THE RUBIACEOUS GENUS MUSSAENDA: THE SPECIES OF THE PHILIPPINE ISLANDS

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IN PREVIOUS PAPERS [1] the morphology of the rubiaceous genus *Mussaenda* has been discussed, and the species of India and Ceylon have been treated. In the Philippine Islands *Mussaenda* is represented by a larger number of species than in the areas considered earlier. Many of the Philippine species are endemic to a single island or are of very limited distribution; only a few may be found throughout the island chain. The Philippine species seem to have some affinity with those of the mainland of China and of the Malayan Peninsula, and to differ rather remarkably from the species of India in the pubescence characters of the inner surface of the corolla tube.

Students of any group of Philippine flowering plants are hampered in their work by the unfortunate loss of the types during World War II. In most cases isotypes are available in one or more of the herbaria of the United States. In such instances a lectotype has been chosen from among them. In some cases it has, however, been necessary to choose a neotype to represent the species.

The institutions from which material has been borrowed for my use were cited in the first of these papers. I should like to express again my appreciation to the officers in charge of these collections for their courtesy, and to the members of the staff of the Arnold Arboretum who have made publication of these studies possible.

The interrelationships of the Philippine species of *Mussaenda* are so complex that an arrangement by affinities seems impracticable at present. For convenience the key which follows is an artificial one. The species have been arranged in alphabetical order.

ARTIFICIAL KEY TO THE SPECIES OF MUSSAENDA IN THE PHILIPPINE ISLANDS

A. Calyx lobes deciduous almost immediately after flowering.
  B. Stipules entire or faintly bifid at apex.
    C. Corolla tube less than 2 cm. in length.
      D. Corolla tube campanulate, 1.1–1.3 cm. long, corolla lobes broader than long; calyx lobes lanceolate, 5.5–6.5 mm. long, hairy on both surfaces; berry ovoid, 1.2–1.7 cm. long, scantily pubescent; seeds

[1] The rubiaceous genus *Mussaenda*: Morphology of the Asiatic species. Jour. Arn. Arb. **44**: 111–126. 1963. The rubiaceous genus *Mussaenda*: The species of India and Ceylon. *Ibid.* 232–267.

0.43–0.56 mm. long with 3–6 foveae in the areoles of the testa. ..... 8. *M. lanata.*

D. Corolla tube tubular, broader at the top, 1.7–2 cm. long, corolla lobes broadly ovate, as broad as long; calyx lobes 6–12 mm. long, lanceolate, glabrous or pubescent within; berry (immature) obovoid, 1 cm. long, glabrescent; seeds 0.7–0.83 mm. long with 4–12 foveae in the areoles of the testa. ..... 6. *M. chlorantha.*

C. Corolla tube 2–3 cm. long, glabrous or straggly pubescent; stipules 7.5–16 mm. long; calyx lobes narrowly oblong-lanceolate or linear, 3.5–6 mm. long, gradually tapering to a point; berry ellipsoid, 1.2–2.2 cm. long, sparsely pubescent; seeds 0.5–0.67 mm. long with 3–6 or 4–12 foveae in the areoles of the testa. ..... 10. *M. magallanensis.*

B. Stipules bifurcate from the apex for about ½ their length.

E. Midrib of the leaf sunken on the upper surface.

F. Calyx lobes 3–5 mm. long, setaceously pointed; corolla tube slenderly tubular, lobes elliptic, glabrous on the outer surface; stipules broadly lanceolate, 9–12 mm. long; berry ellipsoid, reddish strigose-pubescent; seeds 0.6–0.7 mm. long, with 2–4(–6) foveae in the areoles of the testa. ..... 11. *M. milleri.*

F. Calyx lobes 11–16.5 mm. long, linear with a prominent midvein; corolla tube subfalcate, lobes ovate-lanceolate, granular on the inner surface; stipules ovate-acuminate, 4–5.5 mm. long; berry ellipsoid or globular, 1 cm. long, glabrous, seeds 0.46–0.6 mm. long, with 4–12 foveae in the areoles of the testa. ..... 13. *M. nervosa.*

