*; *53788*.

Local names: “tzotz wamal” (Tzeltal, *Gómez L. 92*, *601*, *López P. 520*), “yax wamal” (Tzeltal, *López P. 583*), “ne chij momol” (Tzotzil, *Santíz R. 344*), “tzotzil momol” (Tzotzil, *Santíz R. 984*), “momol antivo” (*Santíz R. 1048*).

Uses: a handful of the entire plant is boiled and taken orally for stomach problems (*Gómez L. 601*); leaves are mixed with *Calliandra* sp., boiled, and administered orally by drops for muteness (*Santíz R. 344*); young leaves are mixed with *Archibaccharis androgyna*, boiled, and administered by washing for bone pain (arthritis?) (*Santíz R. 984*); entire plant is crushed or ground and used as a plaster for wounds (*Gómez L. 92*); two handfuls of the entire plant are placed in a fire and administered by brushing across the skin for body pain (arthritis?) (*López P. 583*); a handful of the entire plant is boiled and taken orally for diarrhea (*López P. 520*); flowers are crushed or ground and mixed with bits of *Passiflora* sp. and three bits of *Pinus* sp. and aspirated for coughs associated with tuberculosis (*Santíz R. 1048*).

**12. *Justicia colorifera* V.A.W. Graham, Kew**  
Bull. 43:611. 1988.

— *Sericographis tinctoria* Oerst., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:150. 1855. — *Jacobinia tinctoria* (Oerst.) Hemsl. Biol. cent.-amer., Bot. 2:522. 1882. — *Justicia tinctoria* (Oerst.) D.N. Gibson, Fieldiana, Bot. 34:74. 1972, nomen illegit. (non *Justicia tinctoria* Lour. (1790)). — TYPE: Costa Rica, Cartago, Cartago, Apr 1847, *A. Oersted 38* (10677) (C; isotype: K!).

ILLUSTRATION: Oersted 1855:t. 4, figs. 15–16; Fieldiana, Bot., n.s. 18:13, fig. 11. 1986.

Shrubs to 1.5 m tall. Young stems subterete to subquadrate, glabrous (although often ± scurfy). Leaves petiolate, petioles to 4 mm long, blades sometimes blackening when dried, lance-ovate to ovate to ovate-elliptic, 20–65 mm long, 7–24 mm wide, 2.7–3.5 times longer than wide, acuminate at apex, acute to subattenuate at base, surfaces glabrous (or with scattered glandular trichomes along midvein), margin entire. Inflorescence of axillary pedunculate dichasiate spikes or panicles of spikes to 60 mm long (including peduncles and excluding flowers), 2–25 mm in diameter near midpoint of fertile portion,

inflorescence bracts (i.e., bracts subtending panicle branches, if present) lanceolate to elliptic, 4–11 mm long, 0.8–2.6 mm wide, glabrous, spikes or panicles alternate or opposite, 1 per axil, peduncles to 13 mm long, glabrous, rachis glabrous; dichasia alternate (rarely opposite at proximalmost node), 1-flowered,  $\pm$  secund, 1 per axil, sessile to subsessile (i.e., peduncles to 1 mm long). Bracts opposite, triangular-subulate to lance-subulate to elliptic, 2–8 mm long, 0.8–1.5 mm wide, abaxial surface glabrous. Bracteoles subulate, 2.2–3 mm long, 0.7–0.8 mm wide, abaxial surface glabrous. Flowers sessile. Calyx 5-lobed, (2.5–) 3.5–5 mm long, lobes (triangular to) subulate, equal, (1.5–) 2–3 mm long, 1–1.2 mm wide, abaxially glabrous. Corolla red, 31–43 mm long, externally glabrous, tube gradually expanded distally, 18–29 mm long, 2.5–4 mm in diameter near midpoint, upper lip 11–13 mm long, entire to  $\pm$  erose to 2-lobed with lobes to 0.4 mm long, lower lip not recoiled, 12–13 mm long, lobes 0.5–1.3 mm long, 0.8–1.5 mm wide. Stamens inserted near apex of corolla tube, 12–14 mm long, filaments glabrous, thecae 2.3–2.7 mm long, equal, subparallel to subperpendicular, subequally to unequally inserted (overlapping by 1.5–2.2 mm), dorsally pubescent with eglandular trichomes, lacking basal appendages or with a rounded basal projection to 0.2 mm long; pollen 2-aperturate, apertures flanked on each side by 1 (–2) rows of insulae, exine reticulate. Style 30–38 mm long, distally glabrous, proximally pubescent with eglandular trichomes, stigma 0.2 mm long, lobes indistinct. Capsule and seeds not seen. Flowering Feb–Mar.

Tropical deciduous forest; uncommon in Central Depression; 680–920 m. Mex. (Chi.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., S.A. (Col.). CHIAPAS COLLECTIONS: *Cro* 64775 (CAS); *V&S* 14Y (DS); 50321.

Although the anthers are not visible on the isotype seen at K, they are pubescent on other specimens from Central America that have glabrous stems and red, glabrous corollas with the lower lip not coiled.

This species resembles *J. spicigera* but can be distinguished by its glabrous stems, red and externally glabrous corollas with the lower lip not recoiled, and dorsally pubescent thecae. Like *J. spicigera*, *J. colorifera* is often cultivated and used as a bluing agent in laundering clothes. The wide distribution noted above undoubtedly includes places of cultivation of the species and not necessarily its native range.

Similar plants previously treated as *Jacobinia scarlatina* S.F. Blake have red corollas but they have the lower lip of the corolla recoiled, inconspicuous glands on the external surface of the proximal portion of the corolla tube, and glabrous thecae. They are treated below under *Justicia spicigera* Schldt.

### 13. *Justicia comata* (L.) Lam. Encycl. 1:632. 1785.

— *Dianthera comata* L. Syst. nat. ed. 10. 850. 1759. — *Leptostachya comata* (L.) Nees in A. DC. Prodr. 11:381. 1847. — *Ecbolium comatum* (L.) Kuntze, Revis. gen. pl. 2:487. 1891. — *Stethoma comata* (L.) Britton, Bot. Porto Rico 6:218. 1925. — *Psacodocalymma comatum* (L.) Bremek. Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 45:55. 1948. — LECTOTYPE (desig-

nated by Graham 1988:618): Jamaica, Linn. Herb. 29:2, *P. Browne* (LINN, microfiche!).

*Rhytiglossa acuminata* Nees in A. DC. Prodr. 11:354. 1847. — *Justicia acuminata* (Nees) Lindau in Engl. & Prantl, Nat. Pflanzenfam. 4(3b):351. 1895. — LECTOTYPE (designated here): Mexico, Tabasco, marais de Teapa, Feb, *J. Linden* 1633 (K!).

*Thalestris graminiformis* Rizzini, Dusenja 3:190. 1952. — TYPE: Brazil, Paraná, S. João, Parque Nacional do Iguaçú, 12 May 1949, A. Duarte 1705 (RB).

ILLUSTRATIONS: Fieldiana, Bot. (n.s.) 18:10, fig. 8. 1986; Ezcurra in Cabrera, Flora Provincia Jujuy (Rep. Argentina) 9:352, fig. 145. 1993.

Erect to spreading to decumbent (annual? to) perennial, often somewhat aquatic, herbs to 1 m tall, often rooting at nodes. Young stems subhexagonal, usually becoming  $\pm$  flattened, glabrous or sparsely pubescent (especially near nodes) with antrorse to antrorsely appressed eglandular trichomes to 1.7 mm long, trichomes usually concentrated in 2 lines. Leaves sessile to petiolate, petioles to 5 mm long, blades (elliptic to) narrowly ovate to lanceolate, 25–163 mm long, 7–35 mm wide, (2.1–) 3–6.8 times longer than wide, acuminate at apex, attenuate to truncate to cordate-auriculate at base, surfaces and margin glabrous or sparsely pubescent with antrorse eglandular trichomes, margin entire. Inflorescence of axillary and terminal pedunculate dichasiate spikes, or, usually, panicles of spikes to 200 mm long (including peduncle and excluding flowers), 25–80 mm in diameter near midpoint of fertile portion, axillary spikes or panicles alternate or opposite, 1–3 per axil, peduncles to 70 mm long, glabrous or pubescent with erect to flexuose to antrorse eglandular trichomes to 2 mm long or pubescent with an understory of antrorse eglandular trichomes 0.1–0.3 mm long and an overstory of erect to flexuose glandular trichomes to 0.4 mm long, main rachis variously pubescent with trichomes like those of peduncle, sometimes glabrous (or nearly so), bracts subtending panicle branches (= inflorescence bracts) lanceolate to subulate to triangular-subulate, 1–6 mm long, 0.3–1.4 mm wide, glabrous, branches of panicles congested at nodes and appearing verticillate, spike rachises pubescent like main rachis or with erect to antrorse eglandular trichomes to 0.2 mm long and erect to flexuose glandular trichomes to 0.4 mm long; dichasia mostly alternate, 1-flowered,  $\pm$  secund, 1 per axil, sessile. Bracts subulate to triangular-subulate, 0.8–2.2 mm long, 0.3–0.5 mm wide, abaxial surface pubescent with antrorse eglandular trichomes. Bracteoles subulate to triangular-subulate, 0.7–2 mm long, 0.2–0.5 mm wide, abaxial surface pubescent like bracts. Flowers sessile. Calyx 5-lobed, 1.5–3.5 mm long, lobes lance-subulate, equal, 1.2–3 mm long, 0.3–0.5 mm wide, abaxially glabrous. Corolla white (sometimes tinged with lavender), with maroon markings on lower lip, 3–6 mm long, externally sparsely pubescent on anterior side only with eglandular trichomes 0.1–0.2 mm long, tube cylindrical, 1–2 mm long, 0.8–1.4 mm in diameter near midpoint, upper lip 2–3 mm long, emarginate, lobes 0.1 mm long, lower lip 1.8–4 mm long, lobes 0.5–1.2 mm long, 0.4–1 mm wide. Stamens inserted just proximal to mouth of corolla, 1.8–3 mm long, filaments glabrous, thecae 0.3–0.5 mm long, unequal, subparallel to perpendicular, unequally inserted (overlapping by 0.2–0.3 mm) or superposed (contiguous), glabrous, lacking basal appendages; pollen 2-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 2–3.5 mm long, sparsely pubes-

cent with eglandular trichomes to nearly glabrous, stigma subcapitate, 0.1 mm long, lobes not evident. Capsule 3–4 mm long, pubescent with flexuose to antrorse eglandular (and usually a few glandular) trichomes 0.1–0.2 mm long, stipe 1–1.7 mm long, head ovoid to subellipsoid to obovoid (often with a medial constriction), 2–2.7 mm long. Seeds 2–4, lenticular, 0.9–1.3 mm long, 0.9–1.2 mm wide, surfaces covered with knoblike papillae, margin fringed, minutely papillose.  $n = 14$ . Flowering Aug–May; fruiting Aug–Apr.

Along streams, freshwater shores, and in wet waste places in Tropical Rain Forest, Evergreen Seasonal Forest, Pine-Oak Forest, and Swamp and Lowland Riparian Forest; uncommon in Gulf Coastal Plain, Sierra Madre, and Pacific Coastal Plain; 0–900 m. Mex. (S.L.P., Ver., Oax., Tab., Yuc., Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Guy., Sur., Fr. Gui., Ecu., Peru, Bol., Braz., Arg., Parag.). CHIAPAS COLLECTIONS: *EM 558* (US); *EM 2156* (K, US); *P 6659* (BM, UC, US); *Ve 678* (BM); 38648; 47240; 56789.

Additional synonyms were provided by Lindau (in Urban, *Symb. antill.* 2:240–241. 1900) and Graham (1988).

Plants show considerable variation in pubescence of the inflorescence; sometimes the glandular trichomes are nearly absent.

Relatives of this species remain obscure; indeed, it was the basis for two segregate genera. It is consistently confused with *J. pectoralis*, another widespread species in tropical America, that can be distinguished by the following couplet:

Corolla 3–6 mm long; calyx equally 5-lobed; branches of panicles congested at nodes and appearing verticillate; bracts and bracteoles abaxially eglandular; thecae 0.3–0.5 mm long, those of a pair unequally inserted to superposed; capsule 3–4 mm long. . . . *J. comata*

Corolla 7.5–10 mm long; calyx unequally 5-lobed (posterior lobe greatly reduced in size); branches of panicles neither congested at nodes nor appearing verticillate; bracts and bracteoles abaxially glandular; thecae 0.6–0.9 mm long, those of a pair equally to subequally inserted; capsule 5.5–9 mm long. . . . . *J. pectoralis*

#### 14. *Justicia eburnea* D.N. Gibson, Fieldiana, Bot. 34:68. 1972.

—TYPE: Guatemala, Izabal, Río Dulce, 2–4 mi W of Livingston, 1–3 m, 16 Apr 1940, *J. Steyermark 39535* (F!).

ILLUSTRATION: none found.

Shrubs to 3 m tall. Young stems quadrate, glabrous. Leaves petiolate, petioles to 12 mm long, blades ovate to elliptic to obovate-elliptic, 52–160 mm long, 23–65 mm wide, 1.8–3.2 times longer than wide, acuminate to subfalcate at apex, acute to subattenuate at base, surfaces glabrous, margin entire to subcrenate. Inflorescence of axillary pedunculate much-branched dichasiate panicles to 55 mm long (including peduncles and excluding flowers), 30 mm in diameter (excluding flowers) near midpoint, panicles opposite, 1–2 per axil, peduncles to 20 mm long, glabrous, panicle rachises slender, glabrous; dichasia alternate, 1-flowered, 1 per axil, sessile (sometimes appearing pedunculate until lateral branching de-

velops). Inflorescence and floral bracts opposite, triangular to subulate, 1–1.5 mm long, 0.5–0.8 mm wide, abaxial surface glabrous. Bracteoles triangular, 1–1.3 mm long, 0.4–0.8 mm wide, abaxial surface glabrous. Flowers sessile to pedicellate, pedicels to 2 mm long. Calyx 5-lobed, 2.8–3.5 mm long, lobes subulate, equal, 2.2–2.9 mm long, 0.5–0.8 mm wide, abaxially glabrous. Corolla white, 21–26 mm long, external surface glabrous, tube gradually expanded distally, 9–11 mm long, 2.7–3 mm in diameter near midpoint, upper lip 12–16 mm long, entire, lower lip 15–16 mm long, lobes 0.6–1 mm long, 0.7–1.2 mm wide. Stamens inserted near base of corolla tube, 17–22 mm long, proximally pubescent with eglandular trichomes, thecae 2.5–3 mm long (including basal appendage), subequal, parallel, subequally inserted, glabrous, with a pointed appendage to 0.4 mm long at base, connective sometimes extending beyond thecae as a sterile apical appendage; pollen 2-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 16–23 mm long, sparsely pubescent with eglandular trichomes proximally, stigma 0.2 mm long, equally 2-lobed. Capsule 12–15 mm long, glabrous, stipe 5–8 mm long, head subellipsoid, 6.5–7 mm long. Seeds 4, lenticular, 2.8–3 mm long, 2.3–2.5 mm wide, surfaces and margin covered with conic tubercles. Flowering Feb–May, Aug; fruiting Mar–May, Aug.

Tropical Rain Forest; rare in Eastern Highlands; 200–350 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *So 1641* (US); 33217.

The collections from Chiapas are in flower only. The above description and phenologies have been augmented by data from Guatemalan collections.

#### 15. *Justicia fimbriata* (Nees) V.A.W. Graham, Kew Bull. 43:608. 1988.

—*Beloperone fimbriata* Nees in A. DC. Prodr. 11:416. 1847. —TYPE: Mexico, Tabasco, Teapa, 1839, *J. Linden 178* (K!; isotype: FI, photo: US!).

*Beloperone kukulcan* Lindau, Repert. Spec. Nov. Regni Veg. 12:425. 1913. —TYPE: Mexico, Chiapas, ruinas de Palenque, 11 Mar 1911, *C. Seler & E. Seler 5464* (385) (B, destroyed; isotype: GH!).

*Justicia magniflora* (S.F. Blake) D.N. Gibson, Fieldiana, Bot. 34:70. 1972. —*Dicliptera magniflora* S.F. Blake, Contr. Gray Herb. 52:98. 1917. —*Beloperone magniflora* (S.F. Blake) Leonard, Publ. Carnegie Inst. Wash. 461:234. 1936. —TYPE: Belize, Toledo, 1905–1907, *M. Peck 622a* (GH!).

*Beloperone crenata* Standl. Publ. Carnegie Inst. Wash. 461:88. 1935. —TYPE: Belize, Pueblo Viejo, 1700 ft, 18 Feb 1934, *W. Schipp S-694* (F!; isotypes: BM!, GH!, K!). ILLUSTRATION: none found.

Shrubs to 3 m tall. Young stems subterete to quadrate-sulcate, (glabrous or) pubescent with flexuose to retrorse eglandular trichomes 0.2–1 mm long, trichomes concentrated in or ± restricted to 2 lines, sometimes with inconspicuous sessile patelliform glands present as well (glandular-punctate), stems soon glabrate. Leaves (subsessile to) petiolate, petioles to 50 mm long, blades elliptic to obovate-elliptic, (28–) 65–265 mm long, (12–) 38–95 mm wide, 2.1–5.3 times longer than wide, acuminate at apex, attenuate at base, surfaces glabrous or pubescent with antrorse eglandular trichomes (often restricted to major veins), sometimes glandular-punctate as well, margin

entire to crenate. Inflorescence of axillary (in axils of distal leaves or reduced leaves of axillary branches) and terminal pedunculate dichasiate spikes to 35 (–58) mm long (including peduncle and excluding flowers), (3–) 6–14 mm in diameter near midspike, usually collectively forming a dense terminal paniclelike or subcapitate cluster (rarely an open panicle), axillary spikes opposite, 1 (–2) per axil, peduncles to 9 (–15) mm long, pubescent like young stems or with the trichomes ± evenly disposed, glandular-punctate, rachis pubescent like peduncles or ± evenly pubescent with trichomes like those of peduncles, glandular-punctate; dichasia opposite (to alternate), 1-flowered, 1 per axil, sessile. Bracts opposite, ovate to linear to linear-lanceolate to oblanceolate, (4.5–) 7–19 mm long, (1.7–) 2.5–4.5 mm wide (proximal bracts sometimes subfoliose and larger), abaxial surface (glabrous or) pubescent with antrorse to antrorsely appressed eglandular trichomes 0.2–0.5 mm long and glandular-punctate, margin densely ciliate with flexuose eglandular trichomes to 1.2 mm long. Bracteoles ovate to linear-elliptic to elliptic, (4.5–) 5.5–10.5 mm long, (1.3–) 1.5–3.3 mm wide, abaxial surface (glabrous or) pubescent like bracts. Flowers sessile. Calyx 5-lobed, (5–) 5.5–7.5 mm long, abaxially (glabrous or) pubescent like bracts (although the eglandular trichomes usually fewer), lobes unequal, posterior lobe ovate-elliptic to elliptic to obovate-elliptic, 5–6.5 mm long, 1.5–2.8 mm wide, other lobes lance-ovate to lance-linear to linear elliptic, (4.2–) 5–6.5 mm long, 1–1.9 mm wide. Corolla ± fusiform in bud (and often curved at apex), yellow to orange-yellow, (32–) 45–60 mm long, externally pubescent with erect to flexuose yellowish eglandular trichomes 0.3–1 mm long, tube ± gradually expanded from near base, (18–) 30–35 mm long, 3.5–6.5 mm in diameter near midpoint, upper lip (12–) 14–24 mm long, emarginate or 2-lobed, lobes 0.2–0.7 mm long, lower lip (13–) 15–23 mm long, shallowly 3-lobed, lobes 0.2–1 mm long, 0.3–1.5 mm wide. Stamens inserted a few mm proximal to mouth, (13–) 16–26 mm long, filaments proximally pubescent with eglandular trichomes, thecae (1.9–) 2.2–2.8 mm long (including basal appendage), subequal, subparallel to subperpendicular, unequally inserted (overlapping by 0.5–1.2 mm), dorsally glabrous or pubescent with eglandular trichomes, both thecae with a ± bulbous basal appendage 0.4–0.8 mm long; pollen 3-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style (31–) 55–61 mm long, glabrous, stigma (0.3–) 0.5–0.7 mm long, 2-lobed with lobes unequal, 0.2–0.5 mm long or lobes indistinct. Capsule 10–13 mm long, glabrous or somewhat scurfy, sometimes inconspicuously glandular-punctate or with a few eglandular trichomes to 0.3 mm long near apex, stipe 3–4 mm long, head ovoid-ellipsoid to ellipsoid, 7–10 mm long. Seeds 4, lenticular, 3.3–4 mm long, 3–3.5 mm wide, surfaces covered with minute papillae, these sometimes subconic and more conspicuous on margin. Flowering Aug, Nov–May; fruiting Feb–May.

Slopes, ridges, and along streams in Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, Evergreen Cloud Forest, Evergreen Seasonal Forest, and Pine-Oak-Liquidambar Forest; common in Northern Highlands, Eastern Highlands, and Central Plateau; 50–2460 m. Mex. (Ver., Oax., Tab., Chis.), Guat., Bel. CHIAPAS COLLECTIONS: *Bam 6180* (F); *Cb 8130* (CAS); *Cz 3093* (MEXU); *Cro 46662* (CAS); *Dan 4992* (CAS); *Dan 5001* (CAS); *Fe 1391* (MEXU); *Hoov 146* (MEXU, US); *Ven 19989* (MEXU); *Luc 2581* (CAS); *Mz 3202* (CAS, MEXU, WIS); *Mz 10843* (CAS, F, MEXU); *Mz 11873* (MEXU); *Mz 17585* (MEXU); *Mz 17588* (MEXU); *Mz 17770*

(F); *Mz 18061* (CAS); *Mv B-236* (MEXU); *Pa 208* (CAS); *QVU 471* (U); *Sch 1714* (US); *S&S 5487* (GH); *So 1697* (MICH, US); *Te 6633* (CAS, MEXU); *T 5481* (MEXU); *T 5533* (MEXU); *T 6003* (MEXU); *T 7133* (MEXU); *T 7194* (MEXU); *Wa W660209* (CAS); *7370*; *22115*; *24175*; *24220*; *29716*; *33007*; *34524*; *35260*; *41949*; *48779*; *49093A*; *49549*; *49679*; *49837*; *50457*; *56135*; *52287*; *56172*; *57231*; *57603*; *68683*.

A high elevation collection from Chiapas that otherwise resembles this species (*Breedlove 49679* from Evergreen Cloud Forest at 2460 m) differs by its shorter corollas (32–36 mm long vs. 45–60 mm long) and more elongate spikes (to 58 mm long vs. to 35 mm long) in a somewhat more open panicle. *Breedlove 7370* and *Ton 6003* (from lower elevations) more closely resemble *Breedlove 49679* in these characteristics than they do more typical *J. fimbriata* which is usually found in Tropical Rain Forest to Montane Rain Forest at elevations from 50–1700 meters in Chiapas.

## 16. *Justicia herpetacanthoides* Leonard, J. Wash. Acad. Sci. 32:185. 1942.

— TYPE: Mexico, Yucatán, Chichen Itzá, 23 Jun 1932, W. Steere 1510 (US!; isotype: MICH!; type fragment: F!).

ILLUSTRATIONS: Fig. 17.

Perennial herbs or shrubs to 1 m tall. Young stems subquadrately, evenly pubescent with erect to flexuose to retrorse eglandular trichomes 0.2–0.8 mm long. Leaves petiolate, petioles to 30 mm long, blades ovate, 23–88 mm long, 10–51 mm wide, 1.4–2.3 times longer than wide, acute to subacuminate at apex, rounded to acute at base, surfaces pubescent with erect to flexuose eglandular trichomes 0.1–0.7 mm long, margin entire to subsinuate. Inflorescence of axillary or terminal sessile (sometimes when terminal) to pedunculate densely bracteate 4-sided dichasiate spikes to 70 mm long (including peduncle and excluding flowers), 13–17 mm in diameter near midspike, axillary spikes alternate or opposite, 1 per axil, peduncles to 45 mm long, pubescent like young stems, rachis pubescent like young stems; dichasia opposite, 1-flowered, 1 per axil, sessile. Bracts opposite, usually tinged with purple along margin near apex, sessile, broadly ovate, 8–12 mm long, 5–9 mm wide (proximalmost bracts often subfoliose and larger), apically acute, abaxial surface and margin pubescent with erect to flexuose to antrorse eglandular trichomes to 1 mm long. Bracteoles linear-elliptic to oblanceolate, 5.5–9 mm long, 1.2–2.2 mm wide, pubescent like bracts. Flowers sessile. Calyx 5-lobed, 3–5.5 mm long, lobes lanceolate to lance-linear, equal, 2.8–5 mm long, 0.8–1 mm wide, abaxially pubescent with flexuose to antrorse eglandular trichomes to 0.7 mm long. Corolla white with upper lip greenish and lower lip with maroon markings, 10.5–15 mm long, externally pubescent with flexuose eglandular trichomes to 0.6 mm long, tube subcylindric, 5–6.5 mm long, upper lip 5–7 mm long, apically 2-lobed, lobes acute to rounded, 0.3–0.7 mm long, lower lip 4.5–7.5 mm long, lobes ovate to subelliptic, 1.8–3.5 mm long, 2.2–3.4 mm wide. Stamens inserted near apex of corolla tube, 6.3–6.5 mm long, filaments glabrous, thecae maroon, 1.2–2 mm long (including basal appendage), subequal, parallel, unequally inserted (overlapping by 0.2–0.4 mm), dorsally pubescent with flexuose eglandular trichomes, upper theca lacking a basal appendage or

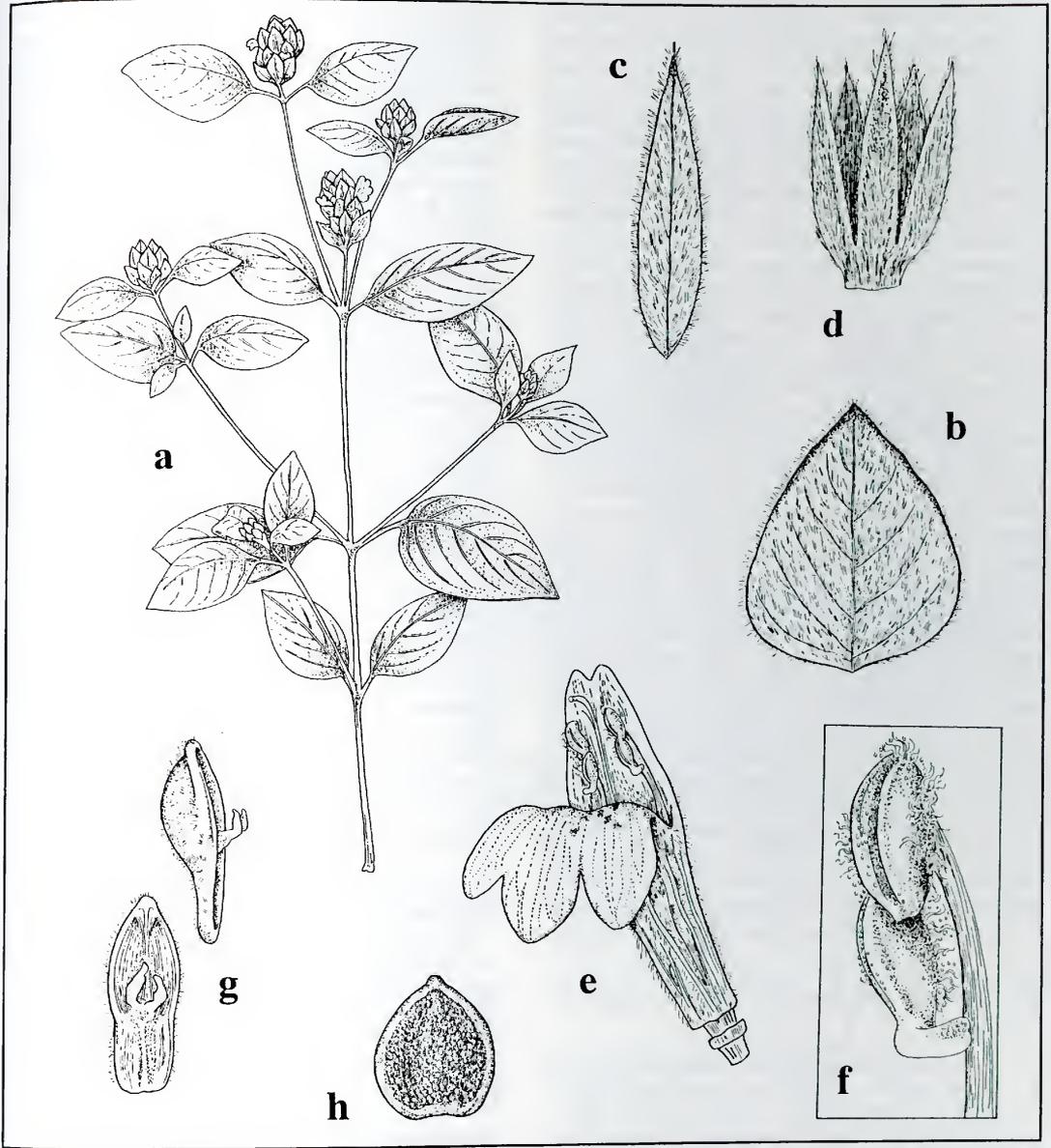


FIGURE 17. *Justicia herpetacanthoides* Leonard (a-f from 71004, g-h from 13364). a, habit,  $\times 0.4$ ; b, bract,  $\times 3.2$ ; c, bracteole,  $\times 5.5$ ; d, calyx,  $\times 8$ ; e, flower with calyx removed,  $\times 4$ ; f, distal portion of stamen,  $\times 16$ ; g, capsule: side view of one valve (top), interior view of one valve (bottom),  $\times 3.2$ ; h, seed,  $\times 7.5$ . Drawn by Tina Cash.

with a basal appendage to 0.2 mm long, lower theca with a basal appendage 0.4–0.5 mm long; pollen 3-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 8.5–10 mm long, distally glabrous, proximally pubescent with antrorse eglandular trichomes, stigma 0.2–0.3 mm long, lobes unequal, 0.1–0.3 mm long. Capsule 7–8.5 mm long, pubescent with erect to flexuose eglandular trichomes to 0.5 mm long, stipe 2.5–3.5 mm long, head subspheric to subellipsoid, 4.5–5.5 mm long. Seeds 4, flat, subcordate, 2.3–2.5 mm long, 2 mm wide, surfaces minutely papillose, lacking trichomes, margin

lighter colored than interior portion.  $n = 14$ . Flowering and fruiting Oct–Jan.

Barrancas in Evergreen Seasonal Forest and Tropical Deciduous Forest; uncommon in Central Depression; 700–850 m. Mex. (Yuc., Chis.). CHIAPAS COLLECTIONS: *Lm* 3836 (US); *Pa* 2011 (CAS); 13364; 53666; 56879; 71004.

Specimens of this species from Chiapas are rather homogeneous. They differ from the type of *J. herpetacanthoides* from Yucatán most noticeably by the even distribution of the cauline trichomes (vs. concen-

trated in two lines), somewhat longer calyces (4–5.5 vs. 3.5–4 mm), longer corollas (10.5–15 vs. 9–10 mm), and the longer capsules (8–8.5 vs. 5–5.5 mm). In many characteristics our plants also resemble the type of *Beloperone blechioides*, a specimen lacking complete flowers. Gibson (1974) included *B. blechioides* into her broad concept of *J. fulvicoma* (including *J. brandegeana* Wassh. & L.B. Sm.). Daniel (Baileya 23:47–50. 1989) rejected this treatment of *J. fulvicoma* and noted that although its taxonomic position was unclear due to the fragmentary nature of the type, *B. blechioides* is more similar to *J. brandegeana* than to *J. fulvicoma*. It appears that corollas of *B. blechioides* are longer than those of our plants. Remnants of a corolla on the type reveal a tube about 10 mm long and in the protologue Leonard (J. Wash. Acad. Sci. 32:186. 1942) noted an immature corolla about 20 mm in length. Additional collections resembling *B. blechioides*, either from the type locality in Chiquimula or elsewhere in Guatemala, would be useful in resolving whether it is a distinct species of *Justicia* or whether it should be treated as a synonym of either *J. brandegeana* or *J. herpetacanthoides*. Another species from the Yucatán Peninsula with many similarities to *J. herpetacanthoides* is *J. lundellii* Leonard (cf. J. Wash. Acad. Sci. 32:186. 1942). The type of this species differs from our plants by their shorter (3 mm long) calyces, shorter (7–8 mm long) corollas, and vegetative organs with a blackish coloration on drying. Additional studies are needed to determine if *J. herpetacanthoides* ought to be included within that species. A collection from 1400 meters elevation in Oaxaca (Hallberg 974, MICH) that otherwise agrees with plants from Chiapas has glabrous capsules. While it is possible that the specimens from Chiapas represent a distinct and undescribed taxon, their resemblance to *J. herpetacanthoides* is sufficient that they are included within that species pending further studies of all of the above mentioned species and specimens in this complex.

## 17. *Justicia inaequalis* Benth. Pl. hartw. 80. 1841.

— *Rhytiglossa inaequalis* (Benth.) Nees in A. DC. Prodr. 11:349. 1847. — *Dianthera inaequalis* (Benth.) Benth. & Hook. ex Hemsl. Biol. cent-amer., Bot. 2:518. 1882. — TYPE: Guatemala, Quezaltenango, Rancho del Palo Hueco, Dec 1840, T. Hartweg 553 (K ex hb. Benth.; isotypes: BM!, G, K ex hb. Hook.!, P!).

ILLUSTRATION: none found.

Suberect shrubs to 2 m tall. Young stems quadrate to quadrate-sulcate, internodes glabrous or bifariously to unifariously (or ± evenly on youngest growth) pubescent with erect to flexuose to antrorse eglandular trichomes 0.2–1 mm long, nodes pubescent with straight (but not erect), eglandular trichomes to 1 mm long. Leaves petiolate, petioles to 45 mm long, blades ovate to lanceolate, 42–135 mm long, 6–70 mm long, 2.4–7 times longer than wide, acuminate at apex, rounded to attenuate at base, adaxial surface pubescent with antrorse eglandular trichomes (especially along midvein), abaxial sur-

face glabrous or with a few antrorse eglandular trichomes along midvein, margin entire to sinuate-crenate. Inflorescence of terminal and axillary pedunculate secund dichasiate spikes (sometimes basally once branched and thus panicles) to 170 mm long (including peduncles and excluding flowers), 3.5–5 mm in diameter near midspike (excluding flowers), axillary spikes (or panicles) alternate, 1 per node, peduncles to 50 mm long, glabrous, rachis glabrous; dichasia alternate, 1-flowered, 1 per axil, sessile. Bracts opposite, subulate, 3–5 mm long, 0.8–1 mm wide, abaxial surface glabrous. Bracteoles subulate to lance-subulate, 2–5.5 mm long, 0.6–1 mm wide, abaxial surface glabrous. Flowers sessile to subsessile (i.e., pedicels to 0.5 mm long). Calyx 4-lobed, 11–18 mm long, lobes lance-linear, subequal, 10–17 mm long, 1.5–2.5 mm wide, widest near middle, abaxially glabrous, margins noticeably thickened and discolored. Corolla red, 34–45 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.5 mm long, tube ± gradually expanded distally, 19–24 mm long, 2.3–5 mm in diameter near midpoint, upper lip 12–21 mm long, entire, lower lip 14–22 mm long, lobes 5–5.5 mm long, 2.6–5 mm wide. Stamens inserted in distal half of corolla tube, 14–20 mm long, filaments proximally pubescent with eglandular trichomes, thecae 2.2–3 mm long, subequal, superperpendicular to perpendicular, unequally inserted (overlapping by 1.5–2 mm), glabrous or dorsally pubescent with eglandular trichomes, lacking basal appendages; pollen 2-aperturate, flanked on each side by 2 rows of insulae, exine reticulate. Style 34–35 mm long, glabrous, stigma 0.2–0.5 mm long, lobes not evident, ovary glabrous. Capsule 16–20 mm long, glabrous, stipe 6–9 mm long, head subellipsoid, 10–12 mm long. Seeds 4, lenticular, 3.3–3.5 mm long, 2.4–2.5 mm wide, surfaces and margin covered with low rounded tubercles. Flowering Jun, Nov; fruiting Nov.

Ecotone between Montane Rain Forest and Evergreen Seasonal Forest; rare in Sierra Madre; 1300–1500 meters. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *He 1071* (CAS); *EM 3990* (MEXU, MICH).

The above description has been augmented by data from Guatemalan specimens.

This species is similar to one described from Tabasco as *Rhytiglossa latifolia* Nees, which differs by its longer corollas (50–53 mm long), glandular-pubescent rachises, and lowland habitat (Tropical Rain Forest at ca. 50 meters elevation). A collection from Tropical Rain Forest (160 m) in the Eastern Highlands of Chiapas (*Sinaca C. & Ibarra M. 1114*, MEXU) shares some features in common with both *J. inaequalis* and *Rhytiglossa latifolia* (e.g., inflorescence form and number of calyx lobes) but differs by having corollas orange (ca. 33 mm long), rachises pubescent with eglandular trichomes, and calyces 7.5–8 mm long. Its identity remains in question.

## 18. *Justicia jitotolana* T.F. Daniel, Proc. Calif. Acad. Sci. 48:263. 1995.

— TYPE: Mexico, Chiapas, Mpio. Rayón, 9 mi NW of Pueblo Nuevo Solistahuacán along rd. between Rincon Chamula and Rayón, 17°30'N, 92°40'W, 1760 m, Sep 1971, R. Thorne & E. Lathrop 41662 (DS!; isotype: RSA!).

ILLUSTRATION: Fig. 18.

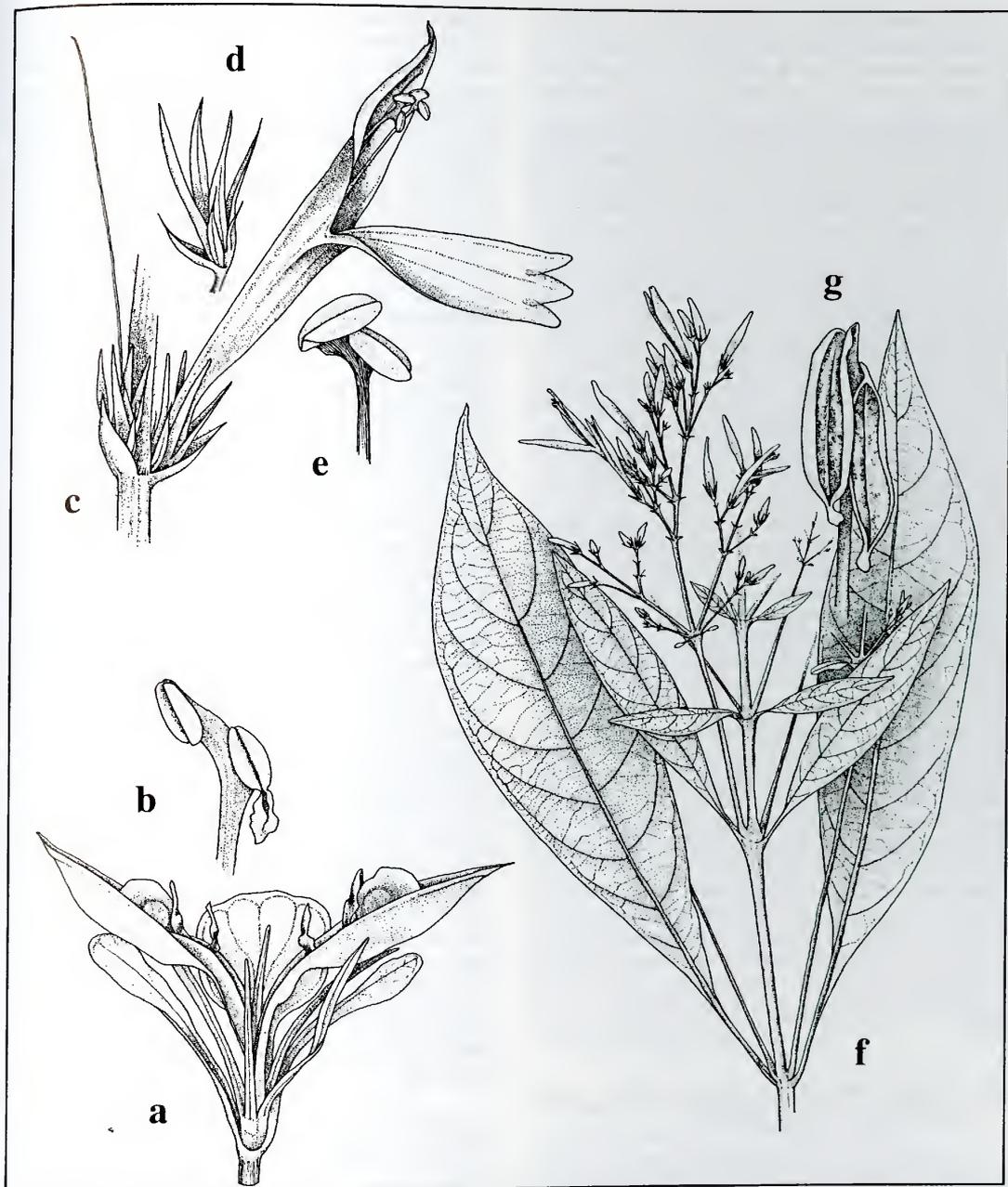


FIGURE 18. *Justicia jitotolana* T.F. Daniel (a–b), *J. tianguensis* T.F. Daniel (7365; c–e), and *J. turipachensis* T.F. Daniel (31242; f–g). a, bract, bracteoles, calyx, and dehiscent capsule (60297),  $\times 3.3$ ; b, distal portion of stamen (Thorne & Lathrop 41662),  $\times 8$ ; c, inflorescence node with flower,  $\times 1.5$ ; d, bract, bracteoles, and calyx,  $\times 2.5$ ; e, distal portion of stamen,  $\times 5$ ; f, distal portion of shoot with inflorescence,  $\times 0.8$ ; g, distal portion of stamen,  $\times 12$ . Drawn by Jenny Speckels.

Perennial herbs or shrubs to 1 m tall. Young stems quadrate to quadrate-sulcate to quadrate-flattened, bifariouly pubescent with retrorse conspicuously multi-septate (with maroon septa) eglandular trichomes to 0.5 mm long. Leaves petiolate, petioles to 34 mm long, blades ovate-elliptic to elliptic to obovate-elliptic, 31–115 mm long, 14–62 mm wide, 1.5–2.8 times

longer than wide, acuminate at apex, attenuate at base, adaxial surface sparsely pubescent with coarse eglandular trichomes to 0.5 mm long, soon glabrate, abaxial surface pubescent along major veins with antrorse conspicuously multi-septate eglandular trichomes to 0.5 mm long, punctate-pitted, margin entire to subsinuate. Inflorescence of congested somewhat headlike ax-

illary (in axils of distalmost pair of leaves) and terminal pedunculate dichasiate thyrses to 37 mm long (including peduncle and excluding flowers), (6-) 10-20 mm in diameter near midthyrs, peduncles to 13 mm long, pubescent like young stems, axillary thyrses opposite, 1 per axil, rachis pubescent like young stems; dichasia subopposite to alternate (proximalmost pair sometimes opposite), 3-7 per thyrs, 1-flowered, 1 per axil, pedunculate, peduncles to 1.5 mm long. Bracts subopposite to alternate (proximalmost pair sometimes opposite), obovate-spatulate (proximalmost sometimes petiolate), (6-) 7.5-16 mm long, 2-5.5 mm wide, rounded to truncate (to emarginate) at apex, abaxial surface glabrous or sparsely pubescent with eglandular trichomes to 0.2 mm long along major veins, punctate-pitted. Bracteoles spatulate, (5.5-) 7.5-13.5 mm long, 1-3 mm wide, apically rounded to truncate, abaxial surface glabrous or pubescent like bracts. Flowers sessile to subsessile (i.e., pedicels to 1 mm long). Calyx 5-lobed, 6.5-10 mm long, lobes linear, equal to unequal (i.e., with posterior lobe  $\pm$  reduced in length), 6-9.5 mm long, 0.8-1.1 mm wide, abaxially glabrous and punctate-pitted (sometimes obscurely so). Corolla pinkish purple with white markings on lower lip, 23-27 mm long, externally glabrous, tube expanded distally, 14-18 mm long, 1.6-2.5 mm in diameter near midpoint, upper lip 7-9.5 mm long, apically 2-lobed, lobes 1-1.5 mm long, lower lip 8-10 mm long, lobes rounded, 4-6 mm long, 4-5.7 mm wide. Stamens inserted near apex of corolla tube, 7-8 mm long, filaments pubescent with glands to 0.1 mm long, thecae 1.2-2.5 mm long (including basal appendage), unequal (lower theca longer), subparallel to subperpendicular, unequally inserted (overlapping by up to 0.3 mm) to superposed (contiguous), glabrous, lower theca with a broad rounded basal appendage to 1 mm long; pollen 4-aperturate, apertures flanked on each side by 4-5 rows of insulae, rows continuous across mesocolpia, exine evident only near poles, reticulate. Style 16 mm long, glabrous, stigma 0.3 mm long, lobes (if distinct) 0.2 mm long. Capsule 13-16 mm long, glabrous, stipe 5-6 mm long, head subovoid to ellipsoid (often with a slight medial constriction), 8-10 mm long. Seeds 4, lenticular, 3.2-3.4 mm long, 2.2-2.5 mm wide, surfaces and margin minutely roughened, sometimes covered with sparse glands to 0.05 mm long. Flowering Sep-Oct; fruiting Nov-Jan.

Chiapas endemic: steep slopes in Montane Rain Forest and Evergreen Cloud Forest; common in Northern Highlands; 1700-2030 m. CHIAPAS COLLECTIONS: *R&B 20032* (DS, US); *T&L 46662* (RSA); *Z 415* (DS); *Z 631* (DS); *29824*; *49312*; *60297*.

### 19. *Justicia kanal* T.F. Daniel, Proc. Calif. Acad. Sci. 48:272. 1995.

— *Beloperone aurea* Leonard, Publ. Carnegie Inst. Wash. 461:233. 1936, non *Justicia aurea* (Rose) Lindau (1897) nec *Justicia aurea* Schtdl. (1832). — *Justicia flava* D.N. Gibson, Fieldiana, Bot. 34:69. 1972, non *Justicia flava* (Vahl) Vahl (1791) nec *Justicia flava* Kurz (1873). — TYPE: Guatemala, Petén, Fallabón-Yaxha Road, 22 Mar 1933, C. Lundell 2189 (US!; isotypes: LL, MICH!).

ILLUSTRATION: Publ. Carnegie Inst. Wash. 461:233, fig. 19. 1936.

Erect shrubs to small trees to 4 m tall. Young stems quadrate, evenly pubescent with yellowish antrorse to antrorsely appressed eglandular trichomes 0.2-0.7 mm long. Leaves petiolate, petioles to 45 mm long, blades ovate to elliptic to obovate,

35-240 mm long, 15-94 mm wide, 1.9-3.8 times longer than wide, acuminate to subfalcate at apex, acute to attenuate at base, surface pubescent with cauline type trichomes (especially along veins), margin entire. Inflorescence of axillary and terminal pedunculate dichasiate spikes to 30 mm long (including peduncles and excluding flowers), 10-14 mm in diameter near midpoint of fertile portion, axillary spikes alternate or opposite, 1 per axil, those near shoot apex sometimes clustered and appearing subcapitate, peduncles to 11 mm long, pubescent like young stems, rachis pubescent with erect glandular and eglandular trichomes 0.05-0.3 mm long (glandular-puberulent) or pubescent with antrorse eglandular trichomes 0.2-0.7 mm long (strigose); dichasia alternate, 1-flowered,  $\pm$  secund, 1 per axil, sessile. Bracts dark maroon at least near apex (at least in dried material), alternate, obovate-elliptic to obovate, 7-11 mm long, 3.2-6.5 mm wide, abaxial surface glandular-puberulent. Bracteoles narrowly elliptic to oblanceolate, 7-11 mm long, 1-2.5 mm wide, abaxial surface pubescent like bracts. Flowers sessile to subsessile (i.e., borne on pedicels to 0.5 mm long). Calyx 5-lobed, 6-7.5 mm long, lobes lance-ovate to lanceolate to linear, subequal (posterior lobe usually wider than others), 5-6.5 mm long, 1.2-2 mm wide, abaxially pubescent like bracts. Corolla light purple with whitish markings on lower lip, 29-42 mm long, externally glandular-puberulent, tube slightly to conspicuously expanded distally, 18-23 mm long, 3.7-4 mm in diameter near midpoint, upper lip 11-18 mm long, entire, lower lip 12-19 mm long, lobes 1.8-3 mm long, 0.6-2.4 mm wide. Stamens inserted a few mm proximal to mouth of corolla, 15-25 mm long, filaments proximally pubescent with eglandular trichomes, thecae 1.6-2.7 mm long (including basal appendage), unequal, subperpendicular, unequally inserted (overlapping by 0.6-1.1 mm), dorsally pubescent with eglandular trichomes (sometimes sparse or nearly absent), lower theca with a teardrop-shaped basal appendage to 0.8 mm long; pollen 2-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 28-40 mm long, pubescent with eglandular trichomes, stigma subcapitate, 0.2 mm long, minutely and equally 2-lobed. Capsule 15-19 mm long, glandular-puberulent, stipe 5-8 mm long, head ellipsoid (usually with a medial constriction), 9-11 mm long. Seeds 4, lenticular, 2.9-4 mm long, 2.5-3.5 mm wide, surfaces and margin covered with knoblike papillae. Flowering Feb-May; fruiting Mar-May.

Tropical Rain Forest and Evergreen Seasonal Forest; uncommon in Northern Highlands and Eastern Highlands; 120-710 m. Mex. (Ver., Chis.), Guat. CHIAPAS COLLECTIONS: *MC 2112* (F, MICH); *Mi 6066* (MEXU); *So 1686* (MICH, US); *So 1698* (DS, US); *68262*.

The dense trichomes of the youngest vegetative growth are conspicuously yellow. The pubescence on the rachis, abaxial surface of the bracts, bracteoles, and calyx is strigose on specimens from Veracruz and glandular-puberulent on specimens from Chiapas and Guatemala. This was the only difference observed between specimens from these two regions. The above descriptions of the capsule and seeds are the first for this species.

### 20. *Justicia lindeniana* (Nees) J.F. Macbr. Candollea 6:18. 1934.

— *Rhytiglossa lindeniana* Nees in A. DC. Prodr. 11:349. 1847. — *Dianthera lindeniana* (Nees) Hemsl. Biol. cent-

amer., Bot. 2:518. 1882. — TYPE: Mexico, Tabasco, Río Teapa, Apr 1840, *J. Linden* 182 (K!; isotypes: F!, G).

ILLUSTRATION: none found.

Erect to spreading perennial herbs to 5 dm tall. Young stems hexagonal-ridged, internodes glabrous, nodes pubescent with flexuose-antrorse eglandular trichomes to 0.5 mm long. Leaves sessile to subsessile (i.e., with petioles to 1 mm long), blades linear to linear-oblancoolate, 9.5–50 mm long, 1.5–4.8 mm wide, (4.4–) 5.5–13.5 times longer than wide, rounded to acute to subattenuate at apex, subattenuate to attenuate at base, surfaces glabrous, margin entire, glabrous or ciliate with antrorse eglandular trichomes to 0.3 mm long. Inflorescence of terminal pedunculate dichasiate spikes to 90 mm long (including peduncle and excluding flowers), 3–5 mm in diameter near midspike, peduncles to 18 mm long, rachis clearly visible (i.e., bracts not imbricate near midspike), internodes glabrous or sometimes with sessile lenticular glands, nodes pubescent like young stems; dichasia opposite, 1-flowered, 1 per axil, sessile. Bracts opposite, (linear to) lance-subulate to triangular-subulate, 1.5–2.5 (–4.5) mm long, 0.8–1 mm wide, abaxial surface glabrous. Bracteoles lance-subulate to subulate to triangular-subulate, 1.2–2 (–2.3) mm long, 0.4–0.5 mm wide, abaxial surface glabrous. Flowers sessile. Calyx 4-lobed (or sometimes inconspicuously 5-lobed with the posterior lobe greatly reduced, i.e., < 1 mm long), 3–4 (–6) mm long, 4 lobes linear to lance-linear to lance-subulate, equal, 2.5–3.5 (–5) mm long, 0.6–0.8 mm wide, abaxially glabrous. Corolla white to rose-purple with purple and white markings on lower lip, 6.5–10.5 mm long, externally glabrous, tube ± expanded distally, 3.5–4 mm long, 0.9–1.2 mm in diameter near midpoint, upper lip 3–5 mm long, emarginate at apex, lobes 0.1–0.2, lower lip 3.5–6.5 mm long, lobes 2–4 mm long, 1.6–3.5 mm wide. Stamens inserted just proximal to mouth of corolla, 2.8–4 mm long, filaments glabrous, thecae 0.7–1 mm long, subequal, subsagittate to subperpendicular, subequally to unequally inserted (overlapping by 0.2–0.6 mm), glabrous, lacking basal appendages; pollen 2-aperturate, apertures flanked on each side by an irregular region of insulae and peninsulae, exine reticulate. Style 4.5–7 mm long, glabrous, stigma subelliptic, 0.3 mm long, lobes not evident. Capsule 5–7 mm long, glabrous, stipe 1.5–2.5 mm long, head subellipsoid, 3–4.5 mm long. Seeds 4, lenticular, 1.5–2.2 mm long, 0.8–1.2 mm wide, surfaces and margin roughened with low rounded bumps (these sometimes forming a reticulum), lacking trichomes. Flowering and fruiting Nov, Feb–May.

Along streams in Montane Rain Forest; uncommon in Central Plateau; 800–1700 m. Mex. (Ver., Tab., Chis.), Guat. CHIAPAS COLLECTIONS: *T* 5980 (MEXU); 22257; 49908; 50439.

This species occurs at lower elevations in Tropical Rain Forest in adjacent regions of Tabasco and Veracruz.

## 21. *Justicia macrantha* Benth. Pl. hartw. 78. 1841.

— *Cyrtanthera macrantha* Nees in A. DC. Prodr. 11:330. 1847. — *Cyrtantherella macrantha* (Benth.) Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:148. 1855. — *Jacobinia macrantha* (Benth.) Benth. & Hook. ex Hemsley, Biol. cent.-amer., Bot. 2:521. 1882. — TYPE: Guatemala, Quezaltenango, Rancho del Palo

Hueco, Dec 1840, *T. Hartweg* 551 (K ex hb. Benth!; isotypes: K ex hb. Hook.!, P!; probable isotype: BM!).

ILLUSTRATIONS: Oersted 1855:t. 4, fig. 10–11; Fieldiana, Bot. (n.s.) 18:11, fig. 9. 1986.

Shrubs to 2 m tall. Young stems quadrate to quadrate-sulcate, glabrous. Leaves petiolate, petioles to 25 mm long, blades elliptic, 41–165 mm long, 13–49 mm wide, 3.2–4 times longer than wide, adaxial surface glabrous, abaxial surface pubescent with erect eglandular trichomes along midvein and proximal portions of some secondary veins, margin subrenate to crenate. Inflorescence of axillary pedunculate dichasiate thyrses or panicles to 60 mm long (including peduncles and excluding flowers) sometimes forming an open terminal complex panicle, inflorescence bracts (if present) subfoliose, thyrses or panicles opposite, 1 per axil, main rachis (if present) glabrous, peduncles to 32 mm long, glabrous, thyrse and panicle rachises glabrous; dichasia alternate, 1-flowered, 1 per axil, pedunculate, peduncles 3–15 mm long, glabrous. Bracts opposite, triangular-subulate to lance-subulate, 2.5–4.5 mm long, 0.8–1 mm wide, abaxial surface glabrous. Bracteoles triangular-subulate to subulate, 1.7–2.7 mm long, 0.6–1 mm wide, abaxial surface glabrous. Flowers sessile to subsessile (i.e., borne on pedicels to 0.8 mm long). Calyx 5-lobed, 4–5 mm long, lobes lance-subulate, equal, 3.2–3.8 mm long, 0.8–1.2 mm wide, abaxially glabrous, margin ciliate with erect to flexuose eglandular trichomes 0.05–0.2 mm long. Corolla orange (often with some pink as well), 55–68 mm long, externally glabrous, tube gradually expanded distally, 30–40 mm long, upper lip 27–30 mm long, 2-fid at apex, lobes to 0.8 mm long, lower lip 25–27 mm long, lobes 2.5–4 mm long, 3.5–5 mm wide. Stamens inserted near apex of corolla tube, 25–33 mm long, filaments recurved at apex, glabrous, thecae crescent-shaped, 2–2.3 mm long, equal, ± parallel, subequally to unequally inserted (overlapping by 1.8–2 mm), glabrous, lacking basal appendages; pollen 2-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 52–60 mm long, proximally pubescent with eglandular trichomes, stigma lobes 0.1–0.2 mm long. Capsule not seen. Flowering Nov–Dec.

Evergreen Cloud Forest; rare in Sierra Madre; ca. 2000 m. Mex. (Chis.), Guat., C.R., Pan. CHIAPAS COLLECTION: *Mc* s.n. (US).

The description and phenology above have been augmented with data from the type.

## 22. *Justicia madrensis* T.F. Daniel, Proc. Calif. Acad. Sci. 48:265. 1995.

— TYPE: Mexico, Chiapas, Mpio. Angel Albino Corzo (Jaltenango), 3–5 km above Jaltenango toward Finca Prusia, 900 m, 11 Oct 1974, *D. Breedlove* 38656 (DS!; isotypes: C!, K!, MEXU!).

ILLUSTRATION: Fig. 16.

Shrubs to 2 m tall. Young stems subquadrate to quadrate, evenly pubescent with flexuose to retrorse eglandular trichomes (and some internodes with glandular trichomes as well) 0.2–1.3 mm long. Leaves petiolate, petioles to 12 mm long, blades ovate, 23–75 mm long, 9–39 mm wide, 1.9–2.6 times longer than wide, acuminate at apex, cordate at base, surfaces pubes-

cent with flexuose to antrorse eglandular trichomes to 1 mm long, margin entire to subsinuate. Inflorescence of axillary pedunculate dichasiate spikes to 55 mm long (including peduncle and excluding flowers), 3–4 mm in diameter near midpoint of fertile portion, spikes alternate or opposite in leaf axils, 1 per axil, peduncles to 26 mm long, evenly pubescent with flexuose to retrorse eglandular trichomes to 1.3 mm long, rachises pubescent like peduncles; dichasia alternate, 1-flowered,  $\pm$  secund, 1 per axil, sessile. Bracts opposite, subulate, 1.8–2.5 mm long, 0.9 mm wide, attenuate at apex, abaxial surface pubescent with flexuose to antrorse eglandular trichomes to 0.7 mm long. Bracteoles subulate, 1.8–2.2 mm long, 0.6–0.7 mm wide, abaxial surface pubescent like bracts (and sometimes with a few flexuose glandular trichomes to 0.5 mm long as well). Flowers sessile. Calyx 4-lobed, 5.5–9 mm long, lobes lanceolate, equal, 5–7 mm long, 1.5–1.8 mm wide, widest at base, abaxially pubescent with flexuose glandular and eglandular trichomes 0.2–0.9 mm long. Corolla pinkish orange, 34–43 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.7 mm long, tube very gradually (if at all) expanded from near base, 18–22 mm long, 2.8–4 mm in diameter near midpoint, upper lip 17–21 mm long, entire, lower lip 15–22 mm long, lobes 2.5–4 mm long, 2.9–4.5 mm wide. Stamens inserted near apex of corolla tube, 19–22 mm long, filaments proximally pubescent with eglandular trichomes, thecae 2–2.2 mm long, equal, subperpendicular to perpendicular, unequally inserted (overlapping by up to 1.5 mm) to superposed (up to 1.2 mm distant), glabrous or pubescent with eglandular trichomes, lacking basal appendages; pollen 2-aperturate, apertures flanked on each side by 1 (–2) rows of insulae, second row intergrading with peninsulae, exine reticulate. Style 33–40 mm long, proximally pubescent with eglandular trichomes, stigma lobes 0.1–0.2 mm long, unequal. Capsule 20 mm long, pubescent with flexuose to retrorse eglandular and glandular trichomes 0.1–0.6 mm long, stipe 9 mm long, head subellipsoid with a medial constriction, 11 mm long. Seeds 4, not seen. Flowering and fruiting Oct.

Chiapas endemic: slopes in Pine-Oak Forest; rare in Sierra Madre; ca. 900 m.

### 23. *Justicia mirandae* T.F. Daniel, Proc. Calif. Acad. Sci. 48:266. 1995.

— TYPE: Mexico, Chiapas, Mpio. Chiapa de Corzo, above El Chorreadero, 800 m, 18 Mar 1981, *D. Breedlove 50163* (CAS!; isotypes: C!, K!, MEXU!).

ILLUSTRATION: Fig. 19.

Shrubs to 3 m tall. Young stems quadrate to quadrate-alate, internodes glabrous or sometimes evenly to bifariously pubescent with erect to flexuose to retrorse to antrorse to appressed eglandular trichomes to 0.6 mm long, nodes sometimes pubescent with flexuose eglandular trichomes to 0.5 mm long. Leaves sessile, blades narrowly elliptic to elliptic to ovate to oblanceolate-elliptic, 65–250 mm long, 12–67 mm wide, 3.3–6.9 times longer than wide, acuminate to attenuate at apex, attenuate to node and often somewhat amplexicaulis at base, surfaces glabrous (or with eglandular trichomes on plants with pubescent stems), margin entire to shallowly crenate. Inflorescence of axillary and terminal pedunculate dichasiate spikes (or panicles of spikes) to 120 mm long (including peduncles and excluding flowers), 18–40 mm in diameter near midspike, sometimes

forming a terminal panicle with spikes or panicles in axils of subfoliose inflorescence bracts, inflorescence bracts (if present) tinged with red, ovate, 28–50 mm long, 10–15.5 mm wide, axillary spikes (or panicles) alternate or opposite, 1–2 per axil of leaf or inflorescence bract, peduncles to 80 mm long, glabrous or pubescent like young stems, rachis glabrous or pubescent with cauline type trichomes; dichasia (opposite to) alternate, 1-flowered, sometimes  $\pm$  secund, 1 per axil, sessile. Bracts (opposite to) alternate, tinged with red, often drying blackish, lanceolate to lance-ovate to elliptic to obovate-elliptic, 15–22 mm long, (2–) 3.5–9.5 mm wide (the proximalmost pair often subfoliose and larger), apically acuminate, abaxial surface glabrous (or with eglandular trichomes on plants with pubescent stems), margin usually ciliate with flexuose eglandular trichomes to 0.7 mm long. Bracteoles tinged with red, linear to linear-lanceolate to oblanceolate-elliptic, 7–19 mm long, 0.9–2.1 (–3) mm wide, abaxial surface glabrous (or pubescent like bracts), margin with flexuose eglandular trichomes to 0.7 mm long. Flowers sessile. Calyx 5-lobed, 5–10 mm long (accrescent in fruit and up to 13 mm long), lobes lanceolate to linear-lanceolate, equal, 4.5–9 (–12) mm long, 1.2–2 mm wide, abaxially glabrous (or pubescent like bracts), margin ciliate or ciliate like bracteoles or glabrous. Corolla yellow speckled with red, subfusiform in bud, 30–34 mm long, externally pubescent with erect to flexuose glandular trichomes to 0.4 mm long and flexuose eglandular trichomes to 0.8 mm long, tube gradually expanded distally, 17–19 mm long, 3–3.5 mm in diameter near midpoint, upper lip 11–14 mm long, apically emarginate, lobes 0.1–0.2 mm long, lower lip 10–16 mm long, lobes 1–2.8 mm long, 0.8–1.5 mm wide. Stamens inserted in distal 1/2 of corolla tube, 15–20 mm long, filaments distally glabrous, proximally pubescent with eglandular (and sometimes glandular as well) trichomes, thecae 1.8–2.4 mm long (including basal appendage), equal, parallel to subperpendicular, unequally inserted (i.e., overlapping by up to 1.2 mm), upper theca pubescent with eglandular trichomes, both thecae with a bulbous basal appendage 0.2–0.4 mm long (appendage of lower theca larger than that of upper theca); pollen 3-aperturate, apertures flanked on each side by 1 row of insulae, insulae sometimes nearly fused into a band with only 1–2 distinct, exine reticulate. Style 30 mm long, distally glabrous, proximally pubescent with eglandular (and sometimes glandular as well) trichomes, stigma 0.2–0.3 mm long, asymmetrically funnelliform to unequally 2-lobed. Capsule 9–11 mm long, glabrous, stipe 2–3 mm long, head subovoid to ellipsoid, 7–8.5 mm long. Seeds 4, lenticular, 2.5–3.5 mm long, 2.5–2.8 mm wide, surfaces minutely roughened, lacking trichomes, entire to  $\pm$  crenate. Flowering Dec–Apr; fruiting Dec–Jul.

Chiapas endemic: along streams in Evergreen Seasonal Forest and Tropical Deciduous Forest; common in Central Depression; 600–900 m. CHIAPAS COLLECTIONS: *Cb 7895* (CAS, MEXU); *RMK 3036* (MICH); *Lm 3918* (US); *La 285* (DS, US); *Mz 22017* (MEXU); *Mi 5262* (MEXU); *Mi 7844* (MEXU); *Ne 5570* (CAS); *RG 103* (CAS); *Sch 1764* (US); 8446; 24580; 30309.

Two sprigs of *Cabrera & H. de Cabrera 7895* (at CAS) differ from other specimens and from another sprig on that sheet by having eglandular trichomes on the young stems, leaves, and the abaxial surface of bracts. These likely represent a pubescent form of the species.

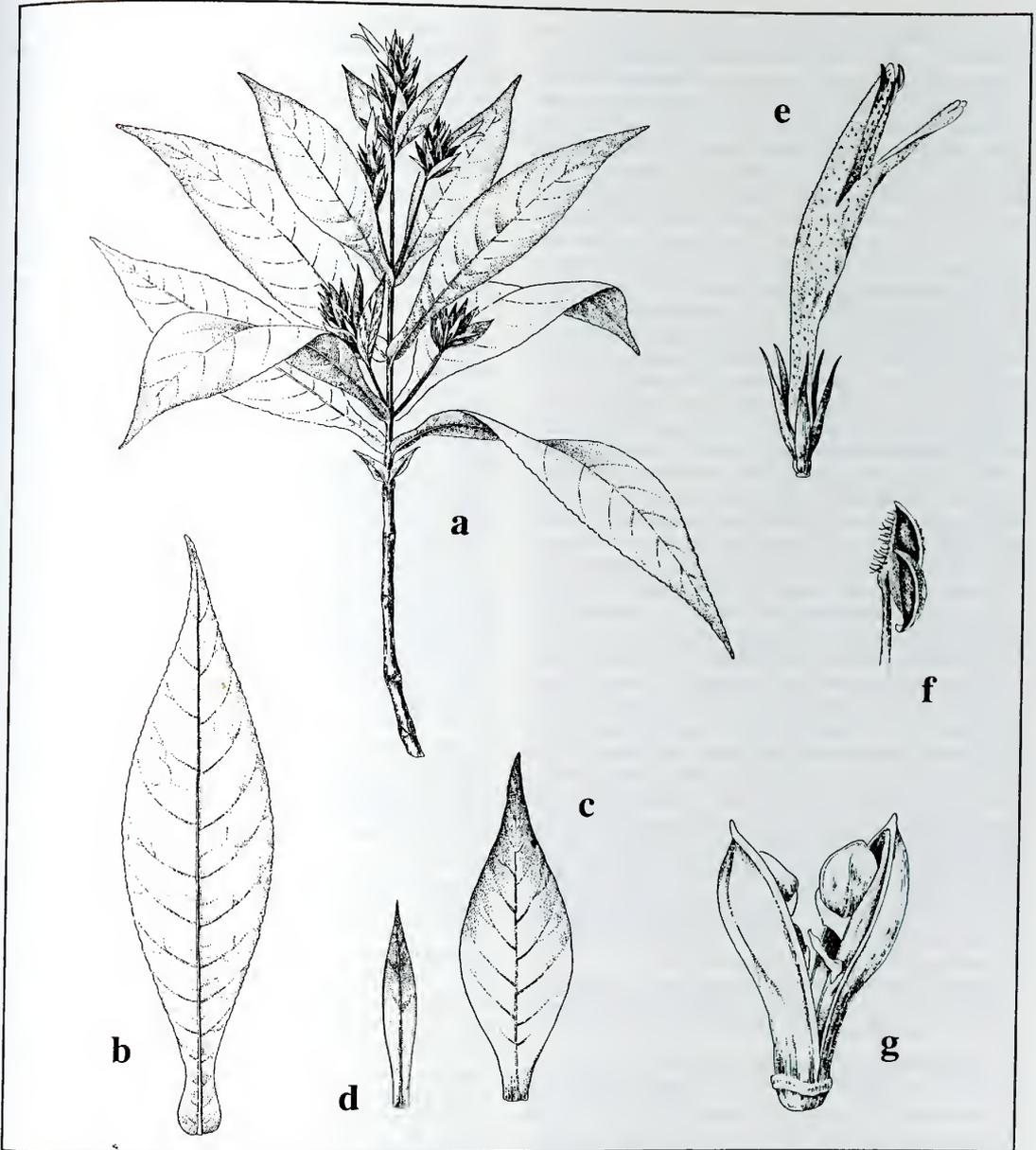


FIGURE 19. *Justicia mirandae* T.F. Daniel. a, habit (50163),  $\times 0.4$ ; b, leaf (50163),  $\times 0.5$ ; c, bract (50163),  $\times 2.3$ ; d, bracteole (50163),  $\times 2.3$ ; e, flower (Neill 5570),  $\times 2.2$ ; f, distal portion of stamen (Neill 5570),  $\times 7.5$ ; g, capsule with seeds (Laughlin 285),  $\times 3$ . Drawn by Ellen del Valle.

**24. *Justicia multicaulis* Donn. Sm. Bot. Gaz. (Crawfordsville) 47:259. 1919.**

— LECTOTYPE (designated here): Guatemala, Alta Verapaz, Pansamalá, 3800 ft, Jun 1885, *H. von Tuerckheim* 741 (US!, isolectotypes: MICH!, US!).

*Justicia alsophila* Standl. & Leonard in Standl. & Steyerm. Publ. Field Mus. Nat. Hist., Bot. Ser. 23:242. 1947. — TYPE: Guatemala, Huehuetenango, vicinity of Maxbal, ca.

17 mi N of Barillas, Sierra de los Cuchumatanes, 1500 m, 15–16 Jul 1942, *J. Steyermark* 48884 (US!; isotype: F!).

ILLUSTRATION: Publ. Field Mus. Nat. Hist., Bot. Ser. 23:242, fig. 3, 1947.

Rhizomatous herbs to 2.5 dm tall. Young stems quadrate to quadrate-flattened, bifariously pubescent with flexuose-retrorse eglandular trichomes 0.2–0.7 mm long. Leaves petiolate, petioles to 9 mm long, blades ovate-elliptic to elliptic to obovate,

6–31 mm long, 5–15 mm wide, 1.6–2.7 times longer than wide, (rounded to) acute to subacuminate at apex, acute to attenuate at base, surfaces pubescent with flexuose to antrorse eglandular trichomes to 0.5 mm long, trichomes restricted to major veins on abaxial surface, margin entire to subsinuate. Inflorescence of dichasia borne in axils of distal leaves or subfoliose bracts (i.e., reduced leaves); dichasia alternate or opposite, 1 (–3)-flowered, 1 per axil, sessile to subsessile (i.e., peduncles to 0.5 mm long). Bracts (if present) opposite, subfoliose, 4–9 mm long, 2–4 mm wide, abaxial surface pubescent like leaves and sometimes with scattered flexuose glandular trichomes to 0.3 mm long as well. Bracteoles spatulate, 4.5–7.5 mm long, 1.3–2.2 mm wide, apically rounded to truncate (to subemarginate), abaxial surface nearly glabrous or sparsely pubescent with erect to flexuose glandular trichomes 0.1–0.3 mm long and sometimes with antrorse eglandular trichomes along midvein. Flowers sessile to subsessile (i.e., pedicels to 0.5 mm long). Calyx 5-lobed, 4.5–6 mm long, lobes subulate, equal to subequal, 4–5.3 mm long, 0.4–0.6 mm wide, abaxially glabrous (or with antrorse, eglandular trichomes along midvein) and inconspicuously glandular-punctate. Corolla white with maroon-purplish markings on upper and lower lips, 10–13 mm long, externally pubescent with flexuose eglandular trichomes 0.1–0.4 mm long, tube subcylindric, 5–5.5 mm long, upper lip 5–5.5 mm long, apically 2-lobed, lobes rounded to acute, 0.3–0.5 mm long, lower lip 5–7 mm long, lobes rounded, 2–3 mm long, 2–3 mm wide. Stamens inserted near apex of corolla tube, 5–6 mm long, filaments glabrous, thecae maroon (at least lower one), 1–1.2 mm long (including basal appendage), subequal to unequal (upper theca larger), subparallel to subperpendicular, superposed (0.9–1.2 mm distant on branched connective), glabrous, lower theca with a ± bulbous basal appendage 0.2–0.3 mm long; pollen 4-aperturate, apertures flanked on each side by both a continuous band of exine and a pseudocolpus, exine reticulate. Style 7–8 mm long, glabrous, stigma 0.2 mm long, lobes indistinct. Capsule 8.5–9.5 mm long, glabrous, stipe 3–3.5 mm long, head ovoid to subellipsoid, 5.5–6.5 mm long. Seeds 4, flattened, subcordate, 2.1–2.6 mm long, 1.3–2 mm wide, surfaces and margin smooth but sparsely and inconspicuously pubescent with erect to flexuose eglandular trichomes to 0.1 mm long. Flowering and fruiting Oct–May.

Slopes in Montane Rain Forest; uncommon in Central Plateau; 1000–1400 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: 35236; 38846; 49946; 56528; 58435.

Our plants closely resemble the type of *J. alsophila*. Gibson (1974) indicated that this was likely the same as *J. multicaulis*. The type of *J. multicaulis* has similar anthers and seeds but differs by its eglandular and more oblanceolate bracteoles, shorter (6 mm long) capsules, and often antrorse cauline pubescence. Other specimens from Guatemala (e.g., *Goll s.n.*, US) with eglandular bracteoles have spatulate bracteoles, capsules 9 mm long, and retrorse cauline pubescence as in our material. Bracteole pubescence is apparently the only difference between *J. alsophila* and *J. multicaulis*. This assemblage is treated here as a single species with greater consideration accorded the distinctive forms of the corolla, anthers, and seeds than bracteole pubescence.

Two syntypes from Guatemala were cited by Donnell Smith for *J. alsophila*. Gibson (1974) indicated that *von Tuerckheim 741* was the type but she did not indicate

which duplicate of this number was the lectotype. A duplicate at MICH was annotated by Gibson as an isolectotype. The lectotype is designated above from among duplicates at US.

## 25. *Justicia nevingii* Wassh. & T.F. Daniel, Novon 5:114. 1995.

—TYPE: Mexico, Veracruz, Mpio. Hidalgotitlán, 0–2 km del Plan de Arroyo-Alvaro Obregón, 14 Apr 1974, J. Dorantes et al. D-2799 (US!; isotype: F!).

ILLUSTRATION: NOVON 5:115. 1995.

Prostrate to erect perennial herbs to 8 dm tall. Young stems quadrate-sulcate to quadrate-flattened, quadrifariously pubescent with kinky-flexuose to antrorsely flexuose-appressed prominently multi-septate eglandular trichomes 0.7–2 mm long, septa maroon. Leaves petiolate, petioles to 72 mm long, blades ovate to elliptic, 65–185 mm long, 30–104 mm wide, 1.8–2.2 times longer than wide, acute to subacuminate at apex, acute to subattenuate at base, surfaces and margin pubescent with cauline type trichomes, margin entire to sinuate. Inflorescence of (axillary and) terminal dense sessile to pedunculate panicles of dichasiate spikes to 15 cm long (including peduncle and excluding flowers), 15–44 mm in diameter near midpoint of fertile portion, spikes opposite, 1 (–2) per axil of an inflorescence bract, inflorescence bracts ovate to linear-ob lanceolate to obovate, 6–12 mm long, 0.8–4.3 mm wide, pubescent with cauline type trichomes, peduncles to 21 mm long, pubescent like young stems, rachises pubescent like young stems or with trichomes becoming ± evenly disposed and shorter; dichasia alternate, 1-flowered, 1 per axil, sessile. Bracts heteromorphic, a fertile and a sterile bract opposite at each node, sterile bracts linear-ob lanceolate to linear to subulate, 2–5.5 mm long, 0.3–0.5 mm wide, fertile bracts petiolate, obovate to elliptic, 5.5–12 mm long, 2.7–6.5 mm wide, acute to truncate-apiculate at apex, abaxial surface sparsely pubescent with antrorsely appressed eglandular trichomes 0.1–0.5 mm long and erect stipitate glandular trichomes to 0.2 mm long, margin ciliate with cauline type trichomes. Bracteoles petiolate, elliptic-ob lanceolate, 4–11 mm long, 1.2–2.2 mm wide, pubescent like bracts (except glands sometimes absent). Flowers sessile to subsessile (i.e., borne on pedicels to 0.5 mm long). Calyx 5-lobed, 3–5 mm long, lobes lance-subulate, equal, 2.5–4.5 mm long, 0.5–0.6 mm wide, abaxially pubescent like bracteoles. Corolla yellow or greenish yellow with maroon markings on upper and lower lips, 8.5–10.5 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.5 mm long, tube cylindrical, 5–5.5 mm long, 2 mm in diameter near midpoint, upper lip 3.2–4.5 mm long, emarginate, lobes to 0.2 mm long, lower lip 3.5–6 mm long, lobes 1–1.5 mm long, 1–1.5 mm wide. Stamens inserted near apex of corolla tube, 4–4.5 mm long, filaments glabrous or with eglandular trichomes proximally, thecae 0.9–1.3 mm long (including basal appendage), equal to subequal, ± parallel to subperpendicular, unequally inserted (overlapping by up to 0.2 mm) or superposed (contiguous), dorsally glabrous or pubescent with eglandular trichomes, upper theca often with a ± bulbous basal appendage to 0.2 mm long, lower theca with a bulbous basal appendage 0.4–0.5 mm long, 2 staminodelike pubescent thickenings or protrusions of corolla present near midpoint of corolla tube; pollen 4-aperturate, apertures flanked on each side by a pseudocolpus and a continuous band of exine

or the band  $\pm$  broken up into at least a some discrete insulae, exine reticulate. Style 6.5–7 mm long, glabrous, stigma 0.2–0.3 mm long, only 1 lobe evident. Capsule 7–8.5 mm long, externally pubescent with erect to flexuose eglandular trichomes 0.2–0.4 mm long, stipe 3–4 mm long, head subcircular, 4–4.5 mm long. Seeds 2, lenticular, 2.2–2.8 mm long, 2–2.5 mm wide, surfaces smooth, lacking trichomes, margin entire. Flowering Apr–Jul; fruiting May–Jul.

Tropical Rain Forest and Lower Montane Rain Forest; uncommon in Northern Highlands and Eastern Highlands; 100–470 m. Mex. (Ver., Chis.). CHIAPAS COLLECTIONS: *Ch 442* (MEXU); *Da 20534* (BM, LL, MEXU); *Li s.n.* (P); *M&M 913* (LL, WIS); *Mz 18149* (F); *McD 201* (DUKE); 35058.

Local name: "pozol agrio" (*Chavelas P. et al.* 442).

## 26. *Justicia pectoralis* Jacq. Enum. syst. pl. 11. 1760.

— *Dianthera pectoralis* (Jacq.) Murr. Syst. veg., ed. 14, 64. 1784. — *Stethoma pectoralis* (Jacq.) Raf. Fl. tellur. 4:61. 1838 (1836). — *Rhytiglossa pectoralis* (Jacq.) Nees in Benth. London J. Bot. 4:637. 1845. — *Ecbolium pectorale* (Jacq.) Kuntze, Revis. gen. pl. 2:487. 1891. — *Pascadocalymma pectorale* (Jacq.) Bremek. Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 45:55. 1948. — TYPE: America, specimens (if any exist) are not known (cf. Stafleu, F. 1967. Introduction to Jacquin's Caribbean "Enumeratio," in N. Jacquin, Enum. syst. pl. (1967 Interdocumentation Co. reprint of 1760 ed. Zug, Switzerland).

ILLUSTRATIONS: Jacquin, Selec. stirp. amer. hist., t. 3. 1763; Bot. Reg. 10:t. 796. 1824; Lindau 1895:350, fig. 140; Bot. Mus. Leaf. 26:273–274, pls. 21–22. 1978; Fieldiana, Bot. (n.s.) 18:12, fig. 10. 1986; Schultes and Raffauf, Healing Forest, 44. 1990.

Erect to spreading to decumbent perennial herbs to 5 dm tall. Young stems subquadrate to subhexagonal, unifariouly pubescent with (erect to) retrorse eglandular trichomes 0.05–0.5 mm long. Leaves subsessile to petiolate, petioles to 15 mm long, blades ovate to lanceolate, 40–120 mm long, 5–25 mm wide, 2.4–10.3 times longer than wide, acuminate to acuminate-attenuate at apex, acute at base, surfaces usually with antrorse eglandular trichomes to 0.2 mm long along midvein, otherwise glabrous, margin entire to subsinuate. Inflorescence of terminal (sometimes also axillary in distalmost pair of leaves) pedunculate panicles of dichasiate spikes to 200 mm long, 10–80 mm in diameter near midpoint of fertile portion of panicle, axillary panicles alternate, 1 per axil, peduncles to 50 mm long, pubescent like young stems or evenly pubescent with erect (to antrorse) eglandular and glandular trichomes 0.05–0.2 mm long (glandular-puberulent), main rachis glandular-puberulent, inflorescence bracts often subfoliose, lance-subulate to subulate, 2–21 mm long, 0.3–1.5 mm wide, abaxial surface glabrous or glandular-puberulent, inflorescence branches alternate or opposite, not appearing verticillate, rachises of spikes glandular-puberulent; dichasia alternate or opposite, 1-flowered, 1 per axil, sessile. Bracts opposite, subulate, 1.3–2.2 mm long, 0.3–0.4 mm wide, abaxially glandular-puberulent. Bracteoles subulate, 1–2.3 mm long, 0.2–0.3 mm wide, abaxially glandular-puberulent. Flowers sessile to subsessile (i.e., borne on pedicels to 0.5

mm long). Calyx 5-lobed, 2–3.5 mm long, 4 lobes subulate, equal, 1.5–3 mm long, 0.3–0.5 mm wide, posterior 5th lobe 0.6–1.5 mm long, 0.2 mm wide, all lobes abaxially glandular-puberulent. Corolla white to rose-pink with white and/or maroon markings on lower lip, 7.5–10 mm long, externally pubescent throughout with erect to flexuose eglandular trichomes 0.1–0.2 mm long, tube  $\pm$  expanded distally, 3.5–5.7 mm long, 1.2–1.4 mm in diameter near midpoint, upper lip 2.5–4 mm long, entire, lower lip 3–4.5 mm long, lobes 0.8–1.5 mm long, 1–2.5 mm wide. Stamens inserted ca. 1–1.5 mm proximal to mouth of corolla, 3–4 mm long, filaments glabrous, thecae 0.6–0.9 mm long, unequal, subparallel to parallel, equally to subequally inserted, separated by a  $\pm$  broad connective, glabrous, lacking basal appendages (although sometimes  $\pm$  apiculate at base); pollen 2-aperturate, apertures flanked on each side by 1 row of peninsulae (a few of these sometimes discrete and thus insulae), exine reticulate. Style 4.5–7 mm long, sparsely pubescent (at least proximally) with eglandular trichomes, stigma 0.3–0.5 mm long, lobes usually not evident (or 1 lobe rudimentary, to 0.1 mm long). Capsule 5.5–9 mm long, pubescent with erect glandular and eglandular trichomes 0.05–0.1 mm long, stipe 2–3.5 mm long, head subellipsoid with a medial constriction, 3.5–5.5 mm long. Seeds 4, lenticular, 1.2–1.8 mm long, 1.2–1.5 mm wide, surfaces and margin covered with prominent knoblike tubercles, lacking trichomes.  $n = 11, 14$ . Flowering Nov–Apr; fruiting Dec–Mar.

Along streams and freshwater shores in Tropical Rain Forest, Montane Rain Forest, Evergreen Seasonal Forest, and Pine-Oak Forest; common in Eastern Highlands and Sierra Madre; 100–1170 m. Mex. (S.L.P., Pue., Ver., Oax., Tab., Yuc., Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Guy., Sur., Ecu., Peru, Bol., Braz.). CHIAPAS COLLECTIONS: *Dan 5008* (CAS); *So 1968* (UC, US); *31591*; *33066*; *33301*; *34124*; *48559*; *71067*.

Additional synonyms were provided by Bremekamp (in Pulle, Fl. Suriname 4(2):243. 1938) and Lindau (in Urban, Symb. antill. 2:242. 1900). This species is reported to have numerous medicinal, hallucinogenic, and economic uses throughout its wide range.

## 27. *Justicia pringlei* B.L. Rob. Proc. Amer. Acad. Arts 26:173. 1891.

— TYPE: Mexico, Jalisco, hills near Guadalajara, 17 Oct 1889, *C. Pringle* 2967 (GH!; isotype: GH!).

ILLUSTRATION: none found.

Erect to spreading perennial herbs to 1 m tall. Young stems subquadrate to quadrate, shallowly 2-sulcate, pubescent with an understory of bifarious retrorse eglandular trichomes 0.2–0.7 mm long and an overstory of evenly disposed erect to flexuose eglandular trichomes 1–3 mm long (hirsute), distal internodes often additionally pubescent with glandular trichomes 0.1–0.3 (–0.5) mm long (glandular-pubescent). Leaves subsessile to petiolate, petioles to 10 mm long, blades lance-ovate to ovate to elliptic, 12–70 mm long, (3–) 12–34 mm wide, 1.5–4.3 times longer than wide, acute to acuminate at apex, acute to rounded at base, surfaces and margin hirsute, margin entire. Inflorescence of axillary (and terminal) pedunculate dichasiate spikes or panicles of spikes to 9 cm long (including peduncles and excluding flowers) collectively forming a terminal leafy pani-

cle, spikes or panicles alternate or opposite, 1 per axil, peduncles to 4.5 cm long,  $\pm$  densely glandular-pubescent and usually with some longer eglandular trichomes as well, rachises glandular-pubescent, mostly lacking the eglandular trichomes of the stems and peduncles, inflorescence bracts, if present, linear-elliptic to lanceolate, 3–10 mm long, 0.4–2 mm wide; dichasia alternate, 1-flowered,  $\pm$  secund, 1 per axil, sessile. Bracts opposite, lance-subulate to subulate, 2–4 mm long, 0.3–0.8 mm wide, abaxial surface glandular-pubescent. Bracteoles lance-subulate to subulate, 2–4 mm long, 0.5–0.8 mm wide, abaxial surface glandular-pubescent. Flowers sessile to subsessile (i.e., borne on pedicels to 0.5 mm long). Calyx 4-lobed, 5–8.5 mm long, lobes lance-subulate to subulate, equal, 5–8 mm long, 0.6–1 mm wide, abaxially glandular-pubescent. Corolla rose-pink with white markings on lower lip, 7–11 mm long, externally pubescent with erect to flexuose eglandular trichomes to 0.5 mm long, tube subcylindric to cylindric, 5–6 mm long, 2–3 mm in diameter near midpoint, upper lip 2.9–4 mm long, emarginate at apex, lobes to 0.3 mm long, lower lip 3–5.5 mm long, lobes 1.5–3.5 mm long, 1.5–3 mm wide. Stamens inserted near apex of corolla tube, 4–5 mm long, filaments glabrous or sparsely pubescent with eglandular trichomes at base, thecae 0.7–1.1 mm long (including basal appendage), unequal, subperpendicular to perpendicular, superposed (0.3–0.5 mm distant), glabrous, lower theca with a bulbous basal appendage to 0.7 mm long; pollen 2-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 5–8 mm long, pubescent with eglandular trichomes at least proximally, stigma subcapitate, 0.2 mm long, minutely and unequally 2-lobed. Capsule 10–13 mm long, pubescent with erect to flexuose to retrorse eglandular and erect to flexuose glandular trichomes 0.3–1 mm long, stipe 3–4.5 mm long, head ellipsoid, 6–8.5 mm long. Seeds 4, lenticular, 2–2.5 mm long, 2–2.5 mm wide, surfaces and margin pubescent with erect eglandular terminally barbed trichomes to 0.7 mm long. Flowering Sep–Nov; fruiting Oct–Nov.

Flats and slopes in Oak Savanna and Pine-Oak Forest; rare in Central Plateau; 920–1000 meters. Mex. (Jal., Gto., Mich., Méx., Oax., Chis.), Guat. CHIAPAS COLLECTIONS: *La 2108* (DS, US); 46783.

## 28. *Justicia ramosa* (Oerst.) V.A.W. Graham, *Kew Bull.* 43:604. 1988, non *Justicia ramosa* Pohl ex Nees (1847), pro syn.

— *Siphonoglossa ramosa* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:160. 1855. — LECTO-TYPE (designated here): Mexico, Puebla, Sta. Lucia pr. Tehuacán, Feb (fide protologue) 1842, *F. Liebmann 10748* (C!; isolectotypes: C!, CAS!).

ILLUSTRATIONS: Oersted 1855:t. 4, figs. 34–35; Fieldiana, Bot. 24(10):443, fig. 100. 1974.

Prostrate to spreading to erect perennial herbs to 8 dm tall. Young stems subquadrate-striate with 6 shallow, dark green grooves, evenly pubescent with flexuose to retrorse eglandular trichomes 0.2–1.2 mm long. Leaves petiolate, petioles to 10 mm long, blades ovate to elliptic to circular, 6–60 mm long, 3–32 mm wide, 1–2.8 times longer than wide, rounded to acute to subacuminate at apex, acute to rounded to truncate to subcordate at base, abaxial surface  $\pm$  densely pubescent with flexuose to antrorse eglandular trichomes to 1 mm long, adaxial surface

sparsely pubescent with similar trichomes to nearly glabrous, margin entire. Inflorescence of axillary and terminal subsessile to pedunculate dichasia spikes to 5 cm long (including peduncle and excluding flowers), 2–3 mm in diameter near midpoint of fertile portion, or sometimes dichasia borne in leaf axils, axillary spikes opposite or alternate, 1 per axil, peduncles to 4 mm long, pubescent like young stems, rachis sometimes pubescent like peduncle proximally and becoming pubescent with erect to flexuose to retrorse to antrorse eglandular trichomes 0.05–0.5 mm long distally, also sometimes with conspicuous subsessile to stipitate glandular trichomes to 0.2 mm long (glandular-pubescent) present distally; dichasia opposite, 1–2-flowered, 1 per axil, sessile to subsessile (i.e., borne on peduncles to 0.5 mm long). Bracts opposite, lance-subulate, 1.5–3 mm long, 0.3–0.7 mm wide (or sometimes subfoliose and larger near base of spike), abaxial surface pubescent with erect to antrorse eglandular trichomes 0.05–0.4 mm long (and sometimes distal bracts glandular-pubescent as well). Bracteoles subulate, 1–2.5 mm long, 0.3–0.4 mm wide, abaxial surface pubescent like bracts. Flowers sessile to subsessile (i.e., borne on pedicels to 0.5 mm long). Calyx 4-lobed, 2.5–5 mm long, lobes subulate, equal, 2–4.4 mm long, 0.3–0.5 mm wide, abaxially pubescent like bracts. Corolla pinkish, 13–28 mm long, externally pubescent with erect to flexuose eglandular and usually (at least on proximal portion of tube) a few scattered glandular trichomes 0.1–0.5 mm long, tube  $\pm$  cylindric, 9–18 mm long, 0.7–0.9 mm in diameter near midpoint, upper lip 2.5–7 mm long, entire, lower lip 5–11 mm long, lobes 3–6.5 mm long, 2.5–5 mm wide. Stamens inserted near apex of corolla tube, 3–4 mm long, filaments glabrous, thecae 0.8–1.3 mm long, subequal to  $\pm$  unequal, parallel, unequally inserted (0.5–0.6), glabrous, lacking basal appendages; pollen 2-aperturate, apertures flanked on each side by 2–3 rows of insulae, exine reticulate. Style 12–20 mm long, pubescent with eglandular trichomes, stigma 0.3–0.5 mm long, lobes subequal or not evident. Capsule 8–11 mm long, pubescent with erect to subflexuose eglandular and glandular trichomes 0.1–0.4 mm long, stipe 2.5–4.5 mm long, head subellipsoid with a medial constriction, 5.5–6 mm long. Seeds 4, lenticular, 2–2.6 mm long, 1.5–2.4 mm wide, surfaces and margin covered with irregular puffy overlapping tubercles. ( $n = 11$ ). Flowering Jun–Mar; fruiting Jul–Mar.

Tropical Deciduous Forest and Short Tree Savanna; uncommon in Central Depression; 200–1660 m. Mex. (Pue., Oax., Yuc., Q.Roo, Chis.), Guat., Hond., C.R., S.A. (Col.). CHIAPAS COLLECTIONS: *EM 5687* (MEXU); *EM 5736*; *Rey 262* (MEXU); *We 11658* (DAV, MEXU); 42341; 50339; 50378.

The above description and phenologies include data from Oaxacan specimens.

This species and several others with elongate and narrowly cylindrical corolla tubes have been treated as *Siphonoglossa* Oerst. Hilsenbeck (1990, *Pl. Syst. Evol.* 169: 219–235, and references cited therein) recognized a more narrowly circumscribed *Siphonoglossa* on the basis of morphological, chemical, and cytological characters. Little is known concerning the flavanoid chemistry of *Justicia* and the putative morphological and cytological distinctions of *Siphonoglossa* (e.g., calyx 4-lobed,  $n = 11$ ) are known in *Justicia*.

Hilsenbeck (1989, *Madroño* 36:198–207.) included several varieties within this species with plants occurring from Puebla and Yucatán to northern South Amer-

ica. Our plants concur with his typical variety (restricted to southern Mexico). The species appears to intergrade with *S. mexicana* Hilsenb. and *Justicia canbyi* Greenm. ( $\equiv$  *S. canbyi* (Greenm.) Hilsenb.) to the north. Demarcations among these and other species still referred to *Siphonoglossa* remain to be worked out.

**29. *Justicia rzedowskii* (Acosta) T.F. Daniel, Proc. Calif. Acad. Sci. 48:273. 1995.**

— *Chaetothylax rzedowskii* Acosta, Acta Bot. Méx. 5:5. 1989. — TYPE: Mexico, Chiapas, Mpio. Huehuetán, Rfo Chamulapa, 50 m, 7 Feb 1985, E. Ventura & E. López 1074 (ENCB; isotypes: CAS!, CHAPA, IEB, MEXU, OAX).

ILLUSTRATION: Acta Bot. Méx 5:6, fig. 1. 1989.

Decumbent to erect perennial herbs to 4 dm tall. Young stems subquadrate, bifariously pubescent with retrorse eglandular trichomes 0.2–0.6 mm long. Leaves petiolate, petioles to 12 mm long, blades ovate-elliptic to narrowly elliptic, (26–) 60–103 mm long, (11–) 17–29 mm wide, 2.2–3.6 times longer than wide, acute to subacuminate at apex, attenuate at base, surfaces glabrous, margin slightly revolute, entire to subcrenate. Inflorescence of axillary or terminal pedunculate dichasiate spikes or panicles of spikes (or modifications thereof) to 80 mm long (including peduncles and excluding flowers), axillary spikes or panicles opposite, 1–2 per axil, peduncles to 35 mm long, bifariously pubescent with flexuose to retrorse eglandular trichomes 0.2–0.4 mm long, rachises pubescent like peduncles; dichasia alternate (often with a dichasium in 1 axil and an inflorescence branch in the opposite axil at a node), 1-flowered,  $\pm$  secund, 1 per axil, sessile to subsessile (i.e., borne on peduncles to 1 mm long). Bracts opposite, subulate (or obovate to elliptic to lance-subulate near base of inflorescence), 3–4 (–6.5) mm long, 0.3–0.5 (–2) mm wide, abaxial surface glabrous, margin ciliate with antrorse eglandular trichomes. Bracteoles subulate, 2.8–3.9 mm long, 0.3–0.4 mm wide, abaxial surface glabrous. Flowers sessile. Calyx 4-lobed, 6.5–8 mm long, lobes subulate to lanceolate, equal, 6–7.6 mm long, 0.5–0.9 mm wide, abaxially pubescent with antrorse eglandular trichomes along midvein and with scattered glandular and subglandular trichomes 0.05–0.1 mm long, trichomes becoming sparse to nearly absent on older calyces. Corolla whitish with maroon markings, 9–12 mm long, externally pubescent with flexuose eglandular trichomes 0.1–0.2 mm long, tube cylindric (or narrowed distally), 5.5–7 mm long, 1.1–1.2 mm in diameter near midpoint, upper lip 3.5 mm long, entire to emarginate at apex, lobes to 0.05 mm long, lower lip 3–5 mm long, lobes rounded, 2–2.2 mm long, 1.5–2 mm wide. Stamens inserted near apex of corolla tube, 3 mm long, filaments glabrous, thecae 0.7–1 mm long (including basal appendage), unequal (upper theca longer), subparallel, superposed (0.3–0.4 mm distant), glabrous, lower theca with a  $\pm$  bulbous basal appendage to 0.2 mm long; pollen 2-aperturate, apertures flanked on each side by 2 (–3) rows of insulae, exine reticulate. Style 7–8 mm long, pubescent with eglandular trichomes proximally, stigma oblique, 0.2–0.3 mm long, lobes not evident. Capsule 6.5–7 mm long, pubescent with erect to flexuose to retrorse eglandular trichomes 0.1–0.2 mm long and distally (at least) pubescent with glandular trichomes 0.05–0.1 mm long, stipe 1.8–2 mm long, head narrowly ellipsoid to  $\pm$  hourglass-shaped, 4.5–5.2 mm long. Seeds 4, sub-lenticular, 1.2–1.4 mm long, 1–1.3 mm wide, surfaces covered

with protrusions bearing retrorse barbs. Flowering and fruiting Jan–Feb.

Chiapas endemic: in regions of Evergreen Seasonal Forest and Lower Montane Rain Forest (now extirpated or degraded); rare in Sierra Madre and Pacific Coastal Plain; 50–250 m. CHIAPAS COLLECTION: *Ve 1033* (CAS).

**30. *Justicia salviiflora* Kunth, Nov. gen. sp. 2:233. 1818.**

— *Sarotheca salviiflora* (Kunth) Nees in A. DC. Prodr. 11:382. 1847. — TYPE: cultivated in a Mexican botanical garden (fide protologue) (P-Bonpl!.; isotype: P!).

*Justicia paniculata* Rose, Contr. U.S. Natl. Herb. 1:348. 1895, non *Justicia paniculata* Burm f. (1768) nec *J. paniculata* Forsk. (1775) nec *J. paniculata* Sessé & Moc. (1887). — TYPE: Mexico, Colima, vicinity of Colima, 9 Jan–6 Feb 1891, E. Palmer 1143 (US!; isotypes: K!, US!).

ILLUSTRATION: Fig. 20.

Shrubs to 2 m tall. Young stems quadrate to subhexagonal, densely and  $\pm$  evenly pubescent with erect to flexuose to antrorse eglandular and glandular (absent or so dense as to render stems viscid) trichomes 0.1–1.5 mm long, trichomes soon becoming mostly antrorse and often  $\pm$  concentrated in 2 lines. Leaves petiolate, petioles to 30 mm long, blades lanceolate to ovate to elliptic, 13–170 mm long, 5–77 mm wide, 1.5–4.4 times longer than wide, acute to acuminate to subfalcate at apex, acute to attenuate at base, surfaces and margin pubescent with cauline type trichomes, trichomes often becoming restricted to midvein on older leaves or older leaves nearly glabrous, margin entire to subcrenate. Inflorescence of axillary pedunculate dichasiate spikes or panicles of spikes to 150 mm long (including peduncle and excluding flowers), inflorescence bracts (if present) lance-elliptic to lanceolate to lance-subulate, 3–9 mm long, 0.5–2 mm wide, variously pubescent, spikes or panicles opposite, 1 per axil, peduncles to 30 mm long, pubescent like younger stems or with an overstorey of trichomes like those of younger stems and an understorey of erect glandular and eglandular trichomes 0.05–0.1 mm long, rachises pubescent like younger stems, or with mostly glandular trichomes to 0.5 mm long, or with an overstorey of flexuose eglandular trichomes 0.2–1 mm long and an understorey of glandular and eglandular trichomes 0.05–0.1 mm long; dichasia alternate (or sometimes opposite at proximalmost node only), 1-flowered,  $\pm$  secund, 1 per axil, sessile. Bracts opposite, lance-subulate (to ovate-elliptic to elliptic), 2.3–4 (–15) mm long, 0.3–1.5 (–8) mm wide, abaxial surface pubescent like rachises or with glands, if present, sometimes denser and longer. Bracteoles subulate (to lanceolate to linear), 2.5–4 (–9) mm long, 0.3–1 mm wide, abaxial surface pubescent like bracts. Flowers sessile to subsessile (i.e., borne on pedicels to 1 mm long). Calyx 4-lobed with lobes equal or 5-lobed (rarely) with 4 lobes equal and posterior 5th lobe reduced in size, 5.5–12 mm long, lobes lance-subulate to lanceolate, 5–11.5 mm long (posterior lobe, when present, 2.5–4.2 mm long), 0.8–1.8 mm wide, abaxially pubescent like bracts or with erect glandular and eglandular trichomes 0.05–0.2 mm long. Corolla greenish or yellowish white tinged with pink and with maroon markings on lower lip, 12–21 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.6 mm long, tube  $\pm$  expanded distally, 6–10.5 mm long, 2.5–4.5 mm in diameter near midpoint, upper lip 5.3–8.5 mm long,

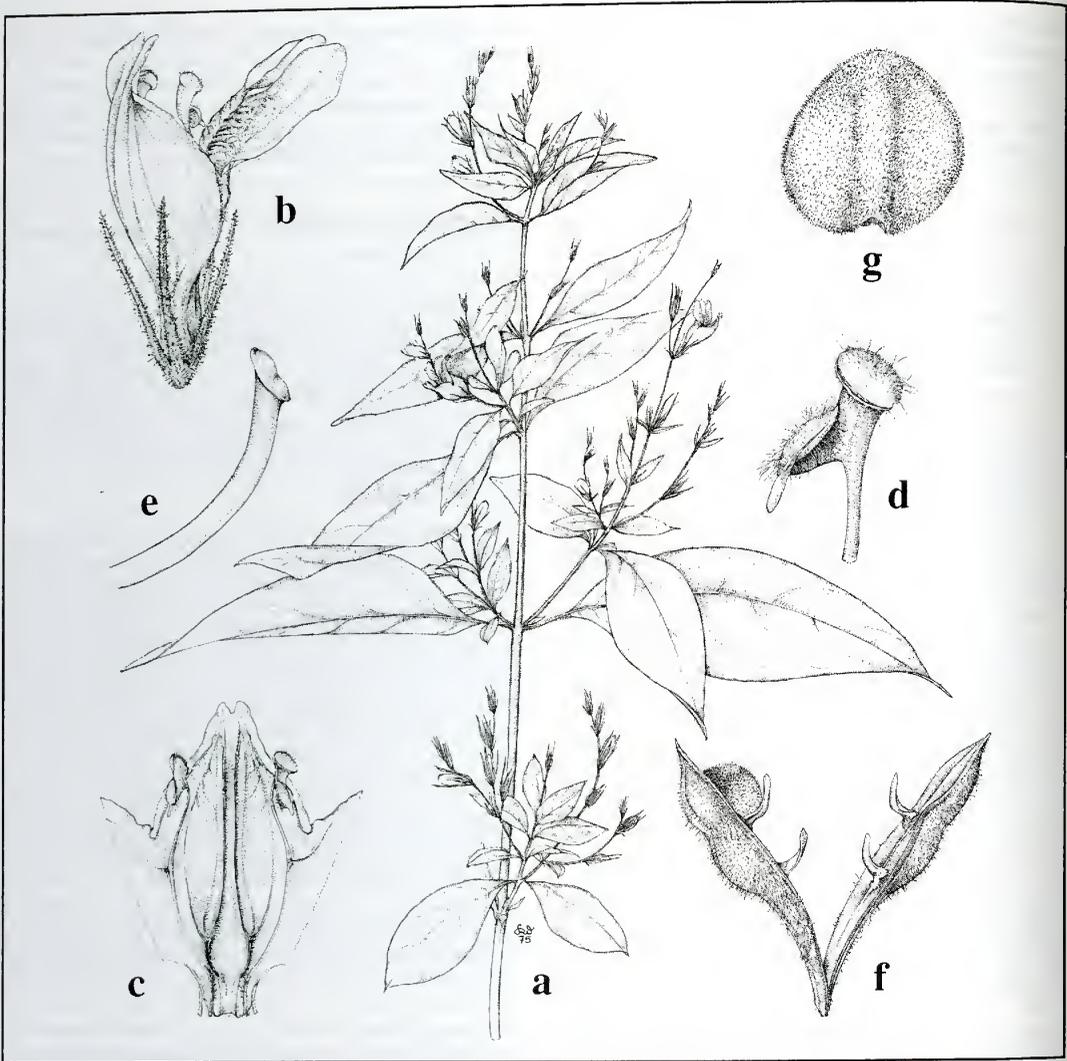


FIGURE 20. *Justicia salviiflora* Kunth (a–e from McVaugh 22669, f–g from McVaugh 23399). a, habit,  $\times 0.5$ ; b, flower,  $\times 2.5$ ; c, corolla split open showing stamens,  $\times 2.5$ ; d, distal portion of stamen,  $\times 7.5$ ; e, distal portion of style with stigma,  $\times 20$ ; f, capsule,  $\times 2.5$ ; g, seed,  $\times 7.5$ . Drawn by Karin Douthit. Copyright reserved to University of Michigan Herbarium, used with permission.

entire to 2-lobed, lobes to 2 mm long, lower lip 6.5–11 mm long, lobes 1.7–5 mm long, 1.5–4.5 mm wide. Stamens inserted near apex of corolla tube, 6.5–9 mm long, filaments proximally pubescent with eglandular trichomes, thecae 1.2–2.5 mm long (including basal appendage), subequal to unequal, subparallel to perpendicular, unequally inserted (overlapping by 0.5–1 mm), dorsally pubescent with eglandular trichomes, lower theca with a  $\pm$  bulbous basal appendage to 1.5 mm long; pollen 2-aperturate, apertures flanked on each side by 1 row of insulae, exine reticulate. Style 10–17 mm long, pubescent (at least proximally) with eglandular trichomes, stigma 0.2–0.4 mm long, lobes unequal or not evident. Capsule 14–20 mm long, pubescent with erect to flexuose eglandular and glandular (sometimes absent) trichomes 0.2–0.6 mm long, stipe 5.5–10 mm long,

head ellipsoid with a medial constriction, 8.5–11 mm long. Seeds 4, lenticular, 3–4 mm long, 2.5–3 mm wide, surfaces and margin covered with subconic trichomelike barbed bristles 0.2–0.4 mm long, some of these sometimes reduced to  $\pm$  anastomosing bumpy ridges.  $n = 12$ . Flowering and fruiting Jan–Apr.

Slopes in Tropical Deciduous Forest; uncommon in Central Depression; 750–1080 m. Mex. (Son., Chih., Sin., Dgo., Nay., Jal., Cma., Mich., Méx., Mlos., Gro., Oax., Chis.). CHIAPAS COLLECTIONS: *Mi 6830* (MEXU); *Pa 1411* (CAS); *R&B 20133* (DS, US); *Sta 229* (BM); *50162*; *50329*.

Much of the variation in this widespread species is evident among the collections from Chiapas. Some Chiapan plants are unusual in having young stems and

capsules pubescent with only eglandular trichomes. Some plants exhibit 4-lobed calyces, others have 5 (4+1)-lobed calyces, and some specimens have both 4- and 5-lobed calyces on the same plant. Variation in form of the bracts and bracteoles (small to subfoliose) and in inflorescence pubescence (glandular vs. eglandular) is evident in *Breedlove 50329* which has large subfoliose eglandular bracts and eglandular rachises, bracteoles, and calyces whereas *Breedlove 50162* has much reduced, usually glandular bracts and glandular rachises, bracteoles, and calyx.

### 31. *Justicia soliana* Standl. J. Wash. Acad. Sci. 14:245. 1924.

— TYPE: El Salvador, Sonsonate, Finca Chilata, 26–27 Dec 1922, P. Standley 19325 (US!).

ILLUSTRATION: none found.

Shrubs to 2 m tall. Young stems subterete to subquadrate, sparsely pubescent with retrorse to antrorse eglandular trichomes 0.2–0.5 mm long, trichomes ± evenly disposed or concentrated in 2 lines. Leaves petiolate, petioles to 45 mm long, blades ovate to elliptic, 75–200 mm long, 28–73 mm wide, 2.5–3.2 times longer than wide, acuminate to subfalcate at apex, attenuate at base, surfaces pubescent with mostly antrorse eglandular trichomes especially along major veins or nearly glabrous, margin entire to subsinuate. Inflorescence complex, flowers borne in dichasiate spikes, these either terminal or in axils of distal leaves and/or inflorescence bracts, collectively forming a terminal pedunculate panicle to 170 mm long, 10–30 mm in diameter near midpoint, peduncles to 28 mm long, rachises of panicles and individual spikes ± evenly pubescent with retrorse to flexuose to antrorsely appressed eglandular trichomes 0.05–0.5 mm long, proximal inflorescence bracts foliose to subfoliose, spikes or panicles opposite or alternate, 1–3 per axil; dichasia opposite or alternate, 1-flowered, 1 per axil (but if present along main panicle rachis, then sometimes accompanied by 1 or more spikes in same axil), sessile. Bracts opposite, lance-ovate to lanceolate to linear, 5.5–14.5 mm long, 1.2–3 mm wide, abaxial surface pubescent with erect to antrorse to antrorsely appressed eglandular trichomes 0.1–0.3 mm long and with scattered glandular trichomes to 0.2 mm long near apex and often with an understorey of erect subglandular trichomes to 0.05 mm long. Bracteoles lance-linear to linear, 4.5–13 mm long, 0.4–1.3 mm wide, abaxial surface pubescent like bracts. Flowers sessile to subsessile (i.e., pedicels to 0.05 mm long). Calyx 5-lobed, 3.5–5 mm long, lobes lanceolate to lance-subulate, equal, 3–4 mm long, 0.7–0.8 mm wide, abaxially pubescent like bracts or with distal glands usually not evident. Corolla red, 24–32 mm long, externally pubescent with flexuose eglandular and glandular (often sparse) trichomes 0.05–0.3 mm long, tube gradually expanded distally, 15–19 mm long, 1.5–2.5 mm in diameter near midpoint, upper lip 8–15 mm long, emarginate, lobes to 0.1 mm long, lower lip 8–13 mm long, lobes 1–1.8 mm long, 0.5–1.2 mm wide. Stamens inserted near apex of corolla tube, 11–18 mm long, filaments proximally sparsely pubescent with eglandular trichomes, thecae 2.3–3 mm long, equal, parallel to subsagittate, equally inserted, glabrous, minutely (if at all) appendaged at base with rounded projections to 0.2 mm long; pollen 2-aperturate, apertures flanked on each

side by 2–3 rows of insulae, exine reticulate. Style 20–30 mm long, glabrous, stigma 2-lobed, lobes equal, 0.2 mm long. Capsule 15–19 mm long, glabrous, stipe 6.5–9 mm long, head subellipsoid, 8–10 mm long. Seeds 4, sublenticular, 2.3–3.5 mm long, 2.5–3 mm wide, surfaces and margin covered with conc and sometimes ± appressed tubercles. Flowering and fruiting Jan, Oct.

Slopes in Evergreen Seasonal Forest; rare in Central Plateau and Sierra Madre; ca. 1060 m. Mex. (Chis.), Guat., Salv. CHIAPAS COLLECTIONS: *La 2565* (DS, US); *EM 2011* (A, K, MICH, US).

*Laughlin 2565* was treated by Gibson (1974) as *Justicia aurea* forma *erythrina* (Standl. & Steyerem.) D.N. Gibson. The type of that form from Guatemala has not been studied for this treatment, but Laughlin's collection is similar to *J. soliana* in all characters.

### 32. *Justicia spicigera* Schlttdl. Linnaea 7:395. 1832.

— *Jacobinia spicigera* (Schltdt.) L.H. Bailey, Stand. cycl. hort. 1715. 1915. — *Sericographis mohintli* Nees in A. DC. Prodr. 11:361. 1847, nomen illegit. (*Justicia spicigera* and *J. atramentaria* cited in synonymy). — *Jacobinia mohintli* (Nees) Hemsl. Biol. Centr.-am. bot. 2:521. 1882. — SYNTYPES: Mexico, Veracruz, Jalapa, May 1829, A. Schiede s.n. (B, destroyed; isosyntype: GH); cultivated at Hacienda de la Laguna, July 1829, A. Schiede s.n. (B, destroyed, P!; isosyntype: BM!).

*Justicia atramentaria* Benth. Pl. hartw. 69. 1840. — *Jacobinia atramentaria* (Benth.) S.F. Blake, Contr. Gray Herb. 52:103. 1917. — TYPE: Mexico, Oaxaca, Zonaguia [= Tonagufa], 1839, T. Hartweg s.n. (K!).

*Sericographis moctli* Nees in Nees & S. Schauer, Linnaea 20:715. Dec 1847. — TYPE: Mexico, "in ditone Toluca" (fide protologue), A. Aschenborn 101 (?).

*Sericographis neglecta* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:151. 1855. — *Jacobinia neglecta* (Oerst.) A. Gray, Syn. fl. 1(2):395. 1878. — *Justicia liebmanii* V.A.W. Graham, Kew Bull. 43:612. 1988, non *Justicia neglecta* T. Anders. (1863). — SYNTYPES: Mexico, Veracruz, Pital ved Río Nautla, Apr 1841, F. Liebmann 10671 (C; isosyntype: K!); Colipa, Mar 1841, F. Liebmann 10670 (C); Paso del Correo ved Río Tecoluta, Jun 1841, F. Liebmann 10672 (C).

*Jacobinia scarlatina* S.F. Blake, Contr. Gray Herb. 52:102. 1917. — *Justicia scarlatina* (S.F. Blake) V.A.W. Graham, Kew Bull. 43:612. 1988. — TYPE: Belize, near Manatee Lagoon, 12 May 1906, M. Peck 430 (GH!; isotype: K!).

ILLUSTRATIONS: Oersted 1855:t. 4, figs. 12–14, 17; Lindau 1895:352, fig. 141D; Fieldiana, Bot. 24(10):401, fig. 88. 1974; Wiggins, Flora Baja California, 193, fig. 141. 1980; Correll and Correll, Flora Bahama Archipelago, 1352, fig. 590. 1982; Mason and Mason, Mexican Roadside Flora, 25. 1987.

Shrubs to 5 m tall. Young stems subterete to quadrate, sparsely to ± densely pubescent with antrorse to retrorse eglandular trichomes 0.5–1.2 mm long, trichomes ± evenly disposed to concentrated in 2 lines. Leaves petiolate, petioles to 20 mm long, blades often blackening when dried, ovate-elliptic to

elliptic to narrowly elliptic, 32–225 mm long, 7–67 mm wide, 2.2–4.6 times longer than wide, acuminate at apex, acute to attenuate at base, surfaces pubescent (primarily along major veins) with cauline type trichomes or glabrous, margin entire to sinuate. Inflorescence of axillary pedunculate panicles of dichasiate spikes to 105 mm long (including peduncle and excluding flowers), 8–25 (–55) mm in diameter near midpoint of fertile portion, peduncles to 40 mm long, pubescent with antrorse to flexuose to retrorse eglandular trichomes 0.5–1.2 mm long, inflorescence bracts triangular to subulate to lanceolate to obovate, 1–5 mm long, 0.5–1.3 mm wide, pubescent with cauline type trichomes or glabrous, panicles opposite or alternate, 1 per axil, rachis glabrous or pubescent with flexuose to antrorse to retrorse eglandular trichomes 0.1–0.5 mm long and sometimes with inconspicuous sessile patelliform glands as well (glandular-punctate), the eglandular trichomes becoming very sparse or concentrated in 2 lines distally; dichasia alternate, 1-flowered, ± secund, 1 per axil, sessile. Bracts opposite, triangular, 1–2 mm long, 0.8–1.2 mm wide, abaxial surface glabrous or inconspicuously glandular-punctate. Bracteoles triangular to ovate to subulate, 0.9–2.2 mm long, 0.6–1 mm wide, abaxial surface glabrous or inconspicuously glandular-punctate. Flowers sessile to subsessile (i.e., borne on pedicels to 1 mm long). Calyx 5-lobed, 2.8–4.5 mm long, lobes lanceolate to lance-subulate, equal, 1.7–3.2 mm long, 0.5–0.9 mm wide, abaxially glabrous or pubescent with subsessile to stipitate glandular trichomes to 0.1 mm long. Corolla orange, fusiform in bud, 33–55 mm long, externally pubescent with inconspicuous subsessile to stipitate glandular trichomes to 0.1 mm long proximally (i.e., near base of tube) and glabrous distally, tube gradually expanded distally, 19–32 mm long, 2.5–4 mm in diameter near midpoint, upper lip 11–21 mm long, entire, lower lip recoiled, 11–21 mm long, lobes 0.8–2.5 mm long, 1–1.7 mm wide. Stamens inserted near apex of corolla tube, 14–20 mm long, filaments glabrous, thecae 1.5–3.2 mm long, equal to subequal, subparallel to subsagittate, subequally inserted, glabrous, lacking basal appendages; pollen 2-aperturate, apertures flanked on each side by 2 (–3) rows of insulae, exine reticulate. Style 28–48 mm long, glabrous or with a few glands near base, stigma 0.4–0.7 mm long, lobes indistinct. Capsule 17 mm long, glabrous, stipe 8 mm long, head hourglass-shaped, 9 mm long. Seeds 4, lenticular, 2.7–3 mm long, 2.5 mm wide, surfaces and margin covered with subconic papillae. Flowering Dec–Aug; fruiting Mar.

Slopes, often in disturbed habitats, in Tropical Rain Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common in Northern Highlands, Eastern Highlands, Central Plateau, Central Depression, and Sierra Madre; 50–1760 m. Mex. (Nay., Jal., Mich., Méx., Pue., Ver., Gro., Oax., Yuc., Chis.), Guat., Bel., Hond., Salv., Nic., C.R. CHIAPAS COLLECTIONS: *Br 66* (CAS); *Fe 1033-a* (MEXU); *GE 1412* (MEXU); *Li 185* (K); *Mi 1901* (MEXU); *Mi 5949* (MEXU); *Mi 7731* (MEXU); *SC 646* (CAS); *T 342* (DS, US); *T 4194* (MEXU); *T s.n.* (DS); *9431*; *24596*.

Local name: “yax an” or “yaxan” (Tzeltal, *Brett 66*, *Sántiz C. 646*).

Uses: crushed leaves used as a plaster for tongue infections (*Sántiz C. 646*); crushed leaves used as a plaster for skin maladies (*Brett 66*); leaves are placed in water to form a blue dye (*Martínez C. 11*); formerly used as an “ink” for whitening clothes (*Martínez C. 1915*).

Because of its numerous medicinal and household uses (especially as a bluing agent in cleaning clothes), this species is commonly cultivated throughout much of Mexico and likely has been for many centuries. Its natural distribution is undoubtedly considerably more restricted than that suggested by herbarium specimens, many of which note that the plants were cultivated or suggest it. Based on the information provided by labels on herbarium specimens, possible wild collections of the species have been made in at least Chiapas, Oaxaca, and Veracruz.

Blake (Contr. Gray Herb. 52:102. 1917) noted that *Jacobiniascarlatina* was closely related to plants treated as *J. neglecta*, *J. spicigera*, and *J. atramentaria*. It appears to differ from *J. spicigera* only by its red corollas.

There is considerable variation in the amount, disposition, and form of vegetative pubescence in *J. spicigera* throughout its range. In Chiapas, the cauline trichomes are mostly antrorse and ± evenly disposed. Variation in corolla size and color are evident as well. Studies of *Justicia spicigera* and its relatives (including *J. leonardii* Wassh. and *J. colorifera* V.A.W. Graham) from throughout their ranges will be necessary in order to better delimit species in this complex.

Synonyms in addition to those noted above have been attributed to *J. spicigera* and others will undoubtedly be revealed with additional studies.

### 33. *Justicia teletheca* T.F. Daniel, Proc. Calif. Acad. Sci. 48:268. 1995.

— TYPE: Mexico, Chiapas, Mpio. Arriaga, La Mina Microwave Station, 915 m, 21 Dec 1981, *D. Breedlove 56314* (CAS!; isotypes: C!, K!, MEXU!, MO!, US!).

ILLUSTRATION: Fig. 21.

Erect perennial herbs to 1.1 m tall. Young stems subquadrate, internodes glabrous or bifariously pubescent (sometimes only for a short distance proximal to only certain nodes) with flexuose to antrorsely appressed eglandular trichomes to 0.7 mm long, nodes usually with at least a few antrorse eglandular trichomes. Leaves subsessile to petiolate, petioles to 37 mm long, blades ovate to elliptic, 19–185 mm long, 6–77 mm wide, 2–3.7 times longer than wide, acute to acuminate at apex, acute to attenuate at base, surfaces pubescent (mostly along major veins) with antrorse eglandular trichomes, margin entire to subrenate. Inflorescence of axillary and terminal pedunculate dichasiate spikes or panicles of spikes to 110 mm long (including peduncle and excluding flowers), 11–18 mm in diameter near midpoint of fertile portion, axillary spikes or panicles mostly opposite, 1–3 per axil, peduncles to 75 mm long, nearly glabrous or ± evenly to ± bifariously pubescent with antrorse to antrorsely appressed eglandular trichomes 0.1–0.9 mm long (strigose), rachises strigose proximally and pubescent with erect glandular and eglandular trichomes 0.05–0.1 mm long (glandular-puberulent) distally, inflorescence bracts (if present) similar to leaves but sometimes smaller; dichasia opposite, 1-flowered, 1 per axil, sessile. Bracts opposite, linear to oblanceolate to obovate, 6–14 mm long, 1.2–7 mm wide, acute at apex, abaxial surface of proximal bracts glabrous or with antrorse eglandular

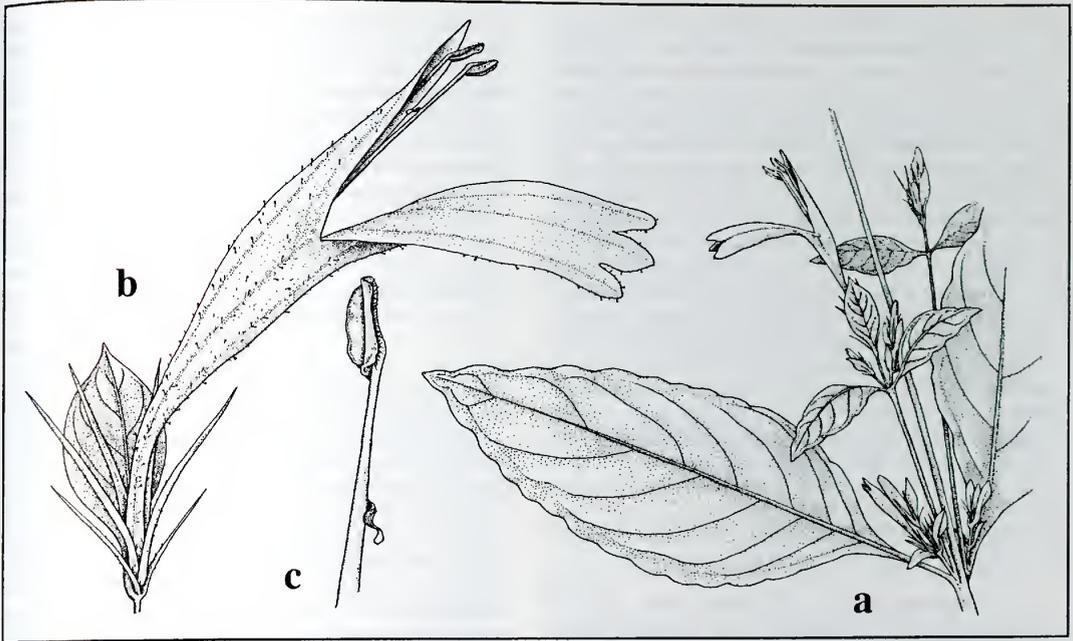


FIGURE 21. *Justicia teletheca* T.F. Daniel (56314). a, habit,  $\times 0.8$ ; b, bract, bracteoles, and flower,  $\times 2.5$ ; c, distal portion of stamen,  $\times 6$ . Drawn by Jenny Speckels.

trichomes 0.1–0.5 mm long, abaxial surface of distal bracts glandular-puberulent and often with a few longer antrorse eglandular trichomes as well, margin ciliate with flexuose to antrorse eglandular trichomes and (on distal bracts) glandular-puberulent. Bracteoles subulate to linear, 4–6 mm long, 0.3–0.5 mm wide, pubescent like bracts. Flowers sessile. Calyx 4-lobed, 9–11 mm long, lobes linear to linear-lanceolate, equal, 8–10.3 mm long, 0.9–1.2 mm wide, abaxially pubescent like bracts or sometimes lobes of proximal calyces glandular-puberulent like lobes of distal calyces. Corolla dark pink-red with white markings on lower lip, 30–35 mm long, externally pubescent with erect to subflexuose glandular and eglandular trichomes 0.05–0.3 mm long, tube  $\pm$  expanded distally, 17–19 mm long, 1.9–2.5 mm in diameter near midpoint, upper lip 11–16 mm long, entire to emarginate, lobes 0.2 mm long, lower lip 14–18.5 mm long, lobes 3–5 mm long, 1.5–3 mm wide. Stamens inserted near apex of corolla tube, 13.5–16 mm long, filaments distally glabrous, proximally pubescent with eglandular trichomes, thecae dimorphic, subparallel to subperpendicular, superposed (1.5–3 mm distant), upper theca fertile, 2–2.5 mm long, pubescent with eglandular trichomes, lower theca borne on a projection of the connective to 0.5 mm long, sterile, 1–1.2 mm long (including a  $\pm$  bulbous basal appendage to 0.4 mm long); pollen 2-aperturate, apertures flanked on each side by 3–4 rows of insulae, exine reticulate. Style 25–30 mm long, sparsely pubescent at base (if at all) with eglandular trichomes, stigma 0.2 mm long, lobes not evident. Capsule (immature) 8 mm long, glandular-puberulent. Flowering Nov–Dec; fruiting Dec.

Slopes in ecotone between Tropical Deciduous Forests and Pine-Oak Forest and in Pine-Oak Forest; rare in NW Sierra Madre; 900–915 m. Mex. (Oax., Chis.).

#### 34. *Justicia tianguensis* T.F. Daniel, Proc. Calif. Acad. Sci. 48:270. 1995.

— TYPE. Mexico, Chiapas, Mpio. Tenejapa, Yochib, Paraje of Kotel Te', 1300 m, 21 Nov 1964, D. Breedlove 7365 (DS!; isotypes: F!, MICH!, US!).

ILLUSTRATION: Fig. 18.

Perennials to 3 (probably considerably more) dm tall. Young stems quadrate-compressed, internodes unifuriously to bifuriously pubescent with retrorse eglandular trichomes 0.2–1 mm long, soon glabrate, trichomes sometimes sparse or absent along proximal portions of internodes, nodes pubescent with straight (but not erect) eglandular trichomes to 1 mm long. Leaves petiolate, petioles to 10 mm long, blades ovate, 58–130 mm long, 18–57 mm wide, 2–3.2 times longer than wide, acuminate to subfalcate at apex, rounded to acute at base, adaxial surface pubescent with antrorse eglandular trichomes along midvein, abaxial surface glabrous or with a few antrorse eglandular trichomes along midvein, margin entire to subcrenate. Inflorescence of terminal (sometimes appearing axillary) pedunculate dichasiate spikes to 200 mm long (including peduncle and excluding flowers), 6–8 mm in diameter near midspike (excluding flowers), peduncles to 55 mm long,  $\pm$  evenly pubescent with erect to retrorse to flexuose to antrorse eglandular trichomes 0.1–0.5 mm long, rachises evenly pubescent with erect eglandular trichomes 0.1–0.2 mm long; dichasia opposite, 1-flowered, 1 per axil, sessile. Bracts opposite, lanceolate to lance-ovate, 4.5–6 mm long, 1.6–2.5 mm wide, acuminate to attenuate at apex, abaxial surface pubescent with erect eglandular trichomes 0.05–0.1 mm long. Bracteoles lanceolate to lance-subulate, 4–5 mm long, 0.7–1.1 mm wide, abaxial surface pubescent like bracts. Flowers sessile. Calyx 5-lobed, 8–10 mm long, abaxially pubescent like bracts, 4 lobes lanceolate, equal,

6.5–9 mm long, 1–1.5 mm wide, posterior 5th lobe 1.8–2.5 mm long, margins neither thickened nor discolored. Corolla red, 39–51 mm long, externally pubescent with erect eglandular trichomes 0.05–0.2 mm long, tube gradually expanded distally, 22–27 mm long, 4.3–5.2 mm in diameter near midpoint, upper lip 17–22 mm long, entire, lower lip 17–24 mm long, lobes 2.5–5.5 mm long, 1.8–5 mm wide. Stamens inserted near apex of corolla tube, 17–20 mm long, filaments proximally pubescent with eglandular trichomes, thecae 2–2.5 mm long, subequal, perpendicular, unequally inserted (overlapping by 0.5–1 mm) to superposed (up to 0.4 mm distant), glabrous, lacking basal appendages; pollen 2-aperturate, apertures flanked on each side by 2 rows of insulae, exine reticulate. Style 37–44 mm long, proximally pubescent with eglandular trichomes, stigma 2-lobed, 1 lobe 0.3–0.4 mm long, other lobe 0.1 mm long. Ovary densely pubescent with erect eglandular trichomes 0.1–0.2 mm long. Capsule not seen. Flowering Nov, Feb.

Moist slopes in Pine-Oak-*Liquidambar* Forest; rare in Central Plateau; ca. 1300 m. Mex. (Chis.), Guat.

### 35. *Justicia turipachensis* T.F. Daniel, Proc. Calif. Acad. Sci. 48:271. 1995.

— TYPE: Mexico, Chiapas, Mpio. Berriozábal, 13 km N of Berriozábal near Pozo Turipache and Finca El Suspiro, 900 m, 1 Jan 1973, D. Breedlove 31242 (CAS!; isotypes: C!, DS!, K!, MEXU!, US!)

ILLUSTRATION: Fig. 18.

Shrubs to 4.5 m tall. Young stems subterete, glabrous. Leaves petiolate, petioles to 65 mm long, blades elliptic, 121–260 mm long, 31–90 mm wide, 2.9–3.9 times longer than wide, acuminate at apex, attenuate at base, surfaces glabrous (or with a few antrorsely appressed eglandular trichomes along midvein on abaxial surface), margin entire to subcrenulate. Inflorescence of axillary and terminal pedunculate dichasiate racemes or panicles of racemes from axils of distal leaves or bracts (= inflores-

cence bracts) forming a complex terminal panicle to 200 mm long (excluding flowers) and 150 mm in diameter near midpoint, commonly both a raceme and a panicle per axil, inflorescence bracts subfoliose, petiolate, 5.5–8 mm long, 1.3–2.1 mm wide, main rachis ± evenly pubescent with flexuose-antrorse to antrorsely appressed eglandular trichomes 0.1–0.3 mm long, peduncles to 15 mm long, pubescent like main rachis, raceme rachises pubescent like main rachis (or with trichomes denser); dichasia alternate or opposite, 1-flowered, 1 per axil, sessile to subsessile (i.e., peduncles to 0.5 mm long). Bracts opposite, subulate to lance-subulate, 1.5–3 mm long, 0.4–0.7 mm wide, abaxial surface pubescent with antrorsely appressed eglandular trichomes 0.05–0.2 mm long and sometimes with a few inconspicuous erect eglandular trichomes to 0.1 mm long. Bracteoles subulate, 1.2–1.5 mm long, 0.3–0.4 mm wide, abaxial surface pubescent like bracts. Flowers pedicellate, pedicels 1.5–2.5 mm long, pubescent like rachises. Calyx 5-lobed, 4–6 mm long, lobes lance-subulate, equal, 3.2–5 mm long, 0.7–0.9 mm wide, abaxially and marginally pubescent like bracts. Corolla yellow, 31–35 mm long, externally pubescent with flexuose eglandular trichomes 0.1–0.3 mm long and distally with erect glandular trichomes to 0.2 mm long as well, tube ± gradually expanded distally, 17–18 mm long, upper lip 14–15 mm long, 2-fid at apex, lobes to 0.3 mm long, lower lip 14.5–16 mm long, lobes 1.5 mm long, 0.5–0.7 mm wide. Stamens inserted near apex of corolla tube, 15–16.5 mm long, filaments proximally pubescent with eglandular trichomes, thecae 2.3–2.6 mm long (including basal appendage), equal, subparallel to subsagittate, subequally to unequally inserted (overlapping by 1.5–2 mm), glabrous, each theca with a bulbous basal appendage to 0.3 mm long (appendage of lower theca longer than that of upper theca); pollen 2-aperturate, apertures flanked on each side by 2–3 rows of insulae, exine reticulate. Style 28.5–31 mm long, glabrous, stigma lobes 0.2–0.3 mm long. Capsule not seen. Flowering Jan.

Chiapas endemic: limestone ridge in Lower Montane Rain Forest; rare in Northern Highlands; 900 m.

## 15. LEPIDAGATHIS

*Lepidagathis* Willd. Sp. pl. 3:400. 1800. — TYPE: *Lepidagathis cristata* Willd.

Decumbent or spreading to erect perennial herbs with cystoliths. Leaves opposite, sessile to petiolate, margin entire. Inflorescence of axillary or terminal densely bracteate dichasiate spikes, spikes solitary or clustered, elongate and cylindrical to second or nearly globose and appearing subcapitate; dichasia opposite, 1–7-flowered, sessile to subsessile, subtended by a bract. Bracts opposite, green, ± hyaline, or colored, often spinose-aristate at apex. Flowers homostylous, subsessile (in ours), subtended by 2 homomorphic bracteoles. Calyx 5-lobed, lobes heteromorphic, posterior lobe largest, lateral lobes smallest, anterior lobes connate for a greater distance than other lobes (rarely only minutely so or not at all). Corolla whitish, yellow, pink, or purplish, often small (i.e., little exceeding calyx), tube cylindrical or gradually to abruptly expanded distally into a throat, limb bilabiate, upper lip rugulate, emarginate or shallowly 2-lobed, lower lip 3-lobed, corolla lobes imbricate in bud. Stamens 4, didynamous, inserted near apex of corolla tube, included in corolla tube or exerted from mouth of corolla, anthers 2-theous (in ours, elsewhere also rarely with 1 pair 1-theous), thecae subequal, parallel to subparallel, equally to unequally inserted, unappendaged or 1 or both thecae minutely appendaged at base, dehiscing toward lower lip (i.e., flower nototribal); pollen prolate, 3-colporate, exine reticulate; staminodes 0. Style exerted from mouth of corolla, stigma appearing entire to 2-lobed. Capsule estipitate, subovoid to subellipsoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 2–4, homomorphic, lenticular, pubescent with hygroscopic trichomes. ( $x = 10, 11, 12$ ).

A mostly paleotropical genus of about 100 species, at least one of which (*L. alopecuroidea*) also occurs in the neotropics.

REFERENCE: DANIEL, T.F. 1995. New and reconsidered Mexican Acanthaceae. VI. Chiapas. Proc. Calif. Acad. Sci. 48:253–282.

1. **Lepidagathis alopecuroidea** (Vahl) R. Br. ex Griseb. Fl. Brit. W. I. 453. 1862.

— *Ruellia alopecuroidea* Vahl, Eclog. amer. 2:49. 1798.  
 — *Aetheilema alopecuroideum* (Vahl) R. Br. ex Spreng. Syst. veg. 2:826. 1825, as "*alopecuroides*." — *Teliostachya alopecuroidea* (Vahl) Nees in Mart. Fl. bras. 9:72. 1847. — TYPE: Montserrat, without locality or date, J. Ryan s.n. (C, photo & fragment at US!).

ILLUSTRATIONS: Fig. 22; Hutchinson and Dalziel, Fl. W. trop. Afr., ed. 2, 2:415, fig. 303. 1963; Fieldiana, Bot. 24(10):453, fig. 104. 1974; Ann. Missouri Bot. Gard. 65:273, fig. 31. 1978; Howard, Flora Lesser Antilles 6:377, fig. 164. 1989.

Reclining to ascendant perennial herbs to 3 dm tall. Young stems subquadrate, bifariously pubescent with flexuose-antrorse eglandular trichomes 0.2–0.6 mm long. Leaves petiolate, petioles to 20 mm long, blades ovate-elliptic to elliptic to obovate-elliptic, 14–69 mm long, 8–29 mm wide, 1.5–3.1 times longer than wide, (rounded to) acute at apex, acute to attenuate at base, surfaces nearly glabrous with trichomes restricted to veins and margin. Inflorescence of terminal sessile to pedunculate cylindrical densely bracteate dichasiate spikes to 4 cm long, 8–15 mm in diameter near midspike, peduncles to 4 mm long, rachis not or hardly visible; dichasia usually 3-flowered, sessile. Bracts obovate, 5–8 mm long, 1.8–3 mm wide, aristate at apex, prominently 3-veined, abaxial surface pubescent with flexuose to flexuose-antrorse eglandular trichomes 0.2–0.7 mm long and inconspicuous glandular trichomes 0.1–0.3 mm long. Bracteoles (lanceolate to) narrowly elliptic to oblanceolate, 3–7 mm long, 0.5–1.5 mm wide, aristate at apex, usually venose, abaxial surface pubescent like bracts, secondary bracteoles similar to

bracteoles except somewhat smaller. Flowers subsessile (i.e., pedicels to 1 mm long). Calyx 3.5–7 mm long, abaxially pubescent like bracts, posterior lobe obovate, 3–6.5 mm long, 1–3 mm wide, aristate at apex, usually venose with 3 prominent longitudinal veins, lateral lobes lance-subulate, 2–3.5 mm long, 0.3–0.6 mm wide, with 1 longitudinal vein, not venose, anterior lobes oblanceolate to narrowly elliptic, connate for a greater distance than other lobes, 2.5–5.5 mm long, 0.5–1.3 mm wide, aristate at apex, each with 1 longitudinal vein, usually ± venose. Corolla white with irregular pink markings on lower lip, 4.5–6 mm long, tube cylindric, 2.5–4 mm long, limb externally pubescent with eglandular trichomes, upper lip 1.5–2 mm long, 2-lobed, lobes rounded, 0.1–0.2 mm long, lower lip 1.8–2 mm long, lobes subcircular, 1.2–1.3 mm long, 1–1.2 mm wide. Stamens 4, longer pair 1.8 mm long, shorter pair 1.3 mm long, thecae 0.3–0.4 mm long, parallel, ± equally inserted on longer stamens, unequally inserted on shorter stamens, unappendaged at base. Style 3–3.5 mm long, curved toward lower lip of corolla at apex, proximally pubescent with eglandular trichomes, stigma subcapitate, 0.2 mm long, lobes, if evident, not conspicuous. Capsule 3.5–4.5 mm long, pubescent near apex with erect to flexuose eglandular trichomes 0.2–0.4 mm long. Seeds 4, 1–1.2 mm long, 0.9–1 mm wide. ( $n = 9$ ). Flowering and fruiting Feb–Apr.

Tropical Rain Forest; rare (known from a single locality) in Eastern Highlands; ca. 120 m. Mex. (Ver., Oax., Tab., Chis.), Guat., Bel., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Guy., Sur., Fr. Gui., Braz., Parag.), Old World. CHIAPAS COLLECTION: *Mz 18315* (CAS, MEXU).

This species is also known from the Gulf Coastal Plain in adjacent regions of Tabasco.

## 16. LOPHOSTACHYS

*Lophostachys* Pohl, Pl. bras. icon. descr. 2:93. 1831. — LECTOTYPE (Bremekamp, Index Nom. Gen. Pl. Card 00646. 1955): *Lophostachys villosa* Pohl.

Erect to spreading perennial herbs or shrubs with cystoliths. Leaves opposite, petiolate, sometimes unequal at a node, margin entire to subcrenate. Inflorescence of axillary and terminal usually densely bracteate dichasiate spikes (to racemes); dichasia alternate, 1-flowered, secund, sessile to subsessile, subtended by a bract. Bracts alternate, green or brightly colored, secund, both fertile and sterile bracts usually present, margin entire. Flowers homostylous, sessile or pedicellate, subtended by 2 homomorphic bracteoles (in ours, elsewhere bracteoles sometimes absent). Calyx deeply 4-lobed, lobes heteromorphic, outer (anterior segment and posterior lobe) larger than inner (lateral) lobes, anterior segment comprising 2 fused lobes, apically 2-lobed, posterior lobe entire to emarginate, lateral lobes entire. Corolla whitish to reddish to purplish, tube ± gradually expanded distally, throat barely to clearly distinct, limb bilabiate, upper lip shallowly 2-lobed, lower lip deeply 3-lobed, corolla lobes imbricate in bud. Stamens 4, didynamous (in ours, elsewhere also 2 stamens and 2 staminodes), inserted near middle of corolla tube, exerted from mouth of shorter pair of stamens 1-theous (in ours, elsewhere in species with 2 stamens and 2 staminodes, the anthers 2-theous), thecae lacking appendages at base, dehiscing toward lower lip (i.e., flower nototribal); pollen prolate, 3-colporate, exine reticulate, reticulum subhomobrochate with lumina mostly pentagonal or hexagonal and baculate, pilate, and/or gemmate; staminodes 0 (in ours, elsewhere in species with 2 stamens, staminodes 2). Style exerted from mouth of corolla, stigma appearing subcapitate (although usually minutely and asymmetrically 2-lobed). Capsule substipitate, ellipsoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4, homomorphic, lenticular.

A genus of 20 species occurring discontinuously from southern Mexico to southeastern Brazil. Three species are known from Mexico and two others occur in Central America. Benoist (Not. Syst. 2:139–144. 1911.) concluded that *Lophostachys* is not distinct from *Lepidagathis*. While his conclusion has not been generally accepted, the putative distinctions between these genera deserve additional study.