E. Midrib of the leaf not sunken on the upper surface.

G. Fruits with persistent, conical, nectariferous discs, nearly glabrous, without lenticels; leaves oblanceolate, 7–20 cm. long, recurved at the apex and decurrently attenuate at base; stipules deciduous, 5–11 mm. long, hairy on both surfaces; calyx lobes lanceolate, 3 mm. long; corolla tube 2.7–4 cm. long; berry ellipsoidally elongated, 1.2–2 cm. long; seeds 0.64–0.77 mm. long, with 3–6(–9) foveae in the areoles of the testa. ..... 4. *M. attenuifolia.*

G. Fruits without persistent, conical, nectariferous discs.

H. Corolla tube hairy within ⅘ way down, slender, 2–2.5 cm. long; leaves ovate-elliptic, 6–13.3 cm. long; stipules 7–8 mm. long, hairy on the inner surface; calyx lobes linear-oblong, 3.5–5.5 mm. long, sharply acuminate; berry ellipsoid, 1–1.3 cm. long; seeds spiny, 0.83–0.9 mm. long, with 3–9 foveae in the areoles of the testa. ..... 18. *M. scandens.*

H. Corolla tube hairy within ¼–½ way down.

I. Flower buds curved and club shaped; leaves 9–25.5 cm. long, ferruginous-hairy on both surfaces; stipules 6.5–10.5 mm. long, glabrous on the inner surface; corolla tube 2.2–3 cm. long, hirsute with spreading hairs; berry ellipsoid, 1.5–2.2 cm. long, ferruginous-pubescent; seeds 0.53–0.73 mm. long, with 3–8 foveae in the areoles of the testa. ..... 20. *M. vidalii.*

I. Flower buds neither curved nor club shaped.

J. Corolla lobes 10–10.5 mm. long, linear-lanceolate, corolla tube very slender, 2.6–3.6 cm. long, pubescent with short,

scattered hairs; leaves 11.5–29 cm. long, pubescent on both surfaces with long, scattered hairs; stipules entire or faintly bifid ⅓ their length, hairy on both surfaces; berry (immature) obovoid, 1–1.3 cm. long; seeds 0.67–0.83 mm. long, with 2–8 foveae in the areoles of the testa. ..... 2. *M. albiflora.*

J. Corolla lobes less than 10 mm. long.

K. Leaves glabrous on the upper surface, minutely pubescent or hirsute beneath, recurved and strongly conduplicate, 3.5–23.5 cm. long; stipules 3–10.5 mm. long; calyx lobes 1.2–7.5 mm. long; corolla tube 2–3.5 cm. long, minutely appressed pubescent; berry globular, 1–1.6 cm. long, lenticellate; seeds 0.6–1 mm. long, with 2–5(–7) foveae in the areoles of the testa. ..... 15. *M. philippica.*

K. Leaves pubescent on both surfaces.

L. Calyx lobes linear, 6–15 mm. long, hairy; leaves 8.5–30 cm. long, long decurrent on petiole from the base; stipules ovate, 9–17 mm. long; corolla tube 2.5–3 cm. long, hirsute, hairs spreading; berry ellipsoid, 1.4–2 cm. long, scantily pubescent; seeds 0.63–0.73 mm. long, with 2–6 foveae in the areoles of the testa. ..... 3. *M. anisophylla.*

L. Calyx lobes lanceolate or oblong-lanceolate.

M. Corolla tube infundibuliform, 2–2.2 cm. long, hairs appressed on the outer surface, lobes acuminate; stipules lanceolate, bifurcate from apex more than ½ their length; calyx lobes 6.7–10.5 mm. long, slenderly acuminate; berry ovoid or obovoid, 1.2–1.4 cm. long, pubescent; seeds 0.6–0.77 mm. long, with 3–6(–8) foveae in the areoles of the testa. ..... 14. *M. palawanensis.*

M. Corolla tube tubular, 2–3 cm. long, hairs horizontally spreading on the outer surface, lobes apiculate; stipules triangular-ovate, bifurcate from the apex for ½ their length; calyx lobes 3.2–8 mm. long, acute; berry globose with very large nectariferous scars; seeds 0.67–0.87 mm. long, with 2–6 foveae in the areoles of the testa. ..... 9. *M. macrophylla* var. *brevipilosa.*

A. Calyx lobes persistent on the ovary after flowering.

N. Inflorescence at the same level or below the terminal leaves.

O. Corolla tube glabrous within, 2.9 cm. long, densely hirsute on the outer surface; calyx lobes short, 1.2–2.5 mm. long, lanceolate; leaves 16–32 cm. long, pubescent on both surfaces; stipules small, slenderly acuminate, bifurcate at the apex, hairy on both surfaces; berry ellipsoid, 1 cm. long, pubescent; seeds 0.64–0.77 mm. long, with 1–4 foveae in the areoles of the testa. ..... 7. *M. grandifolia.*

O. Corolla tube hairy within.

P. Stipules entire or faintly bifid at apex.
Q. Calyx lobes 7.7–8 mm. long, linear-subulate; leaves small, 4–8.3 cm. long, glabrous except on veins beneath; stipules lanceolate, 5–8.5 mm. long, faintly bifid at apex, hairy on the outer surface, hairy within at base and apex only; corolla tube 2–3 cm. long, hairy on the outer surface except at the base; berry not seen. ..... 17. *M. pinatubensis.*
Q. Calyx lobes 10.5–15 mm. long, narrowly lanceolate; leaves 9.5–20 cm. long, glabrate on upper surface, hirsute beneath; stipules 9–13 mm. long, hairy on both surfaces, entire or faintly bifid at apex; corolla tube 2–2.5 cm. long, hairy; berry elliptic, 1.3–1.5 cm. long, rugose; seeds 0.6–0.67 mm. long, with 3–8 foveae in the areoles of the testa. ..... 16. *M. philippinensis.*
P. Stipules bifurcate from apex for ½ their length, 7–10 mm. long, oblong-ovate; leaves pubescent on both surfaces, 5–15 cm. long; calyx lobes 5–9.5 mm. long, linear-acuminate, gradually tapering to an acute apex; corolla tube 2.7–3.6 cm. long, hairy; berry ellipsoid-fusiform, 1.5–2.5 cm. long, strigose, with calyx segments subpersistent; seeds 0.7–0.77 mm. long, with 4–6(–8) foveae in the areoles of the testa. ..... 5. *M. benguetensis.*
N. Inflorescence extending beyond the terminal leaves.
R. Leaves with 15–18 pairs of lateral veins, 12–25 cm. long, strigose on both surfaces; stipules ovate, 6–8 mm. long, bifurcate from apex for about ½ their length; calyx lobes linear-lanceolate, 4–7 mm. long, hairy on both surfaces; corolla tube 3 cm. long, hirsute; berry ellipsoid, 1.5 cm. long, sparingly hirsute. ..... 19. *M. setosa.*
R. Leaves with less than 15 pairs of lateral veins.
S. Calyx lobes broadly lanceolate, 6.7–28 mm. long, 1–6 mm. broad, hairy; leaves 9.5–30 cm. long, densely hirsute on both surfaces; stipules ovate, 12.5–14 mm. long, bifurcate at apex; corolla tube 2.5–3.3 cm. long, densely hirsute, hairs spreading; berry oblong or elliptic, 1.2–2 cm. long, lenticellate; seeds 0.53–0.67 mm. long, faintly spiny, with 4–11 foveae in the areoles of the testa. ..... 12. *M. multibracteata.*
S. Calyx lobes linear-lanceolate, 11(–15) mm. long, 1.4 mm. broad, hairy; leaves 9–16 cm. long, villous on both surfaces; stipules oblong, 15 mm. long; corolla tube 2.5 cm. long, ferruginous-villous on the outer surface; berry (immature) obovoid, 1.4–1.5 cm. long, sparingly pubescent; seeds 0.46–0.6 mm. long, with 4–8(–11) foveae in the areoles of the testa. ..... 1. *M. acuminatissima.*

1. **Mussaenda acuminatissima** Merr. Philip. Jour. Sci. Bot. 17: 436. 1920 (TYPE: *Ramos 33133*); Merrill, Enum. Philip. Fl. Pl. 3: 517. 1923. FIG. 4, o, p, q.