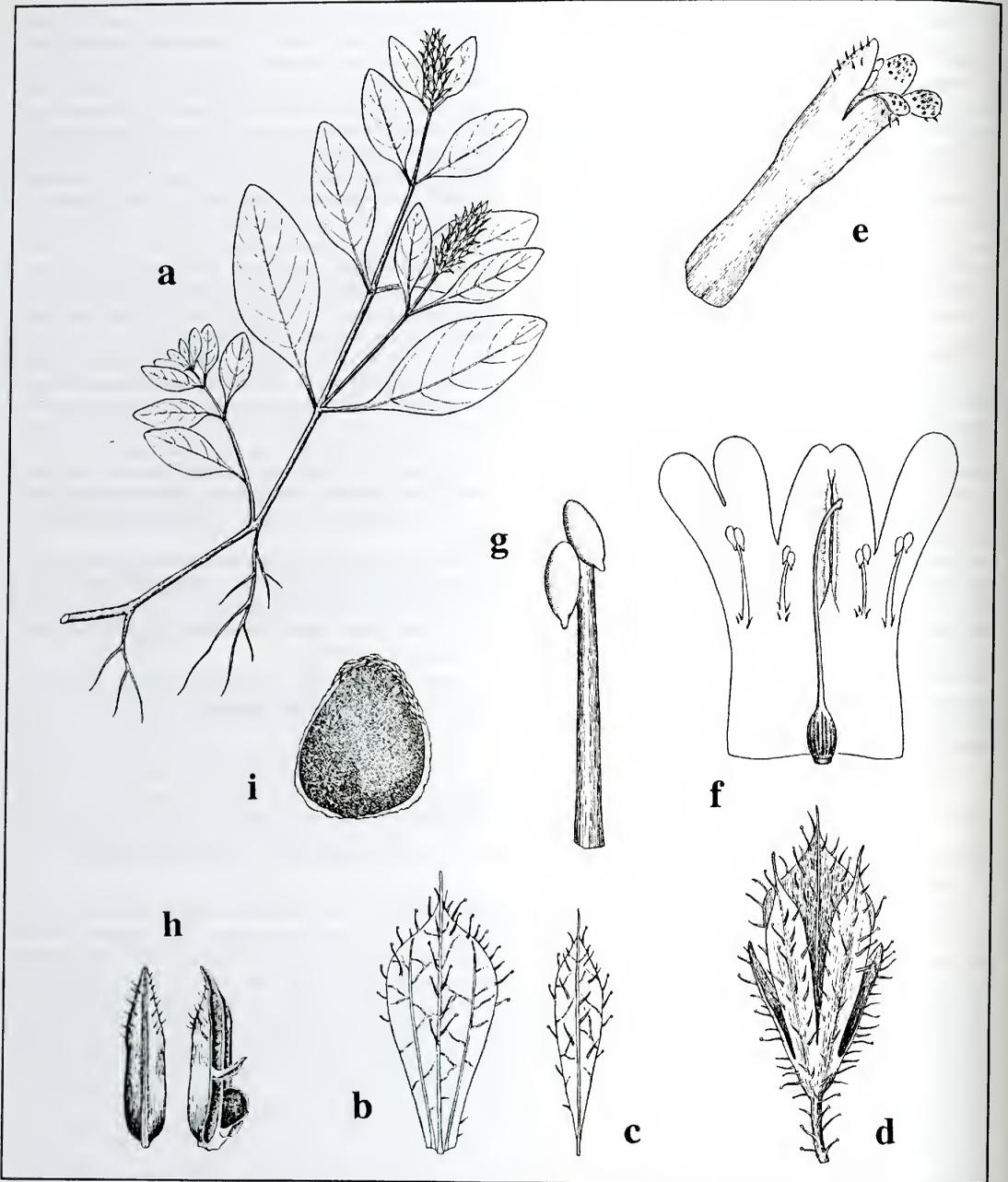


FIGURE 22. *Lepidagathis alopecuroidea* (Vahl) R. Br. ex Griseb. a, habit (Puig 644 and Puig 713),  $\times 0.5$ ; b, bract (Puig 713),  $\times 6$ ; c, bracteole (Puig 713),  $\times 6$ ; d, calyx (Puig 713),  $\times 6$ ; e, corolla (Daniel et al. 5461gh),  $\times 9$ ; f, corolla split open showing stamens and gynoecium (Daniel et al. 5461gh),  $\times 9$ ; g, stamen (Daniel et al. 5461gh),  $\times 38$ ; h, capsule (Puig 644): unopened (left), single valve with seed (right),  $\times 6$ ; i, seed (Puig 644),  $\times 20$ . Drawn by Ellen del Valle.

REFERENCE: DANIEL, T.F. 1993. A synopsis of *Lophostachys* (Acanthaceae) in Mexico and Central America. *Selbyana* 14:64–70. 1993.

- a. Calyx 11.5–15 mm long, lobes of anterior segment 0.5–2 mm long; corolla 24–29 mm long; stamens 8–12 mm long, thecae 1.7–2.3 mm long; capsule 9.5–10 mm long . . . . . 1. *L. chiapensis*  
 aa. Calyx 15–24 mm long, lobes of anterior segment 4–6.5 mm long; corolla 50–56 mm long; stamens 21–25 mm long, thecae 3.5–4 mm long; capsule 15.5 mm long . . . . . 2. *L. soconuscana*

1. *Lophostachys chiapensis* Acosta, *Phytologia* 57:256. 1985.

— TYPE: Mexico, Chiapas, Mpio. Tumbalá, Agua Azul, 10 Apr 1984, R. Fernández 2400 (ENCB!; isotypes: GH!, MEXU, XAL).

ILLUSTRATION: Fig. 23.

Shrubs to 1.5 m tall. Young stems quadrate to quadrate-sulcate, internodes glabrous or sparsely bifariously pubescent with antrorse eglandular trichomes to 0.5 mm long, nodes pubescent with flexuose eglandular trichomes to 0.5 mm long. Leaves petiolate, petioles to 75 mm long, blades elliptic, 42–160 mm long, 17–67 mm wide, 2–3.4 times longer than wide, often unequal at a node, acute to attenuate at base, acuminate at apex, surfaces glabrous or with a few eglandular trichomes along major veins, margin entire. Inflorescence of axillary and terminal pedunculate dichasiate spikes to 145 mm long (including peduncle and excluding flowers), sometimes branched near base and forming a terminal panicle, rachis nearly glabrous to bifariously pubescent with antrorse to antrorsely appressed eglandular trichomes to 0.6 mm long; dichasia sessile. Bracts lance-linear to triangular, 3–6.5 mm long, 1.4–2.3 mm wide, abaxial surface glabrous, margin ciliate with flexuose to antrorse eglandular trichomes to 0.5 mm long, sterile bracts curved and appressed toward floriferous side of inflorescence, usually slightly smaller than fertile bracts. Bracteoles ovate to lance-ovate, 2.5–5 mm long, 1.5–1.6 mm wide, abaxial surface glabrous. Flowers sessile to subsessile (i.e., with pedicels to 1 mm long). Calyx green tinged with red, 11.5–15 mm long, abaxially glabrous, margins of lobes ciliate like bracts, anterior segment elliptic, 11–13 mm long, 3.2–4 mm wide, apically divided 0.01–0.17 its length with triangular lobes 0.5–2 mm long, lateral lobes lance-subulate, 6.5–12 mm long, 1–1.4 mm wide, posterior lobe elliptic, 11–14.5 mm long, 3–3.5 mm wide. Corolla red, 24–29 mm long, externally pubescent with eglandular trichomes to 0.7 mm long, tube 18–20 mm long, upper lip 6–10 mm long, lobes rounded, 0.3–0.8 mm long, lower lip 7.5–11 mm long, lobes elliptic 6–8 mm long, 2.7–5 mm wide. Longer pair of stamens 9–12 mm long, anthers of longer pair of stamens 2-theous, thecae parallel, 1.9–2.3 mm long, shorter pair of stamens 8–10.5 mm long, anthers of shorter pair of stamens 1-theous, theca 1.7–2 mm long, missing theca replaced by a sterile appendage 0.2 mm long. Style 17–30 mm long, glabrous, stigma 0.2–0.3 mm long. Capsule 9.5–10 mm long, externally glabrous (or with a few eglandular trichomes at apex only), stipe 1 mm long, retinacula 2–2.2 mm long. Seeds subcircular in outline, 2.2–2.6 mm long, 2–2.3 mm wide, surfaces covered with appressed scalelike trichomes to 0.3 mm long. Flowering and fruiting Dec–Apr.

Chiapas endemic: slopes and ridges in Lower Montane Rain Forest and Montane Rain Forest; rare to uncommon in Northern Highlands and Eastern Highlands; 350–1225 m. CHIAPAS COL-

LECTIONS: *Dan* 6183 (C, CAS, DUKE, ENCB, F, K, MEXU, MICH, MO, NY, SEL); *T* 9629 (CAS); 30873; 66152.

2. *Lophostachys soconuscana* T.F. Daniel, *Selbyana* 14:69. 1993.

— TYPE: Mexico, Chiapas, Sta. Anita entre Huixtla y Tapachula, 700 m, 26 Dec 1968, W. Boege 1086 (GH!; isotype: MEXU!).

ILLUSTRATION: *Selbyana* 14:68, fig. 3. 1993.

Perennial of unknown height (at least 3.5 dm tall). Young stems subquadrate to quadrate-sulcate, pubescent with antrorse to antrorsely appressed eglandular trichomes 0.2–0.7 mm long concentrated in 2 vertical lines, soon glabrate. Leaves petiolate, petioles to 50 mm long, blades ovate-elliptic to narrowly elliptic, 35–290 mm long, 10–63 mm wide, 2.2–4.6 times longer than wide, attenuate at base, acuminate at apex, surfaces glabrous, margin entire to subrenate. Inflorescence of axillary and terminal pedunculate dichasiate spikes to 120 mm long (including peduncle and excluding flowers), rachis conspicuously ridge-angled, pubescent like young stems; dichasia sessile. Bracts triangular to lanceolate, 3–6 mm long, 1–1.5 mm wide (proximalmost often larger), abaxial surface glabrous, margin ciliate to subciliate with cauline type trichomes, sterile bracts curved and appressed toward floriferous side of inflorescence. Bracteoles triangular to lanceolate, 3.5–7 mm long, 1–1.5 mm wide, abaxial surface glabrous. Flowers sessile or subsessile (i.e., borne on pedicels to 1 mm long). Calyx drying greenish, 15–24 mm long, abaxially mostly glabrous (anterior segment and posterior lobe) or pubescent (lateral lobes) with cauline type trichomes, margins of lobes ciliate with cauline type trichomes, anterior segment elliptic, 15–23 mm long, 3.8–6.2 mm wide, apically divided 0.14–0.31 its length with lance-subulate lobes 4–6.5 mm long, lateral lobes subulate to lance-subulate, 9–14 mm long, 1–1.2 mm wide, posterior lobe elliptic, 15–22 mm long, 3.5–5.5 mm wide, entire to emarginate at apex. Corolla reddish (when dry), 50–56 mm long, externally pubescent with flexuose eglandular trichomes 0.2–1 mm long, tube 35–41 mm long, upper lip 15 mm long, lobes 1 mm long, lower lip 15–17 mm long, lobes subelliptic, 11.5–12.5 mm long, 5.5–6.5 mm wide, central lobe slightly larger than lateral lobes. Longer pair of stamens 25 mm long, anthers of longer pair of stamens 2-theous, thecae parallel, 3.8–4 mm long, shorter pair of stamens 21 mm long, anthers of shorter pair of stamens 1-theous, theca 3.5–3.7 mm long, missing theca replaced by a sterile appendage 0.2 mm long. Style 50–53 mm long, glabrous, stigma subcapitate. Capsule 15.5 mm long, externally glabrous. Seeds 3 mm long, 2.5 mm wide, surfaces and margin covered with inconspicuous trichomes to 0.2 mm long. Flowering and fruiting Dec.

Chiapas endemic: Lower Montane Rain Forest to Montane Rain Forest; rare in SE Sierra Madre; 700–800 m. CHIAPAS COLLECTION: P 7077 (UC).

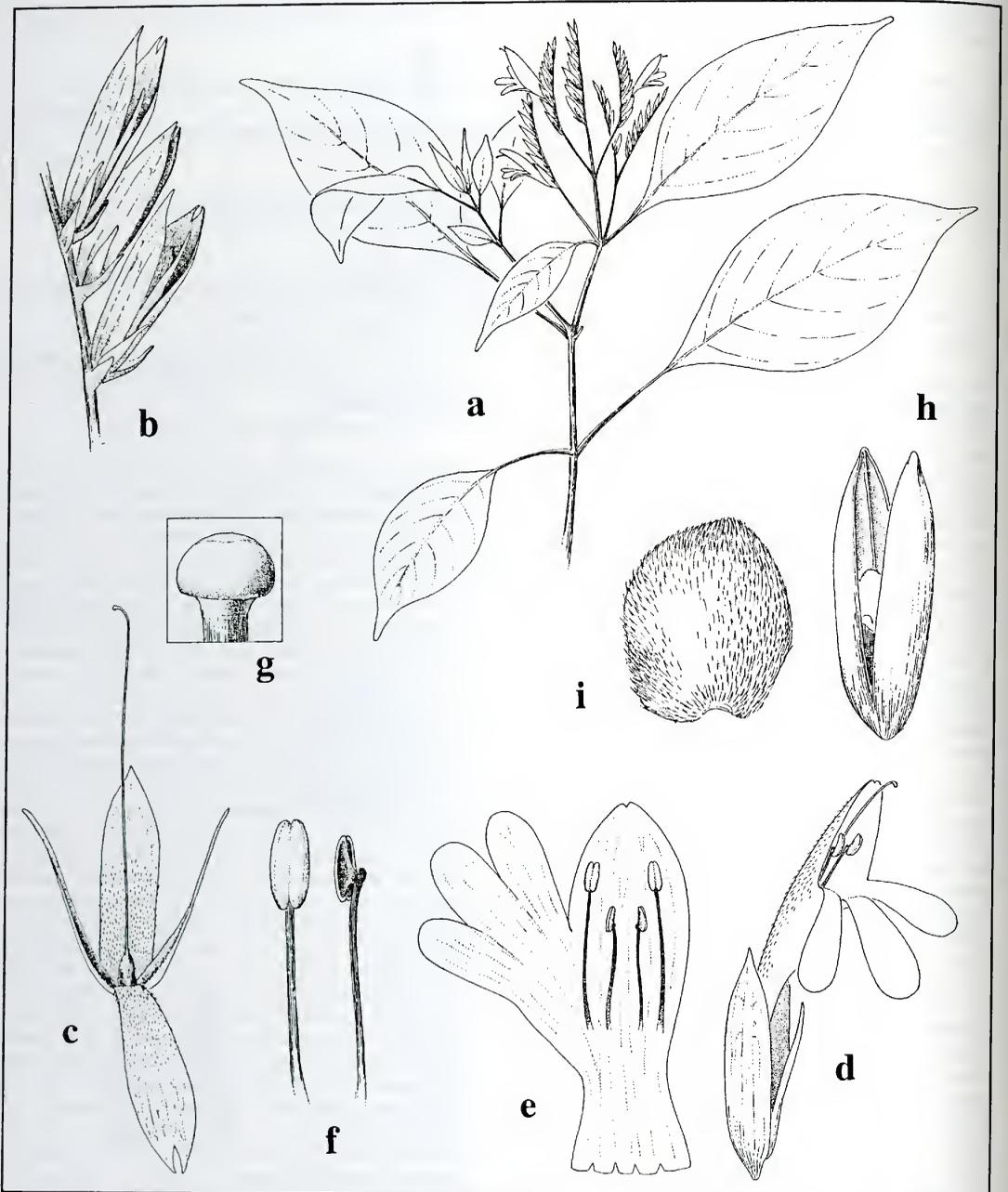


FIGURE 23. *Lophostachys chiapensis* Acosta (a-f from 30873, g-h from Fernández 2400). a, habit,  $\times 0.4$ ; b, inflorescence nodes,  $\times 2.1$ ; c, calyx with gynoecium,  $\times 2.2$ ; d, flower,  $\times 2$ ; e, corolla split open showing stamens; f, stamens: one of longer pair (left), one of shorter pair (right),  $\times 5$ ; g, stigma,  $\times 50$ ; h, capsule,  $\times 4$ ; i, seed,  $\times 12$ . Drawn by Ellen del Valle.

## 17. LOUTERIDIUM

*Louteridium* S. Watson, Proc. Amer. Acad. Arts 23:283. 1888. — TYPE: *Louteridium donnell-smithii* S. Watson.

*Neolindenia* Baill. Bull. Mens. Soc. Linn. Paris 2:851. 1889. — TYPE: *Neolindenia mexicana* Baill. (= *Louteridium mexicanum* (Baill.) Standl.

Terrestrial, epiphytic, or epipetric shrubs or small trees with cystoliths. Leaves opposite, petiolate, margin entire to crenate-dentate. Inflorescence of terminal open or contracted racemes to thyrses (or modifications thereof); dichasia opposite or alternate, 1–many-flowered, sessile to pedunculate, subtended by a bract. Bracts and bracteoles opposite, green, often caducous, margin entire (to subcrenate). Flowers homostylous, long-pedicellate, subtended by 2 homomorphic bracteoles. Calyx deeply 3-lobed (or 5-lobed with 3 prominent lobes and 2 reduced lobes), lobes heteromorphic, posterior lobe conduplicate. Corolla whitish, greenish, yellow or purple, relatively large, tube abruptly expanded into a gibbous-saccate throat, limb subbilabiate, upper lip 2-lobed, lower lip 3-lobed, corolla lobes subequal, often recoiled, contorted in bud. Stamens 2 (with 2 staminodes) (in ours, elsewhere also 4 homodynamous stamens with 0 staminodes), inserted near base of corolla throat, long-exserted from mouth of corolla, anthers 2-theous, thecae equal in size, parallel to sagittate, equally inserted, lacking basal appendages, dehiscing toward lower lip (i.e., flower nototribal); pollen spheric, pantoporate, exine minutely verrucate-gemmate; staminodes 0–2 (see above). Style long-exserted from mouth of corolla, stigma 2-lobed, lobes equal to unequal. Capsule substipitate to stipitate, relatively large, head ovoid to ellipsoid to linear-ellipsoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 12–16, homomorphic, lenticular with a prominent marginal swelling.

A relatively poorly known genus of 10 species occurring mostly in moist or wet regions from northeastern Mexico (Tamaulipas) to Panama. Eight species are known from Mexico.

REFERENCE: RICHARDSON, A. 1972. Revision of *Louteridium* (Acanthaceae). Tulane Stud. Zool. Bot. 17:63–76.

- a. Plants epiphytic or epipetric; leaf blades coriaceous, oblanceolate to obovate, attenuate to long-attenuate at base, margin entire; bracteoles and secondary bracteoles of a pair partially connate and subsaccate; posterior lobe of calyx subsaccate at base; corolla externally glabrous; capsule 28–41 mm long, glabrous . . . . . 3. *L. parayi*
- aa. Plants terrestrial; leaf blades membranaceous, cordate to broadly ovate to ovate to ovate-elliptic to obovate, cordate to rounded to acute to attenuate at base, margin crenate to crenate-dentate; bracteoles and secondary bracteoles of a pair neither connate nor subsaccate; posterior lobe of calyx not subsaccate at base; corolla externally pubescent; capsule 16–30 mm long, pubescent.
  - b. Young stems and leaves densely pubescent with erect to flexuose eglandular trichomes to 2 mm long; rachis, pedicels, and abaxial surface of calyx pubescent with glandular and eglandular trichomes to 2.8 mm long (viscid); external surface of corolla viscid . . . . . 1. *L. donnell-smithii*
  - bb. Young stems and leaves glabrous or pubescent with flexuose to antrorse eglandular trichomes < 0.05–0.5 mm long; rachis, pedicels, and abaxial surface of calyx glabrous or pubescent with eglandular trichomes < 0.05–1 mm long; external surface of corolla pubescent with glandular trichomes 0.05–0.3 mm long.
    - c. Rachis glabrous or pubescent with flexuose to flexuose-antrorse trichomes 0.2–1 mm long (villous); pedicels glabrous or villous; abaxial surface of calyx either appearing glabrous or villous along keel; capsule sparsely puberulent with glandular trichomes to 0.05 mm long; Caribbean slope . . . . . 2. *L. mexicanum*
    - cc. Rachis puberulent with antrorse trichomes to 0.05 mm long; pedicels puberulent with mostly erect trichomes to 0.05 mm long; abaxial surface of calyx pubescent like pedicels and sometimes with a few sparse glandular trichomes to 0.2 mm long as well; capsule densely pubescent with glands (0.05–) 0.1–0.4 mm long; Pacific slope . . . . . 4. *L. purpusii*

### 1. *Louteridium donnell-smithii* S. Watson, Proc. Amer. Acad. Arts 23:284. 1888.

— TYPE: Guatemala, Alta Verapaz, Pansamá, 1170 m, May 1887, *H. von Tuerckheim 856* (US!; isotypes: GH!, NY, US!).

ILLUSTRATIONS: Bot. Gaz. (Crawfordsville) 14:t. 7. 1889; Fieldiana, Bot. 24(10):407, fig. 90. 1974.

Terrestrial shrubs or trees to 9 m tall. Young stems quadrate to quadrate-sulcate, densely pubescent with erect to flexuose eglandular trichomes to 2 mm long (the distal 1 or several internodes sometimes with glandular trichomes as well). Leaves petiolate, petioles to 145 mm long, blades membranaceous, ovate to broadly ovate to cordate, 140–425 mm long, 85–290

mm wide, 1.2–2 times longer than wide, acuminate at apex, acute to rounded to cordate at base, surfaces densely pubescent with cauline type trichomes, margin crenate-dentate with rounded (to acute) teeth up to 2 mm long. Inflorescence a terminal ± contracted pedunculate unbranched raceme to thyse to 45 cm long (including peduncles and excluding flowers), peduncles to 18 cm long, pubescent with flexuose glandular and eglandular trichomes to 2.8 mm long (viscid), rachis viscid; dichasia sessile or pedunculate, (1–) 3–5 (–many)-flowered, peduncles to 5 (to 45 at proximalmost node) mm long, viscid. Bracts foliose to subfoliose and often persistent proximally, reduced in size and caducous (usually only scars present) distally, proximalmost pair sessile to subsessile, lanceolate to cordate, similar to leaves except smaller, distal pairs ovate to lanceolate, 10–22 mm long, 2.5–9 mm wide, pubescent like

leaves (i.e., trichomes mostly eglandular). Bracteoles and secondary bracteoles linear to lanceolate, 3.5–13 mm long, 1–3.4 mm wide, pubescent like bracts or viscid. Flowers pedicellate, pedicels to 95 mm long, viscid with trichomes mostly glandular. Calyx 22–35 mm long, somewhat accrescent (up to 40 mm long) in fruit, viscid where exposed in bud, posterior lobe ovate, 21–33 (–37) mm long, 8–15 mm wide, acuminate at apex, anterior lobes lunate, 17–33 (–37) mm long, 6–10.5 mm wide. Corolla cream to green-yellow with maroon veins to pale maroon, 45–57 mm long, externally viscid, narrow proximal portion of tube 8–14 mm long, glabrous within, throat 15–24 mm long, limb 35–47 mm in diameter, upper lip recoiled, 18–20 mm long, lower lip recoiled, 16–20 mm long. Stamens 2, 70–80 mm long, filaments proximally pubescent with eglandular trichomes, distally glabrous, thecae 12–15 mm long; staminodes 0.5 mm long, appearing as triangular projections at point of insertion of stamens. Style 76–85 mm long, glabrous, stigma lobes obovate-funnelform, subequal, 1.5–2 mm long. Capsule short stipitate, 21–27 mm long, pubescent with erect glandular trichomes 0.1–0.8 mm long, stipe to 2.5 mm long, head ellipsoid. Seeds 12, 4.8–5.5 mm long, 4.2–4.7 mm wide, surfaces minutely papillose in longitudinal rows, lacking trichomes, margin swollen, covered with appressed hygroscopic trichomes. Flowering Nov–May; fruiting Feb–May.

Slopes and flats in Tropical Rain Forest, Lower Montane Rain Forest, and Montane Rain Forest; common in Eastern Highlands; 200–1250 m. Mex. (Chis.), Guat., Bel., Hond. CHIAPAS COLLECTIONS: *Mi 7163* (MEXU); *So 1684* (MICH, UC); *Te 6642* (CAS, MEXU); *T 8893* (MEXU); *TW 2409* (CAS); *15709*; *33282*; *41991*; *48259*; *49721*; *49962*; *50875*; *57578*; *68070*; *71197*.

Local name: "matacuycuchi" (*Miranda 7163*).

## 2. *Louteridium mexicanum* (Baill.) Standl. Contr. U.S. Natl. Herb. 23:1338. 1926.

— *Neolindenia mexicana* Baill., Bull. Mens. Soc. Linn. Paris 2:851. 1890. — TYPE: Mexico, Veracruz or Chiapas (see discussion), "forêts humides de Zacualpan, Chiapas," Feb, *J. Linden s.n.* (P!).

*Louteridium conzattii* Standl. Contr. U.S. Natl. Herb. 23:1338. 1926. — TYPE: Mexico, Oaxaca, Distr. Tuxtpec, de Jalapa a La Raya, 450 m, 3 Nov 1919, *C. Conzatti 3788* (US!); isotype: US!).

ILLUSTRATION: none found.

Terrestrial trees to 9 m tall. Young stems quadrate to quadrate-sulcate, internodes glabrous or with sparse flexuose to antrorse eglandular trichomes to 0.5 mm long, nodes glabrous or with some flexuose eglandular trichomes to 0.5 mm long. Leaves petiolate, petioles to 115 mm long, blades membranaceous, broadly ovate to ovate to ovate-elliptic, 40–300 mm long, 21–160 mm wide, 1.3–2.2 times longer than wide, acute to rounded to subcordate at base, acuminate to acute-apiculate at apex, adaxial surface glabrous, abaxial surface glabrous or pubescent along major veins with trichomes like those at nodes, margin crenate. Inflorescence a terminal ± open pedunculate unbranched (or branched at proximalmost node) thyrses to 39 cm long (including peduncle and excluding flowers), peduncles to 19 cm long, glabrous or pubescent like young stems, rachis glabrous or pubescent with flexuose to flexuose-antrorse

eglandular trichomes 0.2–0.8 (–1) mm long (villous), trichomes sometimes restricted to nodes; dichasia pedunculate, 3–many-flowered, peduncles to 15 mm long, glabrous or villous. Bracts often caducous, sessile to petiolate, ovate to lance-elliptic to linear, 20–48 mm long, 2–16 mm wide (or the proximalmost pair sometimes foliose and larger), abaxial surface glabrous or pubescent with antrorsely appressed eglandular trichomes. Bracteoles and secondary bracteoles usually persistent, lance-ovate to lanceolate to linear-lanceolate, 10–25 mm long, 1–8 mm wide, abaxial surface glabrous or pubescent with a few antrorsely appressed eglandular trichomes to 0.5 mm long along midvein or pubescent with latter type trichomes over entire surface. Flowers pedicellate, pedicels to 85 mm long, glabrous or villous. Calyx 17–34 mm long, somewhat accrescent in fruit, lobes heteromorphic, abaxially appearing glabrous although covered with minute sessile glands (punctate glandular) and posterior lobe sometimes sparsely villous along keel, posterior lobe ovate, conduplicate, 16–31 mm long, 9–13 mm wide, acute at apex, anterior lobes lunate, 16–32 mm long, 6–11.5 mm wide. Corolla greenish and maroon, 38–48 mm long, externally puberulent with sessile to subsessile glands 0.05–0.1 mm long, narrow proximal portion of tube 10–13 mm long, internally sparsely pubescent proximal to base of filaments, throat 15–23 mm long, limb 30–40 mm in diameter, upper lip recoiled, 11–16 mm long, lower lip recoiled, 11–17 mm long. Stamens 2, 65–75 mm long, filaments proximally pubescent with eglandular trichomes, distally glabrous, thecae 10.5–13 mm long; staminodes connate to or free from base of filaments, 1–3 mm long. Style 72–85 mm long, glabrous, stigma equally to subequally 2-lobed, lobes linear-elliptic to elliptic to obovate-elliptic, 1–2.8 mm long. Capsule substipitate, 16–24 mm long, sparsely puberulent with sessile to subsessile glands to 0.05 mm long, stipe 1–2 mm long, head ovoid to ellipsoid to linear-ellipsoid. Seeds up to 16, 4–5.5 mm long, 3.5–5 mm wide, surfaces smooth or covered with subconic papillae, lacking trichomes, margin swollen, covered with appressed hygroscopic trichomes. Flowering Sep–May; fruiting Jan–May.

Slopes and along streams and roads in Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, and Evergreen Seasonal Forest; common on Caribbean escarpment in Northern Highlands and Eastern Highlands; 50–1200 m. Mex. (Ver., Oax., Tab., Chis.), see discussion. CHIAPAS COLLECTIONS: *Is 2035* (CAS); *Mz 3198* (CAS); *Pa 9631* (CAS); *22469*; *24177*; *29799*; *30786*; *49526*; *56091*; *56805*; *58020*; *66158*; *68269*; *70879*.

Local name: "Sabal Tzununte" (*Palacios E. 9631*).

Uses: leaves are flattened against the body for fever (*Wendt et al. 3614*).

Both the protologue and specimen label of *Neolindenia mexicana* indicate that the holotype was collected in Chiapas at Zacualpan. There is no Zacualpan in Chiapas (D. Breedlove, pers. comm.). This reference could be a mistake for Zacuapan (= Zacuapam, a well known collecting locale south of Jalapa) in Veracruz. Linden is known to have spent time in the vicinity of Jalapa as well as in Chiapas (Belgique Hort. 17:245. 1867). The holotype at P is a plant with glabrous pedicels and calyces conforming to a species that occurs in both Chiapas and Veracruz, but that is not presently known from as far north as Zacuapam in the

latter state. *Neolindenia mexicana* was treated as a synonym of *L. donnell-smithii* by Lindau (1895). Although he did not study the type of *N. mexicana*, Richardson (1972) treated *L. mexicanum* as distinct from both *L. donnell-smithii* and *L. conzattii*. He included *L. purpusii* as a synonym of *L. mexicanum*. Because study of the type reveals that the name *L. mexicanum* pertains to the species treated by Richardson (1972) as *L. conzattii*, the next available name (i.e., *L. purpusii*, see below) is taken up for the taxon treated by Richardson as *L. mexicanum*.

This species (as *L. conzattii*) was tentatively reported from Guatemala by Richardson (1972) based on *Steyermark 37024* at F. That collection is sterile and it is difficult to confirm that it even represents a species of *Louteridium*. The species referred to as *L. mexicanum* from Guatemala by Gibson (1974) is here treated as *L. purpusii*.

Considerable variation in pubescence, leaf shape, bract persistence, and bract shape was noted among Chiapan specimens of *L. mexicanum*. With respect to pubescence, for example, Chiapas specimens can be divided into two groups. Those from near Berriozábal, Ocozocoautla, and San Fernando have varying quantities of eglandular trichomes on the abaxial surface of leaves, young stems, inflorescence peduncles, rachises, bracts, bracteoles, pedicels, and calyx lobes. Those from Ocosingo and Pichucalco lack eglandular trichomes on these structures. Specimens from Oaxaca more closely resemble the latter group, except some have sparse eglandular trichomes on some of these structures. *Breedlove 24803* (DS, MICH) from near Berriozábal and *Palacios 385* from near San Fernando resemble *L. mexicanum* in most features but differ by their new growth which is pubescent with glandular trichomes to 0.3 mm long and flexuose eglandular trichomes to 0.8 mm long. Also, their calyx lobes have inconspicuous sessile glands. These collections are somewhat suggestive of *L. donnell-smithii* and may represent hybrids with that species. Richardson (1972) discussed sterile specimens from Guatemala that also share characteristics of *L. donnell-smithii* and other species.

### 3. *Louteridium parayi* Miranda, Ceiba 4: 140. 1954.

— TYPE: Mexico, Chiapas, cerca del Suspiro, unos 9 km NO de Berriozábal, 950 m, 9 Jun 1953, *L. Paray & F. Miranda 7834* (MEXU!; isotypes: FI, MEXU!).

ILLUSTRATIONS: Fig. 24; Ceiba 4:141. 1954.

Epiphytic and epipetric shrubs or trees to 3 m tall. Young stems quadrate-sulcate, glabrous. Leaves petiolate, petioles to 20 mm long, blades coriaceous, oblanceolate to obovate, 50–180 mm long, 15–63 mm wide, 3.3–4.4 times longer than wide, acute-apiculate at apex, attenuate to long-attenuate at base, adaxial surface glabrous, abaxial surface with scattered flexuose to antrorse eglandular trichomes to 1 mm long (or sometimes nearly glabrous), margin entire. Inflorescence a terminal open (i.e., expanded) pedunculate branched thyrse to 27 cm long (including peduncle and excluding flowers), peduncles 3.5–14 cm long, glabrous, rachis glabrous; dichasia pedun-

culate, 1–many-flowered, peduncles to 55 mm long, glabrous. Bracts mostly caducous, lance-ovate to elliptic, 7–15 mm long, 4–8 mm wide, abaxial surface glabrous. Bracteoles and secondary bracteoles ovate to ovate-elliptic to broadly elliptic, those of a pair connate along one side for about 1/2 their length and subsaccate, usually conspicuously imbricate, 6–11 mm long, 5–7.5 mm wide, abaxial surface glabrous. Flowers pedicellate, pedicels to 30 mm long, glabrous. Calyx 29–48 mm long, accrescent in fruit, glabrous, lobes heteromorphic, posterior lobe 25–45 mm long, 7.5–14 mm wide, acute at apex, subsaccate at base, anterior lobes lance-ovate to lance-linear, 22–44 mm long, 5.5–8.8 mm wide. Corolla pale greenish, 45–72 mm long, externally glabrous, narrow proximal portion of tube 3–8 mm long, internally densely pubescent at point of insertion of stamens, throat 25–36 mm long, limb 40–62 mm in diameter, lips 15–38 mm long. Stamens 2, 70–90 mm long, filaments glabrous, thecae 13–17 mm long; staminodes not evident (if present, covered by trichomes). Style 74–90 mm long, glabrous, stigma unequally 2-lobed, lobes linear-elliptic to linear-oblancoolate, 3–6 mm long. Capsule stipitate, 28–41 mm long, glabrous, stipe 5–13 mm long, head ellipsoid to linear-ellipsoid. Seeds 16, 4.5–5 mm long, 4.3–4.5 mm wide, surfaces smooth or with irregular ridges, lacking trichomes, margin swollen, covered with appressed hygroscopic trichomes. Flowering Apr, Jul–Dec; fruiting Sep–Dec.

Limestone slopes and ridges in Tropical Rain Forest, Lower Montane Rain Forest, and Montane Rain Forest; uncommon in Northern Highlands; 100–1500 m. Mex. (Ver., Chis.). CHIAPAS COLLECTIONS: *Pa 1727* (CAS); 20260; 24816; 26336; 28970; 30789; 67024; 70889.

### 4. *Louteridium purpusii* Brandegee, Univ. Calif. Publ. Bot. 6:68. 1914.

— TYPE: Mexico, Chiapas, Finca Irlanda, Aug 1913, *C. Purpus 6969* (UC!; isotypes: BM!, F, GH!, US!).

ILLUSTRATION: none found.

Terrestrial trees to 9 m tall. Young stems quadrate to quadrate-sulcate, glabrous or ± evenly puberulent with ± antrorse eglandular trichomes to 0.05 mm long. Leaves petiolate, petioles to 40 mm long, blades membranaceous, ovate-elliptic to obovate-elliptic to obovate, 130–380 mm long, 55–105 mm wide, 2.1–4.3 times longer than wide, acute to attenuate at base, acuminate to acute-apiculate at apex, adaxial surface glabrous, abaxial surface glabrous or with mostly antrorse eglandular trichomes 0.05–0.1 mm long along major veins, margin crenate to crenate-dentate. Inflorescence a terminal pedunculate unbranched raceme to thyrse to 63 cm long (including peduncles and excluding flowers), peduncles to 20 cm long, glabrous or pubescent like young stems, rachis puberulent with antrorse eglandular trichomes to 0.05 mm long; dichasia sessile to pedunculate, 3–many-flowered, peduncles, if present, to 2 mm long, pubescent like rachis. Bracts caducous, not seen. Bracteoles and secondary bracteoles caducous, lance-linear to linear elliptic, 7–13 mm long, 1.5–2.5 mm wide, abaxial surface pubescent like rachis. Flowers pedicellate, pedicels to 55 mm long, puberulent with mostly erect eglandular trichomes to 0.05 mm long. Calyx 25–40 mm long, abaxially puberulent like pedicels and sometimes with a few sparse stipitate glands up to 0.2 mm long, posterior lobe ovate to obovate, 23–32 mm long, 9–15 mm wide, acuminate at apex, anterior lobes sublunate, 25–37 mm long, 6–9 mm wide. Corolla greenish tinged with

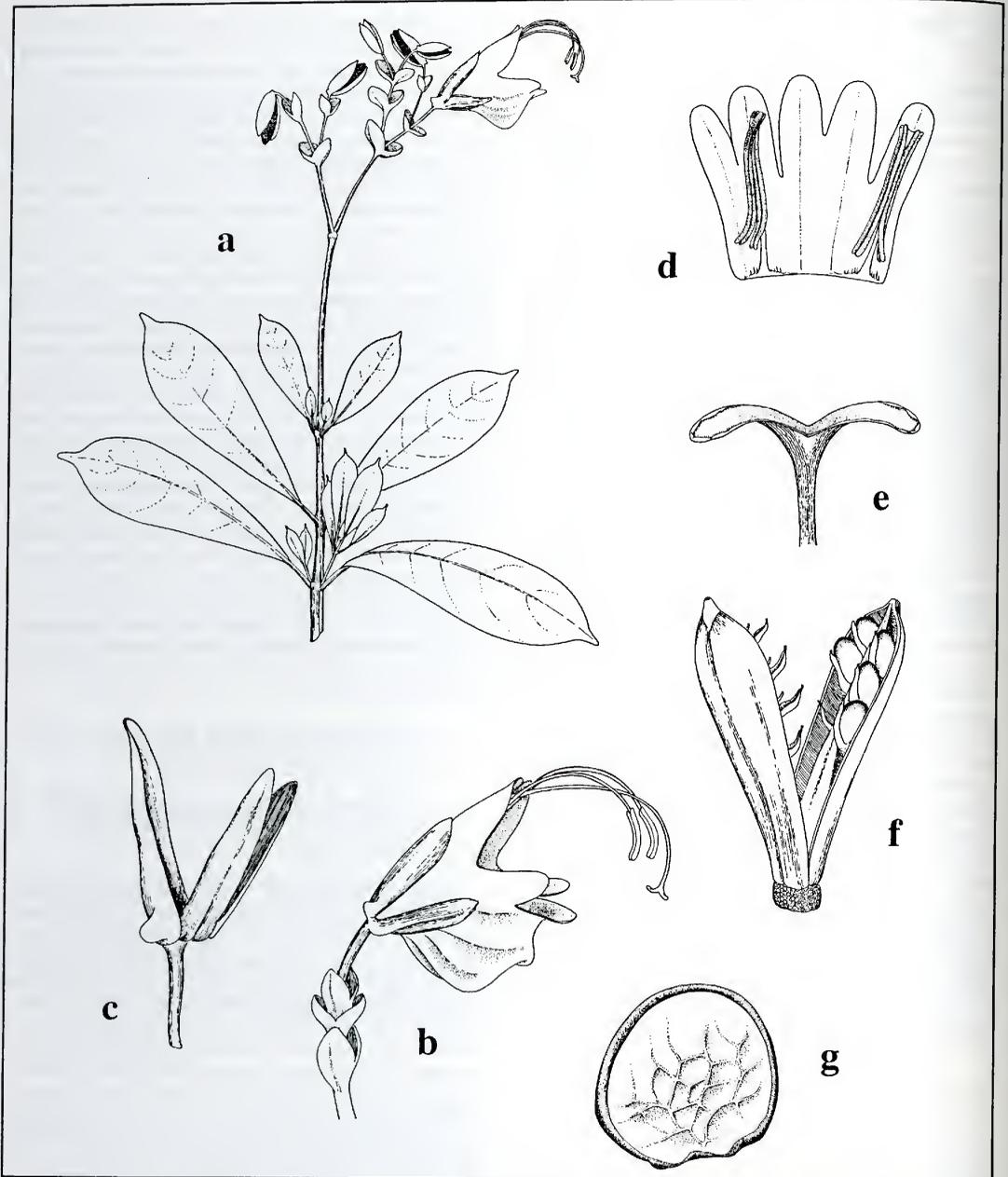


FIGURE 24. *Louteridiumparayi* Miranda. a, habit (67024),  $\times 0.3$ ; b, bracteoles and flower (30789),  $\times 0.5$ ; c, calyx (28970),  $\times 0.8$ ; d, corolla bud split open showing stamens (67024); e, stigma (67024),  $\times 3.8$ ; f, capsule (28970),  $\times 1.1$ ; g, seed (28970),  $\times 5.5$ . Drawn by Ellen del Valle.

maroon, 47–52 mm long, externally pubescent with stipitate glandular trichomes 0.05–0.3 mm long, narrow proximal portion of tube 3–5 mm long, internal surface not seen, throat 22–30 mm long, limb 36–45 mm in diameter, upper lip 14–16 mm long, lower lip 13–19 mm long. Stamens 2, 65–75 mm long, filaments proximally pubescent with glandular trichomes, distally glabrous, thecae 11–12 mm long; staminodes

not seen. Style 85 mm long, glabrous, stigma equally 2-lobed, lobes 1.5–2 mm long. Capsule short stipitate, 22–30 mm long, densely pubescent with stipitate glandular trichomes (0.05–) 0.1–0.4 mm long, stipe 3–3.5 mm long, head ellipsoid. Seeds up to 12, 4.5–5.2 mm long, 4.5–5 mm wide, surfaces smooth, lacking trichomes, margin swollen, covered with appressed hygroscopic trichomes. Flowering and fruiting Aug, Dec–Feb.

Slopes and along streams in Lower Montane Rain Forest and Montane Rain Forest; uncommon on Pacific escarpment in S Sierra Madre; 900–2000 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *Mi* 1723 (US); *N* 3749 (US); *QVU* 137 (U); 31613.

Local name: "palo de agua," (*Quarles van Ufford* 137).

The above description has been augmented by data from some Guatemalan specimens.

This species has long been associated with the name *L. mexicanum*, but the type of that name applies to the species previously known as *L. conzattii*. Brandegee's name becomes the next available one for this species. In addition to the distinguishing characters noted above in the key, there is a tendency for leaves of *L. purpusii* to have a higher length:width ratio and to have a more attenuate base than those of *L. mexicanum*.

## 18. MENDONCIA

*Mendoncia* Vell. ex Vand. Fl. lusit. bras. spec. 43. 1788. — LECTOTYPE (Leonard 1951:12): *Mendoncia aspera* Ruiz & Pav., as "*Mendozia aspera*."

*Engelia* Nees in A. DC. Prodr. 11:721. 1847. — LECTOTYPE (Leonard 1951:12): *Engelia tovarensis* Klotzsch. & H. Karst. ex Nees.

Herbaceous or woody twining (counterclockwise in ours) vines lacking cystoliths. Leaves opposite, petiolate, margin entire. Inflorescence of solitary or clustered dichasia in leaf axils; dichasia 1-flowered, pedunculate. Bracteoles (= bracts of some authors) green, spatheaceous, variously shaped and vested, large (often equaling corolla tube), flat or keeled, valvate, often partially connivent or connate, remaining closed around flower, often widely spreading in fruit. Flowers homostylous, sessile, subtended by 2 homomorphic bracteoles. Calyx inconspicuous, annular or cupular, entire to irregularly dentate or lobed. Corolla whitish (in ours, elsewhere also greenish, reddish, and purplish), often with colored markings within, tube cylindrical to ± gradually expanded distally, throat ± distinct, limb subequally 5-lobed or bilabiate with the upper lip 2-lobed and lower lip 3-lobed, corolla lobes spreading or reflexed, contorted in bud. Stamens 4, didynamous, inserted near middle of corolla tube (in ours, elsewhere also in distal or proximal ½ of corolla tube), included in corolla tube, anthers 2-theous, thecae subequal to unequal in size, parallel, equally to subequally inserted, lacking basal appendages although ± pubescent at base, often with an apical elongation of connective, dehiscing longitudinally or by subapical pores or slits, direction of dehiscence unknown; pollen spheric, 5–6-brevicolate, exine fossulate-verrucate; staminode, if present, 1, inconspicuous. Style included in corolla tube or slightly exerted from mouth of corolla, stigma subfunneliform or subequally to unequally 2-lobed. Fruit drupaceous, ovoid to ellipsoid, mesocarp fleshy, endocarp osseous, retinacula absent. Seeds 1 (–2?), subellipsoid.

About 50–60 species occurring from southern Mexico to southern Brazil in the neotropics and in tropical western Africa and Madagascar in the paleotropics. Most workers have distinguished species primarily on the basis of vegetative and bracteolar characters. Two species are known to occur in Mexico. Both *Mendoncia guatemalensis* Standl. & Steyerl., known from Mexico but not Chiapas, and *M. lindavii* Rusby, not known from Mexico but occurring in nearby regions of Belize and Guatemala, might be expected to occur in Chiapas. Distinctions among these species were noted by Daniel (1992).

REFERENCE: DANIEL, T.F. 1992. Acanthaceae: Mendoncioideae of Mexico. Acta Bot. Méx. 17:53–60.

### 1. *Mendoncia retusa* Turrill, Kew Bull. 1919:423. 1919.

— LECTOTYPE (Daniel 1992:56): Panama, Manmee Station, 30 Sep 1861, *S. Hayes* 169 (K!; isolectotype: BM!).

ILLUSTRATIONS: Fig. 25; Ann. Missouri Bot. Gard. 65:238, fig. 21. 1978.

Perennial vines. Young stems quadrate with angles often minutely winged, at first evenly pubescent with antrorse to antrorsely appressed eglandular trichomes 0.2–0.5 mm long, internodes soon mostly glabrate. Leaves petiolate, petioles to 38 mm long, blades ovate to elliptic to obovate, 67–138 mm long, 32–62 mm wide, 1.9–2.8 times longer than wide, rounded to acute at base, acute-apiculate to acuminate at apex, surfaces pubescent with cauline type trichomes, trichomes sparse and mostly restricted to major veins at maturity, margin entire.

Dichasia alternate or opposite at nodes, 1 per leaf axil, peduncles to 36 mm long, sparsely pubescent with cauline type trichomes or nearly glabrous. Bracteoles ovate to elliptic, 17–30 mm long, 11–18 mm wide, 1.3–1.6 times longer than wide, abaxial surface glabrous or nearly so (i.e., with a few scattered antrorsely appressed eglandular trichomes 0.2–0.3 mm long) or puberulent (i.e., with inconspicuous erect eglandular trichomes 0.05–0.1 mm long), adaxial surface mealy-glandular, (rounded-) retuse-apiculate at apex, margin connivent when young, ciliate with antrorsely appressed eglandular trichomes 0.2–0.5 mm long. Calyx a small rigid entire often flaring annular or cupular ring, 1–1.5 mm long. Corolla white with purplish markings internally, 30–55 mm long, externally glabrous, tube 18–39 mm long, distally expanded, limb 14–27 mm in diameter, upper lip 6–8 mm long, lobes rounded, reflexed, 4–7 mm long, 4.5–6.5 mm wide, lower lip 10.5–12 mm long, lobes rounded, reflexed, 6–10 mm long, 3–9 mm wide. Stamens 10–12 mm long,

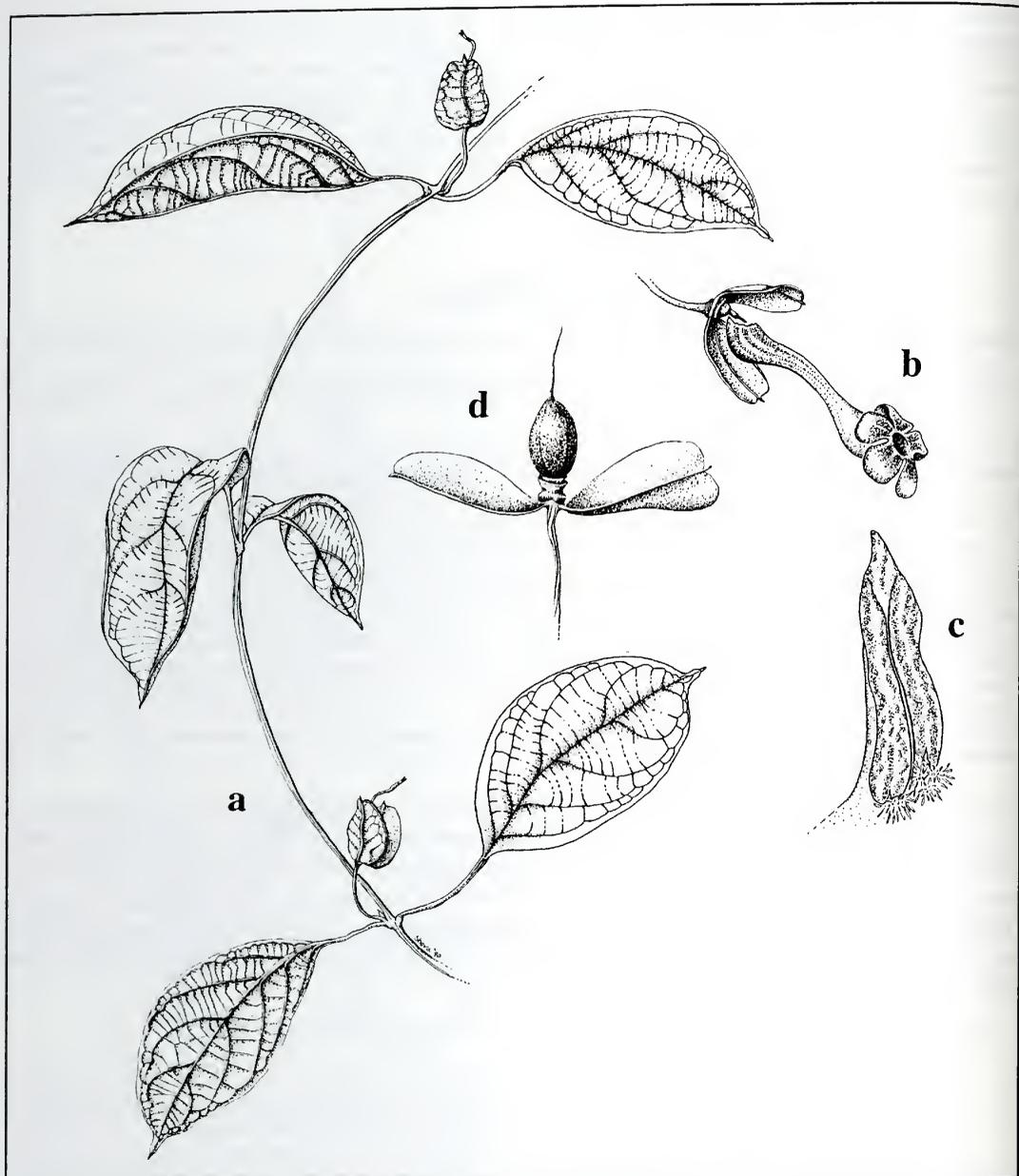


FIGURE 25. *Mendoncia retusa* Turrill. a, habit (30707),  $\times 0.4$ ; b, bracteoles and flower (Lankester 952),  $\times 0.7$ ; c, anther (Lankester 952),  $\times 3.8$ ; d, bracteoles and drupe (Daniel et al. 5477),  $\times 0.7$ . Drawn by Sheva Myers.

filaments short, intergrading with connective, thecae 5–8.5 mm long, each dehiscent by a short apical slit or pore, densely pubescent at base with a tuft of stout eglandular trichomes, connective projecting 1.2 mm beyond thecae, triangular, very sparsely pubescent with glandular trichomes 0.1 mm long or glabrate; staminode, if present, not seen. Style 17–35 mm long, stigma asymmetrically funnelliform to subequally 2-lobed, lobes 0.5–1.6 mm long. Drupe greenish turning blackish purple when mature, obliquely ellipsoid, 11–17 mm long, 7–10 mm in diam-

eter, surface minutely mealy-glandular. Seed 1. Flowering Jul–Dec; fruiting Feb–May, Sep–Dec.

Along streams and forest margins in Tropical Rain Forest and Evergreen Seasonal Forest; uncommon in Eastern Highlands and border between Sierra Madre and Pacific Coastal Plain; 160–500 m. Mex. (Ver., Chis.), Guat., Bel., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: EM 16603 (F, K, MEXU, MICH, MO, USJ); 17300 (F, MEXU); EM 18142 (DS, F, MEXU); Mv B-278 (MEXU); 30707.

Local names: "tapia" (*Matuda 17300*); "tapita" (*Matuda 16603*); "tepita" (*Matuda 17300*).

Flowering collections of *M. retusa* are not common. The above description has been augmented by data from extralimital specimens.

## 19. MIRANDEA

*Mirandea* Rzed. Ciencia (México) 19:80. 1959. — TYPE: *Mirandea grisea* Rzed.

Erect perennial herbs or shrubs with cystoliths. Leaves opposite, subsessile to petiolate, margin entire. Inflorescence of axillary or terminal dichasiate spikes, racemes, thyrses, or panicles; dichasia opposite or alternate, 1–many-flowered, sessile or pedunculate, subtended by a bract. Bracts opposite, green, ± inconspicuous, margin entire. Flowers homostylous, sessile or short-pedicellate, subtended by 2 homomorphic bracteoles. Calyx deeply 5-lobed, lobes homomorphic. Corolla yellow (in ours, elsewhere bluish or rose-colored), tube expanded distally, throat distinct, limb bilabiate, upper lip shallowly 2-lobed, lower lip 3-lobed, corolla lobes imbricate in bud. Stamens 2, inserted in distal 1/3 of corolla tube, exerted from mouth of corolla, filaments twisted just below anthers, anthers 2-theous, thecae equal in size, parallel, subequally inserted, lacking basal appendages, dehiscing toward lower lip of corolla (i.e., flowers nototribal); pollen prolate, 3-colporate, 6-pseudocolpate, pseudocolpi 2 per mesocolpium, exine reticulate; staminodes 0. Style exerted from mouth of corolla, recurved just below stigma, stigma indistinctly or prominently 2-lobed, lobes equal. Capsule stipitate, head ovoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 2–4, homomorphic, lenticular, lacking trichomes. ( $x = 18$ ).

A genus of four species endemic to Mexico. The other three species occur in desert regions of northern Mexico.

REFERENCE: DANIEL, T.F. 1982. The genus *Mirandea* (Acanthaceae). Contr. Univ. Mich. Herb. 15:171–175.

### 1. *Mirandea sylvatica* Acosta, Phytologia 57:249. 1985.

— TYPE: Mexico, Tabasco, Mpio. Teapa, Grutas del Coconá, 50 m, 26 Apr 1983, *F. Ventura 20168* (ENCB; isotypes: BM!, CSAT, MEXU).

ILLUSTRATIONS: Fig. 26; Phytologia 57:250, fig. 1. 1985.

Perennial herbs or shrubs to 2 m tall. Young stems quadrate-sulcate, bifariously pubescent with retrorse eglandular trichomes 0.1–0.3 mm long. Leaves petiolate, petioles to 105 mm long, blades ovate, 50–200 mm long, 18–105 mm wide, 1.8–3.2 times longer than wide, acuminate to falcate at apex, rounded to cordate at base, surfaces and margin pubescent with antrorse eglandular trichomes along midvein. Inflorescence an open terminal (or also in axils of distalmost pair of leaves) pedunculate unbranched thyse to 210 mm long, 10–35 mm across near midthyse, peduncles to 46 mm long, evenly pubescent with erect glandular and subglandular trichomes 0.1–0.3 mm long (at least distally, proximal portion sometimes very sparsely and unevenly pubescent), rachis pubescent like distal portion of peduncle; dichasia opposite, (1–) 3–many-flowered, subsessile to pedunculate, peduncles to 13 mm long, pubescent like rachis. Bracts subulate to triangular, 1–4 mm long, 0.5–0.8 mm wide, abaxial surface pubescent like rachis. Bracteoles and secondary bracteoles subulate to triangular, 1–1.2 mm long, 0.4–0.7 mm wide, abaxial surface pubescent like rachis. Flowers sessile to subsessile (i.e., pedicels to 0.5 mm long), lateral flowers borne

on secondary peduncles. Calyx 2–3.7 mm long, lobes subulate, 1.5–3.3 mm long, abaxially pustulate and pubescent with mostly glandular trichomes 0.1–0.2 mm long. Corolla yellow, 8–13.5 mm long, externally pubescent with erect to retrorse eglandular trichomes 0.1–0.2 mm long, tube 5–8 mm long, expanded distally into a throat, narrow proximal portion of tube 2.5–5.5 mm long, throat 2.5–3 mm long, upper lip 3–4.5 mm long, lobes 0.4–0.5 mm long, 0.3–0.5 mm wide, lower lip 3–5.5 mm long, lobes elliptic, 2.5–3.5 mm long, 1.5–2.3 mm wide. Stamens 4.5–6 mm long, filaments glabrous, thecae 1.3–1.5 mm long. Style 8.5–11 mm long, pubescent with eglandular trichomes, stigma lobes 0.1–0.2 mm long. Capsule 12–15 mm long, externally pubescent with glandular and eglandular trichomes 0.1–0.4 mm long, stipe 6–7 mm long, head 6–8 mm long, 3.5–4.5 mm across at widest expanse. Seeds 4, subcordate in outline, 3–4.2 mm long, 2.8–4 mm wide, surfaces and margin papillose. Flowering and fruiting Jan–May.

Slopes in Tropical Rain Forest, Lower Montane Rain Forest, and Evergreen Seasonal Forest; uncommon in Northern Highlands and Eastern Highlands; 30–1200 m. Mex. (Ver., Oax., Tab., Chis.). CHIAPAS COLLECTIONS: *Da 20427* (BM, CAS, MEXU); *Li s.n.* (P); *Mz 18179* (CAS, MEXU); *Mi 7550* (MEXU); 34899; 57872.

Previously reported only from Tabasco, this species is widespread in the rain forests on the Gulf of Mexico in southern Mexico and is now known from several states.

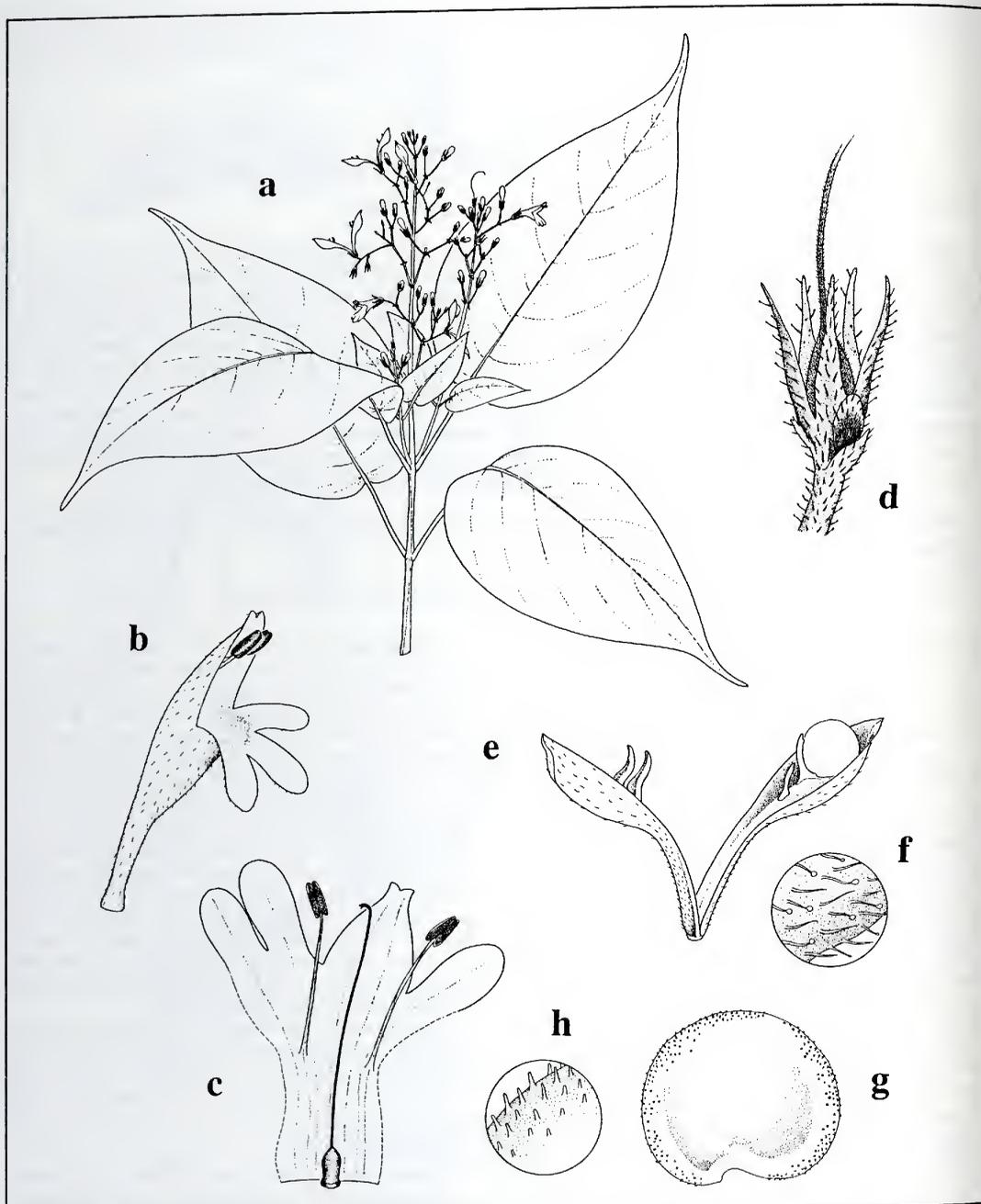


FIGURE 26. *Mirandea sylvatica* Acosta. a, habit (Cowan 2066),  $\times 0.4$ ; b, corolla (Cowan 2852),  $\times 3.7$ ; c, corolla split open showing stamens and gynoecium (Martínez 18179),  $\times 4.3$ ; d, bracteoles, calyx, and proximal portion of gynoecium (Cowan 2852),  $\times 8$ ; e, capsule (Cowan 2066),  $\times 2.5$ ; f, surface of capsule (Cowan 2006),  $\times 12.5$ ; g, seed (Cowan 2066),  $\times 7$ ; h, surface of seed (Cowan 2066),  $\times 25$ . Drawn by Ellen del Valle.

## 20. ODONTONEMA

*Odontonema* Nees, *Linnaea* 16:300. 1842, nomen cons. — TYPE: garden specimen without date or collector (GZU), type cons. *Thyrsacanthus* Nees in *Mart. Fl. bras.* 9:97. 1847, nomen illegit. (*Odontonema* Nees cited in synonymy).  
*Diateinacanthus* Lindau, *Bull. Herb. Boissier* 5:369. 1905. — TYPE: *Diateinacanthus hondurensis* Lindau ( $\equiv$  *Odontonema hondurensis* (Lindau) D.N. Gibson).

Erect perennial herbs or shrubs (in ours, elsewhere rarely, and perhaps erroneously, reported as lianas) with cystoliths. Leaves opposite, sessile to petiolate, margin entire to crenate. Inflorescence of mostly terminal loose to dense sometimes basally branched dichasiate spikes, racemes, or thyrses; dichasia alternate to opposite to whorled, 1–many (i.e., 18 or more) flowered, variously contracted or expanded, sessile or pedunculate, subtended by a bract. Bracts subopposite, opposite, or whorled, green or colored, usually  $\pm$  inconspicuous, margin entire. Flowers heterostylous, usually pedicellate, subtended by 2 homomorphic bracteoles. Calyx deeply 5-lobed, lobes equal in length. Corolla infundibular, white, yellow, purple, pink, or red, tube usually expanded distally into a prominent throat, limb subactinomorphic to bilabiate, internally covered with sessile to subsessile glands (in ours), upper lip 2-lobed, lower lip 3-lobed, corolla lobes imbricate in bud. Stamens 2, inserted near base of corolla throat, thrum stamens exerted from mouth of corolla, pin stamens usually included in corolla tube, anthers 2-theous, thecae equal in size, parallel, equally inserted, lacking basal appendages, dehiscing toward lower lip (i.e., flower nototribal); pollen prolate to spheric, 3- or 4-colporate, 6–8-pseudocolpate, pseudocolpi 2 per mesocolpium, exine reticulate; staminodes 2. Thrum style included in corolla tube, pin style exerted from mouth of corolla, stigma  $\pm$  funnelliform or 2-lobed, lobes equal or unequal in length. Capsule stipitate, head obovoid to subellipsoid (often with a medial constriction), retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4, homomorphic, lenticular, lacking trichomes. ( $x = 21$ ).

A genus of 29 species restricted to the New World tropics and subtropics with eight species in Mexico. In addition to the six species reported from Chiapas, both *O. hondurensis* (Lindau) D.N. Gibson (Belize, Guatemala, Honduras) and *O. steyermarkii* Leonard (Guatemala) might be expected to occur in the state. The former differs from our species by its yellow flowers in branching panicles; the latter differs by its salmon-pink flowers in expanded dichasia and nearly glabrous inflorescence.

REFERENCES: BAUM, V.M. 1982a. A revision of the genus *Odontonema* (Acanthaceae). Unpublished M.Sc. Thesis, Univ. of Maryland, College Park; BAUM, V.M. 1982b. New species and combinations in *Odontonema* (Acanthaceae). *Brittonia* 34:424–434. DANIEL, T.F. 1995a. Revision of *Odontonema* (Acanthaceae) in Mexico. *Contr. Univ. Michigan Herb.* 20:(in press).

- a. Corolla red or pinkish purple.
  - b. Corolla pinkish purple; rachis densely and evenly pubescent . . . . . 2. *O. callistachyum*
  - bb. Corolla red; rachis glabrous or sparsely pubescent, trichomes sometimes concentrated in 2 or more lines.
    - c. At least some, usually most, dichasia whorled at inflorescence nodes; rachis pubescent with flexuose to retrorse to retrorsely or antrorsely appressed trichomes 0.2–1 mm long, trichomes usually concentrated in 2 or more lines; corolla throat 9–13 mm long . . . . . 6. *O. tubaeforme*
    - cc. Dichasia opposite at inflorescence nodes; rachis glabrous or evenly pubescent with erect to flexuose to antrorse trichomes 0.05–0.5 mm long; corolla throat 3–10 mm long.
      - d. Dichasia sessile (rarely subsessile with peduncles to 1 mm long); upper lip of corolla 6–13 mm long; lower lip of corolla 6.5–14 mm long; pollen 3-colporate . . . . . 4. *O. glaberrimum*
      - dd. Dichasia subsessile to pedunculate (at least some, usually most, dichasia clearly pedunculate in each inflorescence, peduncles up to 25 mm long); upper lip of corolla 2–5 mm long; lower lip of corolla 2.5–6 mm long; pollen 4-colporate . . . . . 3. *O. cuspidatum*
- aa. Corolla entirely yellow or pale blue to white with purplish markings on lower lip.
  - e. Young stems, rachis, abaxial surface of bracts and style glabrous; inflorescence of open thyrses, dichasia pedunculate, expanded; corolla yellow; thecae 2.6–3.1 mm long . . . . . 5. *O. glabrum*
  - ee. Young stems, rachis, abaxial surface of bracts and style pubescent; inflorescence of dense dichasiate spikes or racemes, dichasia sessile, contracted; corolla pale blue or white with purplish markings on lower lip; thecae 1.5–1.9 mm long . . . . . 1. *O. albiflorum*

1. ***Odontonema albiflorum* Leonard, Publ. Carnegie Inst. Wash. 461:219. 1936.**

— TYPE: Guatemala, Alta Verapaz, Cubilquitz, 350 m, Feb 1901, *H. von Tuerkheim* 7937 (US!; isotype: US!).

ILLUSTRATIONS: Publ. Carnegie Inst. Wash. 461:220, fig. 14; Baum 1982a:123, fig. 49.

Shrubs to 1 m tall. Young stems subquadrate to quadrate-sulcate, evenly puberulent with retrorse (to flexuose) eglandular trichomes 0.05–0.2 mm long. Leaves petiolate, petioles to 13 mm long, blades ovate-elliptic to obovate-elliptic, 160–415 mm long, 58–135 mm wide, 2.1–3.6 times longer than wide, acuminate to falcate at apex, attenuate at base and often somewhat auriculate at apex of petiole, surfaces puberulent with mostly

erect (to antrorse) eglandular trichomes < 0.05–0.1 (–0.2) mm long, trichomes usually restricted to midvein or major veins. Inflorescence of dense terminal (and sometimes axillary) pedunculate unbranched (rarely branched at base) dichasiate spikes or racemes to 150 mm long, rachis puberulent with erect to antrorse to antrorsely appressed eglandular trichomes 0.05–0.5 mm long; dichasia mostly whorled (opposite proximally), 3 or more-flowered, ± contracted, sessile. Bracts often subfoliose (e.g., ovate-lanceolate) proximally, soon becoming subulate, bracts near middle of inflorescence subulate, 2.5–3.8 mm long, 0.8–1 mm wide, abaxial surface pubescent like rachis. Bracteoles and secondary bracteoles triangular to triangular-subulate, 1.5–3 mm long, 0.7–1 mm wide, abaxial surface pubescent like bracts. Flowers sessile or pedicellate, pedicels 1.5–5 mm long, nearly glabrous or sparsely puberulent. Calyx 2–3 (–5) mm long, tube 0.3–0.8 mm long, lobes subulate, 1.5–2.3 (–4) mm long, 0.5–0.8 mm wide, abaxially glabrous or nearly so. Corolla pale blue to white with purplish markings on lower lip, 10–17 mm long, externally glabrous (although margins of lobes ciliate), tube 7–10 mm long, barely expanded distally into a throat, throat 2.5–4 mm long, 1.5–2 mm in diameter (measured flat) near midpoint, upper lip 5.3–7 mm long, lobes elliptic, 2–4.5 mm long, 1.3–1.9 mm wide, lower lip 5.5–7 mm long, lobes linear-elliptic, 4–5.5 mm long, 2–2.5 mm wide. Thrum stamens 7–9.5 mm long, pin stamens 2.5 mm long, thecae 1.5–1.9 mm long; pollen 3-colporate; staminodes 0.6–1.5 mm long. Thrum style 4–5 mm long, pin style 9–12 mm long, the style proximally (or ± throughout) pubescent with eglandular trichomes, stigma 0.2 mm long, lobes indistinct. Capsule 18–25 mm long, glabrous, stipe 9–13 mm long, head 9–12 mm long. Seeds of unknown shape in outline, 3.5–4 mm long, 2.5–3 mm wide, surfaces rugose to tuberculate. Flowering Nov–May; fruiting Jan–May.

Tropical Rain Forest and Lower Montane Rain Forest; common in Eastern Highlands; 100–520 m. Mex. (Chis.), Guat., Bel., Hond. CHIAPAS COLLECTIONS: *Da 20526* (BM, MEXU); *Da 20537* (BM, MEXU); *Mz 10129* (MEXU); *Mz 10186* (CAS); *Mz 11174* (MEXU); *Mz 11508* (MEXU); *Mz 11867* (CAS, MEXU); *Mz 12081* (MEXU); *Mz 14674* (MEXU); *Mz 16954* (CAS, MEXU); *Mz 17760* (CAS, F); *Mz 18105* (MEXU); *Mv B-187* (ENCB, MEXU); *So 1703* (DS, MICH, UC, US); *Te 6634* (CAS, ENCB, MEXU); 57975.

## 2. *Odontonema callistachyum* (Schltdl. & Cham.) Kuntze, Revis. gen. pl. 2:494. 1891.

— *Justicia callistachya* Schltdl. & Cham. Linnaea 6:370. 1831. — *Thysacanthus callistachyus* (Schltdl. & Cham.) Nees in A. DC. Prodr. 11:326. 1847. — TYPE: Mexico, Veracruz, Misantlae, 1828, *C. Schiede s.n.* (B, destroyed; probable isotype: W!).

*Thysacanthus callistachyus* var. *amplus* Nees in A. DC. Prodr. 11:326. 1847. — LECTOTYPE (Daniel 1995a: in press): Mexico, Veracruz, Cordillera, 3000 ft, Dec 1840, *H. Galeotti* 926 (K!; isolectotypes: BR, G, P!, W!).

*Thysacanthus lilacinus* Lindl. J. Hort. Soc. London 6:159. 1851. — TYPE: plants cultivated under "Justicia lilacina" in Garden of the Horticultural Society of London from an unknown source (presumed to be tropical America) from

Lindley and Paxton (Paxton's Fl. Gard. 2:77. 1851), (CGE, photo US!).