Erect shrub about 3 m. high with reddish-brown, lenticellate, glabrous branches and densely ferruginous-villous branchlets. Leaves ovate, 9–16 cm. long, 5–8.5 cm. broad, subcaudate-acuminate at the apex, abruptly long attenuate at base, decurrent on petiole, villous on both surfaces, more densely so on the midrib and veins of the lower surface, lateral veins 10–12 pairs; petiole 1.3–2 cm. long, villous. Stipules oblong, 15 mm. long, acute

or acuminate, hirsute. Inflorescence a terminal, dichotomously branched, pubescent, many-flowered cyme, primary cyme short, axillary cymes from the terminal pair of leaves longer and extending beyond the leaves; bracts and bracteoles linear-lanceolate, about 7 mm. long, acuminate, hairy on both surfaces. Flowers yellow, on stout, pubescent pedicels shorter than the ovaries. Calyx lobes linear-lanceolate, 11(–15) mm. long, 1.4 mm. broad, hairy on both surfaces with one pair of glands at the base of each; petaloid sepal white, ovate or elliptic-ovate, 4–6 cm. long, acuminate, cuneate at base, pubescent on both surfaces: "petiole" about 1 cm. long, hirsute. Corolla tube 2.5 cm. long, ferruginous-villous on the outer surface, hairs within short (long-styled form), extending as far as the bases of the anthers, below glabrous, not tufted at the mouth; corolla yellow, the lobes ovate, 3.5 mm. long and as broad, apiculate, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous above the middle of the tube, 3/5 way up; anthers linear, dorsifixed, introrse, 4.5 mm. long, bifid at the base. Ovary broadly fusiform, 5 mm. long, villous, 2-locular with numerous ovules on axile placentae; style 2 cm. long, stigma lobes 7 mm. long, stout, not protruding beyond the corolla tube. Berry (immature) obovoid, 1.4–1.5 cm. long, sparingly pubescent with persistent calyx segments; seeds (immature) minute, reticulate, irregularly oblong or ovoid, 0.46–0.6 mm. long, 0.43–0.56 mm. broad, with 4–8(–11) foveae in the areoles of the testa.

DISTRIBUTION. This species is endemic on the dry slopes of Mt. Nagapatan in Luzon at an elevation of 700 meters above sea level.

Philippine Islands. LUZON: Ilocos Norte, Mt. Nagapatan, *Ramos 33133* (NY–lectotype).

Only the isotype from the New York Botanical Garden was available for examination, and I designate it the lectotype.

This species is closely allied to *Mussaenda philippinensis* in its elongated, persistent sepals but differs from it in the indumentum, leaves, oblong stipules, and larger ovaries. *Mussaenda acuminatissima* is distinguished from the other species by its ovate, villous leaves which are acuminate at base and apex, caudate at the apex, abruptly contracted at the base, and decurrent on the petiole, its oblong stipules, short, terminal, primary cymes, pubescent corolla tube, sparingly pubescent fruits with persistent calyx segments, and its minute seeds with 4–8(–11) foveae in the areoles of the testa.

2. **Mussaenda albiflora** Merr. Philip. Jour. Sci. Bot. **5**: 241. 1910 (TYPE: *Curran 17358*); Merrill, Enum. Philip. Fl. Pl. **3**: 518. 1923. FIG. 1, h, i; FIG. 3, a, b, c, d, e.