*Thysacanthus geminatus* Donn. Sm. Bot. Gaz. (Crawfordsville) 13:75. 1888. — *Odontonema geminatum* (Donn. Sm.) S.F. Blake, Contr. Gray Herb. 52:104. 1917. — TYPE: Guatemala, Alta Verapaz, Pansamalá, 3800 ft, Oct. 1885, *H. von Tuerckheim* 740 (US!; isotypes: F!, G, GH!, K!, M, NY, P!, US!). Although Donnell Smith also noted another date in the protologue (i.e., May 1887), the holotype and all isotypes examined bear the earlier date.

*Odontonema breedlovei* V.M. Baum, Brittonia 34:427. 1982. — TYPE: Mexico, Chiapas, Mpio. Ocosingo, along streams near Lacanjá, 2 Apr 1973, *D. Breedlove* 34473 (DS!).

ILLUSTRATIONS: Fig. 27; Paxton's Fl. Gard. 2:t. 53. 1851; Fieldiana, Bot. 24(10):417, fig. 94. 1974; Baum 1982a:37, fig. 28; Baum 1982b:428, fig. 3.

Perennial herbs or shrubs to 3.5 (–5) m tall. Young stems quadrate to quadrate-sulcate, glabrate or sparsely pubescent with flexuose to antrorsely appressed eglandular trichomes 0.2–0.7 mm long, trichomes ± evenly disposed or concentrated in 2 lines, stems sometimes also covered with sessile glands < 0.1 mm in diameter. Leaves petiolate, petioles to 27 mm long, blades ovate to ovate-elliptic to elliptic to obovate-elliptic, 63–300 mm long, 21–163 mm wide, 1.8–4 times longer than wide, acuminate to falcate at apex, acute to attenuate at base, surfaces pubescent with cauline type trichomes (often restricted to major veins) to glabrate. Inflorescence of loose to dense terminal pedunculate often basally branched dichasiate racemes (rarely thyrses) to 600 mm long, rachis evenly and densely pubescent with antrorse to antrorsely appressed eglandular trichomes 0.2–0.6 mm long; dichasia opposite (rarely whorled), 3–18 or more-flowered, ± contracted (rarely ± expanded), sessile (rarely borne on peduncles to 2 mm long), sometimes 2 dichasia present per bract. Bracts lanceolate to subulate to triangular, those near middle of inflorescence 2–8.5 (–13) mm long, 1–3 mm wide, abaxial surface pubescent like rachis. Bracteoles and secondary bracteoles lanceolate to subulate to triangular, 1–6 (–8) mm long, 0.5–2 mm wide, abaxial surface pubescent like bracts. Flowers pedicellate, pedicels 2–12 (–18) mm long, pubescent like rachis. Calyx 2.5–6.5 mm long, tube 0.5–1.2 mm long, lobes subulate, 2–5.7 mm long, 0.3–1 mm wide, abaxially pubescent like rachis or sparsely pubescent with antrorse eglandular trichomes 0.1–0.2 mm long or nearly glabrous. Corolla pinkish purple, (12–) 17–30 mm long, externally glabrous (although margins of lobes ciliate), tube 6.5–19 mm long, expanded distally into a distinct throat, throat (4.5–) 5–10 mm long, (2.5–) 3–4.5 mm in diameter (measured flat) near midpoint, upper lip (3–) 4.5–11 mm long, lobes rounded to subacute, 1.5–3.5 mm long, 1–3.3 mm wide, lower lip (3–) 4–12.5 mm long, lobes linear to elliptic, (3–) 4–12 mm long, (1.5–) 2.5–4.5 mm wide. Thrum stamens 8–13 mm long, pin stamens 4–6 mm long, thecae 1.5–2.5 mm long; pollen 3-colporate; staminodes 0.6–4 mm long. Thrum style 5–13 mm long, pin style (11–) 13–21 mm long, the style pubescent throughout with eglandular trichomes, stigma 0.2–0.4 mm long, appearing funnelliform or 2-lobed. Capsule (10.5–) 15–23 mm long, glabrous, stipe (4–) 6–11 mm long, head (6.5–) 8.5–13 mm long. Seeds subcordate in outline, 3–5 mm long, 2.6–3.3 mm wide, surfaces rugose (not tuberculate). Flowering Oct–Jul; fruiting Oct–May.

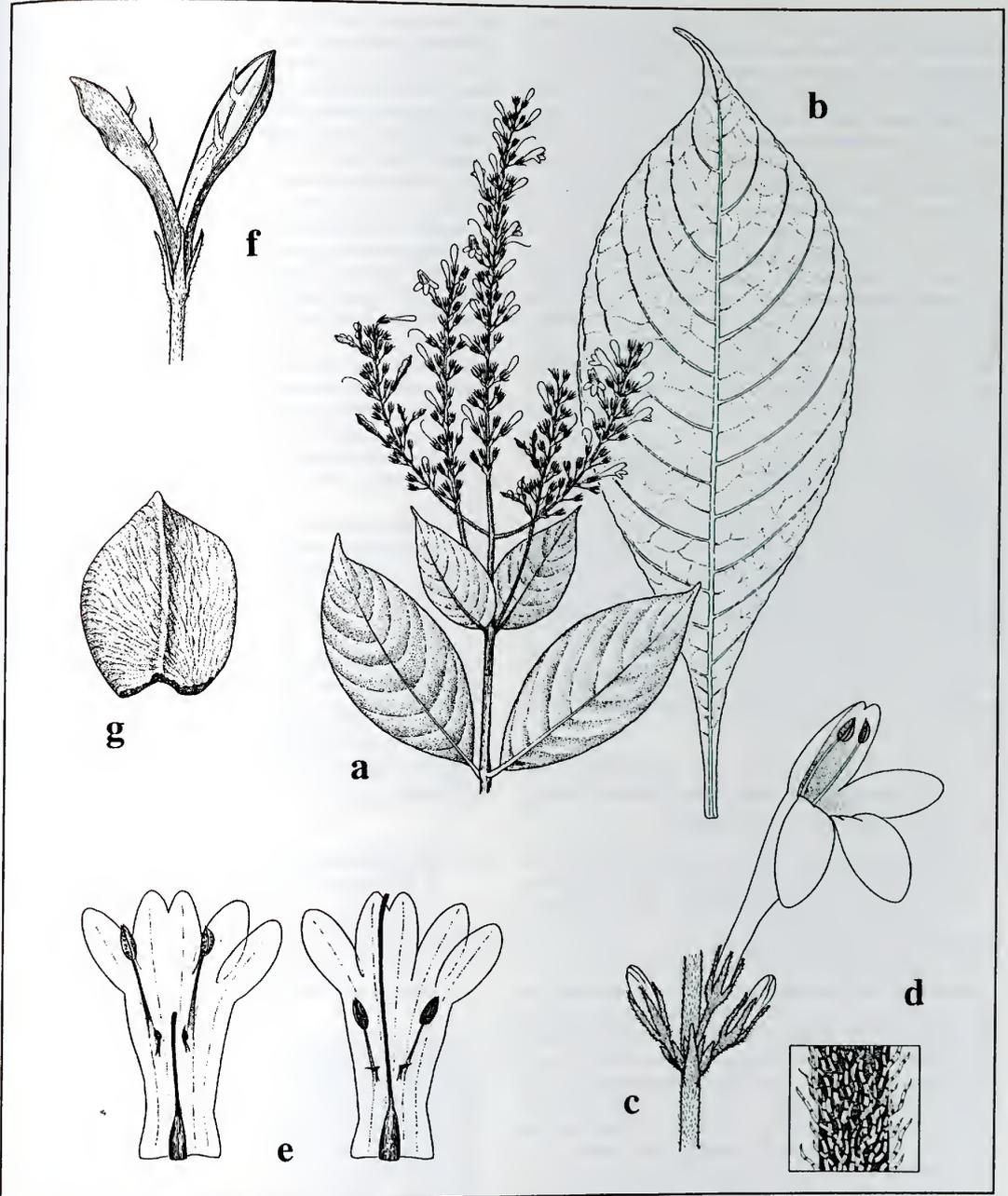


FIGURE 27. *Odontonema callistachyum* (Schltdl. & Cham.) Kuntze. a, habit (48190),  $\times 0.3$ ; b, leaf (Daniel & Bartholomew 5013),  $\times 0.4$ ; c, inflorescence node with flower and buds (Daniel & Bartholomew 5014),  $\times 2$ ; d, portion of pedicel (Daniel & Bartholomew 5014),  $\times 20$ ; e, corolla split open showing androecium and gynoecium: thrum flower (Daniel & Bartholomew 5014, left), pin flower (Daniel & Bartholomew 5013, right),  $\times 1.8$ ; f, capsule (Ton 3806),  $\times 1.7$ ; g, seed (Ton 3806),  $\times 6.5$ . Drawn by Ellen del Valle.

Slopes and along streams in Tropical Rain Forest, Montane Rain Forest, Evergreen Seasonal Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common in Northern Highlands, Eastern Highlands, and Sierra Madre; 40–1790 m. Mex. (S.L.P., Jal., Qro., Hgo., Mich., Pue., Ver., Gro., Oax., Tab., Chis.), Guat., Bel. CHIAPAS COLLECTIONS: *Bal 944* (US); *Br 795* (CAS); *Bu 6* (BM); *Cro 64983* (BM, CAS); *Cro 65256* (CAS); *Dan 5007* (CAS); *Dan 5013* (CAS); *Dan 5014* (CAS, DUKE, K, MICH); *Da 20533* (BM, MEXU); *Es 3104* (MEXU); *Fe 1495* (MEXU); *G-Q 3442* (DS, MICH, WIS); *Luc 2568* (CAS); *Mz 3220* (CAS, MEXU, WIS); *EM 3694* (F, K, MICH); *N 3373* (US); *PM 215* (CAS, MICH); *SC 450* (CAS); *S&S 2204* (K, US); *Te 6613* (CAS, MEXU); *T 1417* (DS, F, MICH, US); *T 2022* (DS, F, MICH, US); *T 2271* (DS); *T 3317* (DS, F, MICH, WIS); *T 3806* (DS, DUKE, WIS); *T 3472* (DS, DUKE, F); *T 3649* (DS, DUKE); *T 9485* (CAS); *7359*; *7553*; *7585*; *9752*; *20747*; *24173*; *32497*; *32845*; *33247*; *33798*; *34057*; *35159*; *48190*; *48381*; *48811*; *49272*; *49594*; *49917*; *50444*; *57146*; *68244*; *71211*.

Local name: "cruz nichim" (Tzeltal, *Brett 795*).

Use: crushed leaves used as a plaster for swelling (*Brett 795*).

This species is often cultivated in many parts of Mexico and it is not certain that all of the states noted above have indigenous populations. The above description and phenologies have been augmented with data from specimens from adjacent regions of Mexico.

*Miranda 1755* (Barranca Aguas Calientes, US) combines some features of *O. callistachyum* and *O. tubaeforme*. This and other unusual specimens were discussed by Daniel (1995a).

### 3. *Odontonema cuspidatum* (Nees) Kuntze, Revis. gen. pl. 2:494. 1891.

— *Thyrsacanthus cuspidatus* Nees in A. DC. Prodr. 11:323. 1847. — LECTOTYPE (Daniel 1995a: in press): Mexico, Oaxaca, Sierra S. Pedro Nolasco, Talea, *C. Jürgensen 895* (K!; isolectotype: BM).

ILLUSTRATION: Baum 1982a:44, fig. 29.

Shrubs to 5 m tall. Young stems quadrate to quadrate-sulcate, sparsely pubescent with antrorse (to erect to flexuose) eglandular trichomes 0.1–0.5 mm long, trichomes often  $\pm$  concentrated in 2 lines, soon glabrate. Leaves petiolate, petioles to 30 mm long, blades ovate-elliptic to elliptic to obovate-elliptic, 39–310 mm long, 15–130 mm wide, 1.7–5.6 times longer than wide, acuminate to falcate at apex, acute to attenuate at base, surfaces pubescent with cauline type trichomes (especially along midvein on abaxial surface) or glabrate. Inflorescence of loose to dense terminal pedunculate often basally branched dichasiate (racemes to) thyrses to 500 mm long, rachis pubescent with erect to flexuose-antrorse eglandular trichomes 0.05–0.3 (–0.5) mm long; dichasia opposite, 1–3- or more-flowered,  $\pm$  expanded, (subsessile to) pedunculate (at least some dichasia in an inflorescence clearly pedunculate), peduncles to 25 mm long, pubescent like rachis. Bracts lance-subulate to subulate to triangular, those near middle of inflorescence 1.5–2.5 (–6) mm long, 0.7–1.5 mm wide, abaxial surface pubescent like rachis or nearly glabrous. Bracteoles and secondary bracteoles triangular to triangular-subulate, 0.7–1.5 mm long, 0.5–0.8 mm wide, ab-

axial surface pubescent like bracts or nearly glabrous. Flowers pedicellate, pedicels 2.5–15 mm long, pubescent like rachis. Calyx 2–5.5 mm long, tube 0.8–1.1 mm long, lobes lanceolate to triangular, 1–5 mm long, 0.8–1.3 mm wide, abaxially pubescent like bracts or nearly glabrous. Corolla red, (15–)21–35 mm long, externally glabrous (although margins of lobes ciliolate), tube 12–30 mm long, barely expanded distally into a  $\pm$  distinct throat, throat 5–10 mm long, 2.5–4 mm in diameter (measured flat) near midpoint, upper lip 2–5 mm long, lobes rounded to acute, 1.5–3.5 mm long, 2.5–3 mm wide, lower lip 2.5–6 mm long, lobes ovate to subcircular, 2.5–6 mm long, 1.5–3.5 mm wide. Thrum stamens 7–9 mm long, pin stamens 4–5 mm long, thecae 2.3–3.5 mm long; pollen 4-colporate; staminodes 1 mm long. Thrum style 4–12 mm long, pin style 15–21 mm long, the style nearly glabrous or pubescent with eglandular trichomes, trichomes disposed  $\pm$  throughout or restricted to proximal portion, stigma 0.2–0.3 mm long, appearing funnelliform with lobes indistinct or distinct. Capsule 16–27 mm long, glabrous, stipe 7–11 mm long, head 9–16 mm long. Seeds subcordate to subrectangular in outline, 2.9–4.2 mm long, 2.2–3.7 mm wide, surfaces rugose to tuberculate. Flowering and fruiting throughout the year.

Slopes in Tropical Rain Forest, Montane Rain Forest, Evergreen Cloud Forest; common in Gulf Coastal Plain, Northern Highlands, and Sierra Madre, cultivated in other regions; sea level–1950 m. Mex. (S.L.P., Qro., Mlos., Ver., Oax., Tab., Chis.), Antill. CHIAPAS COLLECTIONS: *G&H 135* (MEXU, MICH); *M&M 895* (WIS); *EM 149* (F, MEXU, MICH, US); *Mi 1719* (MEXU); *N 3376* (US); *R 880* (K); *R&R&M 1393* (MICH, WIS); *Z 736* (DS); *23784*; *29801*; *32417*; *45893*; *71454*.

This species is widely cultivated and sometimes escapes. Data in the above description and phenologies have been augmented using specimens from elsewhere in Mexico.

### 4. *Odontonema glaberrimum* (M.E. Jones) V.M. Baum, Brittonia 34:427. 1982.

— *Anisacanthus glaberrimus* M.E. Jones, Contr. W. Bot. 15:151. 1927. — TYPE: Mexico, Nayarit, El Tigre Mina, Acaponeta, 1 Mar 1927, *M. Jones 22976* (POM!).

ILLUSTRATION: Baum 1982a:57, fig. 32.

Shrubs to small trees to 3 m tall. Young stems quadrate to quadrate-sulcate, glabrous or  $\pm$  evenly puberulent with flexuose to antrorse eglandular trichomes 0.05–0.2 mm long. Leaves subsessile to petiolate, petioles to 11 mm long, blades ovate to elliptic to obovate-elliptic, 25–200 mm long, 11–78 mm wide, 1.7–2.6 times longer than wide, acute to acuminate at apex, acute to attenuate at base, surfaces glabrous or pubescent with cauline type trichomes mostly restricted to major veins, or  $\pm$  evenly pubescent with coarse flexuose-antrorse eglandular trichomes to 0.6 mm long. Inflorescence of loose to dense terminal (or sometimes axillary) sessile to pedunculate unbranched or basally branched dichasiate racemes to 200 mm long, rachis glabrous or evenly pubescent with flexuose to antrorse eglandular trichomes 0.05–0.5 mm long; dichasia opposite, 1–3 or more-flowered,  $\pm$  contracted, sessile or subsessile (i.e., peduncles to 1 mm long). Bracts often subfoliose proximally, soon becoming subulate to triangular, bracts near middle of inflorescence 1.5–7.5 mm long, 0.8–1.2 mm wide, abaxial surface gla-

brous or pubescent like rachis. Bracteoles and secondary bracteoles subulate to triangular, 1–4 mm long, 0.6–1.2 mm wide, abaxial surface glabrous or pubescent like bracts. Flowers pedicellate, pedicels 3–13 mm long, pubescent like rachis or sometimes nearly glabrous even when rachis is pubescent. Calyx 2.5–5 mm long, tube 0.5–1 mm long, lobes subulate, 2–4.5 mm long, 0.4–0.8 mm wide, abaxially pubescent like rachis or glabrous. Corolla red, 16–32 mm long, externally glabrous, tube 10–17 mm long, expanded distally into a distinct throat, throat 3–8 mm long, 3–6 mm in diameter (measured flat) near midpoint, upper lip 6–13 mm long, lobes rounded to acute, 2–3.5 mm long, 1.7–2.5 mm wide, lower lip 6.5–14 mm long, lobes linear-elliptic, 5–12 mm long, 2–4 mm wide. Thrum stamens 12–14 mm long, pin stamens 4–6.5 mm long, thecae 2–3 mm long; pollen 3-colporate; staminodes 1–1.5 mm long. Thrum style 8–12 mm long, pin style 15–21 mm long, the style glabrous or with sparse eglandular trichomes proximally or pubescent  $\pm$  throughout, stigma 0.2–0.5 mm long, lobes barely or clearly evident. Capsule 18.5–27 mm long, glabrous, stipe 8–12.5 mm long, head 10.5–14 mm long. Seeds subcordate in outline, 5–6 mm long, 4.5–4.8 mm wide, surfaces smooth. Flowering and fruiting Jan–Apr.

Slopes in Evergreen Seasonal Forest and Tropical Deciduous Forest; uncommon in NW Sierra Madre; 100–1300 m. Mex. (Sin., Dgo., Nay., Jal., Mich., Chis.), Guat. CHIAPAS COLLECTIONS: *Cro* 46278 (CAS, F); 23724; 24434; 30601; 49628; 66967.

The above description includes data from specimens occurring outside of Chiapas. The distribution and relationship of this species to *O. auriculatum* (Rose) T.F. Daniel were addressed by Daniel (1995a).

## 5. *Odontonema glabrum* Brandege, Univ. Calif. Publ. Bot. 6:195. 1915.

— TYPE: Mexico, Chiapas, Finca Irlanda, May–Jun 1914, *C. Purpus* 7286 (UC!; isotypes: BM!, DS!).

*Odontonema galbanum* Leonard, J. Wash. Acad. Sci. 33:72. 1943. — TYPE: Guatemala, Escuintla, near Barranca Honda, above Las Lajas, ca. 1200 m, 31 Jan 1939, *P. Standley* 63875 (US!; isotype: F!).

ILLUSTRATION: Baum 1982a:132, fig. 51.

Perennial herbs or shrubs (sometimes epiphytic) to 2.5 m tall. Young stems subterete to subquadrate, glabrous. Leaves petiole, petioles to 10 (–23) mm long, blades ovate to narrowly elliptic to obovate-elliptic, 40–275 mm long, 16–85 mm wide, 2.5–5.2 times longer than wide, acuminate to falcate at apex, rounded to acute to attenuate at base, surfaces and margin glabrous. Inflorescence of an open terminal (or sometimes axillary) pedunculate unbranched or basally branched thyrses to 360 mm long, rachis glabrous; dichasia opposite, 3 (distally)– or more (proximally)–flowered, expanded, pedunculate, peduncles (1.5–) 4–34 mm long, glabrous. Bracts petiolate and narrowly elliptic to oblanceolate proximally, soon becoming sessile and subulate to triangular-subulate, those near middle of inflorescence 2.5–7 mm long, 0.7–1 mm wide, abaxial surface glabrous. Bracteoles and secondary bracteoles subulate, 1–5 mm long, 0.4–0.7 mm wide, glabrous. Flowers pedicellate, pedicels 3–12 mm long, glabrous, lateral flowers of dichasia borne on secondary peduncles. Calyx 2–5 mm long, tube 0.5–1

mm long, lobes lanceolate to subulate, 1.7–4.5 mm long, 0.4–0.9 mm wide, abaxially glabrous. Corolla yellow, 22–32 mm long, externally glabrous (although margins of lobes ciliate), tube 18–29 mm long, expanded distally into a distinct throat, throat 11–15 mm long, 3.5–5.3 mm in diameter (measured flat) near midpoint, upper lip 3–5 mm long, lobes rounded, 1–2.5 mm long, 1.8–3 mm wide, lower lip 2.8–5 mm long, lobes elliptic, 2.8–5 mm long, 2–4.2 mm wide. Thrum stamens 14 mm long, pin stamens 8–11 mm long, thecae 2.6–3.1 mm long; pollen 3-colporate; staminodes 1 mm long. Thrum style 12–16 mm long, pin style 22–26 mm long, the style glabrous, stigma 2-lobed, lobes 0.2–1 mm long. Capsule 17–21 mm long, glabrous, stipe 8–10 mm long, head 9–11 mm long. Seeds subcircular to subelliptic in outline, 3–4.2 mm long, 2.6–3.3 mm wide, surfaces rugose to tuberculate. Flowering Dec–Aug; fruiting Dec–June.

Slopes and along streams in Montane Rain Forest, Evergreen Seasonal Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common in Sierra Madre; 100–1600 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *Boe* 1074 (MEXU); *Cro* 47484 (CAS); *He* MA51 (MEXU); *He* 2113 (MEXU); *EL* 1347 (ENCB); *Mz* 19848 (MEXU); *Mz* 19960 (CAS, MEXU); *EM* 170 (MEXU, MICH, US); *EM* 2470 (MICH); *EM* 5174 (F, MEXU, US); *EM* 17430 (F, MEXU); *EM* 17434 (F, K, MEXU); *EM* 17629 (F, MEXU); *EM* 17657 (F, MEXU); *Mi* 1691 (MEXU); *Mi* 1729 (MEXU); *P* 6845 (UC); *P* 7208 (MO, UC, US); *QVU* 118 (U); *RG* 122 (CAS); *T* 3842 (DS, F, MICH, US); *Ve* 1137 (BM); *Ve* 3257 (MEXU); 30621; 48650; 50735; 56923; 67391; 67668.

Local names: “Cola de Ardilla” (*Boege* 1074); “monte o pluma de oro” (*Boege* 1074).

## 6. *Odontonema tubaeforme* (Bertol.) Kuntze, Revis. gen. pl. 2:494. 1891.

— *Justicia tubaeformis* Bertol. Novi Comment. Acad. Sci. Inst. Bononiensis 4:405. 1840. — *Thysacanthus tubaeformis* (Bertol.) Nees in A. DC. Prodr. 11:324. 1847. — TYPE: Guatemala, Escuintla, Escuintla, 1836, *J. Velasquez s.n.* (BOLO, microfiche!).

*Thysacanthus strictus* Nees in A. DC. Prodr. 11:324. 1847. — *Odontonema strictum* (Nees) Kuntze, Revis. gen. pl. 2:494. 1891. — TYPE: Honduras, without locality or date, *Armstrong s.n.* (K!).

*Eranthemum coccineum* Lem. Fl. Serres Jard. Eur. 3:no. 240, t. 8. 1847, non *Odontonema coccineum* Leonard (1958). — *Thysacanthus lemairianus* Nees in A. DC. Prodr. 11:729. 1847, nomen illegit. (*E. coccineum* cited in synonymy). — TYPE: based on cultivated materials provided by Jacob-Makoy of Liège from an unknown source. Plants apparently arrived on the European continent via England under “*Aphelandra* sp. nov.” Specimens, if any exist, are not known.

*Thysacanthus pantasmensis* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:144. 1855. — *Odontonema pantasmense* (Oerst.) Kuntze, Revis. gen. pl. 2:494. 1891. — TYPE: Nicaragua, “Skyggefulde Skov paa Bjerget Pantasmo i den nordlige Deel af Segovia,” ca. 4000 ft, Jan, A. *Oersted* 10709 (C, photos: F!, US!).

*Thysacanthus longifolius* Oerst. Vidensk. Meddel. Dansk. Naturhist. Foren. Kjøbenhavn 1854:145. 1855. — *Odontonema longifolium* (Oerst.) Kuntze, Revis. gen. pl.

2:494. 1891. — TYPE: "i Naerheden af Nicaraguasö ved Tortuga," Mar 1847, A. Oersted 10708 (C, photos: F!, US!).

*Thysacanthus flagellum* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:146. 1855. — *Odontonema flagellum* (Oerst.) Kuntze, Revis. gen. pl. 2:494. 1891. — TYPE: Costa Rica, Cartago, "i den taette Urskov ved Turrialva," May, A. Oersted 10706 (C, photos: F!, US!).

*Odontonema amicorum* V.M. Baum, Brittonia 34:425. 1982. — TYPE: Belize, Toledo, Temash River, 100 ft, 3 May 1935, W. Schipp 1353 (K!; isotypes: A!, CAS!, F!, G, MICH!, NY).

ILLUSTRATIONS: Fl. Serres 3: no. 240, t. 8. 1847; Baum 1982a:45, fig. 30, 51, fig. 31; Baum 1982b:426, fig. 2; Fieldiana, Bot. (n.s.) 18:15, fig. 13. 1986.

Shrubs to 3 m tall. Young stems subquadrate to quadrately-sulcate, pubescent with flexuose to retrorse to retrorsely or antrorsely appressed (often crinkled or kinky) eglandular trichomes 0.2–1 mm long, trichomes usually  $\pm$  concentrated in 2 lines. Leaves subsessile to petiolate, petioles to 16 mm long, blades ovate to elliptic to obovate-elliptic, (47–) 155–315 mm long, (16–) 60–117 mm wide, 1.9–4.8 times longer than wide, acuminate to falcate at apex, abruptly acute to attenuate at base, surfaces pubescent with cauline type trichomes (often concentrated along major veins) or glabrate. Inflorescence of loose terminal pedunculate unbranched dichasiate racemes to 600 mm long, rachis pubescent with cauline type trichomes usually concentrated in 2 or more lines; dichasia mostly whorled, 1–3 or more-flowered,  $\pm$  contracted, sessile. Bracts lanceolate to lance-subulate, those near middle of inflorescence 2.5–5.5 mm long, 1–1.5 mm wide, abaxial surface pubescent like rachis or glabrate. Bracteoles and secondary bracteoles lance-subulate, 1.5–3.5 mm long, 0.5–0.6 mm wide, abaxial surface pubescent like bracts or glabrate. Flowers pedicellate, pedicels 2–6 mm long, pubescent like rachis. Calyx 2–3.5 mm long, tube 0.5–

mm long, lobes subulate, 1.5–3 mm long, 0.6–1 mm wide, abaxially pubescent like bracts or glabrate. Corolla red, 24–33 mm long, externally glabrous (although margins of lobes ciliate), tube 20–27 mm long, expanded distally into a distinct throat, 9–13 mm long, 3.2–6 mm in diameter (measured flat) near midpoint, upper lip 4–8 mm long, lobes rounded, 2–6 mm long, 1.5–3.8 mm wide, lower lip 4–8 mm long, lobes elliptic to subcircular, 4–7 mm long, 2.5–4.5 mm wide. Thrum stamens 12–15 mm long, pin stamens 6.5–8 mm long, thecae 2–2.8 mm long; pollen 3-colporate; staminodes 1–4 mm long. Thrum style 10–16 mm long, pin style 22–26 mm long, the style usually proximally pubescent with eglandular trichomes, stigma 2-lobed, lobes 0.2–0.4 mm long. Capsule 17–23 mm long, glabrous, stipe 7–11 mm long, head 10–13 mm long. Seeds subcircular to subelliptic to broadly obovate in outline, 4–5 mm long, 2.5–3.5 mm wide, surfaces bumpy to tuberculate. ( $n = 21$ ). Flowering Jan–Jul; fruiting Mar–Jul.

Slopes and ridges in Tropical Rain Forest, Lower Montane Rain Forest, and Evergreen Cloud Forest; common in Northern Highlands and Eastern Highlands; 30–1650 m. Mex. (Tab., Q, Roo, Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *Arm 243* (F, US); *Cb 2663* (BM, MEXU); *Cb 3942* (CAS); *Cb 8164* (CAS); *MC 2104* (F, MICH); *Dan 4991* (CAS, K, MEXU, MICH, US); *Fe 1033b* (MEXU); *Hoov 137* (MEXU, US); *Mz 11645* (CAS, F); *Mz 11735* (MEXU); *Mz 11903* (MEXU); *Mz 15773* (MEXU); *Mz 17634* (CAS); *My 365* (K); *McD 205* (DUKE); *S&S 5468* (CAS); *Su s.n.* (CAS); *Te 5799* (MEXU); *T&L 40564* (DS); *Ven 19988* (MEXU); *Wa W660207* (CAS); *9121*; *24210*; *33909*; *34236*; *34955*; *49520*; *57340*.

A discussion of the synonymy and the spelling of the epithet were provided by Daniel (1995a). *Matuda 17433* (Acacoyagua, F), with orangish corollas, has characteristics of both *O. tubaeforme* and *O. glaberrimum* (Daniel 1995a).

## 21. POIKILACANTHUS

*Poikilacanthus* Lindau, Bot. Jahrb. Syst. 18:57. 1893. — TYPE: *Poikilacanthus glandulosus* (Nees) Ariza ( $\equiv$  *Orthotactus glandulosus* Nees) (see Kurtziana 17:157. 1984).

Erect perennial herbs or shrubs with cystoliths. Leaves opposite, often anisophyllous, petiolate, margin entire to sinuate. Inflorescence of axillary or terminal dichasiate headlike or elongate spikes; dichasia (in ours) opposite, 1-flowered, sessile, subtended by a bract. Bracts opposite, green (although often discolorous), margin entire. Flowers homostylous, sessile, subtended by 2 homomorphic bracteoles. Calyx deeply 5-lobed, lobes equal (in ours). Corolla purple, pinkish, red, and white, tube elongate, distally  $\pm$  expanded, throat not or barely distinct, limb bilabiate, upper lip shallowly 2-lobed, internally rugulate, lower lip shallowly 3-lobed, corolla lobes imbricate in bud. Stamens 2, inserted near apex of corolla tube (in ours), exerted from mouth of corolla, anthers 2-theous, thecae equal to subequal in size, parallel (in ours, elsewhere also oblique), unequally inserted, lacking basal appendages (in ours, elsewhere also with an appendage at base), dehiscing toward lower lip (i.e., flower nototribal); pollen subspheric to prolate, 5 (in ours)- or more-porate, pores equatorial, exine covered with subcircular to rectangular to polygonal insulae, these consisting of gemmate regions enclosed by thick, smooth marginal walls, insulae discreet and more or less evenly distributed over surface or sharing common end-walls and arranged in loops or bands (the loops enclosing a band); staminodes 0. Style exerted from mouth of corolla, stigma obscurely to distinctly 2-lobed, lobes equal (in ours). Capsule stipitate, head obovoid to subellipsoid to subspheric, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4, homomorphic, lenticular. ( $x = 14$ ).

A genus of fewer than 15 species occurring in southern North America, Central America, and South America. In addition to the three species of *Poikilacanthus* occurring in Mexico, two others, *P. pansamalanus* (Donn. Sm.) D.N. Gibson and *P. skutchii* D.N. Gibson are known from

Guatemala. The two Guatemalan species can be distinguished from *P. macranthus* by their bracts that are glandular and corollas that are shorter (35–45 mm long), red, and eglandular.

REFERENCE. DANIEL, T.F. 1991. A synopsis of *Poikilacanthus* (Acanthaceae) in Mexico. *Bull. Torrey Bot. Club* 118:451–458.

### 1. *Poikilacanthus macranthus* Lindau, *Bull. Herb. Boissier* 3:481. 1895.

— SYNTYPES: Nicaragua, Matagalpa, Cañada Yarica, 8 Aug 1893, *E. Rothschuh* 228 (B, destroyed, photos: CAS!, FI, GH!, MO!, US!). Guatemala, without department, Chocóla, Jun 1869, *G. Bernoulli* & *R. Cario* 2302 (B, destroyed). It is unclear whether Gibson's (1974) indication of *Rothschuh* 228 from Nicaragua as the type of this species effectively, though probably unintentionally, lectotyped this species. Both syntypes were destroyed at B in 1943 and I have been unable to locate isosyntypes.

*Jacobinia purpusii* Brandegee, *Univ. Calif. Publ. Bot.* 6:195. 1915. — TYPE: Mexico, Chiapas, Finca Irlanda, May 1914, C. Purpus 7284 (UC!; isotypes: BM!, FI, GH!, MO!, US!).

*Poikilacanthus setiferus* Standl. & Steyer. *Publ. Field Mus.*

*Nat. Hist., Bot. Ser.* 23:246. 1947. — TYPE: Guatemala, Alta Verapaz, Between Chamá and Cobán, 15 Aug 1920, *H. Johnson* 523 (FI!; isotype: US!).

ILLUSTRATIONS: *Fig. 28*; *Fieldiana, Bot.* 24(10):421, fig. 95. 1974.

Shrubs to 2 m tall. Young stems subquadrate to quadrate-sulcate, evenly pubescent with flexuose to antrorse to antrorsely appressed often conspicuously septate eglandular trichomes 0.4–1.5 mm long (hirsute). Leaves anisophyllous, petiolate, petioles to 50 mm long, blades ovate to broadly ovate to elliptic, 14–100 mm long, 9–45 mm wide, 1.4–3 times longer than wide, one of a pair 1.5–3.3 times longer than the other, acuminate at apex, truncate to acute to subattenuate and often asymmetric at base, surfaces hirsute, trichomes sometimes restricted to major veins. Inflorescence of terminal sessile to subsessile (i.e., with peduncles to 1 mm long) congested and headlike dichasiate spikes lacking a well-defined (i.e., < 10 mm long) rachis, 7–13

(–16) mm long (excluding corollas), 10–20 mm in diameter (excluding corollas and measured across flattened surface) near midpoint. Bracts often discolorous with proximal portion conspicuously lighter than distal portion, spatulate to obovate to oblanceolate, 7–13 (–16) mm long, 1.5–4 mm wide, lowermost pair sometimes foliose (i.e., ovate and larger), (emarginate to) truncate to acute to acuminate at apex, abaxial surface and margin hirsute. Bracteoles linear to spatulate to oblanceolate, 6–9 mm long, 0.7–2 mm wide, abaxial surface pubescent like bracts. Calyx 5–7 mm long, lobes lanceolate, 4–6 mm long, 0.8–1.2 mm wide, abaxial surface hirsute. Corolla pinkish purple (often drying somewhat orangish), conspicuously arched, 55–75 mm long, externally pubescent with flexuose glandular (and sometimes a few eglandular) trichomes to 0.7 mm long, tube 32–40 mm long, upper lip 25–35 mm long, lobes rounded to subtriangular, 0.3–0.7 mm long, lower lip 20–33 mm long, lobes rounded to subtriangular, 1–2.5 mm long, 1.5–2 mm wide. Stamens 30–42 mm long, filaments glabrous, thecae 1.7–2.3 mm long; pollen subspheric, 5-porate, insulae discrete. Style 62–70 mm long, glabrous, stigma subhemispheric, 0.4 mm long, shallowly 2-lobed. Capsule 12–18 mm long, hirsute, stipe 5–9 mm long, head 7–9 mm long. Seeds subelliptic in outline, 4–4.7 mm long, 2.5–3 mm wide, surfaces covered with longitudinal rows of minute papillae. ( $n = 14$ ). Flowering May–Oct; fruiting Nov–Jan.

Slopes in Lower Montane Rain Forest and Montane Rain Forest; uncommon in Northern Highlands and Sierra Madre; 900–1300 m. Mex. (Chis.), Guat., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *Dan 6180* (CAS, ENCB, F, K, MEXU, MICH, MO, NY, US); *EM 4209* (A, F, US); *EM 17726* (F); *N 3039* (GH, US); *Th 3670* (US); *20268*; *26283*; *30904*; *39887*; *70860*.

## 22. PSEUDERANTHEMUM

*Pseuderanthemum* Radlk. *Sitzungsber. Math.-Phys. Kl. Akad. Wiss. München* 13:282. 1883. — LECTOTYPE (Leonard, *Contr. U.S. Natl. Herb.* 31(2):292. 1953): *Pseuderanthemum alatum* (Nees) Radlk. (= *Eranthemum alatum* Nees) (see *J. Adelaide Bot. Gard.* 9:141. 1986).

*Siphoneranthemum* (Oerst.) Kuntze, *Revis. gen. pl.* 2:494. 1891. *Eranthemum* L. subg. *Siphoneranthemum* Oerst. *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 1854:166. 1855. — TYPE: *Siphoneranthemum fasciculatum* (Oerst.) Kuntze (= *Eranthemum fasciculatum* Oerst.).

*Buceraenia* Greenm. *Proc. Amer. Acad. Arts* 32:303. 1897. — TYPE: *Buceraenia minutiflora* Greenm.

Decumbent to erect herbs or shrubs with cystoliths. Leaves opposite, sessile to petiolate, margin entire (in ours, elsewhere also to sinuate-lobed). Inflorescence of dichasia in leaf axils or of axillary or terminal dichasiate spikes, racemes, thyrses, or panicles; dichasia opposite or alternate, 1–many-flowered, sessile or pedunculate, subtended by a leaf or bract. Bracts ± inconspicuous, opposite, green, margin entire. Flowers chasmogamous and/or cleistogamous, homostylous or heterostylous, sessile or pedicellate, subtended by 2 small homomorphic bracteoles. Calyx deeply 5-lobed, lobes homomorphic. Corolla white, pink, blue, purplish, or reddish, the lower lip sometimes with a whitish region covered with pinkish or purplish spots, ± salverform (i.e., with a prominent slender tube and a rotate limb), tube cylindrical, sometimes ± expanded distally into a short throat, limb subactinomorphic to bilabiate, upper lip 2-lobed, lower lip 3-lobed, corolla lobes ovate to elliptic, imbricate in bud, corolla of cleistogamous flowers remaining budlike. Stamens 2, inserted at or distal to midpoint of corolla tube, included in corolla tube or exerted from mouth of corolla, anthers 2-theous, thecae equal to subequal in size (or in cleistogamous flowers becoming unequal or with 1 theca suppressed), parallel, subequally inserted, lacking basal appendages, dehiscing introrsely toward lateral lobes of corolla (i.e., flower pleurotribal); pollen spheric to prolate, 3-colporate (sometimes syncolpate), 6-pseudocolpate,

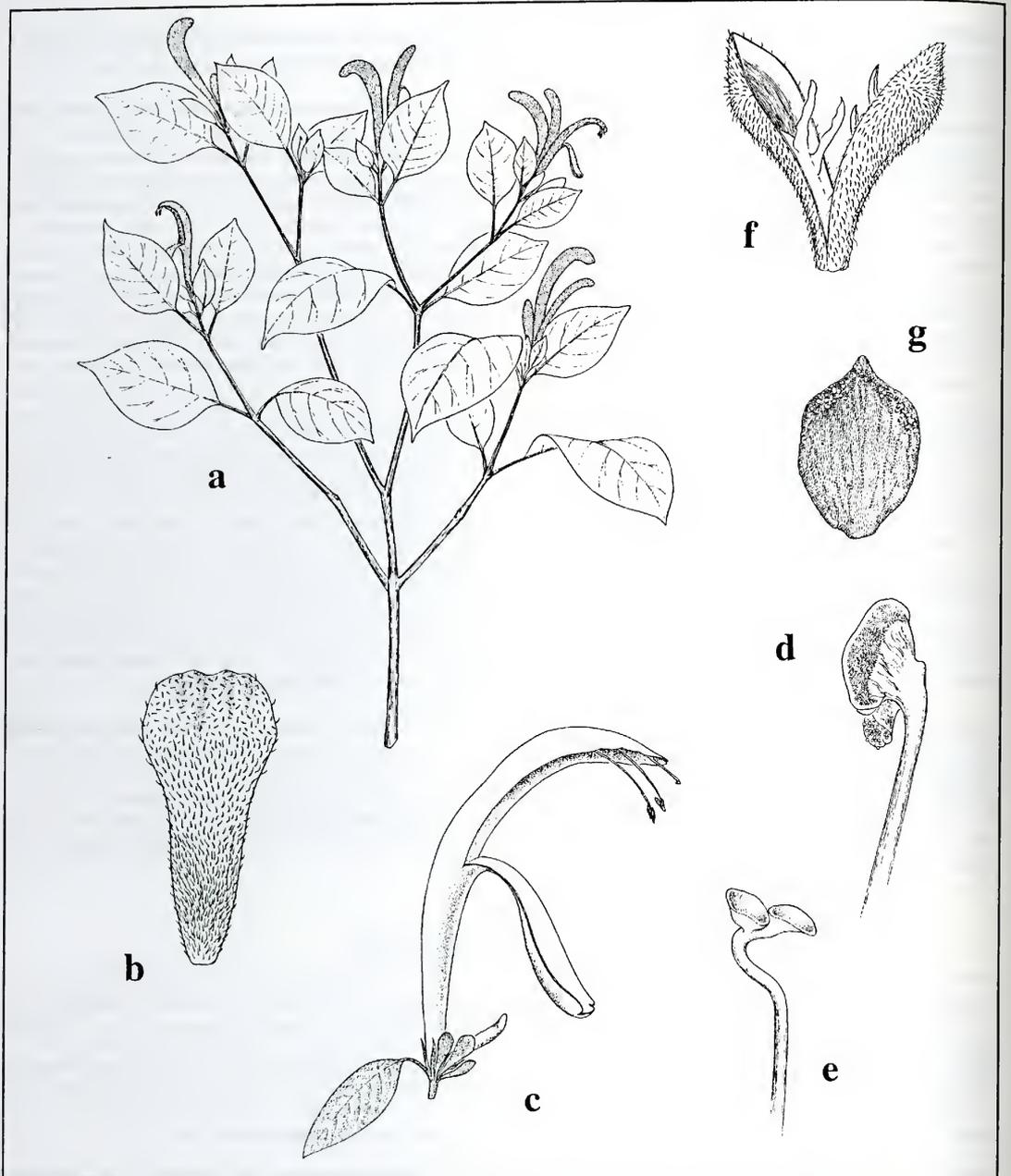


FIGURE 28. *Poikilacanthus macranthus* Lindau. a, habit (26283),  $\times 0.3$ ; b, bract (Matuda 4209),  $\times 6$ ; c, inflorescence node with flower and bud (39887),  $\times 0.9$ ; d, distal portion of stamen (39887),  $\times 6.5$ ; e, distal portion of style with stigma (39887),  $\times 19$ ; f, capsule (30904),  $\times 2.8$ ; g, seed (30904),  $\times 6.5$ . Drawn by Ellen del Valle.

pseudocolpi 2 per mesocolpium, the 2 sometimes fused near poles into pseudocolpal ellipses, exine reticulate; staminodes 0 or 2, short. Style included in corolla throat or exerted from mouth of corolla, stigma 2-lobed, lobes equal. Capsule stipitate, head ellipsoid with a medial constriction, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4 (in ours), homomorphic, plano-convex to lenticular, lacking trichomes. ( $x = 21$ ).

This genus of 40–60 species occurring in the tropics worldwide is in need of considerable study. Its relationships to *Odontonema*, *Chileranthemum*, *Pulchranthus* and *Oplonia* are especially

problematic in the New World. Cleistogamy and heterostyly are both present in *Pseuderanthemum* and have added to taxonomic confusion in the genus. Species previously treated in *Bucurgenia* represent plants of *Pseuderanthemum* with cleistogamous flowers (Daniel 1995). There are 10–15 species in Mexico. The following account should be regarded as preliminary. Some of the remaining problems and unusual specimens are noted.

REFERENCE: DANIEL, T.F. 1995. New and reconsidered Mexican Acanthaceae. VI. Chiapas. Proc. Calif. Acad. Sci. 48:253-282.

- a. Cultivated shrubs; inflorescence a thyrses (i.e., dichasia borne on peduncles 1–7.5 mm long); corolla white with maroon spots within (in ours); leaf margin revolute . . . . . 2. *P. carruthersii*
- aa. Native herbs; inflorescence usually of dichasiate spikes or racemes or panicles of spikes or racemes (i.e., dichasia sessile or borne on peduncles to 1 (–2) mm long); corolla pinkish or purplish; leaf margin flat to undulate.
  - b. Leaves present during anthesis, subcoriaceous; entire external surface of corolla pubescent; capsule pubescent with eglandular and stipitate glandular trichomes; occurring at elevations of 100–450 m . . . . . 7. *P. verapazense*
  - bb. Leaves present or absent during anthesis, if present, then membranaceous; corolla externally glabrous or usually with only throat and limb pubescent; capsule glabrous; occurring at elevations of 800–2760 m.
    - c. Leaves mostly or entirely absent during anthesis.
      - d. Inflorescence strict, erect; bracts imbricate, 6–10 mm long . . . . . 5. *P. hispidulum*
      - dd. Inflorescence lax, spreading; bracts not imbricate, 1.5–6 mm long . . . . . 6. *P. praecox*
    - cc. Leaves present during anthesis.
      - e. Flowers heterostylous; calyx 1.5–4.5 mm long.
        - f. Proximal leaves cordate- to truncate- to rounded-decurrent at base; calyx 1.5–3 mm long . . . . . 1. *P. alatum*
        - ff. Proximal leaves acute- to attenuate-decurrent at base; calyx 3–4.5 mm long . . . . . 3. *P. cuspidatum*
      - ee. Flowers homostylous; calyx 4.5–10 mm long . . . . . 4. *P. fasciculatum*

**1. *Pseuderanthemum alatum* (Nees) Radlk.**  
Sitzungsber. Math.-Phys. Kl. Bayer. Akad.  
Wiss. München 13:286. 1883.

— *Eranthemum alatum* Nees in A. DC. Prodr. 11:450. 1847. — TYPE: Mexico, Hidalgo, Tlacolula, C. Ehrenberg 1167 (B, destroyed).

ILLUSTRATION: none found.

Perennial herbs to 8 dm tall. Stems quadrate-sulcate to ± flattened, glabrous or pubescent with flexuose eglandular trichomes 0.2–1 (–1.5) mm long, trichomes sometimes restricted to 2 decussate lines. Leaves present during anthesis, petiolate (or distal 1–2 pairs sessile-clasping), petioles (naked portion) to 12 mm long, blades membranaceous, distal 1–2 pairs ovate to cordate to circular to obovate, 7–98 mm long, proximal pairs cordate to ovate to broadly ovate to subelliptic, 50–260 mm long, 20–125 mm wide, 1.8–2.8 times longer than wide, acute to acuminate at apex, cordate- to truncate- to rounded-decurrent at base, surfaces glabrous or sparsely pubescent (especially along veins) with cauline type trichomes, margin entire to ± sinuate, flat to ± undulate. Inflorescence of terminal pedunculate dichasiate spikes to racemes or panicles of spikes to racemes to 30 cm long, subtended by a pair of sessile-clasping reduced leaves, peduncles ± evenly pubescent with flexuose to erect to antrorse to retrorse eglandular trichomes 0.05–0.5 mm long, rachis glabrous or pubescent like peduncles; dichasia 1–3 (or more)-flowered, sessile to subsessile (i.e., peduncles to 0.5 mm long), subtended by bracts. Bracts triangular to subulate, 0.7–2 mm long, 0.7–1 mm wide, abaxial surface glabrous or pubescent like rachis. Bracteoles triangular, 0.5–1.2 mm long, 0.6–0.8 mm wide, abaxial surface glabrous or pubescent like bracts,

secondary bracteoles similar to bracteoles or smaller. Flowers chasmogamous and cleistogamous, heterostylous, subsessile to pedicellate, pedicels 0.5–2 mm long, glabrous. Calyx 1.5–3 mm long, lobes triangular to subulate, 1–2.2 mm long, abaxially glabrous or with scattered inconspicuous eglandular trichomes and sessile glands < 0.1 mm long. Chasmogamous corolla rose-pink with a white area spotted with rose-pink on lower-central lobe, 32–45 mm long, externally glabrous, narrow proximal portion of tube 22–30 mm long, 1.2–1.7 mm in diameter at base, narrowed to 0.7–1 mm in diameter at apex, throat 1.7–4 mm long, 1.5–2.3 mm in diameter, limb 17–28 mm in diameter, upper lip 10–14 mm long, lobes 7.5–13 mm long, 4–6 mm wide, lower lip 12–15 mm long, lobes 7.5–13 mm long, 4–8 mm wide. Stamens of thrum flowers exerted 1.5–3.2 mm beyond mouth of corolla, 4–5 mm long, stamens of pin flowers included in corolla tube, 2–2.5 mm long, thecae 1.2–1.6 mm long; staminodes 0.3–0.5 mm long. Style of pin flowers exerted 1–3.5 mm beyond mouth of corolla, 23–30 mm long, style of thrum flowers included in corolla tube, 16–21 mm long, glabrous, stigma lobes 0.2–0.3 mm long. Capsule 11–16 mm long, glabrous, stipe 5–8 mm long, head 6–8 mm long. Seeds 2–3.7 mm long, 1.9–2.7 mm wide, surfaces covered with ± antrorsely appressed minutely barbed conical projections forming ridges, these mostly reduced to low anastomosing ridges on mature seeds. Flowering: see discussion.

Vegetation type unknown; rare in SE Central Depression; ca. 800 m. Mex. (Tam., S.L.P., Jal., Qro., Hgo., Mich., Ver., Gro., Oax., Camp., Yuc., Chis.), Guat., Bel., Nic. CHIAPAS COLLECTION: V&S 71-17 (DS).

The above description has been substantially augmented with data from extralimital specimens. The sole

Chiapas collection was collected in flower sometime between January and May. Based on other collections of the species from throughout its range, flowering occurs from June through November and fruiting occurs from August through March.

The distinctions between *P. cuspidatum* and *P. alatum* are perhaps more tenuous than the key above would indicate. In most extralimital specimens of the latter species, at least the mature leaf blades are distinctly cordate (rarely only truncate) before tapering toward the node. In the sole specimen from Chiapas treated as *P. alatum*, the blades vary from rounded to truncate before tapering toward the node and are thus somewhat transitional to the situation in *P. cuspidatum*. The calyx length, however, would appear to indicate the affinity of this specimen. Similar leaves are present in a specimen from Costa Rica (i.e., *Brenes s.n.*, NY) that has calyx lobes more typical of *P. cuspidatum* (i.e., 3.5–4.2 mm long) and in a cultivated specimen (i.e., *Foster s.n.*, US) that has calyx lobes more typical of *P. alatum* (i.e., 1.3–2 mm long).

## 2. *Pseuderanthemum carruthersii* (Seem.) Guillaumin, Ann. Inst. Bot.-Géol. Colon. Marseille, ser. 6, 5–6:48. 1948.

— *Eranthemum carruthersii* Seem. Fl. vit. 185. 1866. —  
TYPE: fide Heine (Flore Nouvelle-Calédonie 7:60. 1976):  
"Erromango, MacGillivray" (K; isotype: BM).

*Eranthemum atropurpureum* W. Bull, Retail List of New and  
Beautiful and Rare Plants 110:6. 1875. —  
*Pseuderanthemum atropurpureum* (W. Bull) Radlk.,  
Sitzungsber. Math.-Phys. Kl. Bayer. Akad. Wiss.  
München 13:286. 1883. — *Pseuderanthemum*  
*atropurpureum* (W. Bull) L.H. Bailey, Gentes Herb. 1:130.  
1923. — *Pseuderanthemum carruthersii* var.  
*atropurpureum* (W. Bull) Fosberg, Phytologia 5:290.  
1955. — TYPE: not designated in protologue; fide Leonard  
(1953:307): "type grown in the Establishment for New and  
Rare Plants, King's Road, Chelsea, London, S.W., by  
William Bull"; fide Bailey (Gentes Herb. 4:352. 1940)  
quoting from a letter: "a specimen preserved in the Kew  
Herbarium, 'So. Sea Islands' ex Hort. Bull. xi/72, must be  
regarded as the type of *Eranthemum atropurpureum* Bull";  
and fide Heine (Flore Nouvelle-Calédonie 7:62. 1976):  
"Aucun échantillon-type n'ayant pu être localisé, la  
planche originale de Bull (1875) est choisie comme type."

ILLUSTRATIONS: Bot. Mag. 128:t. 7839. 1902; Gentes Herb. 1:130,  
fig. 61. 1923; Durkee 1986:15, fig. 13.

Shrubs to 2.5 m tall. Stems quadrate-sulcate, internodes glabrous, nodes pubescent with flexuose eglandular trichomes 0.1–0.2 mm long. Leaves present during anthesis, petiolate, petioles (naked portion) to 7 mm long, blades coriaceous, ovate-elliptic to elliptic, 24–76 mm long, 16–49 mm wide (reduced in size distally and intergrading with bracts), 1.5–2 times longer than wide, rounded to acute at apex, rounded to acute to subattenuate at base, surfaces and margin glabrous, margin entire, revolute. Inflorescence a terminal thyrse to 120 mm long, rachis glabrous; dichasia 1–3 (or more)-flowered, pedunculate, peduncles 1–7.5 mm long, subtended by bracts. Bracts persistent,

elliptic to ovate to triangular, 1.5–4 mm long, 0.8–1.5 mm wide (proximalmost pair sometimes obovate and to 11 mm long and 8 mm wide), abaxial surface glabrous to sparsely pubescent with antrorse eglandular trichomes (mostly restricted to midvein) to 0.1 mm long. Bracteoles lance-ovate to triangular, 1.3–1.5 mm long, 0.5–0.7 mm wide, abaxial surface glabrous or pubescent like bracts. Flowers chasmogamous, homostylous (at least in 8 cultivated specimens examined at CAS), pedicellate, pedicels 3.5–6 mm long, glabrous or very sparsely pubescent with erect eglandular and subglandular trichomes to 0.1 mm long. Calyx 3–4 mm long, lobes lanceolate to lance-subulate, 2.4–3.2 mm long, abaxially pubescent with erect eglandular and glandular trichomes to 0.1 mm long. Corolla white with maroon spots within, 17–19 mm long, externally glabrous, narrow proximal portion of tube 9 mm long, 2.2–3.2 mm in diameter at base, 2.2–2.5 mm in diameter at apex, throat (barely distinguishable from proximal portion of tube) 2.5–3 mm long, 3.5–4 mm in diameter, limb 15–19 mm in diameter, upper lip 8–11 mm long, lobes 7.5–8 mm long, 3–3.5 mm wide, lower lip 9.5–11 mm long, lobes 9–9.5 mm long, 3.8–7 mm wide. Stamens exerted up to 4 mm beyond mouth of corolla, 6 mm long, thecae 1.7–2 mm long; staminodes 1–2 mm long. Style included in corolla tube or exerted ca. 1 mm from mouth of corolla, 9–10.5 mm long, proximally pubescent with flexuose eglandular trichomes, stigma lobes 0.5–0.7 mm long. Capsule not seen. ( $n = 21$ ). Flowering: Jan.

Mostly cultivated in gardens and along streets; rare in Central Depression (Tuxtla Gutiérrez); 530 m. Mex. (Chis. and undoubtedly elsewhere), Hond., Nic., C.R., Pan., Antill., S.A. (Col., Braz.), Old World. CHIAPAS COLLECTION: 23548.

Presumably native to Polynesia, this species is much cultivated for ornament and sometimes is reported as spontaneous or escaping. As currently treated, this is a morphologically plastic species with considerable variation in foliar and floral coloration. Additional synonyms were provided by Heine (Flore Nouvelle-Calédonie 7:59–62. 1976) and Howard (Flora Lesser Antilles 6:378–379. 1989).

## 3. *Pseuderanthemum cuspidatum* (Nees) Radlk. Sitzungsber. Math.-Phys. Kl. Bayer. Akad. Wiss. München 13:286. 1883.

— *Eranthemum cuspidatum* Nees in Benth. Pl. Hartweg.  
148. 1845. — TYPE: Ecuador, Guayas, Guayaquil, Mar-  
Apr, T. Hartweg s.n. (K!).

*Buceragenia glandulosa* Leonard in Standl. Publ. Field Mus.  
Nat. Hist., Bot. Ser. 18:1205. 1938. — TYPE: Costa Rica,  
San José, Tres Ríos near San José, 1400 m, 17 Jan 1916,  
Holway 440 (US).

ILLUSTRATIONS: Gibson 1974:348, fig. 76; Gibson 1974:425, fig.  
96; Durkee 1986:6, fig. 4; Durkee 1986:15, fig. 13.

Perennial herbs to 1.2 m tall. Stems quadrate-sulcate to ± flattened, pubescent with flexuose to retrorse to antrorse eglandular trichomes 0.05–0.8 mm long, trichomes usually restricted to 2 decussate lines. Leaves present during anthesis, petiolate (or distal 1–several pairs subsessile to sessile), petioles (naked portion) to 45 mm long, blades membranaceous, distal

1-several pairs ovate to cordate-clasping, 6–130 mm long, proximal pairs ovate to elliptic to obovate, 18–200 mm long, 8.5–110 mm wide, 1.8–3.8 times longer than wide, acute to acuminate at apex, acute-to attenuate- to long-decurrent (sometimes tapered nearly to node) at base, surfaces glabrous or sparsely pubescent, especially along veins, with flexuose to antrorse to antrorsely appressed trichomes 0.1–0.5 mm long, margin entire, flat. Inflorescence of axillary and terminal sessile to pedunculate dichasiate spikes (to racemes or thyrses) or panicles to 30 cm long, subtended by a pair of subsessile- to sessile-clasping reduced leaves, peduncles (if present) ± evenly pubescent with erect to flexuose to antrorse glandular and/or eglandular trichomes 0.05–0.7 mm long, eglandular trichomes sometimes concentrated in 2 lines, glandular trichomes (if present) ± evenly disposed, rachis pubescent with erect to flexuose to antrorse eglandular trichomes 0.05–0.7 mm long, trichomes ± evenly disposed or concentrated in 2 lines, or rachis pubescent like peduncle or with glands (if present on peduncle) becoming sparse (rarely absent); dichasia 1–3 (or more)- flowered, sessile to subsessile (i.e., peduncles to 0.7 mm long, rarely pedunculate with peduncles to 2 mm long), subtended by bracts. Bracts triangular to lance-subulate, 1.3–4.5 mm long, 0.6–1.6 mm wide (proximal pairs sometimes intergrading with reduced leaves subtending inflorescence and larger), abaxial surface glabrous or very sparsely pubescent with trichomes like those of rachis. Bracteoles triangular to subulate, 1–3 mm long, 0.4–1 mm wide, abaxial surface glabrous or pubescent like bracts, secondary bracteoles (if present) similar to bracteoles except smaller. Flowers chasmogamous or cleistogamous, homostylous or heterostylous, sessile to pedicellate, pedicels to 1.7 mm long, glabrous or pubescent with eglandular trichomes to 0.1 mm long. Calyx 3–4.5 mm long, lobes subulate, 2–3.5 mm long, abaxially glabrous or with scattered inconspicuous antrorsely appressed eglandular trichomes to 0.1 mm long. Chasmogamous corolla purplish with a white area spotted with purple on lower-central lobe, 16–45 mm long, externally glabrous, narrow proximal portion of tube cylindrical, 9–29 mm long, 1–2.1 mm in diameter at base, 0.7–1.3 mm in diameter at apex, throat 2–4 mm long, 1.5–3 mm in diameter, limb 12–22 mm in diameter, upper lip 5.5–10.5 mm long, lobes 5–9.5 mm long, 3–6 mm wide, lower lip 5.5–13 mm long, lobes 5.3–12 mm long, 3.5–7.5 mm wide. Stamens of homostylous plants (see discussion) included in corolla tube, 2.5–3 mm long, stamens of thrum flowers exerted 2.2–3 mm from mouth of corolla, 4–5 mm long, stamens of pin flowers included in corolla tube, 1.5–2.1 mm long, thecae 1.3–1.9 mm long; staminodes 0.5 mm long in homostylous flowers, 0.2–0.3 mm long in pin flowers, 0.5–0.6 mm long in thrum flowers. Style of homostylous flowers included in corolla tube, 4.5–10.5 mm long, style of pin flowers exerted 1.5–3.5 mm from mouth of corolla, 22–28 mm long, style of thrum flowers included in corolla tube, 19–22 mm long, style glabrous or sparsely pubescent with eglandular trichomes proximally, stigma lobes 0.1–0.2 mm long. Capsule 12–21 mm long, glabrous, stipe 5–9 mm long, head 6.5–12.5 mm long. Seeds 2.1–3.5 mm long, 1.8–2.7 mm wide, surfaces when immature covered with ± antrorsely appressed conical projections forming ridges, when mature covered with low rounded anastomosing ridges. Flowering and fruiting Jun–Dec.

Ridges and slopes in Lower Montane Rain Forest, Montane Rain Forest, Evergreen Cloud Forest, Evergreen Seasonal Forest, Tropical Deciduous Forest, and Pine-Oak-Liquidambar

Forest; common in Northern Highlands, Central Plateau, Central Depression, and Sierra Madre; 800–2700 m. Mex. (Pue., Ver., Oax., Chis.), Guat., Hond., Nic., C.R., Pan., S.A. (Ven., Ecu.). CHIAPAS COLLECTIONS: *Cb 3060* (CAS); *C 356* (DS); *GG 51* (CAS); *GG 421* (CAS); *EL 5809* (MEXU, RSA, US); *EM S-216* (GH, MICH, MO, NY, US); *EM 1606* (CAS, GH, MICH, MO, US); *Mi 6679* (MEXU); *Pa 1725* (CAS); *R&B 20031* (DS, MICH); *R&R&M 1237* (ENCB, US); *T&L 40281* (DS, RSA); *Ti 636-41* (DS, RSA); *T 2802* (DS, ENCB, F); *We 17862* (DS); *Z 58* (DS); *Z 187* (DS, ENCB); *Z 275* (DS); *7007*; *11942*; *15386*; *15414*; *20275*; *20975*; *26105*; *26818*; *28442*; *29137*; *29719*; *30780*; *37815*, *38163*; *38799*; *39992*; *45998*; *47103*; *53461*; *69938*; *70551*; *70692*; *70880*; *71436*; *71483*.

Local names: “bik’it jun tz’utuj” (Tzotzil, *González G. 51*); “sikil vomol” (Tzotzil, *González G. 421*).

Uses: a plaster of crushed leaves is applied for scabies (*González G. 51*); vapors of the leaves boiled with lime are used for treating welts or boils (*González G. 421*).

Baum (Brittonia 34:433. 1982) made the same combination in *Pseuderanthemum* for *Eranthemum cuspidatum* that had been previously made by Radlkofe.

*Pseuderanthemum cuspidatum* is here treated in a broad sense to include two rather distinctive forms, both of which occur in Chiapas as well as in other portions of the range of the species (e.g., Guatemala, Costa Rica). The typical form has eglandular inflorescence peduncles and rachises and heterostylous flowers with the corollas varying in length from 32–45 mm. It occurs at elevations between 800 and 1350 m. In Chiapas it is represented by *EM S-216*, *EM 1606*, *Mi 6679*, *Pa 1725*, *We 17862*, *20275*, *20975*, *28442*, *29137*, *29719*, *30780*, *37815*, *38163*, *39992*, *45998*, *47103*, *69938*, *70692*, and *70880*. A form with glandular peduncles and rachises and homostylous flowers with the corollas 16–28 mm long occurs at somewhat higher elevations (1300–2700 m). It is represented in Chiapas by the remaining collections listed above and includes cleistogamous-flowered individuals previously treated as *Buceragenia glandulosa*. Outside of Chiapas, it is possible that these forms grow together. *Johnson 754* (US) from Guatemala contains 2 plants, one representing each form. In some extra-Chiapan specimens (e.g., *Hall & Backus 7916* at GH from Nicaragua, *Neill 2328* at MO from Nicaragua, and *Holmes 4369* at NY from Honduras) the distinctions between these forms are not so clear. In these specimens, the pubescence is eglandular and the corollas vary from 24–26 mm in length. In some specimens from outside of Chiapas (e.g., *Ventura A. 17667* at ENCB from Veracruz, *Stevens 5982* at MO from Nicaragua, and *Daniel & Almeda 6370* at CAS from Costa Rica) that otherwise resemble the form with glandular inflorescences and smaller corollas, sparse glands are present on the capsules. *Daniel & Almeda 6370* also has glands on the calyces.

The leaf blades in most specimens are acute- to attenuate- to long-decurrent at the base. In some specimens (e.g., *Breedlove 37815*) the leaf bases are sometimes rounded-decurrent and are thus intermediate

between those of *P. cuspidatum* and *P. alatum*. Calyx length confirms placement of these specimens in *P. cuspidatum*, however. Calyces less than 3 mm long were encountered only in one specimen (*Breedlove 53461* with calyces 2.5 mm long) among those treated here as *P. cuspidatum*. See discussion under *P. alatum*.

#### 4. *Pseuderanthemum fasciculatum* (Oerst.) Leonard, Kew Bull. 1938:69. 1938.

— *Eranthemum fasciculatum* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:166. 1855. — *Siphoneranthemum fasciculatum* (Oerst.) Kuntze, Revis. gen. pl. 2:497. 1891. — TYPE: Mexico, Veracruz, Mirador, Apr 1842, *F. Liebmann 10654* (C!).

*Thyrsacanthus foliaceo-bracteatus* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:146. 1855. — *Odontonema foliaceo-bracteatum* (Oerst.) Kuntze, Revis. gen. pl. 2:494. 1891. — *Buceragenia foliaceo-bracteata* (Oerst.) V.M. Baum, Brittonia 34:433. 1982. — TYPE: Mexico, Veracruz, Mirador, Oct 1841, *F. Liebmann 10707* (C!).

*Buceragenia ruellioides* Leonard, J. Wash. Acad. Sci. 32:341. 1942. — TYPE: Mexico, Veracruz, Zacuapam, Oct 1929, *C. Purpus 14083* (DS!).

ILLUSTRATION: none found.

Perennial herbs to 5 dm tall. Stems subquadrate to quadrately sulcate, bifariously or evenly pubescent with flexuose to retrorse eglandular trichomes 0.05–1 mm long. Leaves present during anthesis, petiolate (or distal pairs intergrading with bracts and subsessile to sessile), petioles (naked portion) to 20 mm long, blades membranaceous, distal 1–several pair(s) often intergrading with bracts, 5–6 mm long, proximal pairs ovate to elliptic to lanceolate to subcircular, 8–100 mm long, 5–50 mm wide, 1.1–2.8 (–6) times longer than wide, acute to acuminate (to subfalcate) at apex, (acute to) attenuate to long-decurrent (to or nearly to node) at base, surfaces pubescent with erect to flexuose to antrorse to antrorsely appressed eglandular trichomes 0.05–0.7, trichomes sometimes restricted to major veins, or adaxial surface sometimes glabrous or glabrate, margin entire to somewhat sinuate, flat to ± undulate. Inflorescence of axillary dichasia and/or of axillary or terminal dichasiate spikes, racemes, or thyrses to 18 cm long, rachis (if present) pubescent like young stems (or with trichomes becoming ± antrorse distally) or ± evenly pubescent with flexuose-antrorse to antrorse eglandular trichomes 0.2–0.4 mm long and stipitate glands 0.1–0.3 mm long, the proximal internodes becoming mostly eglandular and with trichomes concentrated in 2 lines; dichasia 1–3 (or more)-flowered, sessile to pedunculate, peduncles to 2 mm long, subtended by leaves or bracts. Bracts (if present) lance-subulate to linear-lanceolate to elliptic, 2–12 mm long, 0.6–4 mm wide, abaxial surface pubescent with antrorse eglandular trichomes 0.1–0.3 mm long. Bracteoles triangular to subulate to lance-subulate to elliptic, 1.5–13 mm long, 0.5–5 mm wide, abaxial surface pubescent like bracts, secondary bracteoles (if present) similar to bracteoles except often smaller. Flowers cleistogamous and/or chasmogamous, homostylous, sessile to pedicellate, pedicels (if present) to 4.5 mm long, pubescent with erect to antrorse eglandular trichomes 0.1–0.3 mm long and usually with stipitate glands as well. Calyx 4.5–10 mm long, lobes subulate, 4–9 mm long, abaxially pubescent

(sometimes very sparsely so) with erect to antrorse eglandular trichomes 0.1–0.3 mm long and sometimes with stipitate glandular trichomes 0.05–0.2 mm long as well, sometimes becoming glabrate. Chasmogamous corolla purplish to pinkish, 16–32 mm long, externally glabrous or with distal portion of tube (sometimes just throat) and limb (sometimes just basal portion) pubescent with erect to flexuose to downward-pointing eglandular trichomes 0.1–0.2 mm long, narrow proximal portion of tube 7–16 mm long, 1.5–2.5 mm in diameter at base, 0.6–1.1 mm in diameter at apex, throat 3–7 mm long, 1.5–2.5 mm in diameter, limb 11–22.5 mm in diameter, upper lip 5–11 mm long, lobes 5–10.5 mm long, 2.5–5.5 mm wide, lower lip 6–12 mm long, lobes 4.5–11 mm long, 3.6–6.5 mm wide. Stamens included in corolla tube, 3–4.5 mm long, thecae 2–2.7 mm long; staminodes 0.6–1.1 mm long. Style exerted 1.5–3 mm beyond mouth of corolla, 13–18 mm long, glabrous or with eglandular trichomes near base, stigma lobes 0.3–0.8 mm long. Capsule 11–19 mm long, glabrous, stipe 4–8 mm long, head 7–12 mm long. Seeds 3–4.5 mm long, 2.3–3.3 mm wide, surfaces covered with low rounded anastomosing ridges, these sometimes beset with subconic papillae. Flowering and fruiting Oct–May.

Slopes in Montane Rain Forest, Evergreen Cloud Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common in Central Plateau and Sierra Madre; 860–2760 m. Mex. (Pue., Ver., Chis.), Guat., Hond., Salv., Nic., C.R. CHIAPAS COLLECTIONS: *Dan 5875* (CAS, K, MEXU, MICH); *Den 1635* (MICH); *He 725* (CAS); *EM 16269* (US); *SC 376* (CAS); *SC 380* (CAS); *T 903* (DS, F, MICH, US); *T 2343* (DS, LL, US); *X&S X-458* (DS); *24393*; *25034*; *25387*; *30997*; *58287*; *68359*; *70847*.

Local names: “tan wamal” (Tzeltal, *Sántiz C. 376*); “tzajal wamal” (Tzeltal, *Sántiz C. 380*).

Uses: a plaster of crushed stems and leaves is applied for scabies (*Sántiz C. 380*); a boiled solution of leaves and roots is taken orally (?) for “aggressive madness” (*Sántiz C. 376*).

Daniel (1995) noted two forms of this species, one conforming to the types of *Thyrsacanthus foliaceo-bracteatus* and *Buceragenia ruellioides* (represented in Chiapas by *Daniel et al. 5875*, *Sántiz C. 376*, *Sántiz C. 380*, and *Breedlove & Daniel 70847*) and the other conforming to the type of *P. fasciculatum* (represented in Chiapas by all other collections listed above). The former differs from the latter by its evenly (vs. bifariously) disposed cauline trichomes, eglandular (vs. glandular) pubescence of the rachis and abaxial surface of the calyx, longer (4–13 mm long vs. 1.5–4 mm long) bracteoles, and sessile to subsessile (i.e., with pedicels, if present, to 1 mm long vs. pedicellate with pedicels 2.5–4.5 mm long) flowers.

Plants conforming to the types of *Thyrsacanthus foliaceo-bracteatus* and *Buceragenia ruellioides* usually have been collected with only cleistogamous flowers. A drawing attached to the type of *Thyrsacanthus foliaceo-bracteatus* shows details of flowers (including corollas) of what appears to be an *Odontonema*. Corollas are not extant on the type, and in the protologue, Oersted noted that corollas were lacking. *Sántiz C. 380* has poorly preserved remains of the basal portion of a putatively chasmogamous flower and plants of *Daniel 5875* grown in a greenhouse eventually yielded chasmogam-

ous flowers. Additional discussion of the broad circumscription herewith accorded *P. fasciculatum* was provided by Daniel (1995).

**5. *Pseuderanthemum hispidulum* (Nees) Radlk. Sitzungsber. Math.-Phys. Kl. Bayer. Akad. Wiss. München 13:286. 1883.**

— *Eranthemum hispidulum* Nees in A. DC. Prodr. 11:450. 1847. — TYPE: "woods near Vera Cruz," Feb 1840, *H. Galeotti* 929 (K!).

ILLUSTRATION: none found.

Perennial herbs to 2.5 dm tall. Stems quadrate-sulcate, pubescent with flexuose to retrorse eglandular trichomes 0.2–1 mm long, trichomes evenly disposed or concentrated in 2 decussate lines. Leaves mostly or entirely absent during anthesis, subsessile (distally) to petiolate (proximally), petioles (naked portion) to 12 mm long, blades membranaceous to subcoriaceous, elliptic to ovate, 13–70 mm long, 5–30 mm wide (reduced in size distally and intergrading with bracts), 2.1–2.9 times longer than wide, rounded to acute at apex, rounded to acute to long-decurrent at base, surfaces sparsely pubescent with erect to flexuose to antrorse eglandular trichomes 0.05–0.4 mm long and covered with inconspicuous sessile glands, margin entire, flat. Inflorescence of strict erect terminal dichasiate spikes to 10 cm long (these sometimes appearing as axillary inflorescences in absence of leaves), rachis pubescent with erect to retrorse to flexuose to antrorse eglandular trichomes 0.1–0.7 mm long and, at least distally, with erect glandular trichomes 0.1 mm long; dichasia 1–3-flowered, sessile, subtended by leaves or bracts. Bracts imbricate (at least distally), linear to lance-elliptic to oblanceolate-elliptic to lance-subulate, 6–10 mm long, 0.7–2.5 mm wide, abaxial surface pubescent with eglandular trichomes like those of rachis. Bracteoles (linear to) subulate, 4–6 mm long, 0.4–0.8 mm wide, abaxial surface pubescent like bracts and sometimes with a few inconspicuous glands to 0.1 mm long as well, secondary bracteoles (if present) similar to bracteoles except smaller. Flowers chasmogamous, homostylous, sessile or subsessile (i.e., pedicels to 1 mm long). Calyx 5–10 mm long, lobes linear to subulate, 4.5–9 mm long, abaxially pubescent like bracteoles but with glands more numerous and up to 0.2 mm long (i.e., conspicuously glandular). Corolla purplish or pinkish, 20–30 mm long, external surface of narrow proximal portion of tube glabrous, external surface of throat and limb sparsely pubescent with erect to flexuose eglandular trichomes to 0.2 mm long, narrow proximal portion of tube 10–15 mm long, 1.2–2 mm in diameter at base, narrowed to 0.5–1 mm in diameter at throat, throat 3–5 mm long, 1.1–1.8 mm in diameter, limb 13–20 mm in diameter, upper lip 7–9.5 (–12) mm long, lobes 6.8–9.5 (–12) mm long, 3–4.8 mm wide, lower lip 7–9.5 (–12.5) mm long, lateral lobes 6.5–9 (–11.5) mm long, 3.5–5.5 mm wide, lower-central lobe 5.5–8.5 (–11) mm long, 3–5.8 mm wide. Stamens included in corolla tube, 2.5–3 mm long, thecae 2–2.5 mm long. Staminodes 0.7–0.9 mm long. Style exerted up to 1.5 mm beyond mouth of corolla, 17–18 mm long, proximally pubescent with eglandular trichomes, stigma lobes 0.4–0.8 mm long. Capsule 12–14 mm long, glabrous, stipe 4–5.5 mm long, head 7–9 mm long. Seeds 2.5–2.8 mm long, 2–2.2

mm wide, surfaces tuberculate-ridged with prominent subconic tubercles and ridges. Flowering and fruiting Jan–Apr.

Slopes in Tropical Deciduous Forest and Pine–Oak Forest; uncommon in Central Plateau and Central Depression; 1330–1770 m. Mex. (Qro., Gro., Ver., Chis.). CHIAPAS COLLECTIONS: *Dan* 5024 (CAS); *Dan* 6205 (CAS); *Lm* 3811 (US); 49803; 50109.

The distinctions between *P. hispidulum* and *P. praecox* are somewhat tenuous. See discussion under the latter species.

**6. *Pseuderanthemum praecox* (Benth.) Leonard, J. Wash. Acad. Sci. 31:99. 1941.**

— *Siphoneranthemum praecox* (Benth.) Kuntze, Revis. gen. pl. 2:497. 1891. — *Eranthemum praecox* Benth. Pl. Hartweg. 291. 1848–1849. — TYPE: Mexico, Guanajuato, Santa Rosa near Guanajuato, *T. Hartweg* 1614 (K!).

ILLUSTRATION: Sánchez S., Flora Valle de México, fig. 297B. 1979.

Perennial herbs to 4 dm tall. Stems subquadrate to quadrate-sulcate, distal portion pubescent with flexuose to retrorse to retrorsely appressed eglandular trichomes 0.1–0.5 (–1) mm long, trichomes often concentrated in 2 decussate lines, proximal portion often glabrate. Leaves mostly or entirely absent during anthesis, petiolate, petioles (naked portion) to 11 mm long, blades subcoriaceous, ovate to subcircular, 7.5–75 mm long, 3.5–32 mm wide, 1.2–2.3 times longer than wide, rounded to acute at apex, (truncate to) rounded to acute to attenuate to long-decurrent at base, surfaces sparsely pubescent with antrorsely appressed eglandular trichomes mostly restricted to major veins and covered with inconspicuous sessile glandular trichomes, margin entire, flat. Inflorescence of lax spreading terminal dichasiate spikes to racemes to 10 cm long, distal portion of rachis ± evenly pubescent with flexuose retrorse or antrorse eglandular trichomes 0.1–0.5 mm long and stipitate glandular trichomes 0.1–0.2 mm long, rachis soon becoming entirely eglandular; dichasia 1–3-flowered, sessile to subsessile (i.e., peduncles to 1 mm long), subtended by leaves and bracts. Bracts triangular to subulate to lance-subulate, 1.5–6 mm long, 0.8–1.1 mm wide, abaxial surface glabrous to sparsely pubescent with antrorse eglandular trichomes to 0.3 mm long (rarely with stipitate glands as on rachis as well). Bracteoles triangular to subulate, 1.5–5 mm long, 0.7–1 mm wide, abaxial surface glabrous or pubescent like bracts, secondary bracteoles similar to bracteoles except usually smaller and often more densely glandular. Flowers chasmogamous, homostylous, sessile to pedicellate, pedicels (if present) to 2 mm long, pubescent with erect to flexuose to retrorse to antrorse eglandular (and often glandular) trichomes 0.05–0.2 mm long. Calyx 4–8 mm long, lobes subulate, 4.5–6 mm long, abaxially pubescent with erect to flexuose eglandular trichomes 0.1–0.3 (–0.6) mm long and glandular trichomes 0.05–0.2 mm long. Corolla lavender with white area near base of lower-central lobe, 20–35 mm long, external surface of narrow proximal portion of tube glabrous, external surface of throat and limb pubescent with flexuose eglandular trichomes, narrow proximal portion of tube 9–16 mm long, 1.6–2 mm in diameter at base, narrowed to 0.9–1 mm in diameter at apex, throat (3.5–) 6–8 mm long, 1.4–2 mm in diameter, limb (14–) 18–25 mm in diameter, upper lip (6.5–)

7.5–12 mm long, lobes (6–) 7–11 mm long, 3.5–5 mm wide, lower lip (7–) 9–13.5 mm long, lobes (6.5–) 8.5–12.5 mm long, 4.3–7 mm wide. Stamens included in corolla tube, 2.5–2.8 mm long, thecae 1.8–2.1 mm long; staminodes 0.5 mm long. Style exerted 0.5–2.5 mm beyond mouth of corolla, 11–20 mm long, glabrous, stigma lobes 0.2–0.5 mm long. Capsule 10–15 mm long, glabrous, stipe 4 mm long, head 8–9 mm long. Seeds 2.8–3.2 mm long, 2.1–2.7 mm wide, surfaces covered with subconic tubercles or rounded bumps and with an anastomosing network of low rounded ridges. Flowering Jan–Mar; fruiting: Feb–Mar.

Slopes and bogs in Montane Rain Forest and Pine-Oak Forest; uncommon in Central Plateau and Sierra Madre; 2100–2300 m. Mex. (Son., Tam., Sin., Dgo., Zac., Nay., Jal., Gto., Qro., Hgo., Mich., Méx., D.F., Mlos., Pue., Gro., Oax., Chis.), Guat. CHIAPAS COLLECTIONS: *Go 825* (US); *La 72* (DS, F, MICH, US); *9205*; *31726-A*; *34360*; *49935*.

Most specimens from Central America (cf. distribution in Gibson 1974) identified with this name do not pertain to the type of *P. praecox*.

As treated above, *P. praecox* appears to differ from *P. hispidulum* only in the rather minor features noted in the key. Further studies of *P. praecox*, *P. hispidulum*, *P. axillare* Leonard, and *P. biceps* Lindau will be necessary in order to resolve specific boundaries among these species.

## 7. *Pseuderanthemum verapazense* Donn. Sm., Bot. Gaz. (Crawfordsville) 48:299. 1909.

— TYPE: Guatemala, Alta Verapaz, ad Yaxcabnal, Cublquit, 320 m, 21 Mar 1902, *H. von Tuerckheim 8258* (US!).

*Pseuderanthemum adenocalyx* Lindau, Repert. Spec. Nov. Regni Veg. 12:425. 1913. — SYNTYPES: Mexico, Chiapas: Palenque ruins, Mar 1911, *C. Selser & E. Selser 5506* (presumably B, destroyed); Guatemala, Alta Verapaz: prope Cublquit, 350 m, *H. von Tuerckheim 8258* (presumably B, destroyed).

*Eranthemum adenocarpum* S.F. Blake, Contr. Gray Herb. 52:98. 1917. — *Pseuderanthemum adenocarpum* (S.F. Blake) S.F. Blake, Proc. Biol. Soc. Wash. 34:200. 1923.

— TYPE: Belize, Toledo, low forest, 10 Apr 1907, *M. Peck 830* (GH!; isotype: K!).

ILLUSTRATION: Fig. 29.

Perennial herbs to 6 dm tall. Stems subquadrate-sulcate to subterete, pubescent with an understory (often absent) of evenly disposed erect eglandular trichomes to 0.1 mm long (puberulent) and an overstory (absent on some internodes) of bifarious recurved (to flexuose) eglandular trichomes 0.1–0.8 mm long. Leaves present during anthesis, sessile to petiolate, petioles (naked portion) to 6 mm long, blades subcoriaceous, (obovate-elliptic to) elliptic to ovate-elliptic to lanceolate (sometimes broadly elliptic to subcircular at base of plant), 25–120 mm long, 8.5–47 mm wide, (1.1–) 1.9–4.2 (–6) times longer than wide, (rounded to) acuminate to subfalcate at apex, acute to attenuate at base, adaxial surface glabrous to puberulent, abaxial surface usually sparsely puberulent along midvein, both surfaces with inconspicuous sessile glands, margin entire to some-

what sinuate, flat to somewhat undulate. Inflorescence of axillary or, more often, terminal dichasiate racemes (to thyrses) or sparingly and basally branched panicles of racemes (to thyrses) to 17 cm long, rachis puberulent; dichasia 1–3-flowered, sessile or subsessile (i.e., peduncles to 1 mm long, rarely with proximal dichasia borne on peduncles to 2 mm long), subtended by bracts. Bracts triangular-subulate to subulate, 1–2 mm long (proximalmost pair often up to 4.5 mm long), 0.5–1 mm wide, abaxial surface puberulent. Bracteoles triangular-subulate, 0.8–1.5 mm long, 0.4–0.8 mm wide, abaxial surface puberulent, secondary bracteoles (if present) similar to bracteoles except smaller. Flowers chasmogamous, homostylous, pedicellate, pedicels 1–2.5 mm long, puberulent or pubescent with glandular and eglandular trichomes 0.05–0.2 mm long. Calyx 2.5–4 mm long, lobes subulate, 2–3.5 mm long, abaxially pubescent with glandular and eglandular trichomes 0.05–0.2 mm long, sometimes becoming glabrate. Corolla pinkish purple, (16–) 18–35 mm long, externally pubescent with glandular and/or eglandular trichomes 0.1–0.2 mm long, narrow proximal portion of tube 8–17 mm long, 1–1.5 mm in diameter at base, 0.6–1 mm in diameter at apex, throat 4–8 mm long, 1.3–2 mm in diameter, limb 11–23 mm in diameter, upper lip (4–) 5.2–11 mm long, lobes (3.8–) 4.3–11 mm long, (1.2–) 3.5–5.5 mm wide, lower lip (4.2–) 6–12 mm long, lateral lobes (4–) 5.5–12 mm long, (2–) 3–6 mm wide, lower-central lobe (4–) 5–12 mm long, (2–) 2.8–5.5 mm wide. Stamens included in corolla tube, 2–2.3 mm long, thecae 1–1.7 mm long; staminodes 1.5 mm long. Style included in corolla tube or exerted up to 2 mm from mouth of corolla, 13–20 mm long, glabrous or pubescent with eglandular trichomes proximally, stigma lobes 0.3–0.7 mm long. Capsule 12–20 mm long, pubescent over entire surface with glandular and eglandular trichomes 0.1–0.2 mm long, stipe 5–10 mm long, head 7–10 mm long. Seeds 3–4 mm long, 2–3 mm wide, surfaces verrucose with the projections often forming low rounded ridges. Flowering and fruiting Dec–May.

Slopes, ridges, and along streams in Tropical Rain Forest and Lower Montane Rain Forest; common in Northern Highlands and Eastern Highlands; 100–450 m. Mex. (Ver., Tab., Chis.), Guat., Bel. CHIAPAS COLLECTIONS: *Ber s.n.* (ARIZ); *Cb 8156* (CAS); *Dan 5009* (CAS); *Fe 1387* (ENCB); *Hoov 143* (MO); *Mz 11456* (CAS); *Mz 11841* (CAS); *Mz 17742* (CAS); *Mz 17771* (CAS); *Mz 18254* (CAS); *Mv B-396* (MEXU); *Me 2032* (US); *QVU 501* (U); *So 1561* (MICH, US); *Su s.n.* (ARIZ); *Ven 19990* (CAS, ENCB); *Ven 20007* (GH); *24195*; *33335*; *33867*; *34069*; *34488*; *34957*; *35344*; *49863*; *57351*.

In the protologue of *Pseuderanthemum adenocalyx*, Lindau cited the same collection of von Tuerckheim that was used for the holotype of *P. verapazense*. Because Lindau presumably cited an isotype of this collection his name would not be considered as superfluous, and therefore illegitimate, under Article 63 of the International Code of Botanical Nomenclature. Attached to the holotype of *P. verapazense* at US there is letter from Lindau (dated 1903) identifying this number as a new species of *Pseuderanthemum*. Because Lindau did not annotate the sheet, it would seem logical that he received a duplicate specimen for identification, which was subsequently destroyed at B in 1943, and that that specimen (along with the Selers' collection which is not represented at US and must have been at B) was the basis for his protologue.

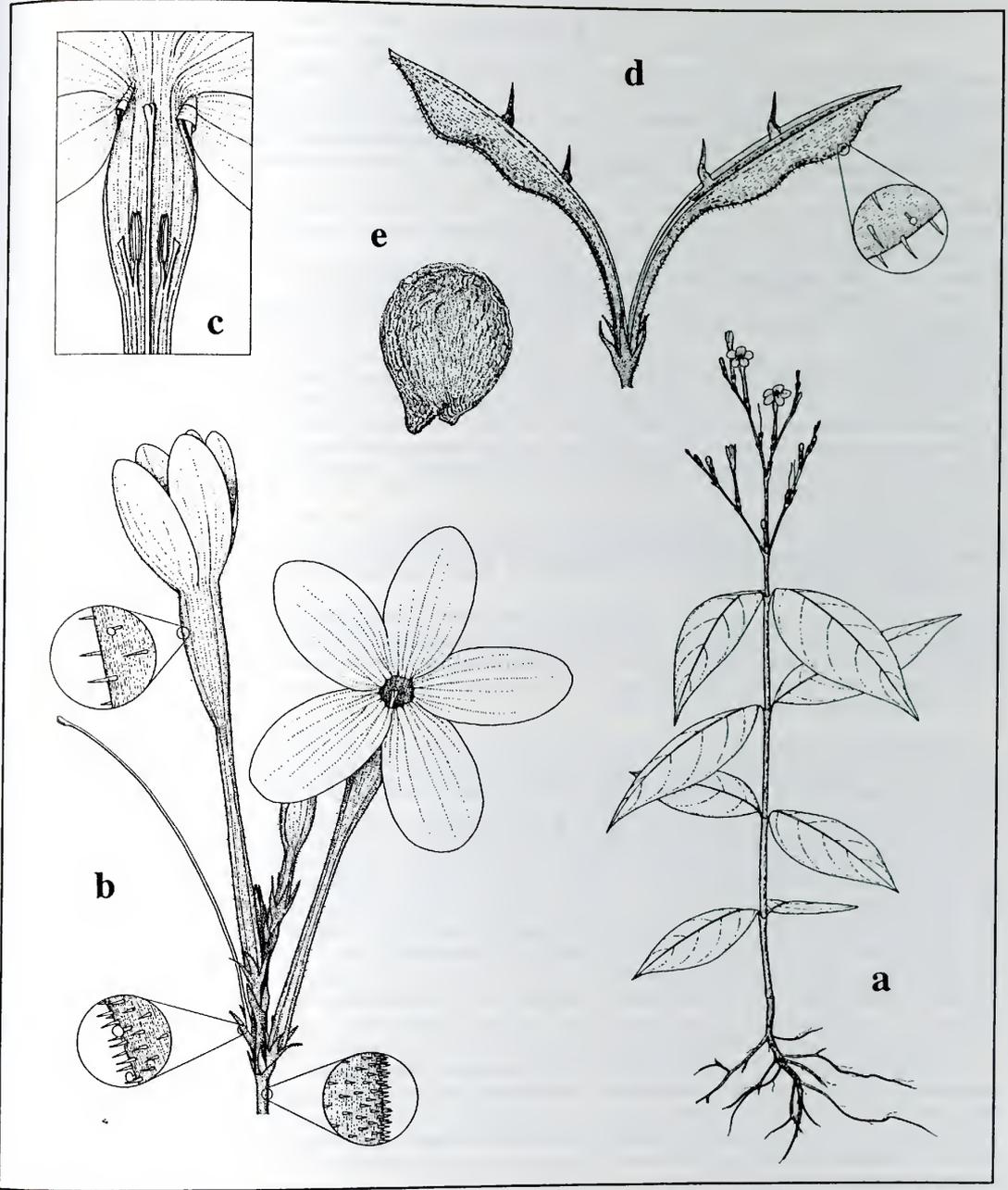


FIGURE 29. *Pseuderanthemum verapazense* Donn. Sm. (a–c from Vázquez T. *et al.* 2375, d–e from 34488). a, habit,  $\times 0.4$ ; b, inflorescence with flowers,  $\times 2.8$  (with enlargements showing pubescence); c, corolla cut open showing androecium and distal portion of gynoecium,  $\times 5$ ; d, capsule,  $\times 4$  (with enlargement showing pubescence); e, seed,  $\times 8.5$ . Drawn by Mary Ann Tenorio.

## 23. RUELLIA

- Ruellia* L. Sp. pl. 634. 1753. — LECTOTYPE (Britton and Brown, Ill. fl. n. U.S., ed. 2, 3:241. 1913): *Ruellia tuberosa* L.  
*Stephanophysum* Pohl, Pl. bras. icon. descr. 2:83. 1831. — LECTOTYPE (Bremekamp and Nannenga Bremekamp, Verh. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 45(1):13. 1948): *Stephanophysum longifolium* Pohl.  
*Dipteracanthus* Nees in Wall. Pl. asiat. rar. 3:75, 81. 1832. — LECTOTYPE (Bremekamp and Nannenga Bremekamp, Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 45(1):15. 1948): *Dipteracanthus prostratus* (Poir.) Nees (= *Ruellia prostrata* Poir.).  
*Aphragmia* Nees in Lindl. Intr. nat. syst. bot. ed. 2, 444. 1836. — TYPE: *Aphragmia haenkei* Nees (= *Ruellia inundata* Kunth).  
*Gymnacanthus* Nees in Lindl. Intr. nat. syst. bot. ed. 2, 444. 1836, non *Gymnacanthus* Oerst. (1854). — TYPE: *Gymnacanthus petiolaris* Nees (= *Ruellia petiolaris* (Nees) T.F. Daniel).  
*Cryphiacanthus* Nees, Index Sem. Horti Vratislav. 1841; Linnaea 16:298. 1842. — LECTOTYPE (designated fide Index Nom. Gen. Pl.): *Cryphiacanthus barbadensis* Nees, nomen illegit. (= *Ruellia tuberosa* L.).  
*Sclerocalyx* Nees in Benth. Bot. voy. Sulphur 145. 1846. — TYPE: *Sclerocalyx mexicanus* Nees (= *Ruellia petiolaris* (Nees) T.F. Daniel).  
*Scorodoxylum* Nees in Benth. Pl. hartw. 236. 1846. — TYPE: *Scorodoxylum hartwegianum* Nees.  
*Arrhostoxylum* Nees in Mart. Fl. bras. 9:57. 1847. — LECTOTYPE (Bremekamp and Nannenga Bremekamp, Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 45(1):11. 1948): *Arrhostoxylon glabrum* Nees.  
*Eurychanes* Nees in Mart. Fl. bras. 9:52. 1847. — TYPE: *Eurychanes verbasciformis* Nees.  
*Penstemonacanthus* Nees in Mart. Fl. bras. 9:159. 1847. — TYPE: *Penstemonacanthus modestus* Nees.  
*Siphonacanthus* Nees in Mart. Fl. bras. 9:45. 1847. — TYPE: *Siphonacanthus villosus* Nees.  
*Stemonacanthus* Nees in Mart. Fl. bras. 9:53. 1847. — LECTOTYPE (Leonard, Contr. U.S. Natl. Herb. 31:66. 1951): *Stemonacanthus salviifolius* Nees.  
*Ophthalmacanthus* Nees in A. DC. Prodr. 11:219. 1847. — TYPE: not designated.  
*Gymnacanthus* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:126. 1855, non *Gymnacanthus* Nees (1836). — LECTOTYPE (Ezcurra, Ann. Missouri Bot. Gard. 80:798. 1993): *Gymnacanthus geminiflorus* (Kunth) Oerst. (= *Ruellia geminiflora* Kunth).  
*Copioglossa* Miers, Proc. Roy. Hort. Soc. London 3:294. 1863. — TYPE: *Copioglossa pilosa* Miers.  
*Salpingacanthus* S. Moore, J. Bot. 42:107. 1904. — TYPE: *Salpingacanthus nobilis* S. Moore.  
*Tremacanthus* S. Moore, J. Bot. 42:33. 1904. — TYPE: *Tremacanthus robertii* S. Moore, as "*robertii*."  
*Ulleria* Bremek. Proc. Kon. Ned. Akad. Wetensch. C. 72:423. 1969. — TYPE: *Ulleria geminiflora* (Kunth) Bremek. (= *Ruellia geminiflora* Kunth).

Decumbent to erect subcaulescent to caulescent perennial herbs, shrubs, or (rarely) trees with cystoliths, vegetative and floral surfaces sometimes beset with sessile lenticular glands mostly 0.05–0.2 mm in diameter (glandular-punctate). Leaves opposite, sometimes anisophyllous, sessile to petiolate, margin entire to sinuate to crenate to dentate. Inflorescence of reduced or expanded dichasia in axils of leaves or bracts, sometimes forming dichasiate spikes, thyrses, or panicles; dichasia alternate or opposite, 1-many flowered, 1 or more per axil, sessile or pedunculate. Bracts opposite, green (in ours), margin entire (in ours). Flowers usually subtended by 2 isomorphic bracteoles (sometimes absent or vestigial), chasmogamous flowers generally large and showy, cleistogamous flowers often present as well, commonly preceding or succeeding chasmogamous flowers. Calyx deeply 5-lobed, lobes homomorphic or heteromorphic, equal to unequal in length. Corolla of chasmogamous flowers blue, blue-purple, pink, red, white, or yellow (in ours, elsewhere also blackish), generally concolorous, sometimes with whitish or greenish markings, tube usually funnelliform, often curved, gradually or abruptly expanded distally into a ± distinct throat (rarely saccate), limb bilabiate (sometimes appearing subactinomorphic), upper lip 2-lobed, lower lip 3-lobed, corolla lobes contorted in bud, corolla of cleistogamous flowers, if present, small, whitish, budlike or tubular, lobes remaining closed. Stamens 4, (homodynamous to) didynamous, usually inserted near base of corolla throat, included in corolla tube or exerted from mouth of corolla, filaments sometimes united in pairs at base, anthers 2-theccous, thecae equal in length, parallel to subsagittate, equally inserted, lacking basal appendages, dehiscing toward lower lip (i.e., flower nototribal); pollen spheroidal, 3-porate, exine coarsely reticulate; staminodes 0 or 1. Style included in corolla tube or exerted from mouth of corolla, stigma 2-lobed, lobes equal or unequal, often with 1 lobe greatly reduced, rudimentary, or not evident. Capsule substipitate or stipitate, head terete or compressed, narrowly ellipsoid to broadly ellipsoid to subglobose to obovoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4–20 per capsule, lenticular, pubescent with hygroscopic trichomes (sometimes restricted to margin). ( $x = 17$ ).

*Ruellia* is the second largest genus of Acanthaceae with approximately 250 species worldwide. Species occur primarily in the tropics and subtropics. It is the second largest genus of Acanthaceae in Mexico with about 65 species there. The generic synonymy given above pertains to New World taxa. Several names of Old World genera are also often considered synonymous with *Ruellia*.

REFERENCES: FERNALD, M.L. 1945. *Ruellia* in the eastern United States. *Rhodora* 47:1–38, 47–63, 69–90; THARP, B.C. and F.A. BARKLEY. 1949. The genus *Ruellia* in Texas. *Amer. Midl. Naturalist* 42:1–86; DANIEL, T.F. 1990. New, reconsidered, and little-known Mexican species of *Ruellia* (Acanthaceae). *Contr. Univ. Michigan Herb.* 17:139–162; EZCURRA, C. 1993. Systematics of *Ruellia* (Acanthaceae) in southern South America. *Ann. Missouri Bot. Gard.* 80:787–845; DANIEL, T.F. 1995. New and reconsidered Mexican Acanthaceae. VI. Chiapas. *Proc. Calif. Acad. Sci.* 48:253–282.

- a. Dichasia expanded, mostly 3–many-flowered, borne on peduncles 10–280 mm long (if peduncles absent or < 10 mm long, then secondary peduncles present and ≥ 5 mm long); bracteoles always present.
- b. Abaxial surface of calyx (exclusive of margins of lobes) glabrous or pubescent with eglandular trichomes only.
  - c. Corolla pink, pinkish purple, or red; peduncles quadrate-alate; stamens 18–25 mm long, usually at least partially exerted from mouth of corolla.
  - d. Young stems quadrate; leaves, peduncles, and abaxial surface of bracteoles glabrous; stamens 18–20 mm long, included in corolla tube or with anthers partially exerted from mouth of corolla . . . . . 17. *R. pereducta*
  - dd. Young stems quadrate-alate; leaves, peduncles, and abaxial surface of bracteoles pubescent; stamens 21–25 mm long, anthers entirely exerted from mouth of corolla . . . . . 12. *R. matudae*
  - cc. Corolla bluish to blue-purple; peduncles terete to quadrate-sulcate (to ± quadrate-alate in *R. jussieuoides*); stamens 5–10 mm long, included in corolla tube.
    - e. Corolla 52–62 mm long, narrow proximal portion of tube 28–32 mm long, throat 3–4.5 mm in diameter near midpoint; thecae 3.8–4 mm long; style 36–40 mm long . . . . . 9. *R. jussieuoides*
    - ee. Corolla 26–43 mm long, narrow proximal portion of tube 6–21 mm long, throat 5–9 mm in diameter near midpoint; thecae 1.8–2.8 mm long; style 21–27 mm long.
      - f. Leaves ± coriaceous, (rounded to) acute at base; bracteoles abaxially glabrous; calyx 8.5–11 mm long; corolla with narrow proximal portion of tube 17–21 mm long, longer than throat; stipe of capsule 5–6.5 mm long; seeds with trichomes restricted to periphery . . . . . 20. *R. stemonacanthoides*
      - ff. Leaves membranaceous, subattenuate to attenuate at base; bracteoles abaxially pubescent; calyx 12–20 mm long; corolla with narrow proximal portion of tube 6–12 mm long, shorter than throat; stipe of capsule 1.5–2.5 mm long; seeds with trichomes covering surfaces and margin . . . . . 18. *R. puberula*
  - bb. Abaxial surface of calyx pubescent with stipitate glandular trichomes.
    - g. Leaves lance-linear, 6.5–27.1 times longer than wide; seeds 16–20 per capsule . . . . . 2. *R. coerulea*
    - gg. Leaves deltate to cordate to ovate to elliptic to obovate, 1.3–3.3 (–3.8) times longer than wide; seeds 4–16 per capsule.
      - h. Young stems and leaves (exclusive of inflorescence) pubescent with eglandular trichomes only; fresh plants not fetid.
        - i. Leaf blades cordate to rounded to acute at base; thecae 4–5 mm long; stipe of capsule 5–7 mm long; seeds 12–16 per capsule, 3.5–4 mm long, trichomes restricted to periphery . . . . . 1. *R. breedlovei*
        - ii. Leaf blades attenuate to constricted-attenuate at base; thecae 2.5–4 mm long; stipe of capsule 2–3.5 mm long; seeds 8–12 per capsule, 2–3 mm long, trichomes covering surfaces and margin.
          - j. Capsule glabrous proximally, sparsely pubescent at apex with eglandular trichomes only; bracteoles abaxially glandular . . . . . 7. *R. intermedia*
          - jj. Capsule pubescent throughout with eglandular and glandular trichomes (or with the latter type trichomes sometimes restricted to apex); bracteoles (at least distal ones) abaxially glandular . . . . . 15. *R. nudiflora*
      - hh. Young stems and leaves pubescent with glandular and eglandular trichomes (viscid); fresh plants fetid.
        - k. Capsule 11–16 mm long, stipe 0.5–1 mm long, head narrowly ellipsoid; seeds 8–12 per capsule, 2–2.5 mm long, trichomes restricted to periphery; thecae 2.5–3.5 mm long; calyx lobes subulate to linear-subulate, subequal (longest lobe 1.07–1.26 times longer than shortest lobe) . . . . . 16. *R. paniculata*
        - kk. Capsule 7.5–10 mm long, stipe 2.2–3.3 mm long, head broadly ellipsoid to subcircular to obovoid; seeds 4 per capsule, 3.2–3.5 mm long, trichomes covering surfaces and margin; thecae 2–2.4 mm long; calyx lobes linear to oblanceolate, unequal (longest lobe 1.40–1.70 times longer than shortest lobe) . . . . . 8. *R. inundata*
  - aa. Dichasia reduced, 1 (–3)-flowered, sessile or borne on peduncles to 3.5 mm long (secondary peduncles absent, or if present, then up to 1 mm long); bracteoles often absent or rudimentary.
    - l. Pubescence of abaxial surface of calyx (exclusive of margins of lobes) and external surface of corolla comprising eglandular trichomes and/or sessile lenticular glands (i.e., glandular-punctate) (external surface of corolla sometimes with a very few inconspicuous stipitate glandular trichomes in *R. puberula*).
    - m. Calyx lobes dissimilar, posterior lobe largest, lance-ovate to narrowly elliptic, 3.9–5 mm wide, lateral lobes lanceolate to lance-subulate, 0.8–2 mm wide, anterior lobes lanceolate to lance-subulate, 0.8–1.7 mm wide; pubescence of stems and calyces including ± wirelike eglandular trichomes 0.7–2 (–3.5) mm long . . . . . 5. *R. harveyana*

- mm. Calyx lobes ± similar to one another, triangular-subulate to subulate to lanceolate, 0.6–1.5 mm wide; pubescence of stems and calyces sometimes with eglandular trichomes to 1.5 mm long, but these not wirelike.
- n. Abaxial surface of calyx, external surface of corolla, and capsule beset with sessile lenticular glands (i.e., glandular-punctate); seeds 4–6 per capsule.
- o. Narrow proximal portion of corolla tube 15–33 mm long, longer than throat; stipe of capsule 2–3 mm long.
- p. Distal flower-bearing leaves commonly clustered, reduced in size, and pubescent with stipitate glands (i.e., modified into bracts); bracteoles usually absent; corolla throat 7–14 mm long, 3.5–6.5 mm in diameter near midpoint; style 20–34 mm long; capsule 11–15 mm long; seeds 6 . . . . . 11. *R. matagalpae*
- pp. Distal flower-bearing leaves similar to proximal leaves (i.e., not modified into bracts as described above); bracteoles present, (2–) 5–22 mm long; corolla throat 15–29 mm long, 8–12 mm in diameter near midpoint; style 36–47 mm long; capsule 8–11 mm long; seeds 4 . . . . . 6. *R. hookeriana*
- oo. Narrow proximal portion of corolla tube 9–14 mm long, shorter than throat; stipe of capsule 1.5–2 mm long . . . . . 4. *R. geminiflora*
- nn. Abaxial surface of calyx, external surface of corolla, and capsule not glandular-punctate; seeds 8–12 per capsule.
- q. Leaf blades acute at base; peduncles of dichasia (if present) to 1 mm long; flowers sessile or borne on pedicels to 1 mm long . . . . . 19. *R. spissa*
- qq. Leaf blades subattenuate to attenuate at base; peduncles of dichasia (3–) 5–40 mm long; flowers pedicellate, pedicels 3–25 mm long . . . . . 18. *R. puberula*
- II. Pubescence of abaxial surface of calyx and external surface of corolla including conspicuous stipitate glandular trichomes.
- r. Dichasia of 2 types, those from axils of proximal leaves long-pedunculate and expanded (3–many-flowered), those from axils of distal leaves or leaflike bracts sessile to pedunculate, ± congested, expanded or (rarely) reduced, the latter dichasia collectively forming a terminal glandular-pubescent paniculiform thyrse; leaves constricted-attenuate at base . . . . . 15. *R. nudiflora*
- rr. Dichasia all similar, reduced (mostly 1-flowered), sessile to short-pedunculate from axils of leaves or leaflike bracts, never forming a terminal glandular-pubescent paniculiform thyrse; leaves acute to attenuate at base.
- s. Corolla dark pink to red to orange-red; stamens exerted from mouth of corolla, 24–30 mm long; stipe of capsule 1.5–2 mm long . . . . . 14. *R. megasphaera*
- ss. Corolla blue to blue-purple; stamens included in corolla tube, 6–15 mm long; stipe of capsule 2–3 mm long.
- t. Calyx lobes lanceolate to elliptic to oblanceolate, 1.5–4 mm wide; bracteoles 4–9 mm wide; corolla 65–90 mm long, narrow proximal portion of tube longer than throat, lobes 15–25 mm long; thecae 5–5.5 mm long; style 50–55 mm long; seeds with trichomes restricted to periphery . . . . . 13. *R. maya*
- tt. Calyx lobes lance-subulate, 0.8–1.5 mm wide; bracteoles absent or 0.3–2.5 mm wide; corolla 28–52 mm long, narrow proximal portion of tube shorter than throat, lobes 5–13 mm long; thecae 3.3–4.2 mm long; style 16–23 mm long; seeds with surfaces and margin covered with trichomes.
- u. Abaxial surface of leaves and bracts glandular-punctate; capsule pubescent throughout with eglandular trichomes and glandular-punctate; seeds 4 per capsule . . . . . 3. *R. donnell-smithii*
- uu. Abaxial surface of leaves and bracts not glandular-punctate; capsule proximally glabrous and distally pubescent with stipitate glandular (and sometimes a few eglandular) trichomes; seeds 8–10 per capsule . . . . . 10. *R. lactea*

**1. *Ruellia breedlovei* T.F. Daniel, Contr. Univ. Michigan Herb. 17:145. 1990.**

— TYPE: Mexico, Chiapas, Cañón El Sumidero, near KM 19, vicinity of Mirador El Roblar, 16 Mar 1987, *T. Daniel & B. Bartholomew* 5025 (CAS!; isotypes: DUKE!, ENCB!, K!, MEXU!, MICH!, MO!, NY!, US!).

ILLUSTRATION: Fig. 30.

Shrubs to 1.4 m tall. Young stems quadrate to quadrate-sulcate, internodes glabrous (rarely with a few scattered eglandular trichomes), or rarely ± densely pubescent with flexuose-retrorse to retrorsely appressed eglandular trichomes up to 0.5 mm long, nodes often sparsely pubescent with flexuose eglandular trichomes 0.1–0.5 mm long. Leaves petio- late, petioles to 90 mm long, blades ovate to broadly ovate to cordate, 40–200 mm long, 15–145 mm wide, 1.4–3.1 times longer than wide, cordate to rounded to acute at base, acuminate at apex, surfaces pubescent with flexuose to antrorse eglandular

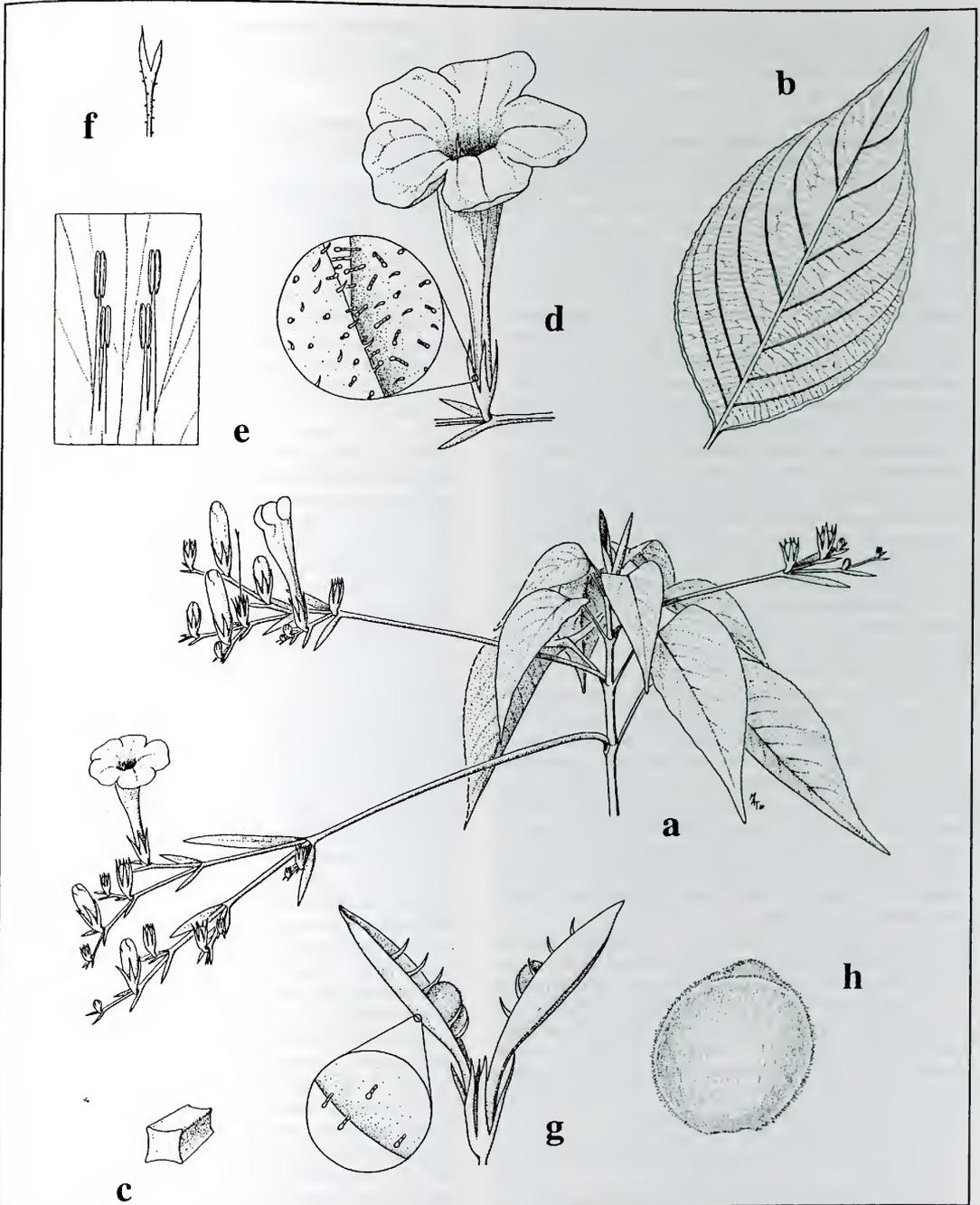


FIGURE 30. *Ruellia breedlovei* T.F. Daniel (Daniel & Bartholomew 5025). a, habit,  $\times 0.3$ ; b, leaf,  $\times 0.6$ ; c, portion of inflorescence rachis,  $\times 5$ ; d, inflorescence node with flower,  $\times 0.9$  (with enlargement showing pubescence); e, corolla split open showing stamens,  $\times 1.2$ ; f, distal portion of style with stigma,  $\times 3$ ; g, calyx and opened capsule with seeds,  $\times 1.7$  (with enlargement showing pubescence); h, seed,  $\times 7$ . Drawn by Mary Ann Tenorio.

trichomes, trichomes soon becoming sparse and restricted to major veins and margin, margin entire to sinuate-crenate. Inflorescence of pedunculate laterally spreading expanded dichasia to 250 mm long from leaf axils; dichasia alternate, 1 per axil, 3–many-flowered, peduncles 37–130 mm long, sharply quadrate with angles usually winged, glabrous or pubescent with flexuose to retrorse to antrorse to antrorsely appressed eglandular trichomes 0.1–0.5 mm long and sometimes with scattered glandular trichomes 0.05–0.2 mm long, secondary peduncles glabrous or pubescent like peduncle. Bracteoles sometimes caducous, sessile to petiolate, lanceolate, 10–45 mm long, 1.5–8 mm wide, pubescent like leaves or sometimes with a few glandular trichomes 0.05–0.2 mm long as well, secondary bracteoles similar to bracteoles although somewhat smaller or becoming lance-subulate and often conspicuously glandular. Flowers subsessile to pedicellate, pedicels to 4 mm long, glabrous or pubescent with erect to flexuose eglandular and glandular trichomes 0.05–0.2 mm long. Calyx 7–18 mm long, tube 1.5–4 mm long, lobes lance-subulate, equal to subequal (i.e., with one lobe up to 2 mm longer than others), 5–15 mm long, 3.6–6 times longer than tube, 0.8–1.2 mm wide, both abaxial and adaxial surfaces and margin pubescent with a mixture of erect to flexuose glandular and eglandular trichomes 0.05–0.4 mm long (glandular-pubescent). Corolla blue-purple, 45–71 mm long, externally glandular-pubescent, tube 35–55 mm long, narrow proximal portion 14–25 mm long, abruptly expanded into throat, throat 20–31 mm long, longer than narrow proximal portion of tube, 7.5–13 mm in diameter near midpoint, limb 27–52 mm in diameter, lobes subcircular to broadly elliptic, 10–20 mm long, 11–21 mm wide. Stamens included, shorter pair 10–13 mm long, longer pair 15–20 mm long, thecae 4–5 mm long. Style 30–35 mm long, sparsely pubescent (at least proximally and usually distally as well) with glandular trichomes to 0.2 mm long and sometimes with antrorse eglandular trichomes as well, stigma lobes unequal, 1 lobe 2–2.5 mm long, other lobe 0.6–1 mm long. Capsule 17–23 mm long, pubescent (at least near apex) with glandular trichomes 0.05–0.2 mm long, stipe 5–7 mm long, head ellipsoid to obovoid. Seeds 12–16, 3.5–4 mm long, 2.5–3.7 mm wide, surfaces glabrous, margin fringed with papillose (when dry) hygroscopic trichomes. Flowering and fruiting Aug–May.

Chiapas endemic: limestone slopes and ridges in Tropical Deciduous Forest and Evergreen Seasonal Forest; common in Central Depression; 600–1450 m. CHIAPAS COLLECTIONS: *Cb* 7859 (CAS); *Co* 5030 (CAS); *Da* 29731 (CAS, MEXU); *Dav* s.n. (TEX); *Lm* 3834 (US); *Mz* 8615 (MEXU); *Mi* 5143 (MEXU); *Mi* 6460 (MEXU); *Mi* 6832 (CHIP, MEXU); *Ne* 5560 (CAS); *Pa* 7 (CAS, CHIP); *Pa* 200 (CAS, MEXU); *Te* 6460 (CAS, MEXU); 9046; 25215; 28222; 30315; 30392; 34324; 36573; 50473; 53667; 56881; 70676; 71002.

Local name: “quiebramuélas” (*Palacios E.* 200) or “quiebra muela” (*Palacios E.* 7).

Most specimens of *R. breedlovei* have glabrous internodes. *Breedlove* 9046 comprises a sprig with glabrous internodes and others with more or less densely pubescent internodes. The latter likely represent a more pubescent form of the species.

## 2. *Ruellia coerulea* Morong in Morong & Britton, Ann. New York Acad. Sci. 7:193, 1893.

— TYPE: Paraguay, Falls of the Pilcomayo River, Mar–May 1888–1890, *T. Morong 1013* (NY; isotypes: MO, US).

*Cryphiacanthus angustifolius* Nees in A. DC. Prodr. 11:199, 1847, non *Ruellia angustifolia* Sw. (1788). — *Ruellia spectabilis* Britton, Ann. New York Acad. Sci. 7:192, 1893, non Nicholson (1886). — *Ruellia brittoniana* Leonard, J. Wash. Acad. Sci. 31:96, 1941. — LECTOTYPE (*Ezcurra* 1993:812): Argentina, Entre Ríos, without locality or date, *J. Tweedie s.n.* (K).

ILLUSTRATIONS: J. Wash. Acad. Sci. 31:96, fig. 1, 1941; *Rhodora* 47:t. 839, 1945; Wagner et al., Flowering Plants of Hawai'i 1:172, t. 2, 1990; Ann. Missouri Bot. Gard. 80:813, fig. 12, 1993.

Erect to ± diffuse perennial herbs or shrubs to 1 m tall. Young stems quadrate-sulcate, internodes glabrous, nodes pubescent with flexuose eglandular trichomes 0.2–2 mm long. Proximal leaves petiolate, distal leaves sessile, petioles to 15 mm long, blades lance-linear, 80–170 mm long, 5–15 mm wide, 6.5–27.1 times longer than wide, attenuate at apex and base, abaxial surface inconspicuously glandular-punctate and sometimes with a few scattered antrorse eglandular trichomes along midvein, adaxial surface glabrous or sparsely pubescent with eglandular trichomes along midvein, midvein conspicuously canaliculate on adaxial surface (at least along proximal portion of blade), margin entire to sinuate-crenate. Inflorescence of pedunculate ascending expanded dichasia to 125 mm long from leaf axils; dichasia alternate, 1 per axil, (1–) 3–many-flowered, peduncles 43–70 mm long, subquadrate to quadrate, glabrous. Bracteoles often caducous, lanceolate to lance-linear, 5–17 mm long, 0.8–1.6 mm wide, glabrous or sometimes with a few scattered glandular trichomes 0.05–0.2 mm long (glandular-puberulent), secondary bracteoles similar to bracteoles although smaller. Flowers pedicellate, pedicels 5–13 mm long, densely glandular-puberulent. Calyx (5.5–) 9–18 mm long, tube 1–3.5 mm long, lobes lance-subulate, equal to subequal, (4–) 7–14.5 mm long, 0.9–1.1 mm wide, 2.7–8.5 times longer than tube, abaxially glandular-puberulent, margin ciliate or glandular-puberulent. Corolla blue-purple, 32–58 mm long, externally pubescent with erect to flexuose glandular and eglandular trichomes 0.05–0.2 mm long, tube 22–40 mm long, narrow proximal portion 9–13 mm long, ± abruptly expanded into throat, throat 12–26 mm long, longer than narrow proximal portion of tube, 7–9 mm in diameter near midpoint, limb 20–49 mm in diameter, lobes 9–20 mm long, 8–20 mm wide. Stamens included, longer pair 9–10 mm long, shorter pair 6–7 mm long, thecae 2.7–3 mm long. Style 25 mm long, sparsely pubescent with eglandular trichomes throughout, stigma unequally 2-lobed, 1 lobe 2 mm long, other lobe 0.3 mm long. Capsule 20–26 mm long, glabrous proximally, sparsely and inconspicuously pubescent with flexuose to antrorse glandular trichomes 0.05–0.2 mm long at apex, stipe 2–4 mm long, head linear-ellipsoid. Seeds 16–20, 2.1–2.6 mm long, 2–2.3 mm wide, surfaces and margin covered with appressed hygroscopic trichomes.  $n = 17$ . Flowering Oct, Feb; fruiting Feb.

Along watercourses and in disturbed habitats in Tropical Deciduous Forest; uncommon in Central Depression and Pa-

cific Coastal Plain; <100–575 m. U.S. (cultivated), Mex. (S.L.P., Hgo., Pue., Ver., Chis.), Guat. (cultivated), S.A. (Bol., Braz., Arg., Parag., Urug.). CHIAPAS COLLECTIONS: *Sol* 207 (MEXU); 9192; 69059.

Plants are commonly cultivated in other parts of Mexico (e.g. Morelos) and probably have become naturalized in disturbed habitats. Chiapas collections likely represent either cultivated or naturalized plants. It is not known with certainty whether the species is truly native to North America. North American plants resembling ours have usually been treated as *R. brittoniana*. The type of *R. coerulea* is from South America. Ezcurra (1993) noted that the species is related to *R. brittoniana* and *R. malacosperma* Greenm. of southern North America. The former name is a nomenclatural synonym of *Cryphiacanthus angustifolius* and the latter may be a taxonomic synonym of this species. Fernald (1945) described the convoluted nomenclatural history of *R. brittoniana*. In his protologue of *Cryphiacanthus angustifolius* Nees (1847) cited two syntypes, a collection of Tweedie from Argentina and a collection of Galeotti from Veracruz. The latter collection concurs with Chiapan plants. Most subsequent workers have considered these collections to represent different species. Unfortunately, few workers, including myself, have studied both syntypes at K. Ezcurra (1993) lectotyped *C. angustifolius* with the Argentinean collection, but maintained the name *R. brittoniana* (Leonard's new name for that species in *Ruellia*) for plants conspecific with the Mexican syntype. Based on Ezcurra's (1993) description, plants from southern South America differ from ours by their glabrous pedicels, styles, and capsules. Examination of a southern Brazilian collection of *R. coerulea* (Hatschbach et al. 52486, CAS) reveals a plant similar to ours including its glandular pedicels, pubescent styles, and capsules with a mixture of glandular and eglandular trichomes at the apex.

Our plants resemble *R. malacosperma* and similar plants from the southern United States were so treated by Small (Man. s.e. fl. 1229. 1933). Fernald (1945) and Sharp and Barkley (1949), maintained both species but the distinctions they provided are not very satisfactory. Long (Bull. Torrey Bot. Club 93:181–187. 1966) echoed the weak distinctions between *R. brittoniana* and *R. malacosperma* and proposed that the latter species might have originated from hybridization between *R. brittoniana* and *R. occidentalis*. The type of *R. malacosperma* from Tamaulipas differs from our specimens only by its leaves which are narrowly elliptic, apically acuminate, and which vary from 3.8 to 5 times longer than wide; and by its internodes which are often sparsely pubescent with flexuose eglandular trichomes to 0.2 mm long. Our plants and other North American plants usually treated as *Ruellia brittoniana* might represent a very narrow-leaved form (e.g., a riparian form) of a more variable species that is widely cultivated. Ezcurra (1993) noted considerable morphological diversity among South American plants and putative hybridization with other species in that region. Plants similar to those from Mexico and southern South America, which are usually

treated as *R. malacosperma*, are known from disturbed habitats in several intervening regions (e.g., Costa Rica and Colombia).

### 3. *Ruellia donnell-smithii* Leonard, J. Wash. Acad. Sci. 31:97. 1941.

— TYPE: Guatemala, Escuintla, San Luís, 1000 ft, Mar 1890, *J. Donnell Smith* 2015 (US!; isotypes: K!, US!).

ILLUSTRATIONS: J. Wash. Acad. Sci. 31:97, fig. 2. 1941; Fieldiana, Bot. 24(10):432, fig. 98. 1974.

Erect perennial herbs to 6 dm tall. Young stems quadrate to quadrate-sulcate, often glandular-punctate, evenly pubescent with flexuose-antrorse to antrorse (to retrorse) eglandular trichomes 0.3–0.5 (–1) mm long. Leaves petiolate, petioles to 14 mm long, blades ovate-elliptic to elliptic, 20–92 mm long, 8–32 mm wide (reduced in size distally into flower-bearing bracts), 2.3–3.8 times longer than wide, (rounded to) acute to acuminate at apex, subattenuate to attenuate at base, surfaces pubescent with cauline type trichomes and, at least abaxial surface, also glandular-punctate, margin entire. Inflorescence of sessile to subsessile usually greatly reduced dichasia (sometimes appearing as a solitary flower) in axils of leaves or leaflike bracts near shoot apex, sometimes forming a terminal leafy dichasiate spike, rachis (if present) pubescent with erect eglandular and mostly glandular trichomes 0.1–0.4 mm long (glandular-pubescent); dichasia alternate or opposite, 1 (–2)-flowered, 1 per axil, peduncles (if present) to 1 mm long. Bracts subfoliose, 16–50 mm long, 3.5–14 mm wide, usually proportionally narrower than leaves (i.e., up to 6 times longer than wide), distal ones densely pubescent with eglandular and glandular trichomes 0.1–0.4 mm long (glandular-pubescent) and glandular-punctate, proximal ones often mostly or completely lacking stipitate glandular trichomes. Bracteoles absent or rarely present and rudimentary (i.e., linear, 1–5 mm long, 0.3–0.4 mm wide, glandular-pubescent). Flowers sessile to subsessile (i.e., pedicels to 1 mm long) or when bracteoles absent, then flowers borne directly on peduncle. Calyx 9–12 mm long, tube 1–2 mm long, lobes lance-subulate, subequal, 8–11 mm long, 1–1.5 mm wide, 4–11 times longer than tube, abaxially glandular-pubescent and usually sparsely glandular-punctate as well, margin ciliate with glandular and eglandular trichomes. Corolla blue-purple, 40–52 mm long, externally pubescent with glandular trichomes 0.05–0.2 mm long and sometimes with a few eglandular trichomes as well, tube 30–40 mm long, narrow proximal portion 13–18 mm long, ± abruptly expanded into throat, throat 14–20 mm long, longer than narrow proximal portion of tube, 5–10 mm in diameter near midpoint, limb 20–32 mm in diameter, lobes 8–13 mm long, 9–14 mm wide. Stamens included, longer pair 9–12 mm long, shorter pair 6–7 mm long, thecae 3.5–3.9 mm long. Style 20–22 mm long, pubescent with eglandular trichomes, stigma unequally 2-lobed, 1 lobe 0.7 mm long, other lobe 2.2 mm long. Capsule 8–11 mm long, pubescent with erect to flexuose to retrorse eglandular trichomes 0.2–0.3 mm long and glandular-punctate, stipe 2–3 mm long, head broadly ellipsoid. Seeds 4, 3–4 mm long, 2.5–3.7 mm wide, surfaces and margin covered with appressed hygroscopic trichomes. Flowering: Dec–Mar; fruiting: Nov–Mar.

Secondary growth or disturbed habitats in a region formerly dominated by Tropical Rain Forest; common in Pacific Coastal Plain and lower slopes of the Sierra Madre; 150–480 m. Mex.

(Chis.), Guat., Salv. CHIAPAS COLLECTIONS: *Boe 1060*; *Dan 6200*; *His.n.* (ENCB); *EM 123* (MEXU, MICH, US); *EM 18544* (DS); *QVU 25* (U); *Ve 739* (BM, MEXU); *Ve 925* (BM, MEXU); *Ve 1054* (MEXU).

*Ventura & Lopez 739* (MEXU) is a strictly fruiting specimen on which some of the glands on older calyces and bracts are no longer evident. They are evident on younger, distal calyces and bracts of this same collection, however.

#### 4. *Ruellia geminiflora* Kunth, Nov. gen. sp. 2:240. 1817.

— *Dipteracanthus geminiflorus* (Kunth) Nees in Mart. Fl. bras. 9:40. 1847. — *Gymnacanthus geminiflorus* (Nees) Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:127. 1855. — *Ulleria geminiflora* (Kunth) Bremek. Proc. Kon. Ned. Akad. Wetensch. C. 72:423. 1969. — TYPE: Colombia, "in locis temperatis, siccis prope Santa Ana et Ibague, Novo-Granatensium," 500–700 m, *A. von Humboldt* (P!).

ILLUSTRATIONS: Publ. Carnegie Inst. Wash. 461:205, fig. 5. 1936; Steyermark and Huber, Flora del Avila, 197, fig. 24b. 1978; Fieldiana, Bot. (n.s.) 18:17, fig. 15. 1986; Mutis, Flora de La Real Expedición Botánica del Nuevo Reyno de Granada (1783–1816) 41:t. 47. 1992.

Erect to spreading perennial herbs to 5 dm tall. Young stems quadrate to quadrate-sulcate, sparsely glandular-punctate and ± evenly pubescent with erect to antrorse to antrorsely appressed eglandular trichomes 0.05–1.3 mm long, longer trichomes soon becoming concentrated along angles of stems. Leaves sessile to petiolate, petioles to 3 mm long, blades ovate-elliptic to elliptic to obovate-elliptic, 18–56 mm long, 6–23 mm wide (reduced in size distally into flower-bearing bracts), 2.2–3.4 times longer than wide, rounded to acute to subacuminate at apex, acute to subattenuate to attenuate at base, surfaces pubescent with erect to flexuose to antrorse eglandular trichomes 0.05–0.6 mm long, abaxial surface glandular-punctate as well, margin entire. Inflorescence of sessile to subsessile greatly reduced dichasia (appearing as a solitary flower or cluster of flowers) in axils of leaves or distal foliose bracts; dichasia opposite, 1–3-flowered, 1 per axil, peduncles (if present) to 0.05 mm long. Bracts foliose, elliptic to ovate-elliptic, 12–30 (–40) mm long, 3–10 (–13) mm wide, pubescent like leaves. Bracteoles absent but thickenings usually evident in their place. Flowers sessile to pedicellate, pedicels to 2 mm long, pubescent like young stems. Calyx 7–11 mm long, tube 1–2 mm long, lobes lance-subulate to lanceolate, equal to subequal, 5–8.5 mm long, 2.5–8.5 times longer than tube, 0.9–1.3 mm wide, abaxially pubescent with antrorse eglandular trichomes 0.1–0.3 mm long and glandular-punctate, margin ciliate with flexuose eglandular trichomes to 1 mm long. Corolla blue, 30–37 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.6 mm long and glandular-punctate (the glands sometimes less conspicuous or smaller than glands on leaves but at least some always present among Chiapan specimens), tube 20–30 mm long, narrow proximal portion 9–14 mm long, abruptly expanded into throat, throat 10–18 mm long, longer than narrow proximal portion of tube, 6–9 mm in diameter near midpoint, limb 22–27 mm in diameter, lobes 9–12 mm long, 9–14 mm

wide. Stamens included, longer pair 7–11 mm long, shorter pair 4–7 mm long, thecae 2.5–3.1 mm long. Style 17–21 mm long, pubescent with eglandular trichomes, stigma 1–1.5 mm long, only 1 lobe evident. Capsule 6.5–11 mm long, pubescent with flexuose eglandular trichomes 0.1–0.5 mm long and glandular-punctate, stipe 1.5–2 mm long, head subellipsoid to subglobose to obovoid. Seeds 4, 2.5–3 mm long, 2.5–2.7 mm wide, surfaces and margin covered with appressed hygroscopic trichomes.  $n = 17$ . Flowering: Jan–Feb, May–Jun; fruiting: Jan–Feb, May–Jul.

Tropical Rain Forest and regions where these formerly existed; uncommon in Eastern Highlands and Pacific Coastal Plain; < 100–200 m. Mex. (Ver., Oax., Tab., Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Guy., Sur., Fr. Gui., Ecu., Peru, Bol., Braz., Arg., Parag.). CHIAPAS COLLECTIONS: *EM 17394* (MEXU); 9163.

The type from Colombia agrees with our plants except it appears to lack sessile glands on the corolla and the corolla throat is barely shorter than the narrow proximal portion of the corolla tube.

#### 5. *Ruellia harveyana* Stapf, Bot. Mag. 139:t. 8485. 1913.

— TYPE: based on cultivated plants sent by J. C. Harvey from his garden in Sanborn, Veracruz to Kew in 1911 and grown there. Plants were originally collected by Harvey in 1904 on the Caribbean side of the Isthmus of Tehuantepec, (K!).

*Ruellia obtusata* S.F. Blake, Contr. Gray Herb. 52:105. 1917. — TYPE: Belize, Toledo, damp, open, cultivated ground, 21 Apr 1907, *M. Peck 871* (GH!; isotype: K!).

*Ruellia longipila* Standl. Publ. Field Columbian Mus., Bot. Ser. 8:44. 1930. — TYPE: Belize, Stann Creek, without locality or date, *C. Stocker 20* (F!; isotype: US!).

ILLUSTRATION: Bot. Mag. 139:t. 8485. 1913; Publ. Carnegie Inst. Wash. 461:206, fig. 6. 1936.

Prostrate to erect perennial herbs to 5 dm tall. Young stems quadrate to quadrate-sulcate to ± flattened, evenly pubescent with an understorey of retrorse eglandular trichomes 0.2–0.3 mm long and an overstorey of flexuose (somewhat coarse and wirelike) eglandular trichomes 0.7–2 (–3.5) mm long. Leaves petiolate, petioles to 21 mm long, blades ovate to elliptic, 30–116 mm long, 15–49 mm wide, 1.6–3.5 times longer than wide, subacuminate to acuminate at apex, acute at base, surfaces and margin pubescent with overstorey type trichomes, abaxial surface glandular-punctate as well, margin subsinuate. Inflorescence of contracted and reduced dichasia borne in axils of distal leaves; dichasia alternate or opposite, 1-flowered, 1 per axil, sessile (see discussion). Bracteoles absent (thickenings present at base of pedicel). Flowers subsessile to pedicellate, pedicels to 3 mm long, pubescent like young stems. Calyx 12.5–23 mm long, lobes heteromorphic, posterior lobe lance-ovate to narrowly elliptic, 11.5–21.5 mm long, 3.9–5 mm wide, lateral lobes lanceolate to lance-subulate, 9–18 mm long, 0.8–2 mm wide, anterior lobes lanceolate to lance-subulate, 8.5–16 mm long, 0.8–1.7 mm wide, lobes 8.5–18 times longer than tube, abaxially pubescent with overstorey type trichomes and glandular-punctate, margin ciliate with overstorey type trichomes. Corolla bluish, 39–60 mm long, externally pubescent with

flexuose eglandular trichomes to 0.6 mm long and sometimes sparsely glandular-punctate, tube 30–45 mm long, narrow proximal portion 15–25 mm long, abruptly expanded into throat, throat 14–20 mm long, shorter or longer than narrow proximal portion of tube, 7.5–10 mm in diameter near midpoint, limb 21–39 mm in diameter, lobes 9–15 mm long, 5–17 mm wide. Stamens included, longer pair 10–14 mm long, shorter pair 8–10.5 mm long, thecae 2–3.2 mm long. Style 28–41 mm long, pubescent throughout with eglandular trichomes, stigma unequally 2-lobed, 1 lobe 0.3–0.7 mm long, other lobe 1.4–2.3 mm long. Capsule 13–17 mm long, glabrous (or with a few flexuose eglandular trichomes to 0.7 mm long at apex), stipe 1–3 mm long, head obovoid to ellipsoid-obovoid. Seeds (based on extralimital material) 10–12, 3–3.8 mm long, 2.5–3 mm wide, surfaces and margin covered with appressed hygroscopic trichomes. Flowering and fruiting: Sep.

Tropical Rain Forest; rare in Eastern Highlands; 150–200 m. Mex. (Ver., Oax., Chis.), Guat., Bel. CHIAPAS COLLECTION: *Mz 13526* (MEXU).

The flowers are borne on short stalks. In the absence of bracteoles, the only evidence for interpreting these stalks as pedicels rather than peduncles is the presence of thickened regions at the base of the stalk. These are assumed to represent rudimentary bracteoles in this and other species lacking bracteoles.

## 6. *Ruellia hookeriana* (Nees) Hemsl. Biol. cent.-amer., Bot. 2:505. 1882.

— *Dipteracanthus hookerianus* Nees in A. DC. Prodr. 11:130. 1847. — TYPE: Mexico, Oaxaca, Sierra San Pedro Nolasco, Talea, etc., *C. Jürgensen 598* (K ex hb. Hook.!; isotype: K ex hb. Benth.!).

*Ruellia megacantha* M.E. Jones, Contr. W. Bot. 18:66. 1933.

— TYPE: Mexico, Jalisco, La Barranta, Guadalajara, 25 Nov 1930, *M. Jones 27387* (POM!).

ILLUSTRATION: none found.

Erect perennial herbs to 4.5 dm tall. Young stems quadrate to quadrate-sulcate, pubescent with an understory of retrorse to retrorsely appressed eglandular trichomes 0.1–0.3 mm long that are either evenly disposed or concentrated in 2 lines and an overstory (sometimes sparse or nearly absent) of flexuose to flexuose-antrorse eglandular trichomes 0.5–1.5 mm long (latter trichomes usually concentrated on stem angles), often glandular-punctate as well. Leaves petiolate, petioles to 15 mm long, blades ovate to elliptic, 11–95 mm long, 4–40 mm wide, 1.4–2.8 times longer than wide, rounded to acute to acuminate at apex, acute to attenuate at base, surfaces pubescent with eglandular trichomes and (especially the abaxial surface) glandular-punctate, margin entire to subsinuate. Inflorescence of sessile to subsessile contracted dichasia in axils of distal leaves; dichasia alternate or opposite, 1 (–2)-flowered, 1 (–2) per axil, peduncles (if present) to 1 mm long. Bracteoles petiolate, lanceolate to lance-ovate to narrowly elliptic to oblanceolate, 5–22 mm long, 0.8–6 mm wide, pubescent like leaves, rarely vestigial and to 2 mm long and to 0.3 mm wide. Flowers sessile to subsessile (i.e., pedicels to 1 mm long). Calyx 11–20 mm long, tube 1–3 mm long, lobes subulate, equal, 10–18 mm long, 4.3–10 times longer than tube, 0.6–1.1 mm wide, pubescent like leaves. Corolla blue-purple, (40–) 50–73 mm long, externally

pubescent with flexuose to retrorse eglandular trichomes 0.1–0.4 mm long and glandular-punctate, tube 35–55 mm long, narrow proximal portion 18–33 mm long, abruptly expanded into throat, throat 15–29 mm long, shorter than narrow proximal portion of tube, 8–12 mm in diameter near midpoint, limb (22–) 28–45 mm in diameter, lobes (8–) 10–17 mm long, 8–19 mm wide. Stamens included, longer pair 10–20 mm long, shorter pair 8–14 mm long, thecae 2–3.1 mm long. Style 36–47 mm long, pubescent with eglandular trichomes, stigma unequally 2-lobed, 1 lobe 3–4.3 mm long, other lobe to 0.3 mm long (or not evident) or ± equally 2-lobed with lobes to 1 mm long. Capsule 8–11 mm long, puberulent with erect to flexuose to retrorse eglandular trichomes 0.05–0.2 mm long and glandular-punctate near apex, stipe 2–2.5 mm long, head broadly ellipsoid to obovoid. Seeds 4, 3–4 mm long, 2.8–4 mm wide, surfaces and margin covered with appressed hygroscopic trichomes. *n* = 17. Flowering: May–Nov; fruiting: May, Aug–Dec.

Rocky or grassy slopes, ridges, flats, streambanks, and disturbed habitats in Evergreen Seasonal Forest, Tropical Deciduous Forest, Short Tree Savanna, and Pine-Oak Forest; common in Northern Highlands, Central Plateau, Central Depression, and Sierra Madre; 50–1700 m. Mex. (S.L.P., Nay., Jal., Méx., Mlos., Ver., Gro., Oax., Chis.), Guat., Bel., Hond., Salv., Nic. CHIAPAS COLLECTIONS: *C 100* (DS); *C 112* (DS); *G-V 4034* (WIS); *Hamp 1276* (BM); *La 1085* (DS); *La 1595* (DS); *EM 1720* (MEXU, MICH, US); *Pa 681* (CAS); *R&R&M 1100* (BM, US); *SC 733* (CAS); 6292; 11843; 19818; 20132; 25484; 26939; 27264; 37188; 37690; 39052; 42440; 46597; 51146; 51647; 69981; 70351; 70439; 70829; 70954; 71008; 71041; 71060.

Local name: “k’al wamal” (Tzeltal; *Sántiz C. 733*).

Uses: leaves and roots are boiled and a small glass of the solution is taken orally for stomach pain and diarrhea (*Sántiz C. 733*).

## 7. *Ruellia intermedia* Leonard, J. Wash. Acad. Sci. 17:512. 1927.

— TYPE: Mexico, Jalisco, Bolaños, 10–19 Sep 1897, *J. Rose 2915* (US!).

ILLUSTRATION: J. Wash. Acad. Sci. 17:513, fig. 2. 1927.

Erect to spreading perennial herbs to 5.5 (or more?) dm tall. Young stems quadrate-sulcate, sparsely pubescent with retrorse eglandular trichomes 0.05–0.1 mm long concentrated in 2 lines and with occasional coarse flexuose eglandular trichomes 0.5–1.5 mm long (especially at nodes). Leaves petiolate, petioles to 30 mm long, blades ovate to elliptic to obovate, 23–65 mm long, 13–36 mm wide, 1.3–2 times longer than wide, rounded to acute at apex, attenuate to constricted-attenuate at base, surfaces very sparsely pubescent with coarse flexuose eglandular trichomes, margin entire. Inflorescence of pedunculate ascending expanded dichasia to 100 mm long from leaf axils; dichasia opposite, 3–many-flowered, 1 per axil, peduncles 15–40 mm long, quadrate-sulcate, sparsely pubescent with erect to flexuose to retrorse eglandular and occasionally glandular trichomes 0.05–0.5 mm long. Bracteoles linear to linear-oblancoate, 6–10.5 mm long, 1–2 mm wide, pubescent like leaves, secondary bracteoles similar to bracteoles although somewhat smaller. Flowers subsessile to pedicellate, pedicels to 5 mm long, pubescent with eglandular and mostly glandular trichomes 0.05–0.3 mm long (glandular-pubescent). Calyx 17–25 mm

long, tube 2–3 mm long, lobes lance-subulate, equal to subequal, 14.5–22 mm long, 5.7–9 times longer than tube, 0.9–1.5 mm wide, abaxially and marginally glandular-pubescent. Corolla blue, 35–39 mm long, externally pubescent with mostly eglandular (glandular trichomes few and inconspicuous) trichomes, tube 25–28 mm long, narrow proximal portion 12–14 mm long, abruptly expanded into throat, throat 13–14.5 mm long,  $\pm$  equal to or longer than narrow proximal portion of tube, 6–8 mm in diameter near midpoint, limb 22–27 mm in diameter, lobes 11–14 mm long, 11–14.5 mm wide. Stamens included, longer pair 9 mm long, shorter pair 7 mm long, thecae 2.5 mm long. Style 20–24 mm long, very sparsely pubescent with eglandular trichomes, stigma unequally 2-lobed, 1 lobe 1.7–2 mm long, other lobe 0.1 mm long. Capsule 16–17 mm long, glabrous proximally, sparsely pubescent at apex with flexuose to antrorse eglandular trichomes 0.1–0.3 mm long, stipe 2–2.5 mm long, head ellipsoid. Seeds (based on extralimital material) 8–12, 2.7–2.9 mm long, 2–2.4 mm wide, surfaces and margin covered with appressed hygroscopic trichomes.  $n = 17$ . Flowering and fruiting: Jul.