Erect shrub 2–5 m. tall with terete branches and densely hirsute branchlets. Leaves ovate, oblong-ovate or lanceolate-elliptic, 11.5–29 cm. long, 5.5–9.5 cm. broad, slenderly acuminate at apex, decurrent-acuminate at base, pubescent on both surfaces with scattered, long, spreading hairs,

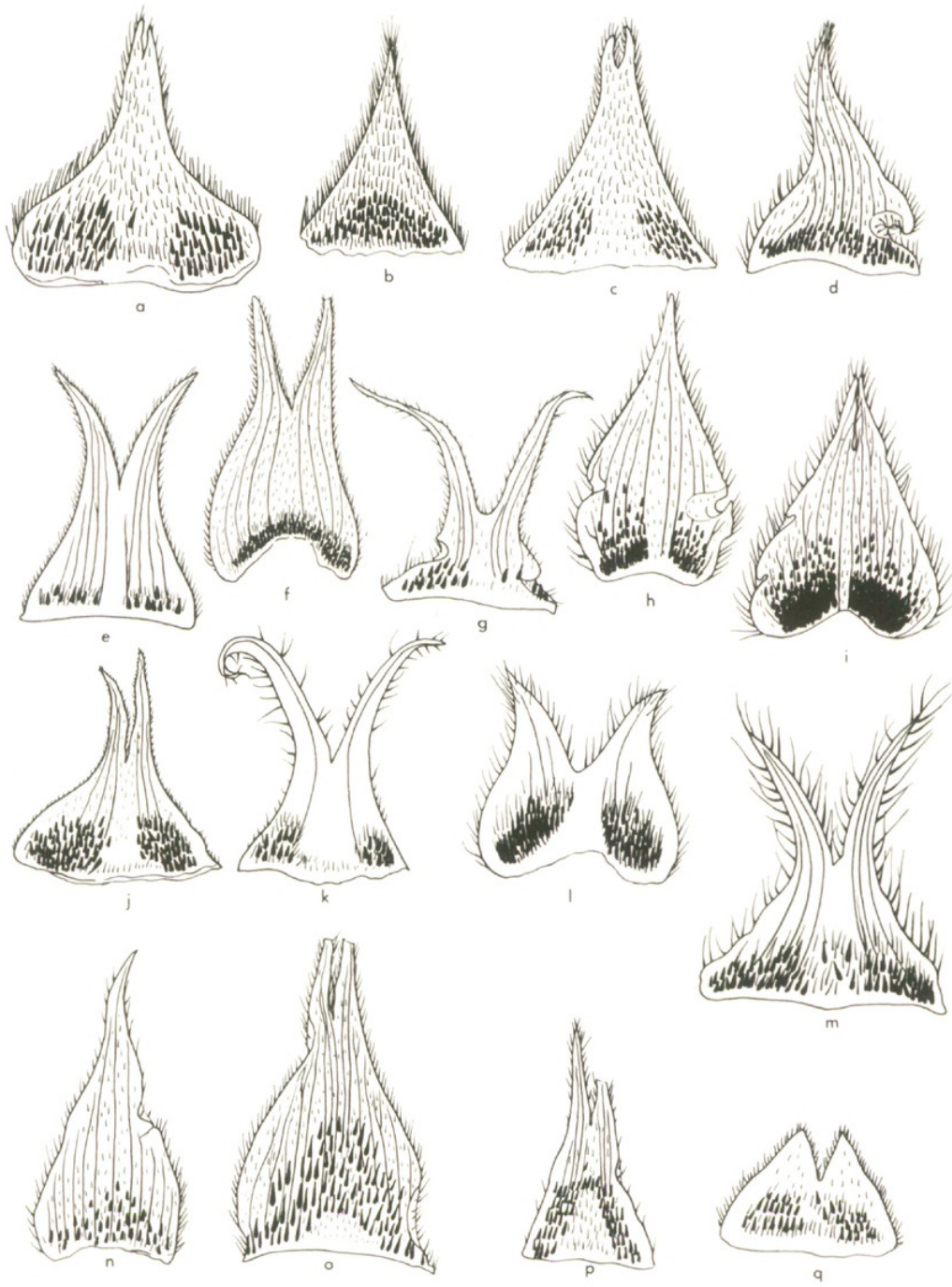

FIG. 1. Stipules of some Philippine species of *Mussaenda* spread out and viewed from the adaxial surface to show bifurcation at the apex and distribution of the hairs and glands. a, *M. lanata* (*Merrill 1768*), × 3. b, c, *M. chlorantha*: b (*Merrill 770*), × 2¾; c (*Elmer 21940*), × 3. d, *M. magallanensis* (*Elmer 12451*), × 3. e, *M. nervosa* (*Ramos & Edano 26422*), × 5. f, *M. attenuifolia* (*Elmer 13304*), × 3¼. g, *M. scandens* (*Elmer 11291*), × 4. h, i, *M. albiflora*: h (*Ramos & Edano 31107*), × 3; i (*Dias 29885*), × 2¾. j, *M. philippica* (*Elmer 7045*), × 4. k, *M. palawanensis* (*Fenix 15531*), × 4. l, *M. benguetensis* (*Santos 5497*), × 3⅓. m, *M. setosa* (*Merrill 9496*), × 4. n–p, *M. philippinensis*: n (*Sulit & Conklin 17652*), × 2½; o (*Escritor 21240*), × 3; p (*McGregor 32449*), × 2¼. q, *M. grandifolia* (*Edano 77424*), × 5, an old stipule, the apical lobes reduced to stumps.

lateral veins 10–14 pairs; petiole 1–3 cm. long, densely hirsute. Stipules broadly ovate or lance-ovate, 1.1 cm. long, 6–7.5 mm. broad at the base, entire or faintly bifid from apex for 1/3 their length, hairy on both surfaces with numerous glands in groups at the base within. Inflorescence a terminal, densely pubescent (with long or short spreading hairs), trichotomously branched, compact cyme; bracts and bracteoles lanceolate, about 7 mm. long, acuminate, hairy on the outer surface, glabrous within. Flowers heterostylous, on stout, pubescent pedicels shorter than the ovaries. Calyx lobes linear-lanceolate, 7–8 mm. long, 0.7–0.9 mm. broad, gradually narrowing to the acuminate apex, hirsute on the outer surface, glabrous within with 2 or 3 pairs of glands at the base of each; petaloid sepal white, ovate to oblong- or elliptic-ovate, 5–7.2(–9) cm. long, 2.7–4.3(–5.5) cm. broad, sharply acute or acuminate at apex, rounded or acute at base, glabrous on both surfaces except on veins beneath, "petiole" 1–2 cm. long, hirsute. Corolla tube white, very slender, 2.6–3.6 cm. long, covered with short, scattered hairs on the outer surface, hairy within as far as the bases of the anthers in long-styled forms, 1/2 way down from the top in short-styled forms, hairs not tufted at the mouth and shorter in long-styled forms; corolla lobes linear-lanceolate, 10–10.5 mm. long, 1.5–2.5 mm. broad, gradually narrowed to an acute apex, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous just below the middle of the tube in long-styled forms and about 2/3 way up from the base in short-styled forms; anthers linear, dorsifixed, introrse, 3.5–4 mm. long, acute at apex, bilobed at the base. Ovary turbinate or cylindric-turbinate, 3–4 mm. long, hairy, 2-locular with numerous ovules on cushion-shaped, axile placentae; style and stigma lobes 2 cm. and 6.5 mm. long respectively in long-styled forms, each 3 mm. long in short-styled forms. Berry (immature) obovoid, 1–1.3 cm. long with few, long, scattered hairs, calyx lobes deciduous; seeds minute, reticulate, 0.67–0.83 mm. long, 0.43–0.53 mm. broad, with 2–8 foveae in the areoles of the testa.

ILLUSTRATION. Sulit, Philip. Jour. Forestry 2(1): 43. *pl. 2, fig. 1.* 1939.

DISTRIBUTION. This species grows under humid conditions in gullies to an altitude of about 300 meters above sea level in the islands of Panay and Negros where it is endemic. It has been collected in flower from April to June and in September; in fruit in September.

Philippine Islands. NEGROS. *Curran 17358* (NY-lectotype), *17359* (US); Occ. Negros, Iglamgam, *Dias 29885* (A, NY). PANAY: Capiz, Jamindan, *Ramos & Edano 31107* (A), *31382* (US); Libacao, *Martelino & Edano 35391* (A, NY); Antique, *McGregor 32450* (A).