Disturbed habitats in region of Tropical Deciduous Forest; Central Depression; ca. 545 m. Mex. (Baja C.S., Son., Chih., Sin., Nay., Jal., Cma., Mich., Méx., Mlos., Gro., Chis.). CHIAPAS COLLECTION: 10617.

## 8. *Ruellia inundata* Kunth, Nov. gen. sp. 2:239. 1817.

— *Aphragmia inundata* (Kunth) Bremek. Verh. Kon. Ned. Akad. Wetensch. Afd. Natuurk., Tweede Sect. 45:10. 1948. — TYPE: Colombia, "in ripa fluminis Magdalenae prope Mompox et Badillas" (fide protologue), May, A. von Humboldt & A. Bonpland mss. n. 3711 (P-Bonpl.).

*Ruellia albicaulis* Bertero in Spreng. Syst. veg. 2:822. 1825. — TYPE: Colombia, "ad fl. Magdalen.", no specimens have been seen.

*Aphragmia haenkei* Nees in Lindl. Intr. nat. syst. bot., ed. 2, 444. 1836. — *Dipteracanthus haenkei* (Nees) Nees in A. DC. Prodr. 11:141. 1847. — TYPE: Mexico, Guerrero, Acapulco, 1791, *T. Haenke s.n.* (no type designated nor place of deposition noted; probable type material: K, PR!, PRC!).

*Ruellia galeottii* Leonard, Kew Bull. 1938:59. 1938. — TYPE: Mexico, Oaxaca, Sola, Oct 1844, *H. Galeotti 510J* (US!).

ILLUSTRATIONS: Publ. Carnegie Inst. Wash. 461:210, fig. 10. 1936; Fieldiana, Bot. (n.s.) 18:17, fig. 15. 1986.

Erect to diffuse perennial herbs or shrubs to 1 m tall with fetid odor. Young stems subterete to quadrate, at first evenly pubescent with erect to flexuose eglandular and glandular trichomes 0.2–2 mm long, pubescence soon consisting of flexuose-retorse eglandular trichomes only. Leaves petiolate, petioles to 85 mm long, blades ovate to elliptic, 33–190 mm long, 13–105 mm wide, 1.5–2.5 times longer than wide, acuminate at apex, acute to attenuate at base, surfaces pubescent with glandular (absent on mature leaves) and eglandular trichomes, margin entire to crenate. Inflorescence of sessile to pedunculate expanded dichasia (or inflorescence seemingly derived from a compound dichasium where the central flower is displaced to a lateral position and one dichasial branch appears central or terminal) to 40 mm long from leaf axils, collectively sometimes forming a terminal leafy panicle; dichasia alternate or opposite,

3–many-flowered, 1 (–3) per axil, peduncles (if present) 1–8 mm long, pubescent with erect to flexuose glandular and eglandular trichomes 0.1–1.5 (–2) mm long (glandular-pubescent), secondary peduncles to 22 mm long, glandular-pubescent. Bracteoles and secondary bracteoles sessile to petiolate, lanceolate to lance-ovate to narrowly elliptic, 4–14 mm long, 0.8–2.8 (–4) mm wide, glandular-pubescent. Flowers sessile to subsessile (i.e., borne on pedicels to 0.5 mm long). Calyx 9–17 mm long, tube 1–2 mm long, lobes linear to oblanceolate, unequal (longest lobe 1.40–1.70 times longer than shortest lobe), (5–) 7–15 mm long, 6.5–24 times longer than tube, 0.2–1 mm wide, abaxial surface and margin glandular-pubescent. Corolla blue-purple or deep pink, 25–35 mm long, externally glandular-pubescent, tube 18–27 mm long, narrow proximal portion 8–16 mm long, gradually to  $\pm$  abruptly expanded into throat, throat 10–17 mm long, usually longer than narrow proximal portion of tube (rarely shorter), 4–6 mm in diameter near midpoint, limb 12–18 mm in diameter, lobes 5–7 mm long, 4–7.5 mm wide. Stamens included or slightly emergent, longer pair 8–12 mm long, shorter pair 7–10.5 mm long, thecae 2–2.4 mm long. Style 15–22 mm long, pubescent throughout with eglandular trichomes, stigma unequally 2-lobed, 1 lobe 0.2–0.5 mm long, other lobe 1.3–1.8 mm long. Capsule often blotched with red, 7.5–10 mm long, glabrous, stipe 2.2–3.3 mm long, head broadly ellipsoid to subcircular to obovoid. Seeds 4, 3.2–3.5 mm long, 2.6–3 mm wide, surfaces and margin pubescent with appressed hygroscopic trichomes.  $n = 17$ . Flowering and fruiting: Oct–Mar.

Slopes, flats, streambanks, and disturbed habitats (e.g., roadsides) in Evergreen Seasonal Forest, Tropical Deciduous Forest, Short Tree Savanna, Thorn Woodland, and Pine-Oak Forest; common in Northern Highlands, Central Depression, Sierra Madre, and Pacific Coastal Plain; 0–1170 m. Mex. (Son., Sin., Jal., Cma., Mich., Méx., Mlos., Pue., Ver., Gro., Oax., Camp., Yuc., Q. Roo, Chis.), Guat., Salv., Hond., Nic., C.R., Pan., S.A. (Col., Ecu., Braz.). CHIAPAS COLLECTIONS: *And 13222* (CAS, MEXU); *Bal 931* (US); *Cb 3835* (CAS); *Co 5015* (CAS); *Dan 5868* (CAS, K); *Dan 6206* (CAS); *Da 29692* (CAS); *Da 30151* (CAS, MEXU); *F 3371* (CAS); *Jo 1058-79* (CAS); *K 7346* (DS, MEXU); *Lm 3807* (US); *EL 7254* (DS); *La 180* (CAS); *La 2801* (DS); *La 2863* (DS, US); *EM 17340* (MEXU); *EM 18545* (DS); *Mi 4934* (MEXU); *Mez 50* (MEXU); *Pa 226* (CAS); *Pa 1122* (CAS); *Rey 141* (MEXU); *San 540* (MEXU); *Sta 167* (BM); *Ten 5683* (CAS, MEXU); *T 3248* (DS, US); *T 3729* (DS, WIS); *Ve 4130* (MEXU); 9110; 13656; 22954; 24132; 28443; 30389; 31278; 41472; 41781; 42166; 46433; 47920; 56871; 65809; 71024.

I have adopted the name traditionally used for this species. The holotype of *R. inundata* differs from our plants by having peduncles to 11 mm long and subequal calyx lobes (i.e., lacking one lobe conspicuously larger than the others). In these features the specimen more closely resembles *R. paniculata*. Unfortunately, capsules, which would readily confirm its identity, are not present on the type.

Certain specimens from western and southern Mexico with broader, linear-spatulate calyx lobes and smaller corollas (up to 21 mm long) with a more prominent throat were described by Leonard as *R. galeottii*. Enough intermediacy exists between plants with these character states and more typical *R. inundata* to suggest

that this is part of the variation of this weedy species. Populations of pink-flowered individuals of the species occur in Oaxaca, Chiapas, and Central America along with populations of blue-flowered individuals.

**9. *Ruellia jussieuoides* Schldl. & Cham.  
Linnaea 6:370. 1830.**

— *Arrhoxylum jussieuoides* (Schldl. & Cham.) Nees in A. DC. Prodr. 11:212. 1847. — TYPE: Mexico, Veracruz, "ad ripas fluminis Misantlensis prope Misantlam" (fide protologue), Mar, *C. Schiede & F. Deppe 1164* (B, destroyed; isotypes: MO!, W).

ILLUSTRATION: Fieldiana, Bot. (n.s.) 18:17, fig. 15. 1986.

Erect perennial herbs or shrubs to 1 m tall. Young stems quadrate to quadrate-sulcate, evenly pubescent with antrorse to antrorsely appressed eglandular trichomes 0.2–1 mm long. Leaves petiolate, petioles to 20 mm long, blades lanceolate to narrowly ovate-elliptic, 41–200 mm long, 5–51 mm wide, (3.4) 4–8.2 times longer than wide, acuminate to subfalcate at apex, attenuate at base, surfaces pubescent with cauline type trichomes, margin entire. Inflorescence of pedunculate ascending expanded dichasia from leaf axils; dichasia alternate or opposite, 1–3 (or more)-flowered, 1 per axil, peduncles 20–70 mm long, quadrate to quadrate-sulcate (to  $\pm$  quadrate-olate), pubescent like stems. Bracteoles petiolate, lanceolate to lance-elliptic, 22–70 mm long, 3.5–10 mm wide, pubescent like leaves, secondary bracteoles similar to bracteoles although somewhat smaller. Flowers sessile or pedicellate, pedicels to 2 mm long, glabrous or nearly so. Calyx 12–15 mm long, tube 1.5–2.5 mm long, lobes subulate, subequal, 10–12.5 mm long, 5–8.3 times longer than tube, 0.7–1.2 mm wide, abaxially and marginally pubescent like stems. Corolla blue-purple, 52–62 mm long, externally pubescent with flexuose glandular (rarely absent) and eglandular trichomes 0.2–0.5 mm long, tube 38–47 mm long, often  $\pm$  geniculate at junction of narrow proximal portion and throat or tube  $\pm$  arched proximal to throat, narrow proximal portion 28–32 mm long,  $\pm$  abruptly expanded into throat, throat 11–15 mm long, shorter than narrow proximal portion of tube, 3–4.5 mm in diameter near midpoint, limb 27–37 mm in diameter, lobes 10–16 mm long, 11–15 mm wide. Stamens included, 7–9 mm long, thecae 3.8–4 mm long. Style 36–40 mm long, pubescent with eglandular trichomes  $\pm$  throughout, stigma unequally 2-lobed, 1 lobe 2–2.5 mm long, other lobe 1.1–1.3 mm long. Capsule 13–14 mm long, pubescent (especially near apex) with antrorse eglandular and erect glandular trichomes 0.1–0.2 mm long, stipè 2.5–4 mm long, head linear-ellipsoid to ellipsoid. Seeds 12, 2–2.3 mm long, 1.8 mm wide, surfaces  $\pm$  striate (lacking trichomes), margin swollen and pubescent with flexuose hygroscopic trichomes. Flowering: Dec–Mar; fruiting: Dec–May.

Along streams and on slopes in Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, and Pine-Oak-*Liquidambar* Forest; uncommon in Northern Highlands, Eastern Highlands, and Central Plateau; ca. 100–1170 m. Mex. (Pue., Ver., Oax., Chis.), Guat., Nic., C.R. CHIAPAS COLLECTIONS: *Lu 17814* (CAS, K, US); *48155*; *49457*; *57192*; *57673*.

**10. *Ruellia lactea* Cav. Icon. 3:28. 1795.**

— *Cryphiacanthus lacteus* (Cav.) Nees in A. DC. Prodr. 11:198. 1847. — TYPE: Mexico, "in Regio horto Matritense," Aug, (MA?, see below).

*Ruellia abbreviata* D.N. Gibson, Fieldiana, Bot. 34:78. 1972.

— *Cryphiacanthus lacteus* var. *acaulis* Nees in A. DC. Prodr. 11:198. 1847. — *Ruellia lactea* var. *acaulis* (Nees) Hemsl. Biol. cent.-amer., Bot. 2:506. 1882, non *R. acaulis* of authors. — LECTOTYPE (Gibson, Fieldiana, Bot. 34:79. 1972): Mexico, Oaxaca, barren plain of Oaxaca, 5000 ft, Nov–Apr 1840, *H. Galeotti 913* (K!).

ILLUSTRATION: Cavanilles, Icon. 3:1. 255. 1795.

Subcaulescent to caulescent perennial herbs to 2 dm tall. Young stems quadrate-sulcate, evenly pubescent with an understorey of erect to flexuose to retrorse eglandular and glandular (sometimes absent) trichomes 0.1–0.3 mm long and an overstorey of flexuose eglandular and glandular (sometimes absent) trichomes to 1.5 (–2.5) mm long, trichomes often becoming mostly or entirely eglandular on older internodes. Leaves sessile to petiolate, petioles to 8 mm long, blades ovate to elliptic to obovate-elliptic, 9–58 mm long, 4–21 mm wide, 2–3.1 times longer than wide, rounded to acute at apex, acute to attenuate at base, surfaces pubescent with eglandular trichomes, margin entire to subsinuate. Inflorescence a terminal spike to thyrses of sessile to short-pedunculate dichasia from axils of distal foliose bracts; dichasia opposite, 1–3-flowered, 1 per axil, often crowded near shoot apex and collectively appearing subcapitate, peduncles (if present) to 1.5 mm long. Bracts foliose, 13–33 mm long, 2–14 mm wide, abaxial surface and margin pubescent with flexuose to antrorse glandular and eglandular trichomes (0.05–) 0.2–1.5 mm long (glandular-pubescent), trichomes becoming mostly or entirely eglandular on proximal bracts. Bracteoles lanceolate to linear, 11–17 mm long, 1–2.5 mm wide, abaxial surface and margin glandular-pubescent, secondary bracteoles lance-subulate and somewhat smaller than bracteoles. Flowers sessile to subsessile (i.e., borne on pedicels to 1 mm long). Calyx 10–18 mm long, tube 1.5–2.5 mm long, lobes lance-subulate, subequal, 8.5–15.5 mm long, 4.5–7.5 times longer than tube, 0.8–1.2 mm wide, abaxially and marginally glandular-pubescent. Corolla blue, 28–42 mm long, externally pubescent with flexuose glandular and eglandular trichomes 0.1–0.5 mm long, tube 21–30 mm long, narrow proximal portion 10–13 mm long, abruptly expanded into throat, throat 12–19 mm long, longer than narrow proximal portion of tube, 6–9 mm in diameter near midpoint, limb 17–26 mm in diameter, lobes 5–12 mm long, 6–13 mm wide. Stamens included, longer pair 12–14 mm long, shorter pair 8.5–10 mm long, thecae 3.3–4.2 mm long. Style 16–23 mm long, proximally pubescent with eglandular trichomes, stigma unequally 2-lobed, 1 lobe 1.3–2 mm long, other lobe 0.2–0.8 mm long. Capsule 14–16 mm long, proximally glabrous, distally pubescent with erect to flexuose stipitate glandular (and occasionally a few eglandular as well) trichomes 0.05–0.2 mm long near apex, stipe 2 mm long, head ellipsoid. Seeds 8–10, 3 mm long, 2.2 mm wide, surfaces and margin covered with appressed hygroscopic trichomes. Flowering: Apr–Aug; fruiting: Jun–Aug.

Pine-Oak Forest; uncommon in Central Plateau; 1030–2200 m. Mex. (Chih., S.L.P., Jal., Aguasc., Qro., Mich., Méx., D.F., Mlos., Pue., Oax., Chis.), Guat. CHIAPAS COLLECTIONS: *Go 931* (US); *GL 523* (CAS); *La 1001* (DS, US); *Lo 446* (CAS); *SR 987* (CAS).

Local names: "belbel wamal" (Tzeltal, López P. 446); "pak'al wamal" (Tzeltal, Gómez L. 523); "Tzotzil mantarex" (Tzotzil, Santíz R. 987).

Uses: a handful of the entire plant is boiled in a liter of water and the resulting solution is dripped into the ear for pain (López P. 446); the entire plant is boiled and the resulting solution is taken orally for diarrhea (Gómez L. 523); flowers are crushed and mixed with *Daucus montanus* and applied as a plaster for eye problems (Santíz R. 987).

Nees (1847:198) listed additional synonyms for *Cryphiacanthus lacteus*.

The name *R. lactea* is more or less consistently applied to plants resembling those described above. The description in the protologue corresponds reasonably well but is not very diagnostic. Stapf (Bot. Mag. 139:t. 8485. 1913) alluded to unspecified differences between Cavanilles protologue and specimens at K conforming to Nees' concept of the same species. At MA there are 4 specimens of *R. lactea* that represent plants cultivated at the Royal Botanical Garden in the late 18th and early 19th centuries. Only one of these (i.e., MA 476196) is known with certainty to have been cultivated and collected prior to the publication of Cavanilles protologue. This specimen was annotated as the lectotype of *R. lactea* by C. Broome but, to my knowledge, this designation has never been published. The specimen differs from our material in several characters including its pedunculate inflorescence (peduncles to 15 mm long), eglandular calyces and corollas, and corollas with the tube shorter than the throat. Our plants very likely represent a species different from that represented at MA by this specimen.

A specimen at F from MA ("ex antiquo herbario generali Herb. Horti. Bot. Matritensis") was annotated by Gibson as a probable isotype of *R. lactea*. Anonymous notes made on the sheet conclude: "matches the illustration in Cav. Ic. Pl.," "stem tomentose-lanate," "calyx 15–20 mm, pilose; corolla 3–3.5 cm, narrow tube portion < 1 cm long; capsule glabrous." This specimen resembles our plants in most characters but differs by the lack of glands on bracts and calyx, the lack of understory trichomes on stems, and the glabrous styles. It is not known if this specimen actually represents type material.

Collections from Oaxaca, Chiapas (e.g., Laughlin 1001), and Guatemala that are nearly stemless have been treated as *R. abbreviata*. Guatemalan and Oaxacan plants treated with this name by Gibson (1974) differ from Chiapan plants by lacking glands on the calyx and corolla and by having shorter capsules (11 mm long) that have a sparse covering of eglandular trichomes throughout and a concentration of them at the apex (but no glandular trichomes). Should the name *R. lactea* not apply to our plants, then *R. abbreviata* likely would.

## 11. *Ruellia matagalpae* Lindau, Bull. Herb. Boissier 3:364. 1895.

— TYPE: Nicaragua, Matagalpa, Cañada Yericá, 21 Feb 1894, E. Rothschuh 395 (B, destroyed).

ILLUSTRATION: none found.

Erect to reclining perennial herbs or shrubs to 2 m tall. Young stems quadrate to quadrate-sulcate, evenly puberulent with erect to antrorse eglandular trichomes 0.05–0.1 mm long, also usually glandular-punctate, soon glabrate and with wartlike blisters. Leaves petiolate, petioles to 20 mm long, blades lance-ovate to ovate to ovate-elliptic to elliptic, 40–200 mm long, 14–55 mm wide, 2.3–4.7 times longer than wide, acuminate to subfalcate at apex, attenuate at base, surfaces pubescent with cauline type trichomes and glandular-punctate, margin entire. Inflorescence of subsessile to pedunculate reduced dichasia in axils of distal leaves or leaflike bracts, usually ± densely clustered at shoot apex and forming a leafy headlike thyrse; dichasia alternate or opposite, 1-flowered, 1 per axil, peduncles 1–3.5 mm long, pubescent like young stems. Bracts, if present, foliose, petiolate, ovate to lance-ovate, 20–45 mm long, 5–21 mm wide, pubescent like leaves or with glandular trichomes 0.05–0.1 mm long as well. Bracteoles usually represented by a minute thickening or completely absent, rarely present and elliptic, 0.4–5 mm long, 0.3–1.5 mm wide, pubescent like leaves. Flowers sessile to subsessile (i.e., borne on pedicels to 1 mm long; flowers lacking a pedicel when bracteoles present). Calyx 3–13 mm long, tube 1–2 mm long, lobes subulate to triangular-subulate, equal, 2–11 mm long, 2–10 times longer than tube, 0.7–1.1 mm wide, abaxially glandular-punctate, margin puberulent. Corolla blue-purple, 28–60 mm long, externally pubescent with flexuose eglandular trichomes 0.1–0.3 mm long and glandular-punctate, tube 23–45 mm long, usually conspicuously geniculate at junction of tube and throat, narrow proximal portion 15–30 mm long, ± abruptly expanded into throat, throat 7–14 mm long, shorter than narrow proximal portion of tube, 3.5–6.5 mm in diameter near midpoint, limb 14–38 mm in diameter, lobes 6–18 mm long, 5–15 mm wide. Stamens included to slightly emergent, 7–9 mm long, thecae 2.5–3 mm long. Style 20–34 mm long, pubescent with eglandular trichomes and often glandular-punctate near base, stigma unequally 2-lobed, 1 lobe 0.7–2 mm long, other lobe 1.9–2.5 mm long. Capsule 11–15 mm long, pubescent with erect to retrorse eglandular trichomes 0.05–0.1 mm long and glandular-punctate throughout, stipe 2–3 mm long, head broadly ellipsoid to obovoid. Seeds 6, 3–4 mm long, 2.5–3.8 mm wide, surfaces and margin covered with appressed hygroscopic trichomes.  $n = 17$ . Flowering: Aug–Mar; fruiting: Oct–Mar.

Slopes and streamsides in Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, Evergreen Cloud Forest, Evergreen Seasonal Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common in Northern Highlands, Eastern Highlands, Central Plateau, Central Depression, Sierra Madre, and Pacific Coastal Plain; 300–2000 m. Mex. (Oax., Chis., Guat., Bel., Hond., Nic. CHIAPAS COLLECTIONS: *He 316* (CAS); *Lm 3882* (US); *EM 158* (MEXU, MICH, US); *Mv B-141* (MEXU); *Mi 5856* (MEXU); *Mi 7658* (MEXU); *Na 1327* (MEXU); *Rey 235* (MEXU); *Rey 255* (MEXU); *Rey 415* (MEXU); *Rey 421* (MEXU); *So 1702* (DS, MICH, UC, US); *X&S 491* (DS, MEXU); 21903; 22114; 23055; 23873; 28952;

29125; 30264; 30319; 31273; 32776; 33267; 34169; 36701; 42600; 47654; 56348; 57706; 60182; 70391; 70675; 70899.

In this species the dichasia are very reduced (i.e., bracteoles mostly absent and only 1 flower present). When bracteoles are absent it is sometimes difficult to distinguish peduncles from pedicels. Thickenings where bracteoles would otherwise emerge are usually evident, however, and the stalk below them is interpreted as the peduncle and the stalk above them as the pedicel.

## 12. *Ruellia matudae* Leonard in Lundell, *Contr. Univ. Michigan Herb.* 6:63. 1941.

— TYPE: Mexico, Chiapas, San Nicolás near Montecristo, Jan 1938, *E. Matuda 1966* (MICH!; isotypes: K!, LL, MEXU!, US!).

ILLUSTRATION: *Contr. Univ. Michigan Herb.* 6:63, fig. 5. 1941.

Shrubs to 2 m tall. Young stems quadrate-alate (i.e., with angles conspicuously winged), pubescent (especially on the angles) with antrorse eglandular trichomes 0.1–0.3 mm long. Leaves petiolate, petioles to 45 mm long, blades ovate to lance-ovate to lance-elliptic, 33–150 mm long, 9–50 mm wide, 2.5–7.3 times longer than wide, acute to acuminate at apex, rounded to acute at base, surfaces pubescent with cauline type trichomes, margin entire. Inflorescence of pedunculate laterally spreading dichotomously (or otherwise) branching expanded dichasia (or thyrsoid derivatives of dichasia with central flower often suppressed and 1–4 branches arising from axil of bracteoles at proximal and other junctures) to 300 mm long from leaf axils; dichasia alternate or opposite, many-flowered, 1 per axil, peduncles 20–140 mm long, quadrate-alate, pubescent like young stems. Bracteoles petiolate, lanceolate to lance-elliptic, 14–35 mm long, 2.5–4.5 mm wide, pubescent like leaves, secondary bracteoles similar to bracteoles but somewhat smaller. Flowers pedicellate, pedicels 1–4 mm long, pubescent like peduncles. Calyx 5–9 mm long, tube 1–2 mm long, lobes subulate, subequal, 4–7.5 mm long, 2.5–6 times longer than tube, 0.6–0.8 mm wide, abaxially and marginally pubescent with erect to flexuose eglandular trichomes 0.1–0.3 mm long. Corolla pink to red, 36–45 mm long, externally pubescent with erect to flexuose glandular and eglandular trichomes 0.1–0.4 mm long, tube 25–37 mm long, narrow proximal portion 10–15 mm long, ± abruptly expanded into throat, throat 15–20 mm long, longer than narrow proximal portion of tube, 4.5–8 mm in diameter near midpoint, limb 22–32 mm in diameter, lobes 10–12 mm long, 4.5–7.5 mm wide. Stamens exerted 4–8 mm beyond mouth of corolla, 21–25 mm long, thecae 3–3.5 mm long. Style 28–34 mm long, pubescent with glandular and eglandular trichomes throughout, stigma unequally 2-lobed, 1 lobe 1.2–1.8 mm long, other lobe 0.2–0.6 mm long. Capsule 14–17 mm long, pubescent throughout with erect glandular and eglandular trichomes 0.1–0.2 mm long, stipe 4–5 mm long, head linear-ellipsoid. Seeds 10–12, 2.5–2.8 mm long, 2 mm wide, surfaces striate (lacking trichomes), margin with a ± conspicuous band of hygroscopic trichomes. Flowering: Jan–May; fruiting: Mar–May.

Chiapas endemic: slopes and ridges in Evergreen Seasonal Forest and Pine-Oak Forest; common in Sierra Madre; 900–1600 m. CHIAPAS COLLECTIONS: *EM 4385* (MEXU); *EM 5189*

(UC, US); *Mi 6922* (MEXU); *RG 140* (MEXU); *Ten 5697* (MEXU); *50701*; *50730*; *57020*; *67437*.

## 13. *Ruellia maya* T.F. Daniel, *Proc. Calif. Acad. Sci.* 48:273. 1995.

— TYPE: Mexico, Chiapas, Agua Azul between Palenque and Ocosingo, ca. 10 mi SW of Río Tuliija, ca. 300 m, 15 Mar 1987, *T. Daniel & B. Bartholomew 5000* (CAS!; isotypes: MEXU!, MICH!).

ILLUSTRATION: *Fig. 31*.

Erect to ± diffuse perennial herbs or shrubs to 1 m tall. Young stems quadrate to quadrate-sulcate, pubescent with flexuose eglandular and glandular (sometimes absent) trichomes 0.5–1.3 (–2) mm long, trichomes often concentrated in 2 lines. Leaves petiolate, petioles to 34 mm long, blades lanceolate to lance-elliptic, 33–150 mm long, 6–50 mm wide, 2.8–9.1 times longer than wide, acute to acuminate at apex, attenuate at base, surfaces pubescent with scattered glandular (on younger leaves, sometimes absent on older leaves) and eglandular trichomes 0.2–1.5 mm long or becoming glabrate, margin entire to subsinuate. Inflorescence of sessile reduced dichasia in axils of distal leaves; dichasia alternate or opposite, 1-flowered, 1 per axil. Bracteoles petiolate, lance-ovate to narrowly-elliptic, 17–46 mm long, 4–9 mm wide, pubescent like young leaves (i.e., glandular). Flowers sessile to subsessile (i.e., with pedicels to 1 mm long). Calyx 14–27 mm long, tube 2–3 mm long, lobes lanceolate to elliptic to oblanceolate, equal to subequal, 12–24 mm long, 5.4–8 times longer than tube, 1.5–4 mm wide, abaxial surface pubescent like bracteoles, margin ciliate with erect to flexuose to antrorse glandular and eglandular trichomes 0.3–1 (–1.6) mm long. Corolla blue-purple, 65–90 mm long, externally pubescent with flexuose glandular and eglandular trichomes 0.2–1 mm long, tube 56–70 mm long, narrow proximal portion 32–50 mm long, arched or curved near apex, abruptly expanded into throat, throat 16–25 mm long, shorter than narrow proximal portion of tube, 9–15 mm in diameter near midpoint, limb 32–60 mm in diameter, lobes 15–25 mm long, 14–25 mm wide. Stamens included, longer pair 13–15 mm long, shorter pair 11–12 mm long, thecae 5–5.5 mm long, connective often with an apical elongation. Style 50–55 mm long, pubescent with eglandular trichomes ± throughout, stigma unequally 2-lobed, 1 lobe 1.7–2.8 mm long, other lobe 0.2–0.5 mm long or not evident. Capsule 13–18 mm long, pubescent with scattered erect to flexuose eglandular and glandular (rarely becoming ± entirely eglandular with age) trichomes 0.1–0.3 mm long, stipe 2–2.5 mm long, head ellipsoid to ellipsoid-obovoid. Seeds up to 16, 3.5–4 mm long, 2.5–3 mm wide, surfaces smooth to striate (lacking trichomes), margin with a prominent band of hygroscopic trichomes.  $n = 17$ . Flowering: Sep–Dec–Mar; fruiting: Dec–Mar.

Along streams in Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, and Evergreen Seasonal Forest; common in Eastern Highlands and Central Plateau; 280–1700 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *Di s.n.* (WIS); *46906*; *47419*; *49094*; *49113*; *49404*; *49578*; *49918*; *50450*; *56133*; *56347*; *57264*; *57394*; *57688*.

This species was previously known by the name *R. longituba* D.N. Gibson. However, the syntypes of that

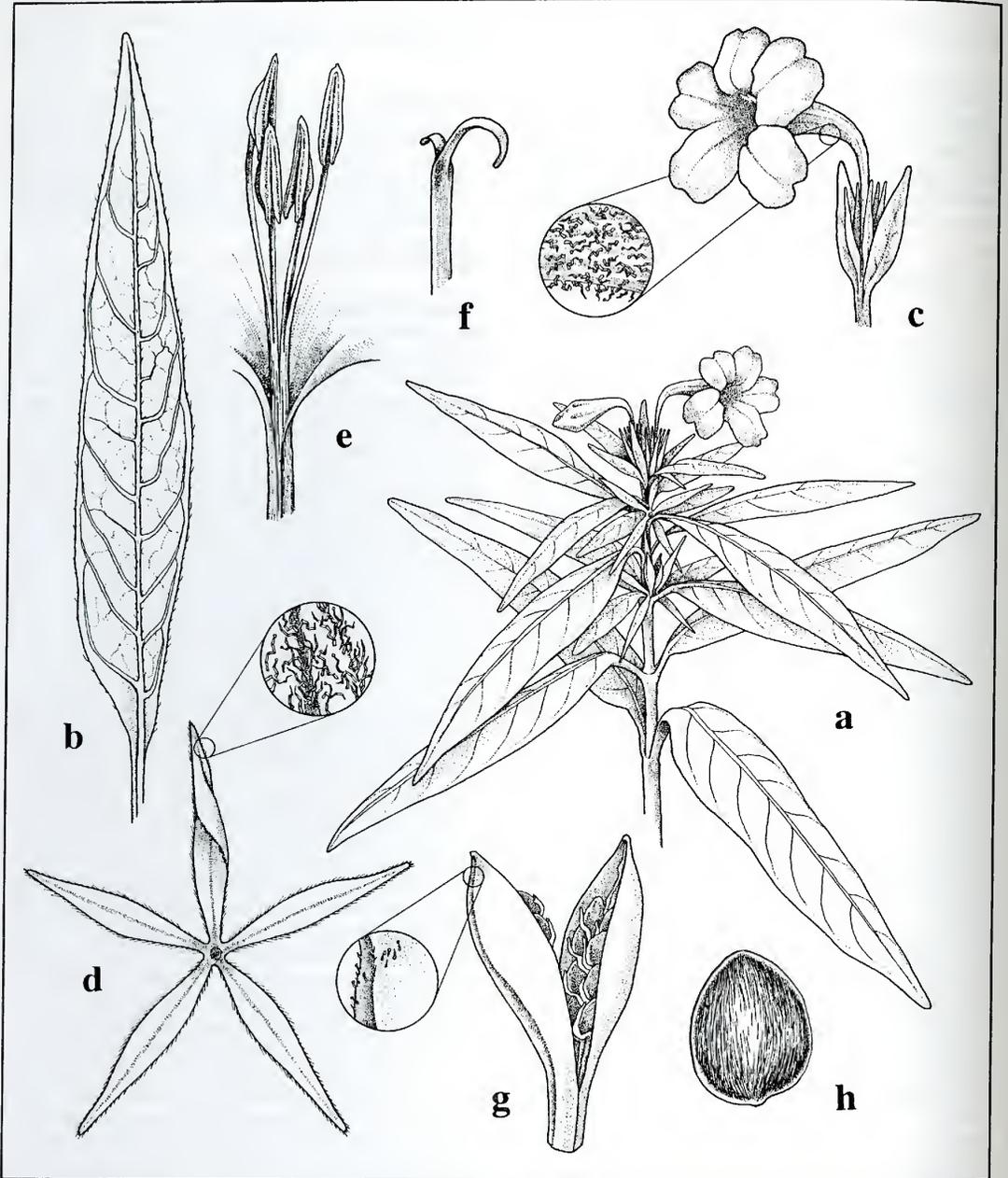


FIGURE 31. *Ruellia maya* T.F. Daniel (*Daniel & Bartholomew 5000*). a, habit,  $\times 0.4$ ; b, leaf,  $\times 1.3$ ; c, bracteoles and flower,  $\times 0.5$  (with enlargement showing pubescence); d, enlarged calyx following dehiscence of capsule,  $\times 1.1$  (with enlargement showing pubescence); e, corolla cut open showing stamens,  $\times 2.7$ ; f, distal portion of style with stigma,  $\times 7.5$ ; g, capsule,  $\times 2.3$  (with enlargement showing pubescence); h, seed,  $\times 7$ . Drawn by Jenny Speckels.

name represent one or more different species (Daniel 1995).

**14. *Ruellia megasphaera* Lindau, Bull. Herb. Boissier 3:364. 1895.**

— TYPE: Mexico, without locality or date, *C. Ehrenberg* 1268 (B, destroyed, see Daniel 1990).

ILLUSTRATION: none found.

Shrubs to 1 m tall. Young stems quadrangle, at first evenly pubescent with a mixture of erect to subflexuose glandular and eglandular trichomes 0.3–1 mm long (glandular-pubescent), soon becoming puberulent with erect to antrorse mostly eglandular trichomes 0.05–0.2 mm long. Leaves petiolate, petioles to 45 mm long, blades ovate to elliptic, 35–160 mm long, 9–80 mm wide, 2–4.7 times longer than wide, subattenuate to attenuate at base, acuminate at apex, surfaces glandular-punctate and glandular-pubescent, margin entire to subcrenate. Inflorescence of subsessile to pedunculate reduced dichasia in axils of distal leaves and leaflike bracts forming terminal branched headlike thyrses; dichasia alternate or opposite, 1-flowered, 1 per axil, peduncles to 3.5 mm long, subterete to subquadrate, glandular-pubescent. Bracts petiolate, ovate to lance-ovate, 18–48 mm long, 4–19 mm wide, abaxial surface glandular-punctate and glandular-pubescent. Bracteoles absent or rudimentary (i.e., reduced to thickenings). Flowers sessile to subsessile (i.e., pedicels to 1 mm long). Calyx 10–18 mm long, tube 1–3 mm long, lobes linear to linear-elliptic to oblanceolate, subequal, 7.5–15 mm long, 6–10 times longer than tube, 1.5–2.8 mm wide, abaxial surface glandular-punctate and glandular-pubescent, margin glandular-pubescent. Corolla dark pink to orange-red to red, 45–67 mm long, externally glandular-pubescent, tube 33–42 mm long, narrow proximal portion 17–32 mm long, gradually ampliate into throat, throat 15–22 mm long, shorter than narrow proximal portion of tube, 5.5–8.5 mm in diameter near midpoint, limb 21–35 mm in diameter, lobes linear-elliptic to elliptic to ovate, 8.5–17 mm long, 4.2–7 mm wide. Stamens exerted 8–11 mm beyond mouth of corolla, 24–30 mm long, thecae 3.5–5 mm long. Style 35–40 mm long, pubescent with eglandular trichomes, stigma unequally 2-lobed, 1 lobe 1.7–2 mm long, other lobe 0.2–1 mm long. Capsule 11–16 mm long, glandular-pubescent, stipe 1.5–2 mm long, head ellipsoid. Seeds 6–8 per capsule, 2.9–3.7 mm long, 2.7–3 mm wide, surfaces and margin covered with appressed hygroscopic trichomes. Flowering: Dec–Jun; fruiting: Jan–May.

Slopes and ridges in Pine-Oak Forests; common in Central Depression and Sierra Madre; 250–1370 m. Mex. (Mich., Ver., Gro., Oax., Chis.), Guat., Salv. CHIAPAS COLLECTIONS: *And* 5568 (ENCB, MICH); *La* 3013 (DS, US); *EM* 124 (MEXU, MICH); *EM* 18747 (DS, MEXU); *Mi* 5972 (CHIP, MEXU); *Mi* 9 (MEXU); *N* 3826 (US); *P* 144 (US); 56280; 57021.

Local name: “jazmin rosado” (*Montes de Oca* 9).

Use of this scientific name was discussed by Daniel (1990).

The absence of developed bracteoles confuses the distinction between peduncle and pedicel. When thickenings are present, the stalk below them is considered to be the peduncle and the stalk above them the pedicel.

**15. *Ruellia nudiflora* (Engelm. & A. Gray) Urban, Symb. antill. 7: 382. 1912.**

— *Dipteracanthus nudiflorus* Engelm. & A. Gray, Boston J. Nat. Hist. 5:229. 1845. — SYNTYPES: United States of America, Texas, Sim’s Bayou near Houston, May–Jul 1843, *F. Lindheimer* 157 (GH!, UC!; isosynotype: K!); Texas, without locality, 1835, *T. Drummond* coll. 2, no. 221 (GH!; isosynotype: K!), coll. 3, no. 257 (GH!; isosynotype: K!). Leonard (J. Wash. Acad. Sci. 27:514. 1927) indicated that Lindheimer’s collection from Sim’s Bayou was the type. Because he did not cite a specimen, his choice would not appear to constitute a lectotypification.

*Cryphiacanthus barbadensis* var. *humilis* Nees in A. DC. Prodr. 11:198. 1847. — *Ruellia nudiflora* var. *humilis* (Nees) Leonard, J. Wash. Acad. Sci. 17:517. 1927. — TYPE: unspecified collections from Cuba and Venezuela at B and G were cited.

*Cryphiacanthus viscosus* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:128. 1855, non *Ruellia viscosa* Kunth (1817). — TYPE: Mexico, Oaxaca, Guatulco, Oct 1842, *F. Liebmann* 10746 (C!).

*Cryphiacanthus tubiflorus* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:129. 1855, non *Ruellia tubiflora* Kunth (1817). — TYPE: Mexico, Veracruz, Papantla, Jun 1841, *F. Liebmann* 10745 (C!).

*Ruellia tuberosa* L. var. *occidentalis* A. Gray, Syn. fl. N. Amer. 2(1):325. 1878. — *Ruellia nudiflora* var. *occidentalis* (A. Gray) Leonard, J. Wash. Acad. Sci. 17:516. 1927. — *Ruellia occidentalis* (A. Gray) Tharp & F.A. Barkley, Amer. Midl. Naturalist 42:25. 1949. — SYNTYPES: collections of Berlandier, Wright, Rothrock, and Coulter from the southwestern United States were cited by Gray. Leonard (J. Wash. Acad. Sci. 17:516. 1927) indicated that the type was collected in Texas by Berlandier. Because he did not cite a specimen, his choice would not appear to constitute a lectotypification.

*Ruellia nudiflora* var. *congesta* Leonard, J. Wash. Acad. Sci. 17:518. 1927. — *Ruellia congesta* (Leonard) Tharp & F.A. Barkley, Amer. Midl. Naturalist 42:8. 1949. — TYPE: Mexico, San Luis Potosí, without locality, 1877, *J. Shaffner* 398 (US).

*Ruellia nudiflora* var. *glabrata* Leonard, J. Wash. Acad. Sci. 17:518. 1927. — *Ruellia glabrata* (Leonard) Tharp & F.A. Barkley, Amer. Midl. Naturalist 42:13. 1949. — TYPE: Mexico, Sonora, Ciénega, Aug 1874, *J. Rothrock* 560 (US; isotype: GH!).

*Ruellia nudiflora* var. *grandiflora* Leonard, J. Wash. Acad. Sci. 17:516. 1927. — *Ruellia muelleri* var. *grandiflora* (Leonard) Tharp & F.A. Barkley, Amer. Midl. Naturalist 42:23. 1949. — TYPE: Mexico, Morelos, near Yauatepec, Jul 1905, *J. Rose et al.* 8601 (US).

*Ruellia nudiflora* var. *insularis* Leonard, J. Wash. Acad. Sci. 17:519. 1927. — TYPE: Cuba, Las Pailas, May 1889, *H. Eggers* 5452 (US).

*Ruellia nudiflora* var. *yucatanana* Leonard, J. Wash. Acad. Sci. 17:518. 1927. — *Ruellia yucatanana* (Leonard) Tharp & F.A. Barkley, Amer. Midl. Naturalist 42:56. 1949. — TYPE: Mexico, Yucatán, near Izamal, 1895, *G. Gummer* 759 (US; isotype: GH!).

*Ruellia gooddingiana* A. Nelson, Amer. J. Bot. 18:437. 1931.  
— TYPE: Mexico, Sonora, La Ciénega, 18 Jul 1911, L. Goodding 959 (RM!).

ILLUSTRATIONS: J. Wash. Acad. Sci. 17:514, fig. 3. 1927; Publ. Carnegie Inst. Wash. 461:211, figs. 11, 12. 1936; Wasshausen in Lundell, Fl. Texas 1(3):240, fig. 5. 1966; Desert Pl. 5:175, fig. 3e.f. 1984; Fieldiana, Bot. (n.s.) 18:18, fig. 16. 1986.

Erect to diffuse perennial herbs to 4.5 dm tall. Young stems quadrate to quadrate-sulcate, pubescent with an understory (sometimes sparse or absent) of retrorse eglandular trichomes 0.2–0.4 mm long and an overstory of flexuose eglandular trichomes 1–2.5 mm long. Leaves petiolate, petioles to 25 mm long, blades elliptic to ovate to broadly ovate to deltate, 25–90 mm long, 18–51 mm wide, 1.3–3.2 (–3.8) times longer than wide, rounded to subacute at apex, constricted-attenuate at base, surfaces pubescent with eglandular trichomes or becoming glabrate, margin undulate-crenate to sinuate. Inflorescence of pedunculate ascending or laterally spreading expanded dichasia from axils of proximal leaves, and sessile to pedunculate  $\pm$  congested to  $\pm$  expanded dichasia from axils of distal (usually reduced) leaves or bracts, the latter dichasia collectively forming a terminal leafy paniculiform thyse, thyse rachis pubescent with erect to flexuose glandular and eglandular trichomes 0.05–0.5 (–1.5) mm long (glandular-pubescent); dichasia alternate or opposite, 3–many-flowered, 1 (–2) per axil, peduncles of proximal dichasia up to 85 mm long, subquadrate to quadrate, pubescent like stems (or sometimes glandular-pubescent), peduncles of distal dichasia 1–45 mm long, glandular-pubescent. Bracts sessile to petiolate, obovate to elliptic to narrowly elliptic to linear to subulate, 3–20 mm long, 0.7–8 mm wide, glandular-pubescent, proximal (more leaflike) bracts sometimes eglandular. Bracteoles lanceolate to lance-ovate to elliptic to oblanceolate, 3–10 mm, 0.7–5 mm wide, glandular-pubescent (or those of proximal dichasia sometimes eglandular), secondary bracteoles similar to bracteoles although reduced in size. Flowers pedicellate, pedicels 1–18 mm long, glandular-pubescent. Calyx 7.5–21 mm long, tube 1–3 mm long, lobes lance-subulate, 6.5–18 mm long, subequal to unequal, 4.3–9 times longer than tube, 0.8–1 mm wide, abaxially and marginally glandular-pubescent. Corolla blue-purple, (25–) 31–60 mm long, externally glandular-pubescent, tube 21–47 mm long, narrow proximal portion 8–27 mm long,  $\pm$  abruptly expanded into throat, throat (9–) 11–25 mm long, longer than or  $\pm$  equal to narrow proximal portion of tube, 4–12 mm in diameter near midpoint, limb 18–31 mm in diameter, lobes 7–17 mm long, 7–18 mm wide. Stamens included, longer pair 8–19 mm long, shorter pair 6–16 mm long, thecae 2.8–4 mm long. Style 15–47 mm long, pubescent with eglandular trichomes and sometimes glandular near base as well, stigma unequally 2-lobed, 1 lobe 1–2 mm long, other lobe 0.1–0.7 mm long. Capsule 11–18 mm long, externally glandular-pubescent (eglandular trichomes becoming retrorse toward base of capsule and glandular trichomes sometimes sparse or restricted to apex), stipe 2–3.5 mm long, head linear-ellipsoid to obovoid. Seeds 8–12, 2.2–3 mm long, 2–2.5 mm wide, surfaces and margin covered with appressed hygroscopic trichomes.  $n = 17$ . Flowering: Feb–Oct; fruiting: Feb–Nov.

Slopes, streamsides, and disturbed habitats (e.g. fields, vacant lots, and roadsides) in Evergreen Seasonal Forest and Tropical Deciduous Forest; common in Central Plateau, Central Depres-

sion, and Pacific Coastal Plain; 60–1120 meters. U.S. (Arizona, Texas, Louisiana), Mex. (Son., Chih., Coah., N.L., Tam., Sin., Dgo., S.L.P., Cma., Mlos., Ver., Oax., Tab., Camp., Yuc., Q. Roo, Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., Antill. CHIAPAS COLLECTIONS: *C 466* (DS); *La 826* (DS); *Mc s.n.* (MEXU); *EM 16965* (F, MEXU); *Mv B-441* (MEXU); *Mv B-660* (MEXU); *Pa 1899* (CAS); *St 872* (CAS); *St 873* (CAS); *Ve 1625* (MEXU); *V&S 64-14* (DS); 7586; 10292; 10624; 24121; 27111.

*Ruellianudiflora* is an extremely variable and widely distributed species. This species along with *R. tuberosa*, *R. intermedia*, and several others that are sometimes recognized, comprise a complex that is deserving of considerable study. Syntypes of *R. nudiflora* from Texas have mostly eglandular corollas and capsules. In our material of *R. nudiflora*, the glands on the corolla and capsule are sometimes few but always present. Flowers borne in the long-pedunculate dichasia from axils of proximal leaves are presumably cleistogamous. *Breedlove 27111* differs from the other collections of *R. nudiflora* from Chiapas by its longer (55–60 vs. 31–36 mm long) corollas, style (39–47 vs. 15–17 mm), and thecae (4 vs. 2.8–3 mm), and by its corolla tube which is approximately equal to or slightly longer than the throat (vs. shorter than throat). This difference does not appear to be the result of heterostyly; the stigma is at the same level with respect to the upper anthers in all specimens. Given the broad sense in which this species is treated, additional names undoubtedly could be added to the synonymy.

*Clarke 466* differs from *R. nudiflora* only by its flowers which are all chasmogamous and borne in long-pedunculate, glandular dichasia from near base of the plant to the apex.

*Matuda 16965* (Paredón, Tonalá, 17 Sep 1947, F) is a rather poorly preserved specimen with affinities to *R. nudiflora*. It differs, however, by having only long-pedunculate dichasia from leaf axils (i.e., lacking a terminal paniculiform thyse) and by having capsules apparently lacking any glandular trichomes. Its identity remains questionable and it is not included in the description above.

## 16. *Ruellia paniculata* L. Sp. pl. 635. 1753.

— *Dipteracanthus paniculatus* (L.) Nees in A. DC. Prodr. 11:142. 1847. — TYPE: based on description in Hort. cliff. (p. 313) and on Sloan's description and figure (Cat. Jam. 59 and Hist. 1:158, t. 100, fig. 2); the type locality is in Jamaica.

*Ruellia viscosa* Kunth, Nov. gen. sp. 2:239. 1817. — TYPE: South America, "in ripa fluminis Apures et in sylvis Orinocensibus juxta pagum Carichana" (fide protologue), "Rio Apuse" (fide specimen), A. von Humboldt & A. Bonpland mss. n. 817 (P-Bonpl.).

ILLUSTRATIONS: Bot. Reg. 7:t. 585. 1821; Publ. Carnegie Inst. Wash. 461:209, fig. 9. 1936; Fieldiana, Bot. (n.s.) 18:18, fig. 16. 1986.

Erect to diffuse perennial herbs or shrubs to 1 m tall with fetid odor. Young stems subquadrate to quadrate, pubescent with an

understory of erect to flexuose eglandular and glandular (often sparse) trichomes 0.05–0.3 mm long sometimes concentrated in 2 lines and an overstory of evenly distributed erect to flexuose eglandular and glandular trichomes 0.2–1 mm long. Leaves petiolate, petioles to 52 mm long, blades ovate to elliptic, 20–185 mm long, 7–76 mm wide, 2.2–3.3 times longer than wide, acute to acuminate at apex, acute to attenuate at base, surfaces pubescent with erect to flexuose glandular and eglandular trichomes 0.05–0.5 (–1) mm long (glandular-pubescent) or older leaves becoming mostly eglandular or glabrate, margin entire to crenate-dentate. Inflorescence of pedunculate expanded dichasia to 150 mm long in leaf axils, these sometimes collectively forming a terminal leafy panicle; dichasia alternate or opposite, 3–many-flowered, 1–2 per axil, peduncles 3–21 mm long, subterete, glandular-pubescent, secondary peduncles to 23 mm long, proximal dichasia sometimes appearing as floriferous branches (i.e., first flower becomes displaced or replaced by a shoot bearing axillary dichasia). Bracteoles and secondary bracteoles petiolate, ovate to elliptic to obovate to oblanceolate, 3–35 mm long, 1–12 mm wide, glandular-pubescent. Flowers sessile or pedicellate, pedicels to 1.5 mm long, glandular-pubescent. Calyx (8.5–) 11–19 mm long, tube 1–2 mm long, lobes subulate to linear-subulate, subequal (longest lobe 1.07–1.26 times longer than shortest lobe), (6.7–) 9–17 mm long, 6.5–13 times longer than tube, 0.5–0.9 mm wide, abaxially and marginally glandular-pubescent. Corolla blue-purple, 21–37 mm long, externally glandular-pubescent, tube 14–28 mm long, narrow proximal portion 9–17 mm long, ± abruptly expanded into throat, throat 5–12 mm long, shorter than narrow proximal portion of tube, 4.5–7 mm in diameter near midpoint, limb 10–25 mm in diameter, lobes 4–10.5 mm long, 4.5–9 mm wide. Stamens included or often slightly emergent, longer pair 9–10 mm long, shorter pair 6–7 mm long, thecae 2.5–3.5 mm long. Style 12–27 mm long, pubescent with eglandular trichomes throughout, stigma unequally 2-lobed, 1 lobe 1.5–2 mm long, often recoiled, other lobe 0.4–0.6 mm long. Capsule 11–16 mm long, glabrous or sparsely pubescent with erect eglandular and/or glandular trichomes 0.05–0.1 mm long, stipe 0.5–1 mm long, head narrowly ellipsoid. Seeds 8–12, 2–2.5 mm long, 1.5–2 mm wide, surfaces minutely papillose to striate (lacking trichomes), margin swollen, covered with appressed hygroscopic trichomes. Flowering and fruiting: Sep–Apr.

Along streams, in dry flats, and in disturbed habitats (e.g., roadsides) in Evergreen Seasonal Forest, Tropical Deciduous Forest, Short-tree Savanna, and Mangrove Swamp; common in Central Depression and Pacific Coastal Plain; 0–920 m. Mex. (Tam., Sin., S.L.P., Ver., Gro., Oax., Camp., Yuc., Q. Roo, Chis.), Guat., Bel., Hond., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Braz.). CHIAPAS COLLECTIONS: *Al 1839* (MEXU); *Dav s.n.* (MICH); *EM 2675* (MEXU, MICH, US); *EM 16281* (MEXU, MICH, US); *EM 16955* (K, MEXU); *EM 17215* (MEXU); *S&S 1839* (K, MEXU, US); *V&S 14-2* (DS); *9191*; *20013*; *20835*; *23447*; *23703*; *29057*; *42248*; *42277*; *50318*; *54217*.

Leonard (1951:76) cited additional synonyms.

### 17. *Ruellia pereducta* Standl. ex Lundell, Publ. Carnegie Inst. Wash. 436:303. 1934.

—TYPE: Mexico, Campeche, Monterrey, 23 Jan 1932, C. Lundell 1239 (F!)

ILLUSTRATION: none found.

Shrubs to 2 m tall. Young stems quadrate, glabrous or bifariously pubescent with antrorse to flexuose to retrorse eglandular trichomes 0.1–0.3 mm long at nodes and along all or part of internodes. Leaves petiolate, petioles to 90 mm long, blades ovate to lance-ovate, 57–210 mm long, 14–100 mm wide, 2–4.1 times longer than wide, acuminate-falcate at apex, (rounded to) acute at base, surfaces glabrous, margin subsinuate to dentate. Inflorescence of pedunculate laterally spreading to ascending expanded (i.e., paniculiform) dichasia to 420 mm long from leaf axils; dichasia alternate (to opposite), many-flowered, 1 per axil, peduncles 80–280 mm long, quadrate with angles slightly winged, glabrous. Bracteoles petiolate, lanceolate to linear-lanceolate, 27–100 mm long, 3–20 mm wide, glabrous, secondary bracteoles similar to bracteoles although smaller. Flowers pedicellate, pedicels 1.2–6 mm long, glabrous. Calyx 5.5–11 mm long, tube 1.5–2.5 mm long, lobes lance-subulate, 5–9 mm long, subequal, 2.5–4.5 times longer than tube, 0.5–1 mm wide, abaxially glabrous or nearly so (i.e., rarely with a very few inconspicuous antrorse eglandular trichomes), margin sometimes sparsely ciliate with inconspicuous erect to antrorse glandular and eglandular trichomes 0.05–0.1 mm long. Corolla dark pink or pinkish purple, 31–43 mm long, externally pubescent with erect to retrorse glandular and eglandular trichomes 0.05–0.1 mm long, trichomes often sparse and inconspicuous on mature corolla, tube 25–37 mm long, narrow proximal portion 10–14 mm long, gradually to ± abruptly expanded into throat, throat ± tubular, 14–26 mm long, longer than narrow proximal portion of tube, 4.5–7.5 mm in diameter near midpoint, limb 16–27 mm in diameter, lobes 5.5–11 mm long, 4.8–9.5 mm wide. Stamens included or barely emergent, 18–20 mm long, thecae 2.2–3.2 mm long. Style 25–31 mm long, pubescent with eglandular (and occasionally with a few glandular) trichomes or glabrous, stigma unequally 2-lobed, 1 lobe 0.9–1.4 mm long, other lobe to 0.4 mm long or not evident. Capsule 17–23 mm long, glabrous or with inconspicuous eglandular or glandular trichomes 0.05–0.1 mm long (sometimes restricted to apex), stipe 4–7 mm long, head ellipsoid to obovoid. Seeds 6–12, 2.3–3.9 mm long, 2–3.7 mm wide, surfaces ± smooth or with longitudinal rows of minute papillae (lacking trichomes), margin conspicuously pubescent-fringed. Flowering: Jan–Jun; fruiting: Jan, Apr–Jun.

Tropical Rain Forest and Lower Montane Rain Forest; common in Eastern Highlands; 150–600 m. Mex. (Tab., Camp., Q. Roo, Chis.), Guat., Bel. CHIAPAS COLLECTIONS: *Cb 2696* (MEXU); *Da 20405* (CAS); *Da 20523* (MEXU); *Mz 10185* (CAS, F); *Mz 11599* (MEXU); *Mz 11744* (MEXU); *Mz 11891* (MEXU); *Mz 17740* (CAS); *34516*; *57850*; *57952*.

Standley's publication of 1935 (Publ. Carnegie Inst. Wash. 461:89) is usually cited as the original place of publication of this species. Lundell's publication with a brief description predates the comprehensive description by Standley and fulfills all requirements for valid publication, however. Leonard (Publ. Carnegie Inst. Wash. 461:206. 1936) included this name as a synonym of *R. stemonacanthoides*. Differences between these two species were pointed out by Gibson (1974).

Two collections from Chiapas superficially resemble *R. pereducta*. One (Mpio. Las Margaritas, confluence of Río Ixcán and Río Lacantum on Guatemala border, 300 m, 14 Mar 1973, *Breedlove & McClintock 34059*, DS) differs by its ± evenly disposed cauline pubescence,

abaxially pubescent (along major veins) leaf blades, and often slightly pubescent peduncles. Furthermore this collection is noted as having "pale lavender" corollas. Indeed, a loose flower in a fragment envelope attached to the specimen has a broader (8–9 mm wide near midpoint), triangular-shaped throat like most species of *Ruellia* with blue corollas. The other collection (Mpio. Berriozábal, 13 km N of Berriozábal, 1000 m, 2 Nov 1971, *D. Breedlove & A. Smith 21607*, DS) differs from *R. pereducta* only by its blue corollas with the broader, triangular-shaped throat. Additional studies will be necessary to determine whether there is a blue-flowered phase of *R. pereducta* or if these specimens represent one or more different taxa. They are not included in the above description.

**18. *Ruellia puberula* (Leonard) Tharp & F.A. Barkley, Amer. Midl. Naturalist 42:17. 1949.**

— *Ruellia nudiflora* var. *puberula* Leonard, J. Wash. Acad. Sci. 17:517. 1927. — TYPE: Guatemala, Zacapa, Gualán, 620 ft, 17 Jun 1909, *C. Deam 6318* (US!; isotype: F!, MICH!).

ILLUSTRATION: none found.

Spreading perennial herbs to 3 dm tall. Young stems quadrate-sulcate, evenly pubescent with an understory of erect to flexuose to retrorse eglandular trichomes 0.1–0.2 mm long and an overstory (sometimes absent) of coarse flexuose eglandular trichomes 0.3–1.5 mm long, the latter soon disappearing. Leaves petiolate, petioles to 25 mm long, blades ovate-elliptic to elliptic to obovate-elliptic to subspatulate, 13–51 (–94) mm long, 5–20 (–28) mm wide, 1.4–4.1 times longer than wide, rounded to acute at apex, subattenuate to attenuate at base, surfaces pubescent with flexuose to antrorse eglandular trichomes, margin entire to undulate-crenate to subsinuate. Inflorescence of pedunculate ascending expanded dichasia to 55 mm long from leaf axils; dichasia alternate or opposite, (1–) 3-many-flowered, 1 per axil, peduncles quadrate to quadrate-sulcate, (3–) 5–40 mm long, pubescent like young stems. Bracteoles ovate to narrowly elliptic to oblanceolate to obovate, 5–14 mm long, 1–5.5 mm wide, pubescent like leaves, secondary bracteoles similar to bracteoles although often somewhat smaller. Flowers pedicellate, pedicels 3–25 mm long, pubescent like young stems. Calyx 12–20 mm long, tube 2–2.5 mm long, lobes lance-subulate, subequal, 10–18 mm long, 5–9 times longer than tube, 0.9–1.3 mm wide, abaxially and marginally pubescent like young stems. Corolla bluish, 26–43 mm long, external surface pubescent with flexuose to retrorse eglandular trichomes 0.1–0.5 mm long (and sometimes with a few inconspicuous stipitate glandular trichomes as well), tube 15–29 mm long, narrow proximal portion 6–12 mm long, abruptly expanded into throat, throat 9–17 mm long, longer than narrow proximal portion of tube, 5–9 mm in diameter near midpoint, limb 20–28 mm in diameter, lobes 9–11 mm long, 6.5–10 mm wide. Stamens included, longer pair 8–10 mm long, shorter pair 5–7.5 mm long, thecae 2.2–2.8 mm long. Style 21–25 mm long, pubescent with eglandular trichomes  $\pm$  throughout, stigma unequally 2-lobed, 1 lobe 2.5 mm long, other lobe 1–1.2 mm long. Capsule 14–17 mm long, pubescent

with erect to retrorse eglandular trichomes 0.1–0.2 mm long and sometimes with a few inconspicuous glandular trichomes at apex, stipe 1.5–2.5 mm long, head narrowly ellipsoid. Seeds ca. 12, 3.5–3.7 mm long, 2.8–3 mm wide, surfaces and margin pubescent with appressed hygroscopic trichomes. Flowering and fruiting: May–Oct.

Flats, slopes, and disturbed habitats (e.g., roadsides) in Tropical Deciduous Forest; uncommon in Central Depression; 485–1080 m. Mex. (Ver., Oax., Chis.), Guat. CHIAPAS COLLECTIONS: *Las 810630-8* (CAS); *La 838* (DS, US); *La 998* (DS); *Rey 1826* (BM, MEXU); 20337; 37494.

This species resembles *R. nudiflora* but lacks the terminal glandular thyrses, glandular calyces, and conspicuously glandular-pubescent corollas of that species. *Ruellia puberula* may not be distinguishable from *R. intermedia*, however. In Oaxaca, separate plants of a specimen (*Nelson 2652*, US) show both glandular and eglandular calyces respectively. All have entirely pubescent capsules like *R. puberula*. If these species are to be maintained, then throughout their entire ranges capsule pubescence would seem to be the only real distinction. Hence, extralimital specimens commonly treated as *R. puberula* sometimes have glandular calyces. Whether they are equivalent to our material (which resembles the type) or represent another species or hybrids is uncertain.

**19. *Ruellia spissa* Leonard, Kew Bull. 1938: 61. 1938.**

— TYPE: Mexico, Jalisco, Guadalajara, 21 Jul 1886, *E. Palmer 218* (US!; isotypes: GH!, K!).

*Ruellia pratensis* D.N. Gibson, Fieldiana, Bot. 34:82. 1972. — TYPE: Guatemala, "Praderas de Guatemala," 1400 m, Jul 1921, *A. Tonduz 620* (F!; isotype: US!).

ILLUSTRATION: none found.

Spreading perennial herbs to 2 dm tall. Young stems quadrate-sulcate to  $\pm$  flattened, pubescent with retrorse to flexuose eglandular trichomes 0.2–1.5 mm long, trichomes  $\pm$  evenly disposed or concentrated in 2 lines. Leaves petiolate, petioles to 18 mm long, blades broadly ovate to elliptic to subcircular, 12–27 mm long, 7–20 mm wide, 1.2–2.2 times longer than wide, rounded to acute at apex, acute at base, surfaces pubescent with flexuose eglandular trichomes, sometimes sparsely and inconspicuously glandular-punctate, margin entire. Inflorescence of sessile or subsessile pedunculate contracted dichasia in axils of distal leaves; dichasia opposite, 1–3-flowered, 1 per axil, peduncles (if present) to 1 mm long. Bracteoles foliose, petiolate, ovate to elliptic to obovate, 5–13 mm long, 2–5 mm wide, pubescent like leaves. Flowers sessile to subsessile (i.e., pedicels to 1 mm long). Calyx 13–17 mm long, tube 1.5–2.5 mm long, lobes lance-subulate, equal to subequal, 10.5–13.5 mm long, 4.2–7.7 times longer than tube, 1–1.5 mm wide, abaxial surface and margin pubescent with coarse flexuose eglandular trichomes 0.5–1.5 mm long. Corolla blue, 34–38 mm long, externally pubescent with flexuose eglandular trichomes 0.1–0.5 mm long, tube 21–27 mm long, narrow proximal portion 8–10 mm long, abruptly expanded into throat, throat 13–18 mm long, longer than narrow proximal portion of tube, 9–10 mm in diameter near midpoint, limb 21–22 mm in diameter, lobes

7–10 mm long, 10–11 mm wide. Stamens included, longer pair 10 mm long, shorter pair 7 mm long, thecae 3 mm long. Style 19–20 mm long, sparsely pubescent with eglandular trichomes, stigma unequally 2-lobed, 1 lobe 2.5 mm long, other lobe 0.5 mm long. Capsule (based on extralimital material), 12–13 mm long, glabrous except for a few flexuose eglandular trichomes to 0.5 mm long at apex, stipe 1.3 mm long, head ellipsoid. Seeds (based on extralimital material) 8–12, 2.5 mm long, 2 mm wide, surfaces and margin covered with appressed hygroscopic trichomes. Flowering: Jun.

Pine-Oak Forest; rare in Central Plateau; ca. 1700 m. Mex. (Jal., Mich., Méx., Chis.), Guat. CHIAPAS COLLECTION: 10554.

The type of *R. spissa* differs from our material by its calyces (20 mm long), corollas (48–54 mm long), and bracteoles (oblanceolate and 5 mm long by 0.3–0.6 mm wide). Measurements of these structures on other specimens annotated by Leonard with this name (e.g., *Hinton 1231*, *13004*, *Pringle 2500*, *11079*) overlap with those of our specimen. *Hinton 1231* is a paratype of both *R. pratensis* and *R. spissa*. The type of *R. pratensis* matches our material very well.

*Ruellia humifusa* (Oerst.) Hemsl. is an older name that might apply to our species. The type of *R. humifusa* is from Veracruz and differs from our plants by its crenate leaf margins, calyx with some glandular trichomes, longer (53 mm) corollas with a throat that is shorter than the narrow proximal portion of the corolla tube.

At K there is an apparent Sessé & Mocíño collection labeled "R. pilosa de Mexico." It conforms to our plants very well (i.e., it has the larger bracteoles unlike the type of *R. spissa*). This specimen may represent an isosynotype of *Dipteracanthus pilosus* Nees.

## 20. *Ruellia stemonacanthoides* (Oerst.) Hemsl. Biol. cent.-amer., Bot. 2:507. 1882.

— *Arrhostoxylum stemonacanthoides* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:130. 1855. — SYNTYPES: Costa Rica, "in monte Jaris," 3000 ft, Nov 1846, A. Oersted 10743 (C!, 2 sheets); "i skyggefulde skove paa Bjerget Aguacate," 1600 ft, collector and date unknown, probably Oersted (?), specimen not located at C).

*Ruellia guatemalensis* Donn. Sm. Bot. Gaz. (Crawfordsville) 48:298. 1909. — SYNTYPES: Guatemala, Escuintla, Concepción, 400 m, Apr 1890, J. Donnell Smith 2115 (US!; isosynotype: K!); Retalhuleo, "ad ripas fluminis Ocosito prope pagum Caballo Blanco," 80 m, Apr 1892, J.

Donnell Smith 2692 (US!). Gibson (1974) noted that the former collection was the type and she annotated the specimen at US as the holotype, but she did not designate a specimen as a lectotype.

ILLUSTRATIONS: Publ. Carnegie Inst. Wash. 461:207, fig. 7. 1936; Fieldiana, Bot. (n.s.) 18:19, fig. 17. 1986.

Shrubs to 1.2 m tall. Young stems quadrate to quadrate-sulcate, glabrous or rarely pubescent with a few scattered erect to flexuose glandular and eglandular trichomes to 0.2 mm long (glandular-puberulent). Leaves petiolate, petioles to 33 mm long, blades somewhat coriaceous, ovate to ovate-elliptic, 45–155 mm long, 8–52 mm wide, 2.1–5.6 times longer than wide, acuminate to subfalcate at apex, (rounded to) acute at base, surfaces glabrous or with a few scattered flexuose eglandular trichomes along major veins, margin crenate-sinuate. Inflorescence of pedunculate laterally spreading to ascending expanded dichasia to 155 mm long from leaf axils; dichasia alternate or opposite, 3 or more-flowered, 1 per axil, peduncles 35–95 mm long, terete to subquadrate, glabrous or glandular-puberulent. Bracteoles petiolate, linear to lance-linear, 14–35 mm long, 0.7–6 mm wide, glabrous, secondary bracteoles similar to bracteoles although somewhat smaller. Flowers sessile or short-pedicellate, pedicels 1–2 mm long, glabrous. Calyx 8.5–11 mm long, tube 2–2.5 mm long, lobes lance-subulate, subequal, 6.5–8.5 mm long, 3–4 times longer than tube, 0.8–0.9 mm wide, abaxially mostly glabrous, adaxial surface and margin inconspicuously glandular-puberulent and often with antorse eglandular trichomes to 0.2 mm long as well (or margin sometimes glabrous or nearly so). Corolla blue-purple, 39–40 mm long, externally glandular-puberulent (or with the eglandular trichomes mostly retrorse), tube 29–32 mm long, narrow proximal portion 17–21 mm long, abruptly expanded into throat, throat 12–13 mm long, shorter than narrow proximal portion of tube, 6–7.5 mm in diameter near midpoint, limb 22–23 mm in diameter, lobes 8–10 mm long, 7–8 mm wide. Stamens included, longer pair 9–10 mm long, shorter pair 6–7 mm long, thecae 1.8–2 mm long. Style 22–27 mm long, pubescent ± throughout with eglandular trichomes, stigma 1.1–1.5 mm long, only 1 lobe evident. Capsule 14–20 mm long, glabrous (or with a few stipitate glands up to 0.05 mm long near apex), stipe 5–6.5 mm long, head ellipsoid to ellipsoid-obovoid. Seeds ca. 12, 2.7–3.2 mm long, 2.2–2.7 mm wide, surfaces smooth to substriate (lacking trichomes), margin with a ± conspicuous band of hygroscopic trichomes.  $n = 17$ . Flowering: Dec–Jan; fruiting: Nov–Jan.

Evergreen Seasonal Forest and Pine-Oak Forest; uncommon in Central Plateau, Sierra Madre, and Pacific Coastal Plain; 180–1000 m. Mex. (Nay., Jal., Cma., Chis.), Guat., Salv., Nic., C.R. CHIAPAS COLLECTIONS: QVU 176 (U); 23766; 29320; 30712.

## 24. SANCHEZIA

*Sanchezia* Ruiz & Pav. Fl. peruv. prodr. 5. 1794. — LECTOTYPE (Bremekamp, Index Nom. Gen. Card 01984. 1956): *Sanchezia oblonga* Ruiz & Pav.

*Ancylogyne* Nees in Mart. Fl. bras. 9:63. 1847. — TYPE: not designated.

Erect to clambering perennial herbs or shrubs (often large) with cystoliths. Leaves opposite, subsessile to petiolate, margin entire to crenate. Inflorescence of mostly terminal dichasiate spikes, spikes either umbellate, branched and becoming paniculate, or condensed and appearing headlike; dichasia alternate or opposite, 1–many-flowered, often secund, sessile, subtended by a bract. Bracts opposite, those at a node free or connate (often forming a cuplike involucre), commonly colored, shorter than to

longer than (and often concealing) bracteoles and calyx, margin entire. Flowers homostylous, subtended by 2 homomorphic bracteoles, sessile. Calyx deeply 5-lobed, lobes subequal to unequal in size. Corolla yellow, orange, red, or purple, tube cylindrical or  $\pm$  expanded distally, throat  $\pm$  distinct, limb subactinomorphic, 5-lobed, corolla lobes relatively small, often recoiled, contorted in bud. Stamens 2, inserted in proximal  $\frac{1}{3}$  of corolla tube (in ours), usually exerted from mouth of corolla, anthers 2-theous, thecae equal in size, parallel, equally inserted, pubescent, appendaged at base with 1 awnlike appendage, dehiscing toward lower lip (i.e., flower nototribal); pollen loxodicolporate (see under *Bravaisia*), exine striate-foveolate; staminodes 2. Style usually exerted from mouth of corolla, stigma 2-lobed, lobes unequal. Capsule (in ours) stipitate, linear-ellipsoid, sides splitting upon dehiscence, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 6–8, homomorphic, lenticular.

Leonard and Smith (1964) recognized 59 species in this American genus. Most of these are endemic to Peru. A majority of species are known from relatively few and incomplete (e.g., capsules and seeds are unknown for most species) collections. Some of the interspecific differences noted by Leonard and Smith (1964) appear trivial or arbitrary. Revisionary studies will likely reveal fewer species than they recognized. Four species are native or naturalized in Central America and Mexico. Several species are cultivated and have become naturalized in tropical regions worldwide.

REFERENCE: LEONARD, E.C. and L.B. SMITH. 1964. *Sanchezia* and related American Acanthaceae. *Rhodora* 66:313–343.