There do not seem to be any close relatives of *Mussaenda albiflora* in the Philippine Islands. It may be distinguished from other species by its large, pubescent leaves; large, ovate or lance-ovate stipules (entire or faintly bifid at the apex); long, slender corolla tubes; linear-lanceolate, white corolla lobes; obovoid, scantily pubescent fruits with deciduous calyx segments; and large seeds with 2 to 8 foveae in the areoles of the testa.

3. **Mussaenda anisophylla** Vidal, Phan. Cuming. Philip. 178. 1885 (TYPE: *Cuming 918*); Merrill, Enum. Philip. Fl. Pl. 3: 518. 1923. FIG. 3, j–s.

Shrub 2–8 m. high with rather lax, hairy branchlets. Leaves membranous, oblong-ovate or elliptic, 8.5–30 cm. long, 3.2–16 cm. broad, acute or acuminate, cuneate, long decurrent on petioles from the base, hairy on both surfaces with 7–15 pairs of lateral veins; petiole 0.5–5.5 cm. long, stout, hirsute. Stipules ovate, 9–17 mm. long, 4.5–10 mm. broad at the base, bifurcate from apex for about 1/2 their length, lobes straight or diverging, densely hirsute on the outer surface, glabrous within or pubescent with numerous glands in a continuous band. Inflorescence a terminal, di- or trichotomously branched, densely hirsute, diffuse, many-flowered cyme; bracts and bracteoles lanceolate, about 6–9 mm. long, hairy on both surfaces; bracteoles usually in opposite pairs, broader at the base with a few glands and trilaciniate to about the middle, lateral lobes shorter. Flowers heterostylous on stout, densely hairy pedicels shorter than the ovaries. Calyx lobes linear, 6–15 mm. long, 1–2 mm. broad, covered with sharp-pointed, straight, stiff hairs on the outer surface, hairs short within with 2 pairs of glands at the base of each sepal; petaloid sepal white, elliptic-ovate, 7.5–10 cm. long, 3.7–6 cm. broad, acute, cuneate at the base, hirsute on both surfaces, 5-veined, "petiole" 1–2 cm. long, hirsute. Corolla orange to yellow, the tube 2.5–3 cm. long, densely hairy on the outer surface, hairs long and spreading, hairy within as far as the bases of anthers or lower; hairs of the inner surface long in short-styled forms and short in long-styled forms, not tufted at the mouth; corolla lobes broadly ovate, 5 mm. long, 6 mm. broad, apiculate, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous about 1/2 way on the tube in long-styled forms and 3/5 way up in short-styled forms; anthers linear, dorsifixed, introrse, 5.5–6.5 mm. long, bilobed at the base. Ovary turbinate, 4.5 mm. long, hirsute, 2-locular with numerous ovules on axile placentae; style and stigma lobes 2.2 cm. and 9 mm. long respectively in long-styled forms, 3.5–4 mm. and 2–2.5 mm. long in short-styled forms. Berry ellipsoid, 1.4–2 cm. long, scantily hairy, lenticellate, calyx segments deciduous; seeds minute, reticulate, oblong or orbicular-ovate, 0.63–0.73 mm. long, 0.33–0.63 mm. broad, with 2–6 foveae in the areoles of the testa.

ILLUSTRATION. Sulit, Philip. Jour. Forestry 2(1): 43. *pl. 1.* 1939.

DISTRIBUTION. This species grows near water courses in deeply shaded ravines in the mossy forests at medium elevations up to 800 meters in the islands of Luzon, Alabat, Mindoro, Negros, and Mindanao. It has been collected in flower in January, February, May, June to August, and October; in fruit in February, June, and November.