### 1. *Sanchezia parvibracteata* Sprague & Hutch. Bull. Misc. Inform. 253. 1908.

— TYPE: protologue based on plants cultivated at Kew from the Botanic Gardens in Peradeniya, Sri Lanka, 19 Nov 1906, 222-05/Hakgala (K!).

*Sanchezia sprucei* Lindau var. *salvadorensis* Donn. Sm. Bot. Gaz. (Crawfordsville) 44:116. 1907. — TYPE: El Salvador, San Salvador, garden in San Salvador, 700 m, Dec 1906, L. Velasco 8985 (US!; isotype: US!).

ILLUSTRATIONS: Fig. 32; Fieldiana, Bot. 24(10):441, fig. 99. 1974.

Shrubs to 7.5 m tall. Young stems quadrate-sulcate, glabrous (although sometimes somewhat scurfy). Leaves petiolate, petioles to 30 mm long, blades elliptic, 55–350 mm long, 20–155 mm wide, 2.2–2.5 times longer than wide, surfaces glabrous or scurfy, margin undulate, entire to crenate, major veins lined with yellowish white (especially on adaxial surface). Inflorescence a terminal panicle (sometimes appearing more like an umbel) of pedunculate dichasiate spikes, spikes (including peduncles and excluding flowers) to 210 mm long, rachises sparsely pubescent with erect to antrorse eglandular trichomes 0.1–0.2 mm long (and sometimes scurfy as well); dichasia alternate (i.e., solitary at nodes), 3–many-flowered,  $\pm$  secund. Bracts reddish or orange, free to base, ovate to ovate-elliptic, 8–20 mm long (shorter than and not concealing bracteoles and calyx), 5–16 mm wide, acute at apex, abaxial surface glabrous or scurfy. Bracteoles and secondary bracteoles linear-elliptic to elliptic to obovate-elliptic, 12–18 mm long, 3.5–7.5 mm wide. Calyx 16–25 mm long, lobes oblanceolate to oblanceolate-elliptic, unequal in length, 2–4 mm wide, rounded to acute at apex, abaxially glabrous or scurfy. Corolla yellow-orange, 40–55 mm long, externally pubescent along distal portion with retrorse to retrorsely appressed eglandular trichomes, tube 37–

50 mm long, distally expanded into a  $\pm$  distinct throat 30–37 mm long, limb 9–12 mm in diameter, lobes 3–5 mm long, recoiled. Stamens 55–59 mm long, exerted 10–22 mm beyond mouth of corolla, filaments pubescent with flexuose eglandular trichomes, thecae 5–7 mm long, basal appendages pointed, to 1.2 mm long, pubescent with stout eglandular trichomes; staminodes unequal, 20–23 mm long, included in corolla tube. Style 60–64 mm long, glabrous, stigma often coiled, 1 lobe 4–4.5 mm long, other lobe 0.2–0.5 mm long. Capsule 11–13 mm long, proximally glabrous, distal beak sparsely pubescent with antrorse to antrorsely appressed eglandular trichomes 0.2–0.3 mm long. Seeds not seen. Flowering Oct–Mar.

Mostly cultivated in gardens throughout Chiapas; native to tropical America (see below). CHIAPAS COLLECTIONS: EM 128 (MEXU, MICH, MO, US); EM 17470 (MEXU); Ve 486 (NY); 13369; 23537; 71315.

Local name: “espinazo de pescado” (*Matuda* 17470).

This species is cultivated in tropical regions worldwide where plants sometimes become naturalized. Most Chiapan collections are from cultivated plants, however some (e.g., *Matuda* 128, 17470) are not noted as such and may represent collections from naturalized populations. Collections from possibly native stands of the species have been made in Costa Rica, Colombia, Ecuador, Peru, and Brazil. Those from South America have often received other names.

Information on capsules in the above description are from a cultivated plant collected in Costa Rica (*Daniel et al.* 6223, CAS) and represent the first data on fruits of this species.

## 25. SPATHACANTHUS

*Spathacanthus* Baill. Hist. pl. 10:444. 1891. — TYPE: *Spathacanthus hahnianus* Baill.

Shrubs or small trees with cystoliths. Leaves opposite, subsessile to petiolate, margin entire. Inflorescence of terminal dichasiate racemes; dichasia (alternate to) opposite, 1-flowered, sessile, subtended by a bract. Bracts opposite, green,  $\pm$

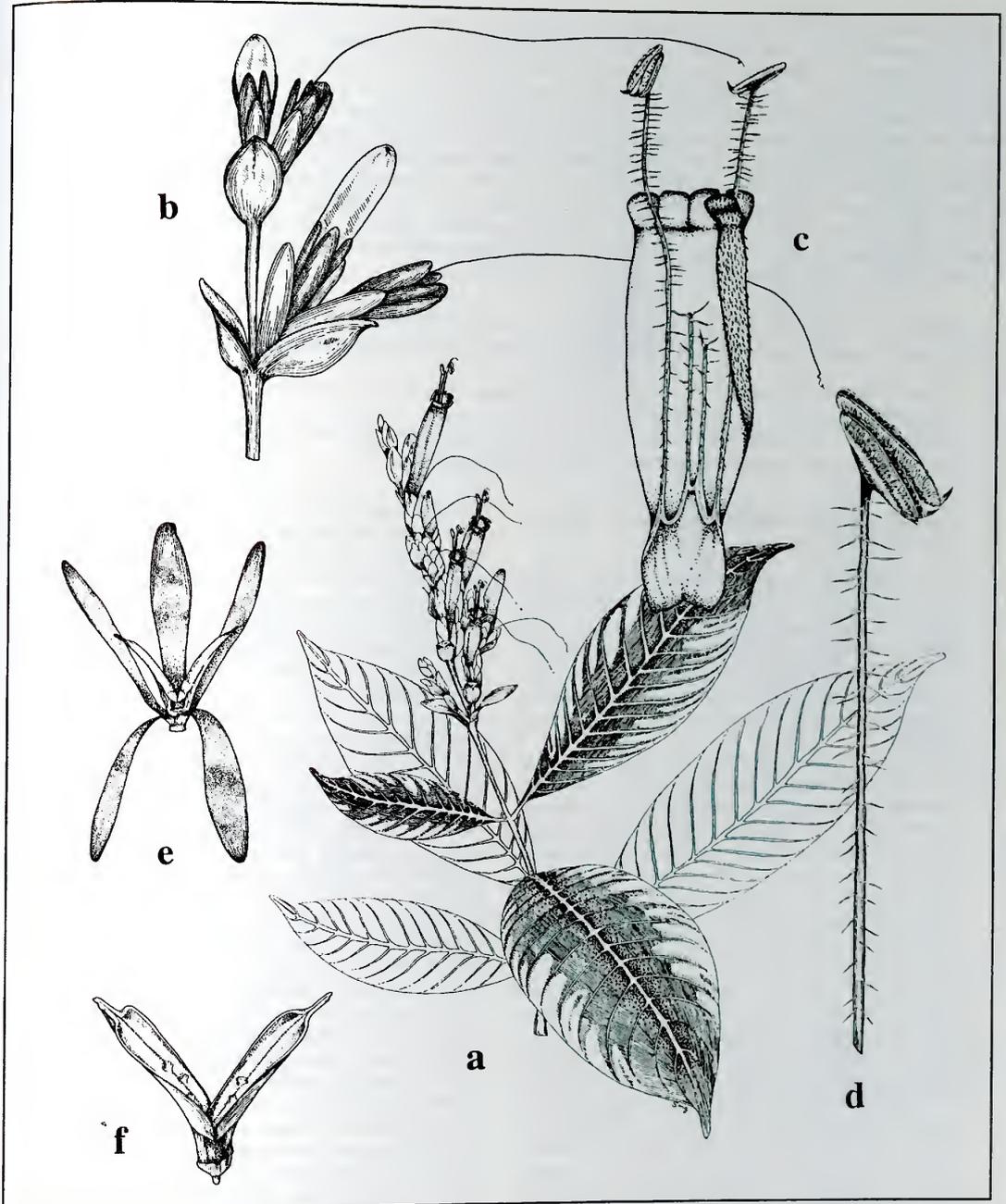


FIGURE 32. *Sanchezia parvibracteata* Sprague & Hutch. a, habit (13369),  $\times 0.3$ ; b, inflorescence (71315),  $\times 1$ ; c, corolla split open showing androecium (71315),  $\times 1.4$ ; d, stamen (71315),  $\times 2.6$ ; e, calyx with immature, opened capsule (Daniel et al. 6223),  $\times 1.5$ ; f, capsule (Daniel et al. 6223),  $\times 1.5$ . Drawn by Susan Guthrie.

inconspicuous, margin entire. Flowers homostylous, subtended by 2 homomorphic bracteoles, generally pedicellate, pedicels usually enlarged in fruit. Calyx green or yellowish, spathaceous, beaked in bud, equally or unequally divided into 2 segments, 1 segment comprising 2 fused lobes, apically entire to 2-lobed, the other segment comprising 3 fused lobes, apically entire to 3-lobed. Corolla white to yellow, tube expanded distally into a  $\pm$  distinct throat, limb bilabiate (or appearing  $\pm$  regular), upper lip deeply 2-lobed, lower lip deeply 3-lobed, corolla lobes imbricate in bud. Stamens 4, didynamous, inserted at base of corolla throat, included in corolla tube, anthers 2-theous, thecae equal in size, parallel, equally inserted, lacking basal appendages, direction of dehiscence not known (in extralimital material with anterior pair dehiscing toward upper lip and posterior pair dehiscing toward lower lip); pollen subspheric to prolate, 3–4-colporate, 6–8-pseudocolpate, pseudocolpi 2 per mesocolpia, pairs of pseudocolpi sometimes fused into pseudocolpal ellipses in mesocolpia, exine foveolate to fossulate; staminodes 0 (i.e., none observed in extralimital material). Style included in corolla tube, glabrous, stigma 2-lobed, lobes equal. Capsule stipitate, very large, glabrous, head subellipsoid to obovoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4, homomorphic, lenticular, lacking trichomes.

A genus of three species occurring in moist to wet forests from southern Mexico to Costa Rica. The woody capsules are among the largest known in New World Acanthaceae.

- a. Corolla white, 23–29 mm long, throat 5–7.5 mm in diameter, limb 5–8 mm in diameter with lobes 1–3 mm long; calyx yellow; capsule 40–50 mm long; Pacific slope . . . . . 2. *S. parviflorus*  
 aa. Corolla yellow, 46–70 mm long, throat 9.5–15 mm in diameter, limb 22–40 mm in diameter with lobes (5–) 8–15 mm long; calyx green; capsule 50–62 mm long; Caribbean slope . . . . . 1. *S. hahnianus*

1. *Spathacanthus hahnianus* Baill. Hist. pl. 10:444. Jan–Feb 1891.

— TYPE: Mexico, Veracruz, Misantla, forêt de la montañas Santa Rita, 3 Jul 1866, L. Hahn 349 (P!). A type was not cited in the protologue but this specimen in the general herbarium at P fits the protologue and bears Baillon's name in his handwriting. Notes corresponding to the data in the protologue are also present on the specimen. A fragmentary specimen in Baillon's herbarium at P likely came from this sheet.

*Ruellia macrocarpus* Sessé & Moc. Fl. mexic., ed. 2. 148. 1894, non *Ruellia macrocarpa* Wall. (1830). — TYPE: the type locality, Mexico, Puebla, Huehuetla, was provided in the protologue. In the Sessé and Moçño Herbarium at MA there are two pertinent collections that lack locality data. Number 302 was originally labeled as "*Justicia macrocarpus* Ic. N." and number 2146 was labeled as "*Ruellia macrocarpus* N." Both were annotated by E.C. Leonard as an unpublished new species of *Spathacanthus*. Both represent *S. hahnianus*.

*Macfadyena simplicifolia* Donn. Sm. Bot. Gaz. (Crawfordsville) 16:198. Jul 1891. — *Spathacanthus simplicifolius* (Donn. Sm.) Lindau ex Bureau & K. Schum. in Mart. Fl. bras. 8(2):294. 1897. — *Spathacanthus donnell-smithii* Lindau ex Donn. Sm. Bot. Gaz. (Crawfordsville) 20:293. Jul 1895, nomen illegit. (new name for *M. simplicifolia* but latter cited as synonym and "specific name dropped as inappropriate"). — *Spathacanthus donnell-smithianus* Lindau, Bull. Herb. Boissier 3:371. Aug 1895, nomen illegit. (*M. simplicifolia* cited in synonymy). — TYPE: Guatemala, Alta Verapaz, Pansamalá, 3800 ft, Aug 1886, H. von Tuerckheim 1030 (US!, isotypes: GH!, K!, M!, US!). ILLUSTRATIONS: Fig. 33; Bot. Gaz. (Crawfordsville) 16:t. 18. 1891.

Branched shrubs or small trees to 8 m tall, often with many stilt roots. Young stems quadrate to somewhat compressed, pubescent (especially at nodes where trichomes often form dense tufts) with flexuose to antrorsely appressed eglandular trichomes to 1 mm long, soon glabrate, mature stems often with

blisterlike lenticels. Leaves petiolate, petioles to 45 mm long, blades elliptic to broadly elliptic to obovate-elliptic, (36–) 45–250 mm long, (9–) 17–143 mm wide, 1.3–3.1 (–4) times longer than wide, (rounded to acute to) acuminate at apex, acute at base, adaxial surface glabrous, abaxial surface glabrous or pubescent along major veins with flexuose to appressed eglandular trichomes to 0.5 mm long, margin glabrous. Inflorescence a terminal dichasiate raceme or a basally branched panicle of racemes to 5 cm long (excluding flowers), rachis nearly glabrous or pubescent with flexuose-appressed eglandular trichomes; dichasia opposite. Bracts triangular to subulate, 1.5–6 mm long, 1–2.3 mm wide, abaxial surface nearly glabrous or pubescent like rachis. Bracteoles triangular to subulate to linear-lanceolate, 1–6 mm long, 0.8–1.5 mm wide, abaxial surface nearly glabrous or pubescent like rachis. Flowers sessile to pedicellate, pedicels to 7 mm long, 3–3.7 mm in diameter in fruit, glabrous. Calyx green, (18–) 22–43 mm long, 8–14 mm in diameter (measured flat), abaxially glabrous, beaked in bud with beak to 2 mm long, unequally divided into 2 elliptic to ovate-elliptic segments with incisions 16–30 mm long on 1 side and (0.5–) 3–15 mm long on the other, longer incision 0.56–0.87 the length of calyx, 1 segment generally with 2 triangular lobes 0.4–2 mm long, other segment generally with 3 triangular lobes 0.4–4 mm long, lobes rarely longer and the calyx then appearing unequally 5-lobed. Corolla yellow, 46–70 mm long, externally glabrous, narrow proximal portion of tube 13–20 mm long, 2.5–4 mm in diameter near midpoint, throat 19–33 mm long, 9.5–15 mm in diameter at widest expanse, limb 22–40 mm in diameter, upper lip 12–19 mm long, lobes elliptic, (5–) 9–10.5 mm long, 4.5–8.5 mm wide, lower lip 15–18 mm long, lobes linear-elliptic to elliptic, 8–15 mm long, (3.5–) 7–8.5 (–11) mm wide. Stamens with longer pair 16–18.5 mm long and shorter pair 12–14.5 mm long, thecae 3.3–4.2 mm long. Style 28–35 mm long, stigma lobes 0.7 mm long. Capsule 50–62 mm long, stipe 27–34 mm long, head 25–28 mm long, retinacula 7–10 mm long. Seeds subcircular to somewhat squarish to deltate in outline, 6.3–9 mm long, 5.7–8 mm wide, 2–2.3 mm thick, surfaces with low verrucose ridges or bumps. Flowering Aug–Mar, Jul; fruiting Dec, Mar.

Limestone slopes in Lower Montane Rain Forest and Montane Rain Forest; rare in Northern Highlands; 800–1000 m.

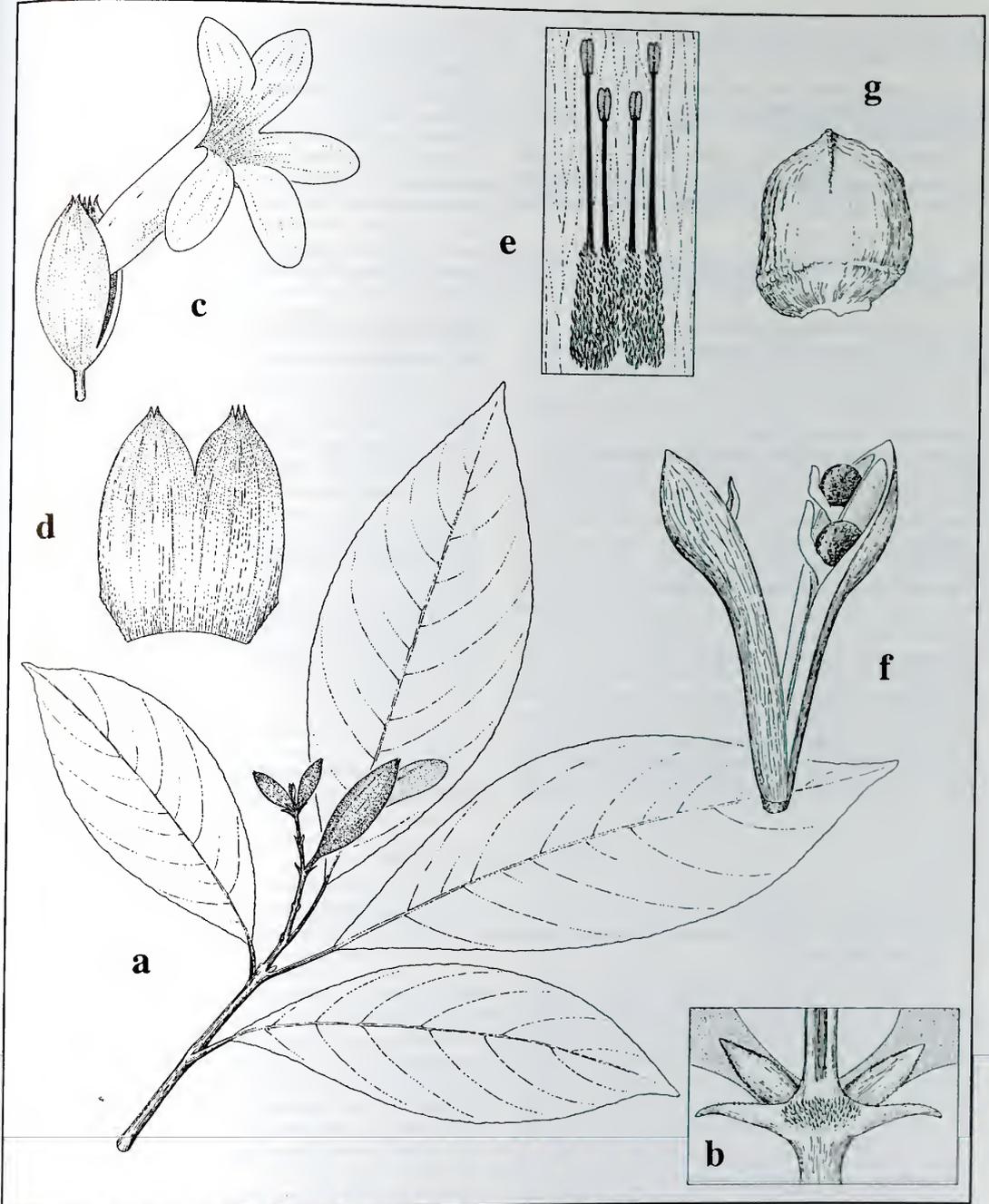


FIGURE 33. *Spathacanthus hahnianus* Baill. (a–b from Hernández G. & González L. 1855, c–e from Hernández G. & González L. 1777, f–g from Wendt et al. 3773). a, habit,  $\times 0.5$ ; b, inflorescence node,  $\times 3.5$ ; c, flower,  $\times 1.1$ ; d, calyx split open,  $\times 1.3$ ; e, corolla split open showing stamens,  $\times 1.8$ ; f, capsule,  $\times 1$ ; g, seed,  $\times 3.9$ . Drawn by Ellen del Valle.

Mex. (Pue., Ver., Oax., Chis.), Guat., Hond. CHIAPAS COLLECTIONS: *Pa 1726* (CAS); *21618*; *30868*.

The above description and phenologies have been augmented with data from specimens from throughout the range of the species.

Leonard (Proc. Biol. Soc. Wash. 50:16. 1937) made the same combination in *Spathacanthus* for *Macfadyena simplicifolia* that had previously been made by Lindau.

## 2. *Spathacanthus parviflorus* Leonard, Proc. Biol. Soc. Wash. 50:15. 1937.

— TYPE: Guatemala, Quezaltenango, Volcán Zunil, 7 Aug 1934, A. Skutch 961 (US!; isotypes: A!, BM!, LL, US!).

ILLUSTRATION: Fieldiana, Bot. 24(10):446, fig. 101. 1974.

Branched shrubs or small trees to 7.6 m tall. Young stems subquadrate to somewhat compressed, internodes glabrous or sparsely bifariously pubescent with antrorsely appressed eglandular trichomes 0.2–0.5 mm long, nodes usually with a few stiff erect to flexuose eglandular trichomes to 0.5 mm long. Leaves petiolate, petioles to 27 mm long, blades ovate-elliptic to elliptic to obovate-elliptic, 18–150 mm long, 11–79 mm wide, 1.6–3.7 times longer than wide, (rounded to) acute to acuminate (often abruptly so) to subfalcate at apex, acute at base, surfaces and margin glabrous. Inflorescence a terminal dichasiate raceme to 8 cm long (excluding flowers), additional racemes sometimes present in axils of distalmost pair of leaves, rachis glabrous (or bifariously pubescent near base with antrorse to antrorsely appressed eglandular trichomes 0.2–0.3 mm long); dichasia opposite. Bracts triangular to subulate, 1.3–5 mm long, 0.8–1.4 mm wide, abaxial surface glabrous or pubescent with antrorsely appressed eglandular trichomes (especially along midvein), proximalmost pair often subfoliose and larger.

Bracteoles and secondary bracteoles triangular to subulate, 1–2.7 mm long, 0.6–1 mm wide, abaxial surface glabrous or pubescent like bracts. Flowers pedicellate, pedicels to 13 mm long, 1–2.5 mm in diameter in fruit, glabrous. Calyx greenish yellow to pale yellow, 15–23 (–25) mm long, 6.5–11 mm in diameter (measured flat), abaxially glabrous, beaked in bud with beak 1–3.5 mm long, unequally divided into 2 lance-ovate to ovate segments with incisions of 7–17 mm on 1 side and 1–6 (–12) mm on the other, longer incision 0.45–0.89 the length of calyx, 1 segment with 2 triangular lobes 0.3–0.7 mm long, other segment with 3 triangular lobes 0.6–0.8 mm long. Corolla white, 23–29 mm long, externally glabrous (although margins of lobes ciliate), narrow proximal portion of tube 7–14 mm long, 1.8–4 mm in diameter near midpoint, throat 12–18 mm long, 5–7.5 mm in diameter at widest expanse, limb 5–8 mm in diameter, upper lip 2–3 mm long, lobes rounded, 1.5–3 mm long, 1.5–2 mm wide, lower lip 2.5–3.5 mm long, lobes rounded, 1–3 mm long, 1.5–2.5 mm wide. Stamens with longer pair 11–15 mm long and shorter pair 8–12 mm long, thecae 3–4.5 mm long. Style 10–17 mm long, stigma lobes 0.5–0.7 mm long. Capsule 40–50 mm long, stipe 20–25 mm long, head 17–25 mm long, retinacula 5–7 mm long. Seeds subcircular to somewhat squarish in outline, 7–10 mm long, 6.5–8 mm wide, 2.7 mm thick, surfaces with low verrucose ridges or bumps or becoming smooth. Flowering throughout year; fruiting Sep–Nov, Feb.

Montane Rain Forest and Evergreen Cloud Forest; uncommon in Sierra Madre; 730–2000 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *Cz 8738* (UC); *Hamp 522* (BM); *He MA84* (BM); *He 491* (MEXU); *EM 1696* (A, F, GH, LL, MEXU, MICH, MO, US); *X&S 338* (MEXU).

Local name: “huesco de pollo” (*Heath & Long MA84*).

The above description and phenologies include data from numerous Guatemalan specimens.

## 26. STENANDRIUM

*Stenandrium* Nees in Lindl. Intr. nat. syst. bot., 2nd ed. 444. 1836, nomen conserv. — TYPE: *Stenandrium mandiocanum* Nees. *Gerardia* L. Sp. pl. 610. 1753, pro parte, nomen rej. vs. *Stenandrium* Nees (1836). — LECTOTYPE (see ICBN 1961:310. 1961): *Gerardia tuberosa* L.

Acaulescent (arising from a woody rhizome or caudex) or caulescent erect to spreading perennial herbs lacking cystoliths. Leaves opposite or quaternate, sessile or petiolate, margin entire to subrenate (in ours, elsewhere also dentate). Inflorescence of axillary or terminal elongate or headlike usually pedunculate dichasiate spikes; dichasia opposite or alternate, 1-flowered, sessile, subtended by a bract. Bracts opposite to alternate, green, margin entire (in ours). Flowers homostylous, subtended by 2 homomorphic bracteoles, sessile. Calyx deeply 5-lobed, lobes equal or subequal in size. Corolla pink, purple, or white, tube expanded distally into a short throat, throat pubescent within, limb appearing subactinomorphic to bilabiate, upper lip 2-lobed, lower lip 3-lobed, corolla lobes imbricate in bud. Stamens 4, subdidynamous, inserted in distal  $\frac{2}{3}$  of corolla tube, included in corolla tube, anthers 1-thecous, lacking basal appendages, pubescent, dehiscing toward lower lip (i.e., flower nototribal); pollen spheric to prolate, 3-colpate (in ours, elsewhere rarely 6-colpate or ecolpate), exine psilate to foveolate to fossulate to verrucate to subreticulate; staminode 0–1, borne between posterior pair of stamens, usually shorter than filaments. Style included in corolla tube, stigma asymmetrically funnelliform. Capsule estipitate to substipitate, ellipsoid to obovoid, retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule. Seeds 4 (or fewer by abortion), homomorphic, lenticular, often with barbed or branched trichomes. ( $x = 13$ ).

*Stenandrium* has traditionally been treated as a New World genus with some 40 to 50 species. Vollesen (1992) recently included *Stenandriopsis* S. Moore from Africa and Madagascar within *Stenandrium*. The enlarged genus encompasses about 60–70 species with concentrations of taxa

in Mexico (9 species), the West Indies (ca. 15 species), South America (15–25 species), tropical Africa (8 species) and Madagascar (10 species).

REFERENCES: DANIEL, T.F. 1985. A revision of *Stenandrium* (Acanthaceae) in Mexico and adjacent regions. *Ann. Missouri Bot. Gard.* 71:1028–1043; VOLLESEN, K. 1992. The Old World species of *Stenandrium* (Acanthaceae: Acantheae). *Kew Bull.* 47:169–202.

- a. Inflorescence elongate; bracts lance-subulate to subulate, 1–1.5 mm wide, long-tapered to a point at apex; seeds covered with a few conic or knoblike papilla (mostly restricted to margin) lacking barbs or branches . . . . .  
 . . . . . 1. *S. chameranthemoideum*
- aa. Inflorescence usually subcapitate; bracts (elliptic to) obovate, 2.5–7 (–12) mm wide, rounded (to subacute) at apex; seeds densely covered with bristlelike trichomes bearing lateral barbs or branches . . . . . 2. *S. pedunculatum*

**1. *Stenandrium chameranthemoideum***  
 Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:139. 1855.

— *Gerardia chameranthemoidea* (Oerst.) S.F. Blake, *Contr. Gray Herb.* 52:100. 1917. — LECTOTYPE (Daniel 1984:1036): Mexico, Veracruz, Colipa, Mar 1841, F. Liebmann 10750 (C!; isolectotype: US!).

ILLUSTRATION: Fig. 34.

Erect to spreading caulescent perennial herbs to 3 dm tall. Young stems terete to subquadrate, evenly pubescent with an understory of erect to retrorse eglandular trichomes 0.05–0.1 mm long and an overstory (sometimes sparse or absent) of flexuose eglandular trichomes 0.5–1 mm long or evenly pubescent with erect to retrorse eglandular trichomes 0.1–0.6 mm long. Leaves opposite, petiolate, petioles to 40 mm long, blades ovate to elliptic to obovate, 16–94 mm long, 10–41 mm wide, 1.1–3.4 times longer than wide, (rounded to) attenuate-decurrent at base, rounded to acute at apex, surfaces pubescent (sometimes sparsely so) with eglandular trichomes, margin entire to subcrenulate. Inflorescences of axillary or terminal sessile or pedunculate dichasiate spikes to 110 mm long (including peduncles, when present, and excluding flowers), peduncles to 20 mm long, peduncles and rachises pubescent like young stems or nearly glabrous; dichasia subopposite to alternate. Bracts subopposite to alternate, lance-subulate to subulate, 2.5–7 mm long, 1–1.5 mm wide, long-tapered to a point at apex, abaxial surface pubescent with antrorse eglandular trichomes 0.1–0.2 mm long. Bracteoles lance-subulate to subulate, 2–4 mm long, 0.5–0.7 mm wide, abaxial surface pubescent like bracts. Calyx 4–9 mm long, lobes lance-subulate to subulate, subequal, 4–8.5 mm long, abaxially pubescent like bracts or nearly glabrous, margin sometimes with inconspicuous glands. Corolla pinkish or whitish, 9–16 mm long, externally glabrous (in ours; elsewhere sometimes with lower-central lobe pubescent), tube 4–8 mm long, upper lip 3–6 mm long, lobes 2.5–6 mm long, more than 2/3 as long as upper lip, 0.5–0.7 mm wide, lower lip 5–8 mm long, lobes 4.5–8 mm long, 1.5–4.5 mm wide. Stamens inserted in distal 1/3 of corolla tube, 1.5–2.5 mm long, thecae 1–1.8 mm long; staminode 0.2 mm long. Style 3–3.5 mm long, glabrous, stigma 0.3 mm long. Capsule substipitate, 6–9 (–13) mm long, glabrous (in ours; elsewhere sometimes sparsely pubescent with erect eglandular trichomes 0.1–0.2 mm long), stipe to 1.5 mm long. Seeds 1.5–3.5 mm long, 1–2.5 mm wide, covered with a few conic or knoblike papillae (mostly restricted to margin) lacking barbs or branches. Flowering and fruiting Sep–Apr.

Limestone ridges in Lower Montane Rain Forest and Montane Rain Forest; rare (known from a single locality) in Northern Highlands; 900–1080 m. Mex. (Ver., Oax., Chis.). CHIAPAS COLLECTIONS: 21604; 31226; 39893; 66157; 67020.

**2. *Stenandrium pedunculatum* (Donn. Sm.)**  
 Leonard, J. Wash. Acad. Sci. 32:187. 1942.

— *Blechnum pedunculatum* Donn. Sm. *Bot. Gaz.* (Crawfordsville) 49:457. 1910. — TYPE: Guatemala, Zacapa, ca. 0.5–0.75 mi on opposite side of river from Gualán, 15 Jun 1909, C. Deam 6277 (US!; isotypes: GH!, MICH!, MO!).

ILLUSTRATION: none found.

Erect to spreading caulescent perennial herbs to 5.5 dm tall. Young stems terete, pubescent with an understory of evenly disposed or bifarious erect to retrorse (to antrorse) eglandular trichomes 0.1–0.5 mm long and an overstory of ± evenly disposed flexuose to antrorse eglandular trichomes 0.5–1.5 mm long. Leaves opposite, petiolate, petioles to 30 mm long, blades ovate to ovate-elliptic to obovate, 12–115 mm long, 7–45 mm wide, 1.7–3.6 times longer than wide, subtruncate to long-attenuate at base, rounded to subacute at apex, surfaces pubescent (often sparsely so) with eglandular trichomes, margin entire to crenulate. Inflorescence of axillary or terminal usually subcapitate pedunculate spikes to 50 mm long (including peduncles and excluding flowers), peduncles to 36 mm long, pubescent like young stems, rachis pubescent with erect to flexuose to antrorse eglandular trichomes 0.05–0.7 mm long; dichasia opposite or subopposite. Bracts opposite to subopposite, (elliptic to) obovate, 5.5–14 mm long, 2.5–7 (–12) mm wide, ± prominently palmately 3-nerved, rounded (to subacute) at apex, abaxial surface pubescent with erect to flexuose to antrorse eglandular trichomes 0.1–1 mm long. Bracteoles linear to subulate, 1.3–5.5 mm long, 0.3–0.7 mm wide, abaxial surface glabrous or with antrorse eglandular trichomes 0.1–0.2 mm long. Calyx 3–6.5 mm long, lobes lanceolate to lance-subulate, subequal, 2.5–5.5 mm long, abaxially glabrous or pubescent like bracteoles. Corolla pink to pale purple to white, 8–19 mm long, external surface of lower-central lobe pubescent with erect to flexuose eglandular trichomes 0.1–0.2 mm long, tube 4–7 mm long, upper lip 3–8 mm long, lobes 3–8 mm long, more than 2/3 as long as upper lip, 2–5 mm wide, lower lip 5–11 mm long, lobes 4–10 mm long, 3.5–9 mm wide. Stamens inserted in distal 1/3 of corolla tube, 1.2–1.5 mm long, thecae 1–1.1 mm long; staminode 0.3 mm long. Style 2–3 mm long, glabrous (or with a few eglandular trichomes near apex), stigma 0.3–0.4 mm

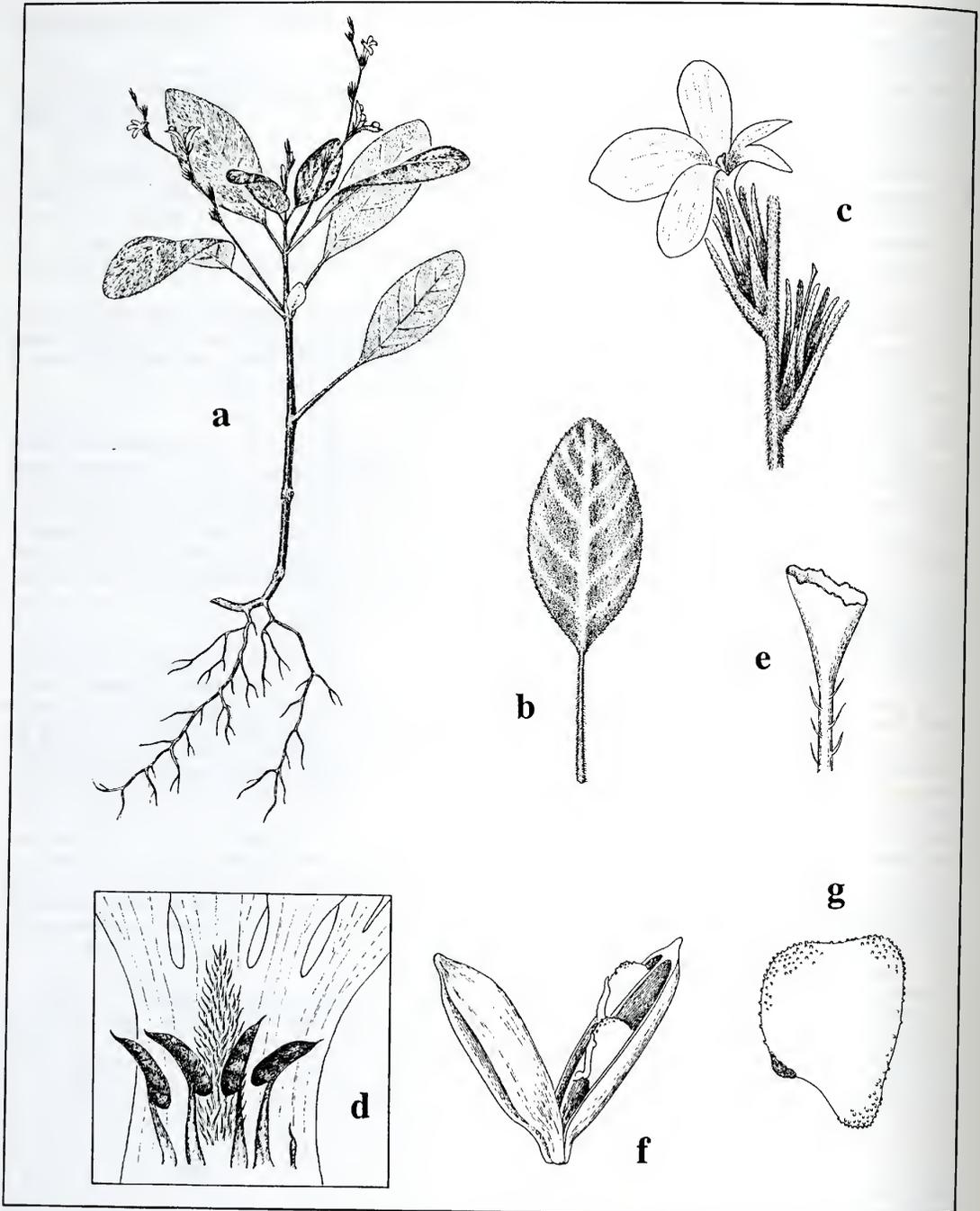


FIGURE 34. *Stenandrium chamerantheroideum* Oerst. (a-f from 67020, g from 39893). a, habit,  $\times 0.5$ ; b, leaf,  $\times 0.8$ ; c, inflorescence nodes,  $\times 3$ ; d, corolla split open showing androecium,  $\times 15$ ; e, stigma,  $\times 38$ ; f, capsule,  $\times 3.8$ ; g, seed,  $\times 11$ . Drawn by Ellen del Valle.

long. Capsule estipitate, 5.5–8 mm long, glabrous (in ours, elsewhere sometimes sparsely pubescent above middle). Seeds 2–3 mm long, 1.5–2.5 mm wide, densely pubescent with long bristlelike trichomes bearing lateral barbs or branches. Flowering and fruiting May–Dec.

Bluffs and slopes, often on limestone, in Tropical Deciduous Forest; uncommon in Central Depression; 550–1350. Mex. (Jal., Cma., Gro., Chis.), Guat., Hond., Salv., Nic. CHIAPAS COLLECTIONS: *Hamp 1130* (BM); *La 880* (DS); *EM 5661* (LL, MEXU); *Rey 1819* (BM, MEXU); *T 2990* (DS); *We 11753* (DAV, DS); 37429; 42253.

### 27. STENOSTEPHANUS

*Stenostephanus* Nees in Mart. Fl. bras. 9:91. 1847 (Jun). — TYPE: *Stenostephanus lobeliiformis* Nees.

*Habracanthus* Nees in A. DC. Prodr. 11:312. 1847 (Nov). — TYPE: *Habracanthus silvaticus* Nees (= *Stenostephanus silvaticus* (Nees) T.F. Daniel).

*Galeottia* Nees in A. DC. Prodr. 11:311. 1847, non *Galeottia* Rupr. (1842) nec *Galeottia* A. Rich. (1845). — TYPE: *Galeottia gracilis* Nees.

*Glockeria* Nees in A. DC. Prodr. 11:728. 1847, non *Glockeria* Göpp. (1836). — TYPE: *Galeottia gracilis* Nees.

*Hansteinia* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:142. 1855. — TYPE: *Hansteinia gracilis* Oerst. (= *Stenostephanus gracilis* (Oerst.) T.F. Daniel).

*Syringidium* Lindau, Notizbl. Bot. Gart. Berlin-Dahlem 8:142. 1922, non *Syringidium* Ehrenb. (1845). TYPE: *Syringidium atropurpureum* Lindau.

*Kalbreyeracanthus* Wassh. Taxon 30:477. 1981. TYPE: *Kalbreyeracanthus atropurpureus* (Lindau) Wassh. (= *Syringidium atropurpureum* Lindau).

Erect to spreading perennial herbs or shrubs with cystoliths. Leaves opposite, petiolate or distalmost (i.e., subtending inflorescence) pair often sessile, margin entire to subcrenate to sinuate. Inflorescence of (axillary and) terminal dichasiate spikes, racemes, thyrses, or panicles; dichasia opposite or alternate, 1–many-flowered, sessile or pedunculate, subtended by a bract. Bracts opposite (in ours), green, relatively small, often ± conduplicate (in ours), margin entire. Flowers homostylous, subtended by 2 homomorphic bracteoles, sessile to pedicellate. Calyx deeply 5-lobed, often accrescent in fruit, lobes equal or nearly so. Corolla 1- or 2-colored, colors various, tube cylindrical or distally gradually or abruptly expanded into a throat, narrow proximal portion (if distinct) shorter than throat, throat (if present) sometimes prominently saccate, urceolate to subcylindric, limb 1-labiate or bilabiate, upper lip entire (in ours, elsewhere also 2-fid), erect or recurved, lower lip 3-lobed or truncate and minutely 3-fid or essentially absent, corolla lobes imbricate in bud. Stamens 2, inserted near apex of corolla tube or near base of throat, exerted from mouth of corolla, anthers 1-theous, glabrous, dehiscing toward lower lip (i.e., flower nototribal); pollen spheric or compressed, 2-porate, with encircling peripheral band, exine bacculate to echinate (or the peripheral band lacking spines or baculae); staminodes 0. Style exerted from mouth of corolla, stigma ± swollen, lobes not evident. Capsule stipitate, head ovoid to subellipsoid (sometimes with a slight medial constriction), retinacula present, septa with attached retinacula remaining attached to inner wall of mature capsule wall. Seeds 4, homomorphic, sublenticular to lenticular, lacking trichomes.

A neotropical genus of about 65 species occurring primarily at relatively high elevations from western Mexico to Bolivia; the genus reaches its greatest diversity in Colombia. Generic limits of *Stenostephanus* and its relatives were addressed by Wood (1988, under *Habracanthus*) and Daniel (1995). Most of the 12 or so Mexican species were described in *Hansteinia*. Mexican and Guatemalan species of *Stenostephanus* (especially those previously treated in *Hansteinia*) exhibit considerable variation from locality to locality. This may be due, in part, to their rather isolated occurrences at high elevations. These species tend to occur in cloud forests at higher elevations than most other Mexican and Central American Acanthaceae. Similar variation patterns are known for other plants that occur at high elevations in cloud forests in Mexico and Central America.

REFERENCES: WOOD, J.R.I. 1988. Colombian Acanthaceae—some new discoveries and some reconsiderations. Kew Bull. 43:1–51; DANIEL, T.F. 1995. New and reconsidered Mexican Acanthaceae. VI. Chiapas. Proc. Calif. Acad. Sci. 48:253–282.

- a. Corolla blue-purple to whitish, 10–18 mm long, lower lip 6–11 mm long, upper lip recurved to recoiled, 5–11 mm long, tube cylindrical (or expanded only at mouth), lacking a distinct throat; stamens inserted in distal 1/3 of corolla tube, 9–15 mm long.
- b. Leaf margin ciliate; bracts triangular-linear to linear-elliptic, rounded at apex; abaxial surface of calyx glabrous, calyx lobes linear to lance-linear; lower lip of corolla 5–8.5 mm wide; thecae 3.3–3.8 mm long . . . . . 5. *S. latilabris*
- bb. Leaf margin eciliate; bracts subulate, acute at apex; abaxial surface of calyx puberulent, calyx lobes lance-subulate; lower lip of corolla 3–5 mm wide; thecae 1.5–2.5 mm long . . . . . 8. *S. silvaticus*

- aa. Corolla red, red and yellow, reddish purple and white, or purplish, 17–29 mm long, lower lip absent or < 0.5–8 mm long, upper lip erect to spreading, 2–8.5 mm long, tube gradually or abruptly expanded distally into a distinct, often saccate, throat; stamens inserted in proximal 1/3 to 1/2 of corolla tube, (14–) 17–38 mm long.
- c. Dichasia borne on peduncles 2–38 mm long, 3–many-flowered; lateral flowers of dichasia borne on secondary peduncles 2–15 mm long.
  - d. Cauline trichomes 1–1.3 mm long; flowers sessile to subsessile (i.e., borne on pedicels to 1 mm long); upper lip of corolla 4.5–5.5 mm long; lower lip of corolla 4.5–8 mm long with lobes 1.5–2 mm long . . . . . 7. *S. purpusii*
  - dd. Cauline trichomes < 0.2–0.8 mm long or absent; flowers pedicellate, pedicels 1.5–7 mm long; upper lip of corolla 2–4 mm long; lower lip of corolla absent or up to 2.1 mm long with lobes (if present) 0.2–1.4 mm long.
  - e. Corolla externally pubescent with flexuose eglandular (and a few glandular) trichomes 0.2–0.7 mm long, lower lip 1.5–2.1 mm long with lobes 1–1.4 mm long; capsule pubescent with eglandular trichomes . . . . . 4. *S. gracilis*
  - ee. Corolla externally glabrous, lower lip not evident or up to 0.7 mm long with lobes (if present) 0.2–0.5 mm long; capsule glabrous.
    - f. Young stems pubescent with flexuose-retorse to flexuose-antrorse eglandular trichomes 0.3–0.8 mm long; corolla red and yellow, throat 3–6.5 mm in diameter . . . . . 6. *S. monolophus*
    - ff. Young stems glabrous (rarely with a few antrorse to antrorsely appressed eglandular trichomes to 0.3 mm long near nodes); corolla reddish purple proximally and white distally, throat 6.5–10 mm in diameter . . . . . 3. *S. glabrus*
- cc. Dichasia sessile to subsessile (i.e., borne on peduncles to 1 mm long except at base of inflorescence where peduncles to 6 mm long are sometimes present in *S. breedlovei*), 1–3 (rarely more)-flowered; lateral flowers of dichasia (if present) lacking secondary peduncles or borne on secondary peduncles to 1 mm long.
  - g. Cauline trichomes retrorsely appressed; throat of corolla 17–19 mm long; lobes of lower lip of corolla 3–3.5 mm long . . . . . 1. *S. breedlovei*
  - gg. Cauline trichomes flexuose-retorse to flexuose to antrorse to antrorsely appressed; throat of corolla 8–16 mm long; lobes of lower lip of corolla absent or < 0.5 mm long.
    - h. Bracts lanceolate to ovate to ovate-elliptic, 2.5–11 mm long; corolla red, externally pubescent with flexuose eglandular trichomes 0.2–1 (–2) mm long, upper lip 4.5–8.5 mm long, lower lip 3–6.5 mm long; capsule pubescent with eglandular trichomes 0.05–0.2 mm long . . . . . 9. *S. tacanensis*
    - hh. Bracts triangular to subulate, 1.3–2.5 mm long; corolla red and yellow, externally glabrous or inconspicuously puberulent with trichomes < 0.1 mm long (sometimes with a few flexuose eglandular trichomes to 0.4 mm long), upper lip 2.5–4 mm long, lower lip not evident or < 0.5 mm long; capsule glabrous . . . . . 2. *S. chiapasensis*

**1. *Stenostephanus breedlovei* T.F. Daniel, Proc. Calif. Acad. Sci. 48:277. 1995.**

—TYPE: Mexico, Chiapas, Mpio. Tenejapa, near paraje Yashanal, 2400 m, 5 Mar 1981, *D. Breedlove 49995* (CAS!; isotypes: C!, K!, MEXU!, MO!, US!).

ILLUSTRATION: Fig. 35.

Shrubs to 1.2 m tall. Young stems quadrate to quadrate-sulcate, bifariously pubescent with retrorsely appressed conspicuously septate eglandular trichomes 0.2–0.4 mm long. Leaves petiolate, petioles to 36 mm long, blades ovate-elliptic to elliptic to obovate-elliptic, 32–140 mm long, 11–45 mm wide, 2.4–4.3 times longer than wide, acuminate to subfalcate at apex, acute to subattenuate at base, surfaces pubescent with antrorse to antrorsely appressed eglandular trichomes along major veins, margin entire to subcrenate, ciliate with closely appressed trichomes. Inflorescence of terminal narrow pedunculate racemes (to thyrses) to 200 mm long (including peduncles), peduncles to 25 mm long, rachis subquadrate-flattened to somewhat ridge-angled, pubescent with an understorey of erect mostly eglandular trichomes 0.05–0.2 mm long and an overstorey of flexuose glandular trichomes 0.2–0.5 mm long; dichasia opposite or alternate, ± contracted, 1-flowered, sessile (or borne on peduncles to 6 mm long at proximalmost nodes). Bracts

triangular-subulate to subulate, 1.4–2.2 mm long, 0.5–0.8 mm wide, abaxial surface glabrous or with a few antrorsely appressed eglandular trichomes or flexuose glandular trichomes to 0.3 mm long. Bracteoles triangular-subulate to subulate, 1.3–2.2 mm long, 0.3–0.4 mm wide, abaxial surface pubescent like rachis. Flowers pedicellate, pedicels to 5.5 mm long, pubescent like rachis. Calyx 4.5–7.5 mm long, abaxially pubescent like rachis, lobes lance-subulate, 3.5–6.2 mm long, 0.6–0.9 mm wide. Corolla linear to subfusiform in bud, red, 25–29 mm long, externally glabrous (margins of lobes with a few flexuose eglandular trichomes evident at apex of buds), tube ± gradually expanded distally into a throat, narrow proximal portion 4–8 mm long, 2–3 mm in diameter, throat 17–19 mm long, 5–7 mm in diameter, widest near midpoint, upper lip erect to spreading, 4–4.7 mm long, 1.9–2.5 mm wide, lower lip 4–5 mm long, 3-lobed, lobes 3–3.5 mm long, 2–2.5 mm wide. Stamens inserted near base of throat (i.e., in proximal 1/2 of corolla tube), 22–31 mm long, filaments color unknown, glabrous, thecae red, 3–3.4 mm long. Style 29–33 mm long, glabrous, stigma 0.2–0.3 mm long. Capsule not seen. Flowering Jan–Mar.

Chiapas endemic: Evergreen Cloud Forest and Pine-Oak-*Liquidambar* Forest; rare in Northern Highlands and Central Plateau; 1600–2460 m. CHIAPAS COLLECTIONS: 49368; 49644; 49995.

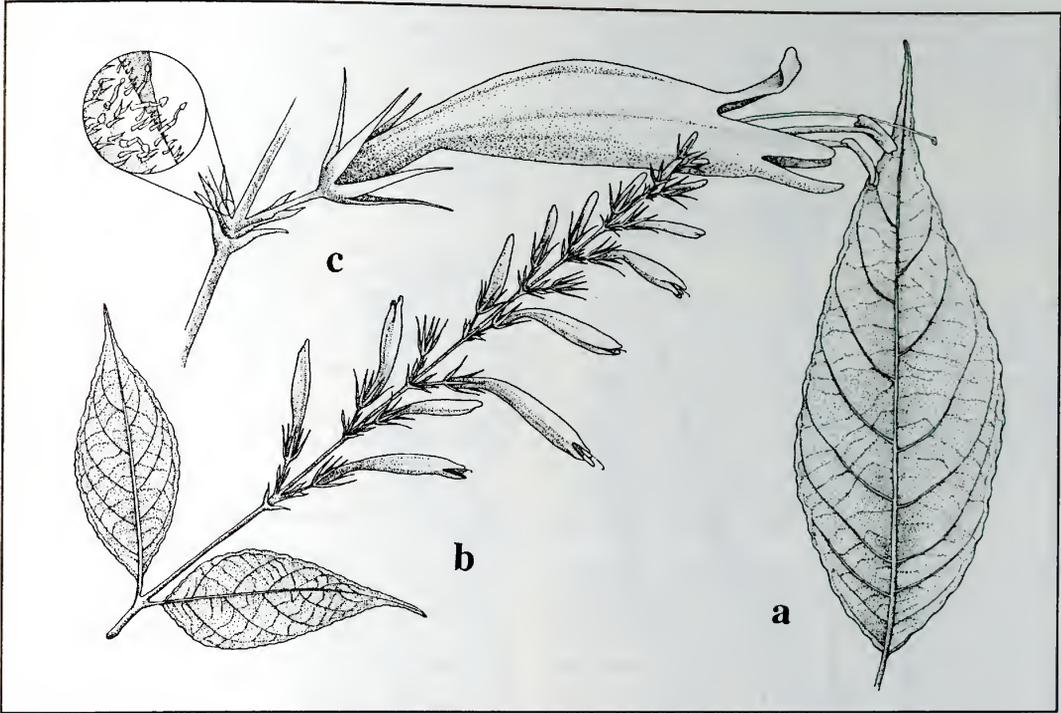


FIGURE 35. *Stenostephanus breedlovei* T.F. Daniel (49995). a, leaf,  $\times 0.8$ ; b, inflorescence,  $\times 0.7$ ; c, inflorescence node with flower,  $\times 2.3$  (with enlargement showing pubescence). Drawn by Jenny Speckels.

## 2. *Stenostephanus chiapensis* T.F. Daniel, Proc. Calif. Acad. Sci. 48:278. 1995.

— TYPE: Mexico, Chiapas, ridge above Ejido Berriozábal near Cerro Boquerón, 2440 m, 29 Nov 1991, *D. Breedlove* & *C. Burns* 72688 (CAS!; isotypes: C!, K!, MEXU!, MICH!, MO!, US!).

ILLUSTRATION: Fig. 36;

Shrubs to 1.5 m tall. Young stems quadrate-sulcate to ridge-angled, bifariously pubescent (for varying distances proximal to nodes) with flexuose to antrorse to antrorsely appressed eglandular trichomes to 0.5 mm long. Leaves petiolate (distal pair often sessile), petioles to 55 mm long, blades ovate to ovate-elliptic, 13–190 mm long, 7–80 mm wide, 1.4–3 times longer than wide, acuminate to abruptly acuminate at apex, acute to attenuate at base (distal sessile pair rounded to cordate at base), surfaces glabrous or pubescent with antrorse multicelled eglandular trichomes to 0.8 mm long on major veins, margin entire to subcrenate, ciliate. Inflorescence of axillary and terminal  $\pm$  narrow pedunculate racemes or panicles of racemes to 23 cm long, peduncles to 75 mm long, rachis ridge-angled, densely pubescent with an understory of erect to flexuose multicelled eglandular trichomes 0.2–0.5 mm long or erect to subflexuose subglandular to glandular trichomes 0.05–0.2 mm long and an overstory of flexuose glandular trichomes 0.3–2 mm long; dichasia opposite or alternate,  $\pm$  contracted, 1–3 (–many)-flowered, subsessile (i.e., borne on peduncles to 1 mm long). Bracts triangular to subulate, 1.3–2.5 mm long, 0.6–1 mm wide, abaxial surface pubescent like rachis or nearly

glabrous. Bracteoles and secondary bracteoles triangular to subulate, 1–2 mm long, 0.2–1 mm wide, abaxial surface pubescent like bracts or nearly glabrous. Flowers pedicellate, pedicels 1–4 mm long, pubescent like rachis, lateral flowers (if present) borne on secondary peduncles to 1 mm long. Calyx 4.5–13 mm long (accrescent in fruit; e.g., during anthesis 4.5–5 mm long, in fruit 9–13 mm long), abaxially pubescent like rachis, lobes linear-lanceolate to lance-subulate, 4.3–12 mm long, 0.6–0.8 mm wide. Corolla  $\pm$  c-shaped in bud, red and yellow, 18–23 mm long, externally glabrous or often appearing glabrous but inconspicuously puberulent with trichomes  $< 0.1$  mm long and sometimes with a few flexuose eglandular trichomes to 0.4 mm long, tube abruptly expanded distally into a throat, narrow proximal portion 2–4 mm long, 2–2.5 mm in diameter, throat 12–16 mm long, 5.5–7.5 mm in diameter, widest near base or midpoint,  $\pm$  narrowed distally, upper lip erect to spreading, 2.5–4 mm long, 1–1.4 mm wide, lower lip absent (corolla truncate there) or with lobes  $< 0.5$  mm long and wide. Stamens inserted at base of throat (i.e., in proximal 1/3 of corolla tube), 17–27 mm long, filaments red, glabrous, thecae red, 2.8–3.6 mm long. Style red, 22–29 mm long, glabrous, stigma 0.2 mm long. Capsule 12–16 mm long, glabrous, stipe 3–5 mm long, head ellipsoid. Seeds lenticular, 2.5–3.5 mm long, 1.6–2.1 mm wide, surfaces roughened. Flowering and fruiting Nov–May.

Chiapas endemic: slopes and ridges in Montane Rain Forest to Evergreen Cloud Forest; uncommon in Sierra Madre, 1500–2400 m. CHIAPAS COLLECTIONS: *N* 3774 (GH, US); *Sta* 387 (BM); 24984; 30229; 34374; 72688.

*Breedlove* & *Burns* 72688 from Boquerón differs from the other Chiapas collections (all from Cerro Tres

erect to flexuose eglandular trichomes 0.05–0.2 mm long, stipe 3–3.5 mm long, head subellipsoid. Seeds lenticular, 2.5–2.8 mm long, 2–2.3 mm wide, surfaces covered with subconic tubercles bearing retrorse barbs. Flowering Nov, Feb; fruiting Feb.

Hedgerows in a region of Montane Rain Forest; rare in S Sierra Madre; 700–1380 m. Mex. (Chis.), C.R. CHIAPAS COLLECTIONS: *QVU 164* (U); *71524*.

Chiapan collections closely resemble a collection from Costa Rica (*Herrera Ch. et al. 292*, CAS) that was annotated by Durkee as *Hansteinia stricta* (Leonard) D.N. Gibson. The Chiapan specimens differ from the type of *H. stricta* by their pedunculate (vs. sessile), 3–many-flowered (vs. 1-flowered) dichasia and their capsules with eglandular (vs. glandular only) pubescence. Rather, they conform to the type of *H. gracilis*.

A specimen from Chiapas (*Breedlove & McClintock 23469*, DS) that resembles this species in most features except that the dichasia appear to be sessile and 1-flowered (as in *H. stricta*) is not treated here. It differs from the type of *H. stricta* from Costa Rica by its glabrous capsules; however, Durkee (1986) noted that capsules of *H. stricta* are glabrous in Costa Rica.

### 5. *Stenostephanus latilabris* (D.N. Gibson) T.F. Daniel, Proc. Calif. Acad. Sci. 48:281. 1995.

— *Habracanthus latilabris* D.N. Gibson, Fieldiana, Bot. 34:60. 1972. — TYPE: Guatemala, El Quiché, Cerro Putul, "Zona Reyna," 1640 m, 3 Dec 1934, A. Skutch 1836 (US!).

ILLUSTRATION: Fieldiana, Bot. 34:61, fig. 2. 1972.

Shrubs to 1.5 m tall. Young stems subquadrate to quadrate-sulcate, some internodes glabrous, others bifariously pubescent with flexuose conspicuously multi-septate (with septa dark) eglandular trichomes 0.4–1.3 mm long (at least some internodes pubescent on each shoot). Leaves petiolate, petioles to 30 mm long, blades ovate to elliptic, 22–145 mm long, 10–60 mm wide, 2–2.8 times longer than wide, acuminate at apex, (rounded to) attenuate at base, surfaces sparsely pubescent with flexuose eglandular trichomes, margin subcrenate, ciliate with flexuose to antrorse eglandular trichomes. Inflorescence of axillary and terminal pedunculate thyrses to 165 mm long (including peduncles), peduncles to 45 mm long, rachis quadrate-sulcate to ± flattened and ridge angled, glabrous; dichasia opposite, expanded, (1–) 3–many-flowered, pedunculate, peduncles 7–13 mm long, glabrous. Bracts triangular-linear to linear-elliptic, 1.5–3 mm long, 0.8–1.2 mm wide, rounded at apex, abaxial surface glabrous. Bracteoles and secondary bracteoles linear, 1–2 mm long, 0.5–0.8 mm wide, abaxial surface glabrous. Flowers subsessile to pedicellate, pedicels to 1.8 mm long, glabrous, lateral flowers borne on secondary peduncles 2.5–7 mm long. Calyx 4.5–6 mm long, abaxially glabrous, lobes linear to lance-linear, 4–5 mm long, 0.6–0.9 mm wide, darkened at apex. Corolla subfalcate to subfusiform in bud, blue-purple, 10–14.5 mm long, externally glabrous, tube cylindrical (or expanded only at mouth), lacking a well-defined throat, 4–6 mm long, 0.9–1.4 mm in diameter, upper lip recurved,

lance-linear, 5–10 mm long, 0.7–1.5 mm wide, lower lip 6–10 mm long, 5–8.5 mm wide, lobes 1 mm long, 0.7–0.8 mm wide (lobes rarely divided nearly to base of lip on aberrant corollas). Stamens inserted in distal 1/3 of corolla tube, 9.5–12 mm long, filaments color unknown, glabrous, thecae 3.3–3.8 mm long. Style 11–12.5 mm long, glabrous, stigma 0.2 mm long. Capsule not seen. Flowering Aug.

Montane Rain Forest; rare in S Sierra Madre; ca. 1700 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *EM 2485* (CAS, K, MEXU, MICH); *Ve 4078* (MEXU).

The type from Guatemala is described as having whitish corollas.

### 6. *Stenostephanus monolophus* (Donn. Sm.) T.F. Daniel, Proc. Calif. Acad. Sci. 48:281. 1995.

— *Glockeria monolopha* Donn. Sm. Bot. Gaz. (Crawfordsville) 27:439. 1899. — *Hansteinia monolopha* (Donn. Sm.) D.N. Gibson, Fieldiana, Bot. 34:62. 1972. — TYPE: Guatemala, Zacatepéquez, Capetillo, 1500 m, Nov 1889, E. Heyde & E. Lux 4556 (US!; isotypes: GH!, K!, US!).

*Glockeria moralesii* Standl. Publ. Field Columbian Mus., Bot. Ser. 8:47. 1930. — TYPE: Guatemala, Chimaltenango, San Martín, 1800 m, Nov 1928, J. Morales R. 1237 (F!).

ILLUSTRATION: Fieldiana, Bot. 24(10):371, fig. 83. 1974.

Shrubs to 1.2 m tall. Young stems subquadrate to quadrate-sulcate, ± bifariously pubescent with flexuose-retrorse to flexuose-antrorse multiseptate eglandular trichomes 0.3–0.8 mm long. Leaves petiolate (or distalmost pair sessile), petioles to 95 mm long, blades ovate, 27–210 mm long, 20–105 mm wide, 1.4–2.1 times longer than wide, acuminate to subfalcate at apex, rounded to acute to subattenuate (or distalmost sessile pair cordate) at base, surfaces sparsely pubescent with flexuose to flexuose-antrorse eglandular trichomes, margin entire to subcrenate, ciliate. Inflorescence of (axillary and) terminal pedunculate open thyrses to 40 cm long (including peduncle), peduncles to 75 mm long, rachis quadrate-sulcate to ridge-angled, pubescent with an understory of erect to flexuose eglandular and subglandular trichomes 0.05–0.2 mm long and an overstory of flexuose eglandular and glandular trichomes 0.3–0.8 mm long (e.g., *Heyde & Lux 4556* from Guatemala) or pubescent with a ± even layer of erect to flexuose glandular and eglandular trichomes 0.1–0.5 mm long (e.g., *Matuda 3969* at GH) or inconspicuously sparsely puberulent with eglandular and glandular trichomes less than 0.05 mm long (e.g., *Matuda 3969* at NY) or pubescent with an understory as described for the previous specimen and in addition a few flexuose eglandular trichomes to 0.9 mm long on some internodes (e.g., *Breedlove & Smith 22692*); dichasia opposite or alternate, expanded, 3–many-flowered, pedunculate, peduncles 6–28 mm long, pubescent like rachis. Bracts lance-subulate to subulate, 1.5–3 mm long, 0.7–1.2 mm wide, abaxial surface pubescent with a few flexuose to antrorse eglandular trichomes 0.05–0.4 mm long to nearly glabrous. Bracteoles and secondary bracteoles triangular to subulate, 1–1.5 mm long, 0.4–0.6 mm wide, abaxial surface glabrous or pubescent like bracts. Flowers pedicellate, pedicels 2–4 mm long, pubescent like rachis, lateral flowers borne on secondary peduncles 4.5–12 mm long. Calyx 3.5–13 mm long,

accrescent in fruit, abaxially pubescent with an understory of erect subglandular to glandular trichomes 0.1 mm long and an overstory of flexuose glandular trichomes 0.4–2 mm long (most collections) or sparsely puberulent with eglandular and  $\pm$  sessile to stipitate glandular trichomes to 0.1 mm long (e.g., *Breedlove & Smith 22692*), lobes lance-linear, 3–12 mm long, 0.6–0.9 mm wide. Corolla c-shaped in bud, red and yellow, 17–21 mm long, externally glabrous, tube abruptly expanded distally into a throat, narrow proximal portion 2.5–3 mm long, 1.2–1.3 mm in diameter, throat 11–15 mm long, 3–6.5 mm in diameter, widest near base or midpoint, upper lip erect to spreading, 2.5–4 mm long, 1–1.5 mm wide, lower lip absent or < 0.5 mm long, lobes (if present) < 0.5 mm long and wide. Stamens inserted near base of throat (i.e., in proximal 1/3 of corolla tube), 18–28 mm long, filaments red, glabrous, thecae red, 3–3.4 mm long. Style 23–31 mm long, glabrous, stigma 0.2 mm long. Capsule 9.5–13 mm long, glabrous, stipe 3–4 mm long, head ellipsoid. Seeds sublenticular, 2.8–3.5 mm long, 2–2.5 mm wide, surfaces covered with subconic tubercles. Flowering and fruiting Nov.

Slopes in Montane Rain Forest; rare in Sierra Madre; 1500–1900 m. Mex. (Chi.), Guat. CHIAPAS COLLECTIONS: *EM 3969* (GH, NY, US); 22692.

Plants treated under this name are doubtfully distinct from *S. glabrus*. The primary difference between them is corolla color. The other differences noted in the key may be the result of our lack of knowledge of these plants based on the few known collections. However, I am hesitant to combine them without further studies in general and field observations in particular.

*Hansteinia sessilifolia* (Oerst.) Durkee from Costa Rica appears to differ only by its generally shorter corollas and apically glandular-puberulent capsules.

Data in the above description have been augmented using specimens from Guatemala.

## 7. *Stenostephanus purpusii* (Brandege) T.F. Daniel, Proc. Calif. Acad. Sci. 48:281. 1995.

— *Hansteinia purpusii* Brandege, Univ. Calif. Publ. Bot. 6:67. 1914. — TYPE: Mexico, Chiapas, Cerro de Boquerón, Aug 1913, *C. Purpus 6842* (UC!; isotypes: BM!, GH!, NY!, US!).

ILLUSTRATION: none found.

Herbs to 4 dm tall. Young stems terete to subquadrate, densely bifariously pubescent with coarse multi-celled flexuose eglandular trichomes 1–1.3 mm long. Leaves petiolate (distal pairs sessile or sessile), petioles to 15 mm long, blades ovate to elliptic, 30–85 mm long, 13–37 mm wide, 2.3–3.2 times longer than wide, acuminate at apex, (rounded to) acute to subattenuate at base, surfaces pubescent with cauline type trichomes, margin entire, ciliate. Inflorescence a terminal pedunculate open thyrses to 12 cm long (including peduncles), peduncles to 40 mm long, rachis subterete to quadrate, glabrous; dichasia opposite or alternate, expanded, 3–many-flowered, pedunculate, peduncles 6–14 mm long, glabrous. Bracts triangular to triangular-subulate to linear, 1–1.7 mm long, 0.3–0.6 mm wide, abaxial surface glabrous. Bracteoles and secondary bracteoles triangular to linear, 0.8–1 mm long, 0.3–0.5 mm

wide, abaxial surface glabrous. Flowers sessile to subsessile (i.e., with pedicels to 1 mm long), lateral flowers borne on secondary peduncles 3–10 mm long. Calyx 4–7.7 mm long, abaxially glabrous, lobes lance-subulate, 3.8–6.9 mm long, 0.5–0.8 mm wide. Corolla subfusiform in bud, appearing purplish in dried condition, 18–24 mm long, externally glabrous, tube abruptly expanded distally into a throat, narrow proximal portion 4–5 mm long, 1.5–3 mm in diameter, throat saccate, 11–12 mm long, 3.5–6.5 mm in diameter, widest proximally and narrowed distally, upper lip erect, 4.5–5.5 mm long, 0.6–1 mm wide, lower lip 4.5–8 mm long, 3-lobed, lobes triangular, 1.5–2 mm long, 1.2–1.5 mm wide. Stamens inserted near base of throat (i.e., in proximal 1/3 of corolla tube), 14–23 mm long, filaments color unknown, glabrous, thecae 3.2–3.5 mm long. Style 20–28 mm long, glabrous, stigma 0.1 mm long. Capsule not seen. Flowering Aug, Feb.

Chiapas endemic: from a region of Montane Rain Forest; rare in Sierra Madre; 1000 m. CHIAPAS COLLECTION: *QVU s.n.* (U).

This species is very similar to *Habracanthus azureus* D.N. Gibson (which differs by less prominent vegetative pubescence and longer calyces), if the latter is indeed distinct. Also, the type of *H. azureus* has blue flowers (color unknown in *S. purpusii* but appearing purplish in dried state) and calyx lobes glabrous or sometimes with a few glands.

## 8. *Stenostephanus silvaticus* (Nees) T.F. Daniel, Proc. Calif. Acad. Sci. 48:281. 1995.

— *Habracanthus silvaticus* Nees in A. DC. Prodr. 11:312. 1847. — LECTOTYPE (Daniel 1995:281): Mexico, Oaxaca, Sierra San Pedro Nolasco, Talea, etc., 1843–1844, *C. Jürgensen 902* (K!; isolectotype: CGE!).

*Stenostephanus lindenii* Baill. Bull. Mens. Soc. Linn. Paris 2:855. 1890, as "*lindenii*." — TYPE: Mexico, Chiapas, entre San Bartolo et Pueblo Nuevo, 1840, *J. Linden s.n.* (P!; probable isotypes, i.e., *J. Linden 181*: G!, K!).

ILLUSTRATIONS: Fig. 37; Oersted 1855:t. 4, fig. 20; Ann. Missouri Bot. Gard. 65:202, fig. 12. 1978; Fieldiana, Bot. (n.s.) 18:8, fig. 6. 1986.

Perennial herbs to 1.5 m tall. Young stems subquadrate to quadrate-sulcate to  $\pm$  flattened, glabrous or bifariously pubescent with antrorse to antrorsely appressed eglandular trichomes 0.05–0.2 (–0.3) mm long (puberulent), trichomes usually with maroon septa. Leaves petiolate, petioles to 35 mm long, blades ovate to elliptic, 35–170 mm long, 14–70 mm wide, 1.7–4.4 times longer than wide, often somewhat anisophyllous at a node, acuminate to subfalcate at apex, acute to attenuate at base, surfaces glabrous or puberulent along major veins on abaxial surface, margin entire to irregularly subsinuate, ciliate. Inflorescence a terminal pedunculate thyrses to 335 mm long, peduncles to 25 mm long, rachis quadrate-flattened, bifariously to  $\pm$  evenly puberulent or evenly pubescent with erect to antrorse eglandular trichomes 0.05–0.1 mm long (rarely with scattered erect glandular trichomes to 0.2 mm long as well); dichasia opposite, expanded, (1–) 3–many-flowered, pedunculate, peduncles 3–11 mm long, pubescent like rachis. Bracts subulate, 1.3–4 mm long, 0.5–0.8 mm wide, acute at apex, abaxial sur-

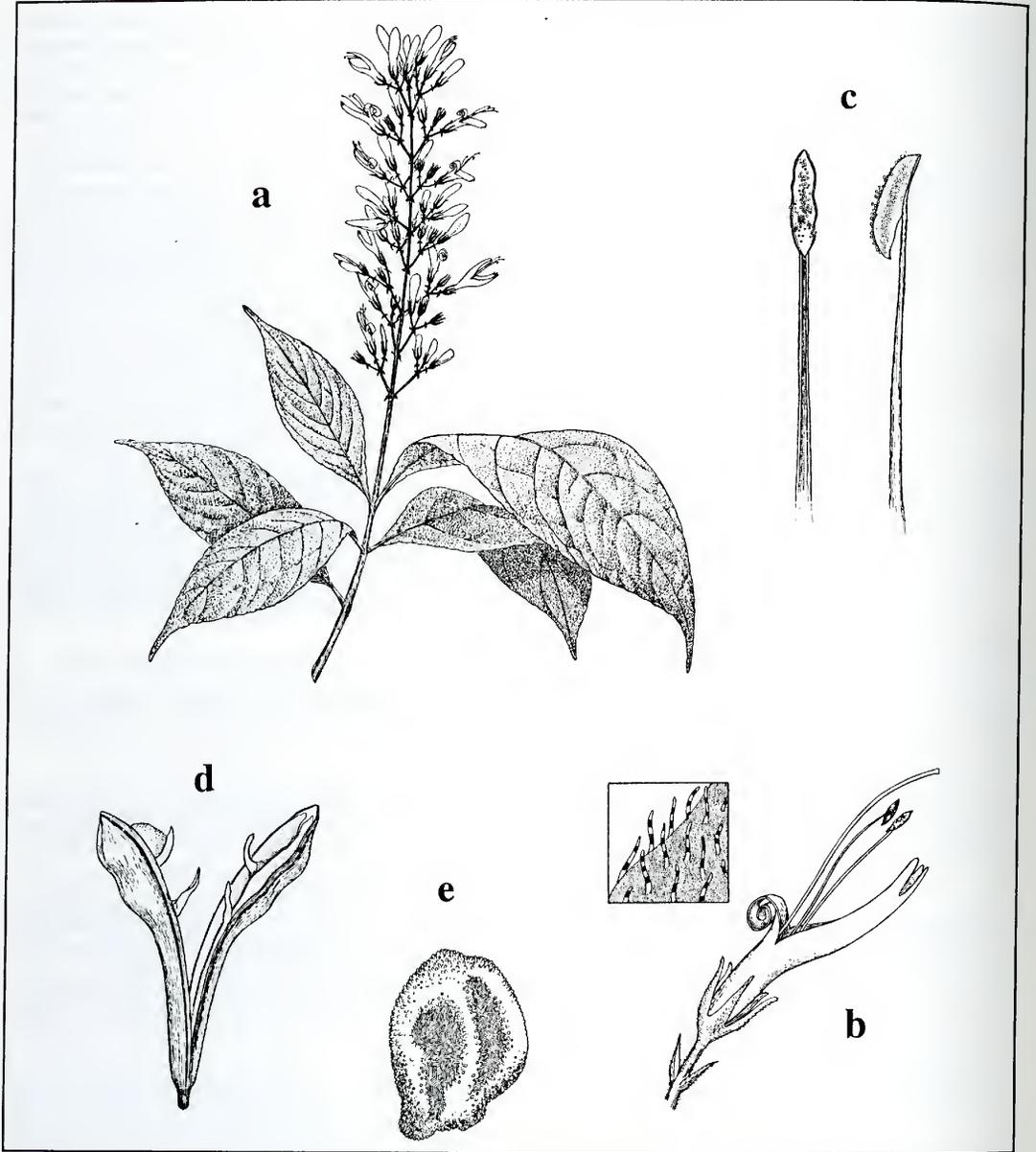


FIGURE 37. *Stenostephanus silvaticus* (Nees) T.F. Daniel. a, habit (Martínez S. et al. 3234),  $\times 0.5$ ; b, bracteoles, pedicel, and flower (34666),  $\times 2.3$  (with enlargement showing pubescence on external surface of corolla); c, stamens (Ton 3970): head-on view (left), side view (right),  $\times 7$ ; d, capsule (Mexia 9273),  $\times 2.5$ ; e, seed (Mexia 9273),  $\times 11.5$ . Drawn by Ellen del Valle.

face glabrous or puberulent. Bracteoles and secondary bracteoles triangular to subulate, 0.7–2.5 mm long, 0.2–0.5 mm wide, abaxial surface glabrous or puberulent. Flowers pedicellate, pedicels 1–4 mm long, pubescent like rachis, lateral flowers borne on secondary peduncles 1.5–7 mm long. Calyx 2.5–6 mm long, abaxially puberulent, lobes lance-subulate, 3–4.5 mm long, 0.4–0.6 mm wide, sometimes darkened at apex. Corolla falcate to fusiform in bud, white to pale purplish, 13–18 mm long, externally glabrous (marginal tips of the lobes puberulent-

ciliate), tube cylindric (or expanded only at mouth), lacking a well-defined throat, 5–10 mm long, 1–2 mm in diameter, upper lip recurved to recoiled, linear, 8–11 mm long, 0.5–2.5 mm wide, lower lip broad, 8–11 mm long, 3–5 mm wide, 3-lobed, lobes 1–3 mm long, 0.4–0.9 mm wide. Stamens inserted in distal 1/3 of corolla tube, 9–15 mm long, filaments color unknown, glabrous, thecae 1.5–2.5 mm long. Style 13–19 mm long, glabrous, stigma capitate, 0.1–0.2 mm long. Capsule 11–17 mm long, glabrous, stipe 5–9 mm long, head ovoid to ellip-

soid to obovoid (often with a medial constriction). Seeds lenticular, 1.5–2 mm long, 1.5 mm wide, surfaces papillose to tuberculate. Flowering Feb–May; fruiting Mar–May.

Slopes in Montane Rain Forest and Evergreen Cloud Forest; common in Northern Highlands and Central Plateau; 1200–2700 m. Mex. (Ver., Oax., Chis.), Guat., C.R., Pan. CHIAPAS COLLECTIONS: *Broome 709* (DUKE); *Cro 47805* (CAS, MO); *Mz 3234* (CAS, K, MEXU, WIS); *QVU 472* (CAS, U); *T 3970* (DS, F, US); *Z 772* (DS); *34666*; *49899*; *67022*.

The protologue of *S. lindenii* notes that the inflorescence is entirely glabrous. Examination of the holotype reveals that its inflorescences are pubescent in a manner consistent with the above description.

**9. *Stenostephanus tacanensis* (Acosta & R. Fernández) T.F. Daniel, Proc. Calif. Acad. Sci. 48:281. 1995.**

— *Hansteinia tacanensis* Acosta & R. Fernández, Novon 3:221. 1993. — TYPE: Mexico, Chiapas, Mpio. Unión Juárez, SE side of Volcán Tacaná above Talquian, 23 Nov 1980, D. Breedlove & F. Almeda 47714 (MEXU; isotypes: CAS, US!).

ILLUSTRATION: none found.

Shrubs to 1.2 m tall. Young stems subquadrate to quadrate-sulcate, pubescent with flexuose-retrorse conspicuously septate eglandular trichomes 0.2–2 mm long, soon glabrate, trichomes concentrated in or restricted to 2 lines or ± evenly disposed. Leaves petiolate (distalmost pair sometimes sessile), petioles to 53 mm long, blades ovate to elliptic, (15–) 34–145 mm long, (10–) 17–71 mm wide, 1.5–3 times longer than wide, ± abruptly acuminate at apex, acute to subattenuate at base (distalmost sessile pair cordate at base), surfaces sparsely pubescent with antrorse eglandular trichomes especially or exclusively along major veins, margin entire to subcrenate, ciliate. Inflorescence of axillary and terminal pedunculate narrow basally branched (if at all) dichasiate racemes to 25 cm long (including peduncle), peduncles to 55 mm long, rachis subterete to subquadrate to ridge-angled, densely pubescent either with an understory of erect to subflexuose eglandular and glandular trichomes to 0.3 mm long and an overstory of flexuose glandular trichomes 0.5–1.5 mm long or pubescent with erect to flexuose eglandular and usually glandular trichomes 0.2–0.8 mm long (i.e., *Breedlove & Almeda 47714*); dichasia opposite or alternate, ± contracted, 1 (–3)-flowered, sessile to subsessile (i.e., borne on peduncles to 0.5 mm long). Bracts lanceolate to

ovate to ovate-elliptic, 2.5–11 mm long, 0.8–4 mm wide, abaxial surface pubescent like rachis or with an understory of erect to antrorse eglandular trichomes 0.05–0.3 mm long and an overstory (sometimes absent) of flexuose glandular trichomes to 0.5 mm long. Bracteoles lance-subulate to lanceolate to linear, 2.5–5 mm long, 0.4–1.2 mm wide, abaxial surface pubescent like bracts. Flowers pedicellate, pedicels to 5 mm long, pubescent like rachis or with mostly erect eglandular (and sometimes a few glandular) trichomes 0.1–0.3 mm long, lateral flowers (if present) not borne on secondary peduncles. Calyx 6–16 mm long (accrescent in fruit), abaxially pubescent like bracts, lobes linear to lance-linear, 5–14 mm long, 0.7–0.9 mm wide. Corolla subfusiform to ± arched or c-shaped in bud, red, 19–28.5 mm long, externally pubescent with flexuose eglandular trichomes 0.2–1 (–2) mm long, tube gradually or abruptly expanded distally into a throat, narrow proximal portion 5–7 mm long, 0.8–3 mm in diameter, throat 8–14 mm long, 3.5–11 mm in diameter, widest near midpoint, upper lip erect, 4.5–8.5 mm long, 6–8 mm wide, lower lip 3–6.5 mm long, 7–8 mm wide, lobes (if distinct) < 0.5 mm long and wide. Stamens inserted near base of throat (i.e., in proximal 1/2 of corolla tube), 21–38 mm long, filaments reddish, glabrous, thecae red, 2–3 mm long. Style red, 27–43 mm long, glabrous, stigma 0.2 mm long. Capsule 9–13 mm long, pubescent with erect to flexuose to retrorse eglandular trichomes 0.05–0.2 mm long, stipe 2.5–4.5 mm long, head subellipsoid. Seeds sublenticular, 2.6–3.2 mm long, 1.8–2.8 mm wide, surfaces roughened. Flowering and fruiting Nov–Feb.

Chiapas endemic: slopes and along streams in Montane Rain Forest and Evergreen Cloud Forest; uncommon in Sierra Madre; 1300–2200 m. CHIAPAS COLLECTIONS: *Cro 47422* (CAS); *EM 16249* (MEXU, US); *N 3794* (GH, US).

The collections of Breedlove, Croat, and Nelson differ from that of Matuda by their corollas with the tube abruptly (vs. gradually) expanded into a throat, and the throat 6.5–11 mm wide (vs. 3.5–4.7 mm wide). This same pattern of variation in form of the corolla is also encountered in *Habracanthus haematodes* Nees from eastern and southern Mexico.

Pubescence of the rachis in *Breedlove & Almeda 47714* is variable and not conspicuously layered as in the other collections cited. Also in this collection, the eglandular trichomes are longer than in other collections and the glandular trichomes are not always present on every internode of the inflorescence.

## 28. TETRAMERIUM

*Tetramerium* Nees in Benth. Bot. voy. Sulphur 147. 1846, nomen conserv., non *Tetramerium* C.F. Gaertn. (1806). — TYPE:

*Tetramerium polystachyum* Nees (= *Tetramerium nervosum* Nees).

*Averia* Leonard, J. Wash. Acad. Sci. 30:501. 1940. — TYPE: *Averia longipes* (Standl.) Leonard (≡ *Drejerella longipes* Standl.; = *Tetramerium nemorum* Brandegee).

Erect or spreading or prostrate perennial herbs or shrubs with cystoliths. Older stems with epidermis exfoliating. Leaves opposite (rarely ternate in some individuals of *T. nemorum*), subsessile to petiolate (the distal leaves rarely sessile), margin entire to crenate, petioles detaching a short distance from their base leaving petiolar stubs at nodes. Inflorescence of terminal conspicuously and usually densely bracteate 4-sided unbranched dichasiate spikes; dichasia opposite, 1–3-flowered, sessile, subtended by a bract. Bracts opposite, green, margin entire to dentate. Bracteoles smaller than bracts. Flowers homostylous,

subtended by 2 homomorphic bracteoles, sessile. Calyx deeply 4- or 5-lobed, lobes equal or, if 5, then 1 usually reduced in size. Corolla white, cream, yellow, blue, or red, often with maroon and purplish markings on upper lip, externally glabrous (in ours), tube subcylindric or gradually expanded distally, throat indistinct or distinct only near mouth, limb pseudopapilionaceous, upper lip entire to shallowly 2-lobed, lower lip 3-lobed, lower-central lobe usually conduplicate (and enclosing stamens and often style during anthesis), corolla lobes imbricate in bud. Stamens 2, inserted near base of lower-central lobe of limb, exserted from mouth of corolla, anthers 2-theous, thecae equal to subequal in size, parallel to subsagittate, equally inserted, lacking basal appendages, dehiscent toward upper lip (i.e., flower stenotribal); pollen prolate, 3-colporate, 6-pseudocolpate, pseudocolpi 2 per mesocolpium, exine reticulate; staminodes 0. Style exserted from mouth of corolla, stigma 2-lobed, lobes triangular, equal. Capsule stipitate, head ellipsoid to obovoid, retinacula present, septa with attached retinacula separating from inner wall of mature capsule. Seeds 4 (or fewer by abortion), homomorphic, plano-convex (in ours, elsewhere also concavo-convex), lacking trichomes. (x = 18).

A genus of 28 species occurring from the southwestern United States southward throughout most of Mexico, Central America, and northwestern South America to southeastern Bolivia. With 21 species, Mexico is the center of diversity of *Tetramerium*. The species occur primarily in regions of dry forest at relatively low elevations.

REFERENCES: HAPP, G.B. 1937. Monograph of *Tetramerium* and *Henrya*. Ann. Missouri Bot. Gard. 24:501-583; DANIEL, T.F. 1986. Systematics of *Tetramerium* (Acanthaceae). Syst. Bot. Monogr. 12:1-134.

- a. Calyx 4-lobed; bracteal margin ciliate with at least some (usually most) trichomes longer than 1 mm; apical portion of bract usually twisted and somewhat recurved . . . . . 2. *T. nervosum*
- aa. Calyx 5-lobed; bracteal margin ciliate with trichomes up to 0.8 mm long; apical portion of bract usually straight and erect.
  - b. Capsule pubescent; corolla 7-12 mm long; stamens 4.5-5.2 mm long; style 6-8 mm long; bracteal margin entire . . . . . 4. *T. tenuissimum*
  - bb. Capsule glabrous; corolla 11-21.5 mm long; stamens 6-8 mm long; style 10-16 mm long; bracteal margin sometimes dentate.
    - c. Young stems, leaves, and bracts pubescent with eglandular trichomes; corolla 18-21.5 mm long; petioles shorter than blades . . . . . 3. *T. oaxacanum*
    - cc. Young stems, leaves, and bracts pubescent with glandular and eglandular trichomes; corolla 11-16 mm long; petioles often as long as or longer than blades . . . . . 1. *T. nemorum*

**1. *Tetramerium nemorum* Brandegee, Univ. Calif. Publ. Bot. 4:386. 1913.**

— TYPE: Mexico, Veracruz, Baños del Carrizal, Aug 1912, *C. Purpus* 6071 (UC!).

*Drejerella longipes* Standl. Publ. Field Columbian Mus., Bot. Ser. 8:47. 1930. — *Averia longipes* (Standl.) Leonard, J. Wash. Acad. Sci. 30:503. 1940. — *Justicia longipes* (Standl.) V.A.W. Graham, Kew Bull. 43:608. 1988. — TYPE: Mexico, Yucatán, Chichén Itzá, 27-28 Feb 1899, C. Millsbaugh 1621 (F!).

*Averia serrata* Leonard, J. Wash. Acad. Sci. 30:502. 1940. — TYPE: Guatemala, Retalhuleu, Champerico, 26 Feb 1939, P. Standley 66612 (F!; isotypes: NY!, US!).

*Averia melanosperma* Leonard, Ceiba 1:110. 1950. — TYPE: Honduras, El Paraíso, along Choluteca River near Ojo de Agua, 1 Feb 1947, L. Williams & A. Molina R. 14050 (US!; isotype: F!).

ILLUSTRATIONS: J. Wash. Acad. Sci. 30:501, fig. 1. 1940; Ceiba 1:111, fig. 4. 1950; Fieldiana, Bot. 24(10):338, fig. 72. 1974.

Erect perennial herbs to 7 dm tall. Young stems terete to subquadrate, evenly pubescent with an understorey of erect to flexuose glandular and eglandular trichomes 0.05-0.3 mm long and an overstorey of erect to flexuose mostly glandular trichomes 0.3-1.2 mm long, trichomes often becoming concentrated in 2 lines on mature stems, older stems becoming glabrate. Leaves petiolate, petioles to 60 mm long, often as long as or longer than

blades, blades ovate to cordate to deltate, 5-50 mm long, 3-40 mm wide, 0.9-1.7 times longer than wide, acute to acuminate at apex, acute to truncate to cordate at base, surfaces and margin pubescent like young stems (or becoming somewhat less glandular with age), margin entire to subcrenate. Inflorescence of loosely to densely bracteate spikes to 45 mm long, 7-16 mm in diameter near midspike, rachis not or only partly or clearly visible, pubescent like young stems. Bracts intergrading with leaves, deltate to broadly ovate to lance-ovate to broadly elliptic to oblanceolate to obovate, 5-15 mm long, 1.5-8 mm wide, acute- to acuminate-mucronate at apex, apical portion of bract straight and erect or somewhat twisted and recurved, major veins 3-5, palmate or subpalmate or subpinnate, abaxial surface and margin pubescent with eglandular and glandular trichomes 0.05-0.7 mm long, margin sometimes irregularly blunt-toothed or mucronate-toothed. Bracteoles lance-subulate, (2.5-) 4.5-8 mm long, 0.4-1 mm wide, pubescent like bracts except with more conspicuous flexuose glandular trichomes 0.2-1 mm long along the margin and at the apex. Calyx 5-lobed, 2.5-5.5 mm long, lobes subulate to lance-subulate, 2-4.8 mm long, pubescent like bracteoles. Corolla whitish with a purplish chevron on upper lip, 11-16 mm long, tube 3.5-7 mm long, upper lip 6-8.5 mm long, 3-4 mm wide, lower lip 7-11 mm long, lateral lobes 7-10 mm long, 2.8-4 mm wide, lower central lobe 6-8 mm long, 3-4 mm wide. Stamens 6-8 mm long, thecae 1.2-1.8 mm long. Style 10-14 mm long. Capsule 4-6 mm long, glabrous. Seeds 1.2-2 mm long, 1.1-1.8 mm wide, surfaces covered with subconic or bubbly tubercles (sometimes bearing retrorse

barbs), these becoming rounded or restricted to the margin on mature seeds. Flowering and fruiting Jan.

Tropical Deciduous Forest; rare in Central Depression; ca. 750 m. Mex. (Ver., Yuc., Chis.), Guat., Hond., Salv., Nic. CHIAPAS COLLECTION: *La 2996* (DS).

The description above includes morphological data from specimens collected in regions adjacent to Chiapas.

## 2. *Tetramerium nervosum* Nees in Benth. Bot. voy. *Sulphur* 148. 1846.

— TYPE: Ecuador, Guayas, Puna, 1836–1839, *A. Sinclair s.n.* (K!).

*Tetramerium polystachyum* Nees in Benth. Bot. voy. *Sulphur* 147. 1846. — TYPE: Honduras, Valle, Gulf of Fonseca, Tiger Island, 1836–1839, *A. Sinclair s.n.* (K!).

*Tetramerium hispidum* Nees in A. DC. Prodr. 11:468. 1847. — LECTOTYPE (Happ 1937:529): Mexico, state unknown: “prope las Ajuntas ad flumen Montezuma” (fide protologue), Jan, *C. Ehrenberg 1072* (B, destroyed; isolectotype: GH!).

*Tetramerium nervosum* var. *angustifolium* Nees in A. DC. Prodr. 11:468. 1847. — LECTOTYPE (Happ 1937:512): Mexico, Nayarit, Tepic, 1836–1839, *A. Sinclair s.n.* (K ex hb. Bentham!; isolectotype: K ex hb. Hooker!).

*Tetramerium ovalifolium* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:170. 1855. — TYPE: Mexico, Puebla, “Achapulco” [Chapulco], Dec 1841, *F. Liebmann 10752* (C!; isotype: K!).

*Tetramerium ovatum* Oerst. Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:169. 1855. — TYPE: Mexico, Oaxaca, San Agustín, Oct 1842, *F. Liebmann 10753* (C!; isotypes: K!, US!).

*Tetramerium nervosum* var. *hispidum* Torr. in Emory, Rep. U.S. Mex. bound. 2(1):125. 1859. — LECTOTYPE (Daniel 1986:48): Mexico, Sonora, Santa Cruz, Sep 1851, *G. Thurber 918* (NY!; isolectotypes: F!, GH!, NY!).

*Justicia papilionacea* Sessé & Moç. Pl. nov. Hisp. 4:1887. — TYPE: Fl. Mex. Ic. 4 (illustration preserved at Hunt Institute for Botanical Documentation, Pittsburgh, U.S.A.).

*Dianthera sonorae* S. Watson, Proc. Amer. Acad. Arts 24:67. 1889. — TYPE: Mexico, Sonora, vicinity of Guaymas, Sep 1887, *E. Palmer 240* (GH!; isotypes: K!, US!).

*Tetramerium calderonii* Happ, Ann. Missouri Bot. Gard. 24:519. 1937. — TYPE: El Salvador, Usulután, Hacienda Concordia, Jan 1924, *S. Calderón 2098* (NY!; isotype: US!).

*Tetramerium hispidum* var. *greenmanii* Happ, Ann. Missouri Bot. Gard. 24:531. 1937. — TYPE: Nicaragua, department unknown, between Managua and Asososca, 24 Feb 1922, *Greenman & Greenman 5627* (MO!).

*Tetramerium scabrum* Happ, Ann. Missouri Bot. Gard. 24:532. 1937. — TYPE: Mexico, Sonora, Fronteras, Jun 1851, *G. Thurber 432* (NY!; isotypes: CAS!, GH!).

*Tetramerium standleyi* Happ, Ann. Missouri Bot. Gard. 24:514. 1937. — TYPE: El Salvador, La Unión, vic. of La Unión, 13–21 Feb 1922, *P. Standley 20680* (US!; isotypes: GH!, NY!).

ILLUSTRATIONS: Fig. 38; Bentham, Bot. voy. *Sulphur*, t. 48. 1845; Contr. U.S. Natl. Herb. 31:326, fig. 119. 1958; Acta Bot. Venez. 8:165, t. 4. 1973; Fieldiana, Bot. 24(10):455, fig. 105. 1974; Ann. Missouri Bot. Gard. 65:275, fig. 32. 1978; Desert Pl. 5:174, fig. 2f. 1984; Syst. Bot. Monogr. 12:58, fig. 46, 61, figs. 47–49. 1986.

Erect to spreading perennial herbs or shrubs to 6 dm tall. Young stems terete to quadrate, evenly to bifariously pubescent with erect to flexuose to retrorse to antrorse eglandular trichomes to 1 mm long and sometimes with erect glandular trichomes to 0.2 mm long as well. Leaves petiolate, petioles to 30 mm long, shorter than blade, blades ovate to lance-ovate, 15–55 mm long, 5–26 mm wide, 1.9–3 times longer than wide, acuminate at apex, subcordate to truncate to rounded at base, surfaces pubescent with flexuose to antrorse eglandular trichomes and young leaves sometimes with erect glandular trichomes as well, margin entire. Inflorescence of densely bracteate spikes to 70 mm long, 11–17 mm in diameter near midspike, rachis not or only partly visible, pubescent with erect to flexuose to antrorse eglandular trichomes to 0.5 mm long. Bracts ovate to ovate-elliptic to broadly elliptic, 8–16 mm long, 3–9 mm wide, rounded- to acute- to subacuminate-mucronate at apex, apical portion of bract usually twisted and slightly recurved, major veins 3–5, palmate, abaxial surface pubescent with an understory of erect glandular and eglandular trichomes 0.05–0.2 mm long and an overstory of antrorse to subflexuose eglandular trichomes to 2.5 mm long, margin entire, ciliate with eglandular trichomes (0.4–) 1.3–2.5 mm long (and rarely with inconspicuous glands to 0.2 mm long as well), at least some (usually most) trichomes longer than 1 mm. Bracteoles lance-subulate, 2.5–6 mm long, 0.5–0.7 mm wide, pubescent like bracts except with eglandular trichomes usually shorter. Calyx 4-lobed, 2.5–5 mm long, lobes subulate, 2–4.5 mm long, pubescent like bracteoles. Corolla whitish with a maroon chevron on upper lip, 16–22 mm long, tube 8–11.5 mm long, upper lip 8–11 mm long, 2.5–4.5 mm wide, lower lip 7.5–13 mm long, lateral lobes 7–12.5 mm long, 2.8–5.5 mm wide, lower central lobe 6.7–9 mm long, 3–4 mm wide. Stamens 6–8.5 mm long, thecae 1.1–1.7 mm long. Style 10–16 mm long. Capsule 4.5–6 mm long, pubescent with flexuose to retrorse eglandular trichomes 0.1–0.4 mm long. Seeds 1.3–1.9 mm long, 1.2–1.6 mm wide, surfaces covered with barbed conical to subconic tubercles. ( $n = 18$ ). Flowering and fruiting Oct–Mar.

Evergreen Seasonal Forest, Tropical Deciduous Forest, and Pine-Oak Forest; common in Central Depression; 600–1200 m. U.S. (Arizona, New Mexico, Texas), Mex. (Baja C.S., Son., Chih., Coah., N.L., Tam., Sin., Dur., Zac., S.L.P., Nay., Jal., Gto., Qro., Hgo., Cma., Mich., Méx., Mlos., Pue., Ver., Gro., Oax., Camp., Yuc., Chis.), Guat., Hond., Salv., Nic., C.R., Pan., S.A. (Col., Ven., Ecu., Peru). CHIAPAS COLLECTIONS: *Dan 1283* (CAS); *T 3239* (DS, F, US); *13175*; *23416*; *24444*; *31274*; *42125*; *48923*; *49083*; *56863*; *65808*; *71009*.

A highly variable and widely distributed species (Daniel 1986). Only information from Chiapas collections is included in the description above. All collections of *T. nervosum* from Chiapas that I have examined have four-lobed calyces. Plants with five-lobed calyces might be expected to occur near the Pacific coast in Chiapas (see discussion in Daniel 1986).

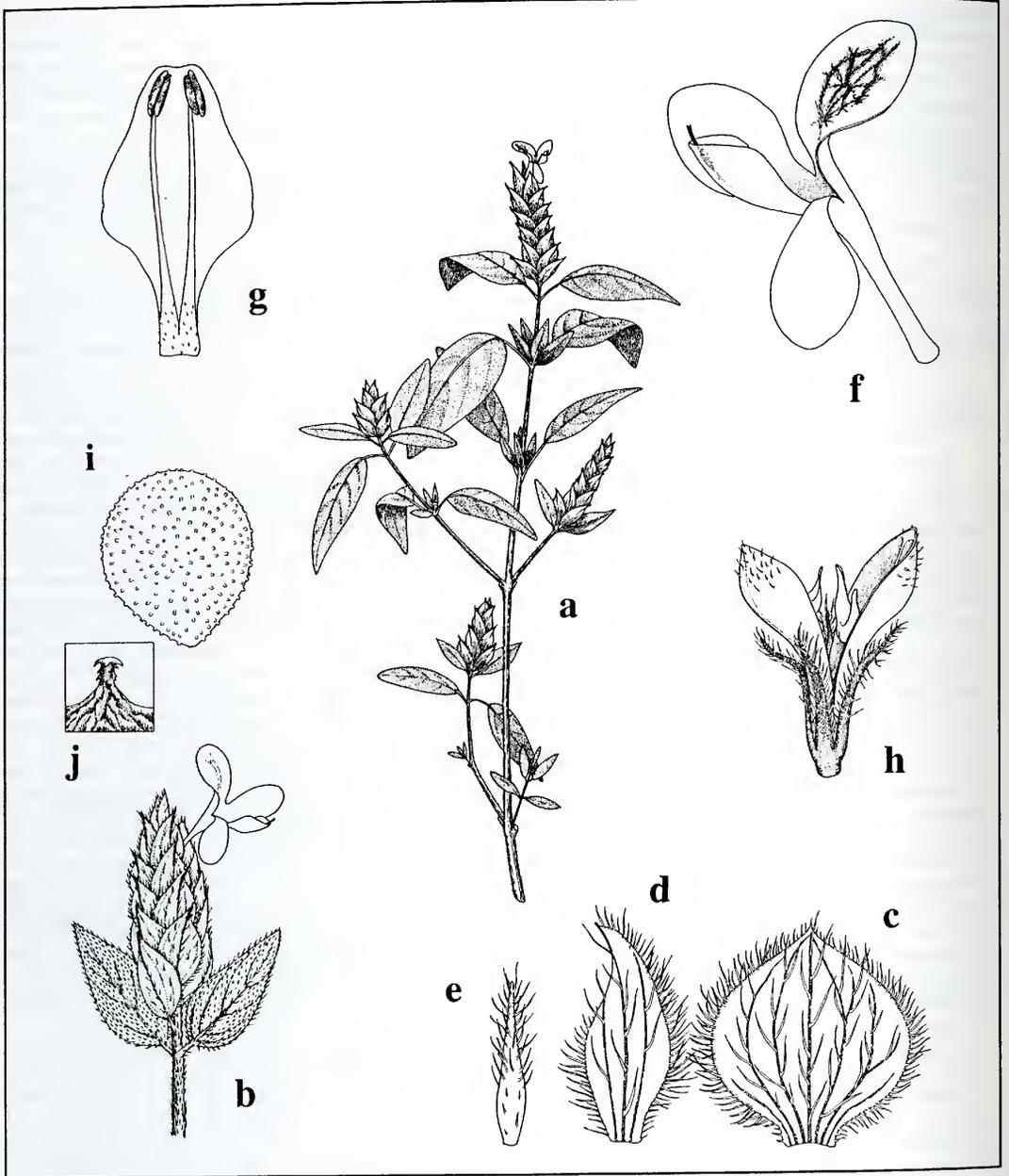


FIGURE 38. *Tetramerium nervosum* Nees. a, habit (31274),  $\times 0.5$ ; b, inflorescence with flower (48923),  $\times 1.2$ ; c, wide bract (23416),  $\times 3$ ; d, narrow bract (31274),  $\times 3$ ; e, bracteole (42125),  $\times 6.5$ ; f, flower with calyx removed (56863),  $\times 2.5$ ; g, lower-central corolla lobe with stamens attached (48923),  $\times 5$ ; h, calyx and capsule (49083),  $\times 5.8$ ; i, seed (49083),  $\times 14$ ; j, tubercle from surface of seed (49083),  $\times 33$ . Drawn by Ellen del Valle.

**3. *Tetramerium oaxacanum* T.F. Daniel,**  
Syst. Bot. Monogr. 12:77. 1986.

— TYPE: Mexico, Oaxaca, 34 mi NW of Salina Cruz on Hwy. 200, 12 Nov 1980, *P. Fryxell & E. Lott 3390* (CAS!; isotype: hb. of Paul Fryxell!).

ILLUSTRATION: Syst. Bot. Monogr. 12:76, figs. 74, 75.

Erect to spreading perennial herbs or shrubs to 8 dm tall. Young stems terete to subquadrate, evenly pubescent with erect to flexuose to recurved glandular trichomes 0.3–0.8 mm long, trichomes sometimes becoming concentrated in 2 lines on mature growth. Leaves petiolate, petioles to 16 mm long, shorter than blades, blades ovate to cordate, 16–40 mm long, 9–28 mm wide, 1.4–2.1 times longer than wide, acute to acuminate at apex, rounded to truncate to cordate at base, surfaces pubescent like stems except with trichomes flexuose to antrorse, margin entire. Inflorescence of densely bracteate spikes to 30 mm long, 13–24 mm in diameter near midspike, rachis not visible, densely pubescent with erect to flexuose glandular trichomes to 0.7 mm long. Bracts intergrading with leaves at base of spike, ovate to deltate, 9–18 mm long, 5–10 mm wide, acute- to acuminate-mucronate at apex, apical portion of bract straight and erect, abaxial surface pinnately veined with a prominent midvein and 3–5 lateral veins per side arising along lower 2/3 of midvein, abaxial surface and margin pubescent like leaves, margin entire to conspicuously coarsely dentate with 1–4 (–5) teeth per side (teeth inconspicuous or absent in specimens from Chiapas, see discussion). Bracteoles linear-lanceolate to lance-subulate, 3–6 mm long, 0.5–1 mm wide, pubescent like rachis. Calyx 5-lobed, 2.5–4.3 mm long, lobes subulate, 2–3 mm long, pubescent like rachis. Corolla white to cream with a purplish-maroon chevron on upper lip, 18–21.5 mm long, tube 8–10.5 mm long, upper lip 7–8.5 mm long, 2.5–3.5 mm wide, lower lip 9–11 mm long, lateral lobes 8.5–10.5 mm long, 3–4 mm wide, lower-central lobe 6.5–8.5 mm long, 4–6 mm wide. Stamens 6.5–7 mm long, thecae 1.5–1.8 mm long. Style 13–16 mm long. Capsule 5–6 mm long, glabrous. Seeds 1.5–2 mm long, 1.3–1.7 mm wide, surfaces covered with barbed conical tubercles. ( $n = 18$ ). Flowering and fruiting Oct–Jan.

Tropical Deciduous Forest; rare in NW Sierra Madre; ca. 500 m. Mex. (Oax., Chi.). CHIAPAS COLLECTION: *Dan 5864* (CAS).

Morphological and phenological data from specimens occurring in adjacent regions of Oaxaca are included in the above description. Plants from Chiapas differ from those in Oaxaca only in lacking conspicuous teeth on at least some bracts (usually the proximal ones) in each inflorescence. Instead, they are entire-margined to inconspicuously toothed.

**4. *Tetramerium tenuissimum* Rose, Contr.**  
U.S. Natl. Herb 1:349. 1895.

— TYPE: Mexico, Colima, vicinity of Colima, 27–28 Feb 1891, *E. Palmer 1297* (US!; isotypes: GH!, K!, NY!, US!).  
*Tetramerium leptocaula* Happ, Ann. Missouri Bot. Gard. 24:516. 1937. — TYPE: Mexico, Michoacán, Distr. Huetamo, Tacupa, 17 Jan 1934, *G. Hinton et al. 5494* (K!; isotypes: DES!, GH!, MO!, NY!, US!).

ILLUSTRATION: none found.

Erect to spreading perennial herbs or shrubs to 8 dm tall. Young stems subquadrate, bifariously pubescent with flexuose-retorse glandular trichomes 0.2–0.7 mm long. Leaves petiolate, petioles to 40 mm long, shorter than blade, blades ovate, 19–55 mm long, 8–36 mm wide, 1.7–2.8 times longer than wide, acute to acuminate at apex, rounded to acute at base, surfaces pubescent with flexuose to antrorse glandular trichomes, margin entire. Inflorescence of terminal  $\pm$  densely bracteate spikes to 30 mm long, 7–11 mm in diameter near midspike, rachis evenly pubescent with an understory of glandular, subglandular, and glandular trichomes 0.05–0.1 mm long and an overstory of flexuose glandular trichomes to 0.4 mm long. Bracts ovate to elliptic, 5–9.5 mm long, 2.5–4.3 mm wide, rounded- to acute- to subacuminate-mucronate at apex, apical portion of bract straight and erect, major veins 3 (sometimes  $\pm$  obscure), palmate, abaxial surface and margin pubescent like rachis but with overstory trichomes mostly restricted to midvein, flexuose to antrorse, and up to 0.6 mm long, margin entire. Bracteoles lance-subulate, 4–5.8 mm long, 0.6–0.7 mm wide, pubescent like bracts. Calyx 5-lobed, 2–3 mm long, lobes subulate, 1.5–2.5 mm long, pubescent like bracts. Corolla whitish with a maroon chevron on upper lip, 7–12 mm long, tube 3.7–4 mm long, upper lip 5–6.8 mm long, 1.4–1.5 mm wide, lower lip 5.5–8 mm long, lateral lobes 5–6.5 mm long, 1.5–2.5 mm wide, lower central lobe 4.5–6 mm long, 2–2.6 mm wide. Stamens 4.5–5.2 mm long, thecae 0.6–0.7 mm long. Style 6–8 mm long. Capsule 3.5–5 mm long, pubescent with flexuose to retrorse glandular trichomes 0.05–0.4 mm long. Seeds 0.8–1.2 mm long, 0.8–1 mm wide, surfaces covered with subconical to  $\pm$  rounded tubercles, tubercles  $\pm$  barbed. ( $n = 18$ ). Flowering and fruiting Nov–Jan, Apr.

Tropical Deciduous Forest; uncommon in Central Plateau, Central Depression, and Sierra Madre; 530–900 m. Mex. (Son., Sin., Nay., Jal., Cma., Mich., Mlos., Ver., Gro., Yuc., Chi.), Guat. CHIAPAS COLLECTIONS: *Dan 6207* (CAS); *La 2832* (DS); *Pa 1196* (CAS); *Sau 45* (LL, US); 71317.

This widespread species is rather uniform throughout its range.

## 29. THUNBERGIA

*Thunbergia* Retz., Physiogr. Sölsk. Handl. 1(3):163. 1780 ("1776"), nomen conserv. — TYPE: *Thunbergia capensis* Retz.

Erect to spreading perennial herbs or shrubs or perennial twining (counterclockwise) vines lacking cystoliths. Leaves opposite, petiolate, often cordate to hastate at base, margin entire to lobed or dentate. Inflorescence of solitary or clustered dichasia in leaf axils or in axils of bracts in a terminal dichasiate thyrse; dichasia alternate or opposite, 1-flowered (in ours), pedunculate. Bracteoles green (in ours), spatheaceous, enclosing most or all of corolla tube, free or fused along one side. Flowers homostylous, subtended by 2 bracteoles, sessile. Calyx reduced, annular, entire or  $\pm$  irregularly 5–20 lobed. Corolla white, yellow, orange, blue or purple (in ours, elsewhere also reddish), tube expanded distally into a distinct throat, throat sometimes greatly expanded

and open, limb 5-lobed, subregular to bilabiate, if bilabiate then upper lip 2-lobed, lower lip 3-lobed, corolla lobes homomorphic or nearly so, contorted in bud, spreading to reflexed. Stamens 4, often didynamous, inserted near base of throat, included in corolla tube, anthers 2-theous, thecae (in ours) equal to unequal, parallel to subparallel, equally to subequally inserted, often appendaged at base, variously pubescent, dehiscing toward lower lip (i.e., flower nototribal); pollen spheric, spiraperturate, exine subfossulate (in *T. alata*, not observed in other species); staminodes 0. Style included in corolla tube, stigma funnelliform or 2-lobed, lobes equally inserted or superposed. Capsule estipitate, with expanded seed-bearing portion at base, distally prominently rostrate, retinacula present, digitaliform, inserted into opening on flat side of seed. Seeds 2–4, homomorphic, hemispheric, excavated or with prominent pore on flattened side. ( $x = 8, 14?$ ).

A paleotropical (mostly African) genus of between 100 and 200 species. A dozen or more species are cultivated in the American tropics and in warm temperate regions; some of these have become naturalized. All species known from Chiapas are treated below.

REFERENCE: BREMEKAMP, C.E.B. 1955. The *Thunbergia* species of the Malesian area. Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 50(4):1–90.

- a. Young stems pubescent with sessile glands (concentrated just proximal to nodes); bracteoles 30–47 mm long; calyx annular, unlobed; corolla externally glabrous, limb 50–83 mm in diameter; thecae 9–12 mm long.
  - b. Leaves narrow (2.3–3.5 times longer than wide), rounded to subcuneate at base, major veins 3, margin entire to subsinuate . . . . . 5. *T. laurifolia*
  - bb. Leaves broad (1.1–2.3 times longer than wide), cordate (to truncate) at base, major veins 5–7, margin conspicuously toothed or lobed . . . . . 4. *T. grandiflora*
- aa. Young stems pubescent with eglandular trichomes only; bracteoles 11–25 mm long; calyx with 10 or more lobes; corolla externally pubescent, limb 20–55 mm in diameter; thecae 2.5–5 mm long.
  - c. Erect to arching shrubs; leaf blades acute to attenuate at base, venation pinnate; bracteoles abaxially glabrous or nearly so; corolla 55–75 mm long; thecae with a cluster of stiff spines 0.2–0.4 mm long at base; capsule glabrous . . . . . 2. *T. erecta*
  - cc. Twining vines; leaf blades truncate to subcordate to cordate-hastate at base, venation (major veins) palmate; bracteoles abaxially pubescent; corolla 25–50 mm long; thecae with either a single awnlike projection 1–1.6 mm long at base or without basal appendages; capsule pubescent.
    - d. Petioles conspicuously alate; leaf blades sagittate; bracteoles abaxially pubescent with eglandular trichomes and sessile glands (sometimes inconspicuous); corolla orange (rarely white) with a dark purple and internally glandular throat; thecae pubescent with beaded papillalike trichomes and at least one theca per anther with a prominent spurlike appendage at base; capsule 14–23 mm long . . . 1. *T. alata*
    - dd. Petioles naked; leaf blades ovate to narrowly ovate-deltate; bracteoles abaxially pubescent with eglandular trichomes only; corolla entirely white (or with throat faintly yellow), the throat internally eglandular; thecae glabrous and lacking basal appendages; capsule 22–27 mm long . . . . . 3. *T. fragrans*

## 1. *Thunbergia alata* Bojer ex Sims, Bot. Mag. 52:t. 2591. 1825.

— TYPE: based on plants cultivated by R. Barclay from seeds from Mauritius. Specimens, if any exist, are not known.

ILLUSTRATIONS: Fig. 39; Bot. Mag. 52:t. 2591. 1825; Bot. Cab. 11:no. 1045. 1825; Paxton's Mag. Bot. 2:t. opposite p. 2. 1836; Wasshausen in Lundell, Fl. Texas 1(3):227, fig. 2. 1966; J. Arnold Arbor. 51:275, fig. 1. 1970; Fieldiana, Bot. 24(10):457, fig. 106. 1974; Correll and Correll, Flora Bahama Archipelago, 1359, fig. 594. 1982; Howard, Flora Lesser Antilles 6:377, fig. 164. 1989; Ezcurra in Cabrera, Flora Provincia Jujuy (Rep. Argentina) 9:282, fig. 114. 1993.

Herbaceous vines. Stems subquadrate to ± flattened, pubescent with flexuose to recurved or retrorse to retrorsely appressed eglandular trichomes to 1.7 (–3) mm long. Leaves petiolate, petioles 10–85 mm long, alate, blades sagittate, 20–135 mm long, 9–84 mm wide, 1.3–2.5 times longer than wide, (rounded to) acute at apex, cordate-hastate at base and decurrent along petiole as a narrow wing 1.3–7 mm across, surfaces pubescent

with erect to antrorse to antrorsely appressed eglandular trichomes and covered with sessile dark reddish glands < 0.1 mm in diameter, major veins palmate, margin entire to undulate or shallowly and irregularly coarsely dentate. Dichasia solitary in leaf axils (sometimes accompanied there by a branch shoot as well), peduncles 30–90 mm long, pubescent with cauline type trichomes. Bracteoles lance-ovate to ovate, 11–25 mm long, 4–15 mm wide, rounded to truncate to cordate at base, acute to acuminate at apex, surfaces pubescent like leaves. Calyx 2–4.5 mm long, > 10 (i.e., 11–13)-lobed, lobes subulate, unequal, pubescent with ascendant eglandular trichomes 0.2–0.3 mm long and glandular trichomes 0.1 mm long. Corolla orange (rarely white) with a dark purple and glandular “eye” in throat, 25–43 mm long, externally sparsely and inconspicuously pubescent with glands up to 0.1 mm long, limb subactinomorphic, 20–43 mm in diameter, lobes obovate to obdeltate, 7.5–15 mm long, 6–22 mm wide, apically truncate. Stamens didynamous, 7–9 mm long, anthers of longer pair with both thecae appendaged at base with a single curved awnlike projection 1–1.6 mm long, anthers of shorter pair with 1 theca appendaged at base, thecae 3–5 mm long (including basal appendage), subequal to unequal in size, subparallel, equally to subequally inserted, pubescent with beaded papillalike trichomes along line

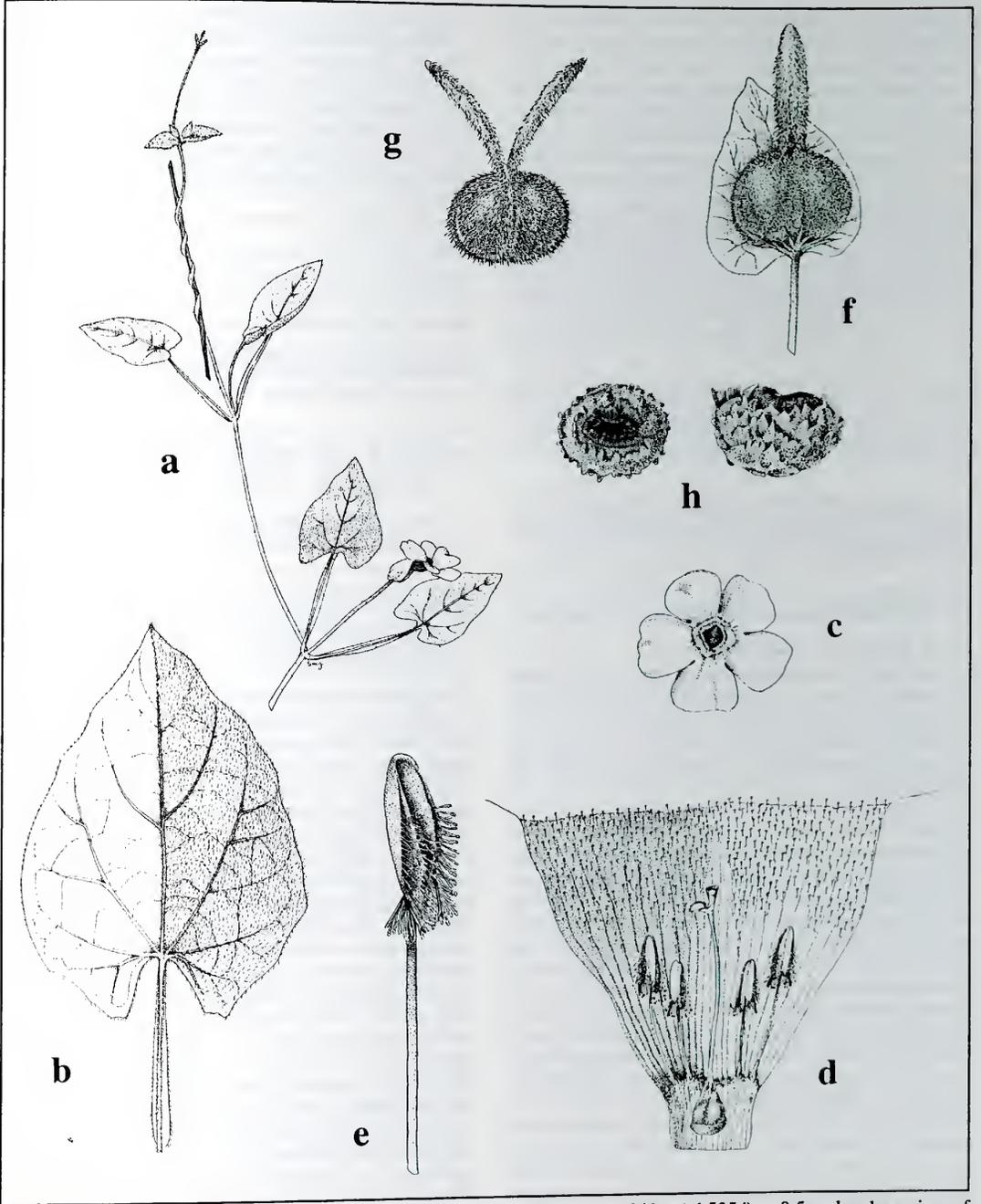


FIGURE 39. *Thunbergia alata* Bojer ex Sims. a, habit (26136),  $\times 0.3$ ; b, leaf (Daniel 5354),  $\times 0.5$ ; c, head-on view of corolla (Daniel 5354),  $\times 0.5$ ; d, corolla split open showing stamens and gynoecium (Daniel s.n.),  $\times 2.2$ ; e, stamen (Daniel s.n.),  $\times 7.5$ ; f, bracteole, calyx, and unopened capsule (Ton 4327),  $\times 2.2$ ; g, partially dehiscent capsule (McPherson 972),  $\times 2.2$ ; h, seeds (McPherson 972): flat side with prominent pore (left), side view (right),  $\times 3.8$ . Drawn by Susan Guthrie.

of dehiscence and at base. Style 12 mm long, glabrous, stigma lobes  $\pm$  funnelliform, superposed, 1.5–2 mm long. Capsule 14–23 mm long, densely pubescent with erect eglandular trichomes 0.1–0.7 mm long, base subglobose, 5–10 mm in diameter, beak 9–15 mm long. Seeds 2, 4–5 mm in diameter, with a prominent pore on flat side, covered with  $\pm$  appressed scalelike tubercles to 0.5 mm long (these forming a  $\pm$  homobrochate reticulum) and covered with appressed scalelike trichomes to 0.1 mm long. ( $n = 9$ ). Flowering and fruiting throughout year.

Disturbed habitats (e.g., gardens, plantations, roadsides, and pastures) in various vegetation types; common in Gulf Coastal Plain, Northern Highlands, Central Plateau, Sierra Madre, and Pacific Coastal Plain; 0–1700 m. U.S. (Texas, Florida), Mex. (S.L.P., Nay., Jal., Hgo., Mich., Méx., Mlos., Pue., Ver., Gro., Oax., Tab., Chis.), Guat., Bel., Hond., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Guy., Sur., Ecu., Peru, Bol., Braz., Arg., Parag.), Old World. CHIAPAS COLLECTIONS: *M&M 885* (LL, WIS); *Mol 2250* (LL); *T 4327* (CAS, MEXU); *T 4636* (CAS, MEXU); *T 6796* (RSA); *Ve 395* (BM, MEXU); *Ve 1126* (BM); *Ve 2124* (MICH); *Ve 2486* (MEXU, RSA); 19934; 26136; 31597.

A native of eastern and southern Africa, this species is cultivated for ornament and has become naturalized throughout tropical America.

## 2. *Thunbergia erecta* (Benth.) T. Anderson, J. Linn. Soc. 7:18. 1863.

— *Meyenia erecta* Benth. in Hook. Niger Fl. 476. 1849.

— SYNTYPES: Ghana, Central Region, Cape Coast Castle, July 1841, *J. Vogel 14* (K!); *J. Vogel 83* (K!).

ILLUSTRATIONS: Bot. Mag. 83:t. 5013. 1857; Fl. W. trop. Afr. 2:251, fig. 264. 1931; Fl. W. trop. Afr., ed. 2, 2:401, fig. 298. 1963.

Erect to arching shrubs to 2 m tall. Stems subquadrate to quadrate-alate to  $\pm$  flattened, internodes sparsely pubescent with antrorse eglandular trichomes 0.1–0.2 mm long, soon glabrate, nodes pubescent with flexuose eglandular trichomes to 0.3 mm long. Leaves petiolate, petioles 2–6 mm long, often distally alate, blades ovate-elliptic to elliptic, 12–50 mm long, 5–30 mm wide, 1.7–2.9 times longer than wide, acuminate at apex, acute to attenuate (with blade sometimes tapering nearly to node) at base, surfaces pubescent with a few antrorse eglandular trichomes mostly along veins to glabrous, major veins pinnate, margin entire or coarsely and shallowly sinuate-dentate. Dichasia solitary in leaf axils, peduncles 20–23 mm long, sparsely pubescent with mostly antrorse eglandular trichomes to nearly glabrous. Bracteoles caducous, ovate, 13–20 mm long, 8–13 mm wide, truncate at base, rounded to acute at apex, abaxial surface glabrous or nearly so. Calyx 3–10 mm long, 10–12-lobed, lobes lance-subulate to subulate, unequal, abaxially pubescent with glandular trichomes 0.05–0.1 mm long. Corolla blue or white with throat yellow within, 55–75 mm long, externally sparsely pubescent with erect to flexuose glandular trichomes 0.1–0.3 mm long, limb subactinomorphic, 37–55 mm in diameter, lobes broadly obovate, 14–19 mm long, 15–25 mm wide, rounded to truncate at apex. Stamens didynamous, 11–15 mm long, thecae 3–3.5 mm long (including basal spines), unequal in size, subparallel, subequally inserted, with a cluster of ca. 20 stiff straight spines 0.2–0.4 mm long at base,

pubescent with beaded papillalike trichomes flanking line of dehiscence and at base. Style 26–34 mm long, glabrous, stigma 2-lobed, lobes subfunnelliform, superposed, 2.5–3 mm long. Capsule 25–29 mm long, glabrous, base subglobose, 11–12 mm in diameter, beak 15–17 mm long. Seeds apparently 4, 5–6.5 mm in diameter, with a shallow “eye” 3–4 mm in diameter on flat side, surfaces dimpled, lacking trichomes. ( $n = 28$ , and numerous other numbers reported). Flowering Sep–Dec; fruiting Sep.

Usually cultivated in gardens. CHIAPAS COLLECTIONS: *Ve 355* (BM); 71517; 71522.

Native to western tropical Africa, this species is cultivated worldwide but is not reported as becoming naturalized in the American tropics. *Ventura and López 355* was reported from “matorral” at 150 m in Mpio. Tapachula. White-flowered individuals (cultivar “alba”) are known from Chiapas.

## 3. *Thunbergia fragrans* Roxb. Pl. Coromandel 1:47. 1796.

— TYPE: India, Madras, according to the protologue, plants were encountered near Samulcotah and were also cultivated. Specimens, if any exist, were not located.

ILLUSTRATIONS: Roxburgh, Pl. Coromandel 1:t. 67. 1796; Bot. Mag. 44:t. 1881. 1817; Fl. Mag. (London) 6:t. 325. 1867; Contr. U.S. Natl. Herb. 31:43, fig. 16. 1951; Wagner et al., Flowering Plants of Hawai‘i 1:t. 2. 1990.

Herbaceous vines. Stems subquadrate to  $\pm$  flattened, pubescent with retrorse to retrorsely appressed eglandular trichomes 0.3–0.5 mm long. Leaves petiolate, petioles 6–45 mm long, naked, blades ovate to narrowly ovate-deltate, 27–110 mm long, 9–66 mm wide, 1.5–3 times longer than wide, acute to acuminate at apex, truncate to subcordate at base, surfaces pubescent with antrorse eglandular trichomes 0.1–0.5 mm long, major veins palmate, margin entire to irregularly sinuate to shallowly coarsely dentate (especially proximally and the proximalmost teeth sometimes becoming lobelike). Dichasia 1 (–2) in leaf axils, peduncles 18–65 mm long, pubescent with cauline type trichomes. Bracteoles ovate, 11–18 mm long, 5.5–11 mm wide, truncate at base, acuminate at apex, abaxial surface pubescent with antrorse eglandular trichomes. Calyx 3–5 mm long, > 13 (i.e., 14–17)-lobed, lobes subulate, unequal, pubescent with ascendant to antrorse eglandular trichomes 0.2–0.3 mm long and with inconspicuous glandular trichomes up to 0.1 mm long (especially along margin). Corolla white throughout (or throat faintly yellow but lacking glandular “eye”), 30–50 mm long, externally pubescent with conspicuous flexuose glandular and eglandular trichomes to 0.8 mm long, limb subactinomorphic, 25–55 mm in diameter, lobes broadly elliptic, 10–22 mm long, 13–31 mm wide, truncate at apex. Stamens didynamous, 6–10 mm long, thecae 2.5–3.5 mm long, equal to subequal in size, subparallel, equally to subequally inserted, lacking basal appendages, glabrous. Style 15–20 mm long, glabrous, stigma funnelliform, not noticeably 2-lobed, 1.5–1.8 mm long. Capsule 22–27 mm long, densely pubescent with erect to retrorse eglandular trichomes 0.2–0.3 mm long, base subglobose 9–13 mm in diameter, beak 13–19 mm long. Seeds 4, 4–5 mm in diameter, with a prominent pore on flat side,

surfaces wrinkled and covered with scurfy scalelike projections up to 0.05 mm long. Flowering and fruiting throughout year.

Disturbed habitats (e.g., roadsides, cultivated fields, and pastures) in regions of Tropical Rain Forest and Tropical Deciduous Forest; rare in Sierra Madre and Pacific Coastal Plain; 0–900 m. U.S. (Florida), Mex. (S.L.P., Hgo., Mlos., Pue., Ver., Oax., Tab., Yuc., Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan., Antill., S.A. (Col., Ven., Sur., Ecu., Peru, Braz.). CHIAPAS COLLECTIONS: *Ve 557* (BM); *Ve 1164* (MEXU); *Ve 1513* (BM, DUKE).

A native of India, this species is widely cultivated for ornament elsewhere and has become naturalized in the American tropics.

#### 4. *Thunbergia grandiflora* (Roxb. ex Rottler) Roxb. Bot. Cab. 4:t. 324. 1820.

— *Flemingia grandiflora* Roxb. ex Rottler, Ges. Naturf. Freunde Berlin Neue Schriften 4:202. 1803. — TYPE: based on material collected near Calcutta, India; specimens, if any exist, not seen.

ILLUSTRATIONS: Bot. Cab. 4:t. 324. 1820; Bot Reg. 6:t. 495. 1820; Bot. Mag. 50:t. 2366. 1823; Ann. Missouri Bot. Gard. 65:279, fig. 33. 1978.

Woody vines. Young stems subquadrate to quadrate-sulcate, pubescent with erect to flexuose eglandular trichomes 0.05–0.3 mm long and sessile glands ca. 0.1 mm long, trichomes concentrated just proximal to nodes and scattered elsewhere. Leaves petiolate, petioles (20–) 40–65 mm long, naked, blades ovate to subcircular, (65–) 115–150 mm long, (38–) 53–135 mm wide, 1.1–2.3 times longer than wide, acute to acuminate to abruptly acuminate at apex, cordate (to truncate) at base, surfaces pustulate and pubescent with eglandular trichomes to 0.3 mm long, major veins 5–7, palmate, margin coarsely and irregularly angular lobed along proximal 1/2, lobes up to 17 mm long. Inflorescence of many-flowered pedunculate dichasiate thyrses to 300 mm long (including peduncles and excluding flowers) from leaf axils (or sometimes pedunculate dichasia present in leaf axils), peduncles to 100 mm long, peduncles and rachis pubescent like young stems; dichasia opposite, 1–3 per axil, peduncles 26–57 mm long, pubescent with antrorse eglandular trichomes throughout and with sessile glands distally. Proximal bracts sessile to subsessile, subfoliose, 10–67 mm long, 7–41 mm wide, reduced in size acropetally, distal bracts lance-subulate to subulate, 2–6 mm long, 1–1.5 mm wide, pubescent with antrorsely appressed eglandular trichomes. Bracteoles often coherent on posterior side, ovate-elliptic to obovate, 34–47 mm long, 16–22 mm wide, truncate at base, rounded-apiculate at apex, abaxial surface evenly pubescent with antrorse eglandular trichomes and sessile glands. Calyx annular, unlobed, 1.8–2 mm long, densely pubescent with ascendant-appressed eglandular trichomes 0.2–0.5 mm long. Corolla light purple or white with a yellowish throat, 62–75 mm long, externally glabrous, limb subactinomorphic, 65–83 mm in diameter, lobes subelliptic, 30 mm long, 25–40 mm wide, apically subtruncate. Stamens ± homodynamous, 21–22 mm long, thecae 9–11 mm long (including basal appendage), subequal in size, parallel, equally inserted, thecae of anterior pair of stamens each bearing a single prominent awnlike appendage (sometimes bifurcate at tip) 2–2.8 mm long at base, thecae pubescent with beaded

papillalike trichomes flanking line of dehiscence and clustered at base, thecae of posterior stamens with either 1 theca or both thecae appendaged at base, thecae similarly but less densely pubescent. Style 21 mm long, glabrous, stigma lobes subfunnel-form, equally inserted, 1.1–1.2 mm long. Capsule and seeds not seen. ( $n = 28$ ). Flowering: Jan, Jul, Oct.

Usually cultivated in gardens. CHIAPAS COLLECTIONS: *Boe 3220* (MEXU); *Pa 885* (CAS); 20052; 23559; 70841.

A Native of India and southeastern Asia, this species is often planted for ornament in tropical and subtropical regions where plants sometimes persist or escape. In Mexico it is apparently known only from cultivated or persisting plants. Additional synonyms were provided by Bremekamp (1955).

#### 5. *Thunbergia laurifolia* Lindl. Gard. Chron. 1856:260. 1856.

— *Thunbergia grandiflora* var. *laurifolia* (Lindl.) Benoist in Lecomte, Fl. Indo-Chine, 4:618. 1935. — TYPE: the protologue indicated that material was cultivated by J. Veitch & Son, but Hooker (Bot. Mag. 83:t. 4985. 1857) disagreed as to the source; specimens, if any exist, not seen.

ILLUSTRATIONS: Bot. Mag. 83:t. 4985. 1857; Ill. Hort. 4:t. 151. 1857; Gartenflora 14:t. 475. 1865; Garden (London) 12:420, 421. 1877; Garden (London) 30:292, 293. 1886.

Woody vines. Young stems subquadrate to quadrate, pubescent with mostly erect eglandular trichomes 0.05–0.2 mm long and sessile glands ca. 0.1 mm long, trichomes concentrated just proximal to nodes. Leaves petiolate, petioles 15–70 mm long, naked, blades ovate-elliptic, 70–205 mm long, 22–38 mm wide, 2.3–3.5 times longer than wide, acuminate at apex, rounded to subcuneate at base, surfaces pubescent (mostly along major veins) with eglandular trichomes to 0.2 mm long, major veins 3, palmate, margin entire to coarsely subsinuate. Inflorescence of dichasia in axils of leaves or reduced leaves (= bracts) in a terminal thyrs; dichasia opposite, 1–2 per axil, pedunculate, peduncles 25–30 mm long, pubescent with cauline type trichomes. Proximal bracts sessile to subsessile, ovate, 25–41 mm long, 10–15 mm wide, reduced in size distally, distal bracts ovate to lanceolate, 8–10.5 mm long, 2.5–4 mm wide, abaxial surface pubescent with antrorsely appressed eglandular trichomes. Bracteoles often coherent on posterior side, ovate-elliptic to subelliptic, 30–42 mm long, 15–20 mm wide, truncate at base, acute-apiculate at apex, abaxial surface evenly pubescent with antrorse eglandular trichomes and sessile glands. Calyx annular, unlobed, 1–1.5 mm long, pubescent (especially at or near apex) with eglandular trichomes to 0.1 mm long. Corolla light purple with a white throat streaked with darker purple veins, 55–80 mm long, externally glabrous, limb subactinomorphic, 50–65 mm in diameter, lobes subelliptic to subcircular, 23–28 mm long, 22–33 mm wide, apically rounded to truncate to emarginate. Stamens didynamous, 14–21 mm long, thecae 11–12 mm long (including basal appendage), subequal in size, parallel, equally inserted, thecae of anterior pair of stamens each with an awnlike basal appendage, pubescent with beaded papillalike trichomes flanking line of dehiscence and clustered at base, thecae of posterior pair with 1 theca with an awnlike basal appendage, other theca either lacking a basal appendage or with a much shorter appendage, pubescent like

thecae of anterior pair of stamens except trichomes less dense. Style 26 mm long, glabrous, stigma lobes subfunneliform, equally inserted, 1.5–1.7 mm long. Capsule not seen.

Cultivated or persisting (noted as occurring in second growth at 150 meters in the Pacific Coastal Plain). CHIAPAS COLLECTION: *Ve 1130* (UC).

A native of Indo-China and the Malay Peninsula, this species is cultivated worldwide. The above description has been augmented with data from extralimital cultivated materials. Additional synonyms were provided by Bremekamp (1955).

The foliar distinctions noted in the key above appear to be the only ones useful for distinguishing this species from *T. grandiflora*. Bremekamp (1955) noted additional distinctions between the species in features of the

basal appendages of the thecae, peduncle length, and coherence of the bracteoles. Based on specimens that I examined, I could not confirm these distinctions. Plants are known with leaves intermediate between *T. laurifolia* and *T. grandiflora* in all of the distinguishing features noted in the key above. Both species (as defined above) are widely cultivated and it is not known whether the intermediates represent natural or artificial hybrids or horticultural selections. It appears likely, however, that plants commonly treated as *T. laurifolia* and *T. grandiflora* may represent extreme forms of a single variable taxon. Study of the appropriate types and plants in their native habitats would seem to be appropriate prior to making taxonomic modifications, however.

Appendix 1. *Abbreviations of Names of Collectors:*

|                               |       |                                    |        |
|-------------------------------|-------|------------------------------------|--------|
| Alava, R.                     | (A)   | González-Espinosa, M.              | (GE)   |
| Altamirano, F.                | (Al)  | González G., L.                    | (GG)   |
| Anderle, R.F.                 | (An)  | González-Quintero                  | (G-Q)  |
| Anderson, W.R.                | (And) | González-Villareal, L.             | (G-V)  |
| Arcos V., R.                  | (AV)  | Green, H.T. (= H.T.G.)             | (HTG)  |
| Armor, A.                     | (Arm) | Hale, M. & T. Soderstrom           | (H&S)  |
| Arrequín S., M.L.             | (Ar)  | Hammel, B.                         | (Ham)  |
| Avendaño, S.                  | (Av)  | Hampshire, R.                      | (Hamp) |
| Balough, P.                   | (Bal) | Hardison, L.                       | (Hd)   |
| Bamps, P.                     | (Bam) | Harriman, N.                       | (Ha)   |
| Becerra, M.E.                 | (Be)  | Heath, M.                          | (He)   |
| Berger, B.                    | (Ber) | Hernández G., H.                   | (HG)   |
| Beutelspachen, C.R.           | (Bt)  | Hernández M., R.                   | (HM)   |
| Bodegas, R.                   | (Bod) | Hernández X., E.                   | (X)    |
| Boege, W.                     | (Boe) | Hernández X., E. & A.J. Sharp      | (X&S)  |
| Bossé, G.                     | (Bo)  | Hilerio H., L.                     | (Hi)   |
| Brenan, J.                    | (Bre) | Hoover, W.B.                       | (Hoov) |
| Brett, J.                     | (Br)  | Howard, M.J.                       | (Ho)   |
| Burnham, R.                   | (Bu)  | Huft, M.                           | (Hu)   |
| Cabrera C., T.                | (TCC) | Ishiki, M.                         | (Is)   |
| Cabrera, E.                   | (Cb)  | Jezepeczuk, S.V.                   | (J)    |
| Calvert, D.                   | (Cv)  | Johnson, C.                        | (Jo)   |
| Calzada, J.I.                 | (Cz)  | Johnston, M.C.                     | (Jt)   |
| Carlson, M.                   | (MC)  | King, R.M.                         | (RMK)  |
| Chavelas P., J.               | (Ch)  | Koch, S.D.                         | (K)    |
| Clarke, O.F.                  | (C)   | Krauss                             | (Kr)   |
| Cloud, J.                     | (Cl)  | Langman, I.                        | (Lm)   |
| Collins, G.N. & C.B. Doyle    | (C&D) | LaSalle, J.                        | (Las)  |
| Cowan, C.                     | (Co)  | Lathrop, E.W.                      | (EL)   |
| Croat, T.                     | (Cro) | Laughlin, R.M.                     | (La)   |
| Cruden, R.                    | (Cru) | Lavin, M.                          | (Lav)  |
| Daniel, T.F.                  | (Dan) | Linden, J.J.                       | (Li)   |
| Davidse, G.                   | (Da)  | Little, E. & A.J. Shapr            | (L&S)  |
| Davis, L.                     | (Dav) | López, E.                          | (EL)   |
| Delgado, A.                   | (De)  | López P., J.                       | (Lo)   |
| Denton, M.                    | (Den) | Luckow, M.                         | (Luc)  |
| Diboll, N.                    | (Di)  | Lundell, C.L.                      | (Lu)   |
| Dressler, R.L.                | (Dr)  | MacDougall, T.                     | (Mc)   |
| Enriquez                      | (En)  | Magaña, M.                         | (Mag)  |
| Espejo, A.                    | (Es)  | Marcks & Marcks                    | (M&M)  |
| Fernández N., R.              | (Fe)  | Marin                              | (Ma)   |
| Fisher, G.L.                  | (Fi)  | Martínez S., E.                    | (Mz)   |
| Fryxell, P.A.                 | (F)   | Matuda, E.                         | (EM)   |
| García F., J.                 | (Ga)  | Mayo, S.                           | (My)   |
| Ghiesbreght, A.               | (G)   | McDade, L.                         | (McD)  |
| Gilly, C.L. & E. Hernández X. | (G&H) | Meave, J.                          | (Mv)   |
| Gittens, B.T.                 | (Gi)  | Mell, C.D.                         | (Me)   |
| Goldman, E.A.                 | (Go)  | Mendez T., A. (see also Ton, A.S.) | (T)    |
| Gomez L., M.                  | (GL)  | Meza A., R.                        | (Mez)  |
| Gomez-Pompa, A.               | (G-P) | Mickel, J.T.                       | (JTM)  |

|                            |         |                               |       |
|----------------------------|---------|-------------------------------|-------|
| Miranda, F.                | (Mi)    | Seler, C. & E. Seler          | (S&S) |
| Moldenke, H.               | (Mol)   | Sharp, A.J.                   | (S)   |
| Montes de Oca, R.          | (Mt)    | Sianca C., S.                 | (Si)  |
| Morley, T.                 | (Mo)    | Smith, C.E. & F. Ruiz M.      | (S&M) |
| Moore, H.E.                | (Mr)    | Sohns, E.R.                   | (So)  |
| Münch, G.                  | (GM)    | Solis E., J.                  | (Sol) |
| Narave F., H.              | (Na)    | Sørensen, M.                  | (Sør) |
| Neill, D.                  | (Ne)    | Soule, J.                     | (Sl)  |
| Nelson, E.W.               | (N)     | Spellman et al.               | (Sp)  |
| Oberg, R.                  | (O)     | Stafford, P.                  | (Sta) |
| Palacios E., E.            | (Pa)    | Starr, G.                     | (St)  |
| Pérez M., A.               | (PM)    | Stevens, W.D.                 | (Ste) |
| Perino & Perino            | (P&P)   | Sutherland, S.                | (Su)  |
| Purpus, C.A.               | (P)     | Télez, O.                     | (Te)  |
| Quarles van Ufford, L.     | (QVU)   | Tenorio L., P.                | (Ten) |
| Quiroga M., R.             | (Qu)    | Thomas, W.                    | (Th)  |
| Raven, P. & D.E. Breedlove | (R&B)   | Thorne, R.L. & E. Lathrop     | (T&L) |
| Reeder, J.R. & C.G. Reeder | (R&R)   | Tillet, S.S.                  | (Ti)  |
| Reyes G., A.               | (Rey)   | Ton, A.S.                     | (T)   |
| Reznicek, A.               | (Re)    | Torres, R.                    | (To)  |
| Riba, R.                   | (Ri)    | Ulbrich, E.                   | (U)   |
| Rodriguez G., G.           | (RG)    | Valdivia, P.E.                | (V)   |
| Roe, K., E. Roe & S. Mori  | (R&R&M) | Vaughn et al.                 | (Va)  |
| Rovirosa, J.N.             | (R)     | Ventura, E.                   | (Ve)  |
| Rzedowski, J.              | (Rz)    | Ventura A., F.                | (Ven) |
| Sánchez M., H.             | (San)   | Vera S., J.                   | (VS)  |
| Sanders, R.                | (RS)    | Voorhies & Sánchez            | (V&S) |
| Sántiz C., E.              | (SC)    | Walker, T.                    | (Wa)  |
| Sántiz R., C.              | (SR)    | Weatherwax, P.                | (W)   |
| Saunders, D.C.             | (Sau)   | Webster, G.                   | (We)  |
| Saunders, J.G.             | (Sa)    | Wendt, T.                     | (TW)  |
| Schubert, B.               | (Sch)   | Xolocotzi, E. H. & A.J. Sharp | (X&S) |
| Seler, G.E.                | (Se)    | Zuill, H.                     | (Z)   |

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