Philippine Islands. LUZON: Albay Prov., *Cuming 918* (BM-lectotype); Pangasinan Prov., Labrador, Mt. San Isidro, *Fenix 29851* (NY, US); Bataan Prov., Mt. Mariveles, Lamao River, *Meyer 3020* (NY, US), *Merrill 2508* (NY, US), *Borromeo 25602* (A, US), Batangas Prov., *Vidal 801* (A); Laguna Prov., Los Banos

(Mt. Maquiling), *Elmer 17481* (A, GH, NY, US); Mt. Makiling, *Canicosa 9730* (PNH), *Sulit 8232* (A, PNH), *7087* (A, PNH); San Antonio, *Ramos 21988* (US), *McGregor 23006* (A, US); Tabayas Prov., Lucban, *Elmer 9154* (A, NY, US); Rizal Prov., Antipolo, *Merrill 1341* (NY); Kalinga Subprov., Balbalan, *Celestino 7819* (A, PNH). ALABAT: *Ramos & Edano 48110* (A, NY, US). MINDORO: Mt. Halcon, *Ramos & Edano 40703* (A), *Edano 3500* (A, PNH); Mt. Ilong, *Edano 3290* (A, PNH). NEGROS: Gimogaan River, *Danao & Aspillera 5218* (US). MINDANAO: Dinagat Island, *Ramos & Convocar 84044* (A).

Probably the only isotypes of this species are in the British Museum (Nat. Hist.) and in the Conservatoire et Jardin botaniques, Genève, since the holotype (*Cuming 918* [PNH]) and other isotypes apparently have been destroyed. The sheet in the British Museum has two specimens of the same species mounted on it. The specimen at the top agrees with the original description and it is therefore selected as the lectotype. This species approaches *Mussaenda magallanensis* in the size and pubescence of its stems, leaves, and inflorescence, but differs from it in the deeply bifurcate stipules, longer calyx lobes, hairy corolla tube, larger stamens, and larger seeds containing fewer foveae in the areoles of the testa. It agrees completely with *Wenzel 442* and *Ramos 15328* from Leyte belonging to *M. magallanensis* in the structure of the seed and the number of foveae in the areoles of the testa. The stipule of *Elmer 17481* resembles typical *M. macrophylla* Wall. except that it is glabrous within.

The species is distinguished by the almost horizontal, long hairs on the stems, leaves, and flowers, the large leaves long decurrent on the petiole, the linear or linear-lanceolate sepals, the large, scarcely pubescent, lenticellate berries with deciduous calyx segments, and the small seeds with 2 to 6 foveae in the areoles of the testa.

USES. The fresh leaves of this species are used medicinally, in the form of a decoction, as a cure for asthma in the Philippine Islands.

4. **Mussaenda attenuifolia** Elmer, Leafl. Philip. Bot. 5: 1874. 1913 (TYPE: *Elmer 13304*); Merrill, Enum. Philip. Fl. Pl. 3: 518. 1923. FIG. 1, f.

Shrub about 5 m. high with grayish-white mottled bark and slender, lax, dark brown, white-lenticellate branchlets, the young suberect portions densely soft ferruginous. Leaves opposite, ascending, submembranous, oblanceolate, 7–20 cm. long, 2–7 cm. broad, abruptly short-pointed, acuinate at the recurved apex, decurrently attenuate at base, sparsely pubescent on the upper surface, more densely soft pubescent along the midrib and veins on the lower surface, veins 10–14 pairs, curved-ascending, obscurely reticulate; petiole 0.5–1.5 cm. long, stout, hirsute. Stipules oblong-ovate, membranous, deciduous, 5–11 mm. long, 4.5–5.5 mm. broad, occasionally split or regularly bifurcate at the apex more than 1/2 way, strigose-hairy on the outer surface, pubescent within with numerous glands in a continuous band at the base. Inflorescence a terminal, pubescent, erect or suberect, dichotomously branched, few-flowered cyme not produced be-

yond the leaves, lower branches curved-ascending, opposite, subtended by slender linear or lanceolate hairy bracts and bracteoles, terminal flowers subsessile. Flowers probably heterostylous on stout, pubescent pedicels shorter than the ovaries. Calyx lobes lanceolate, acuminate or sharply acute, about 3 mm. long, pubescent on both surfaces; petaloid sepal creamy white or white, ovate or elliptic, 8–13 cm. long, abruptly pointed at apex and abruptly attenuate at base, 5-nerved, "petiole" 2–3 cm. long, pubescent. Corolla tube greenish to yellowish-white, 2.7–4 cm. long, pubescent on the outer surface, hairy within as far as the middle of the tube in long-styled forms, hairs short and not tufted at the mouth (short-styled forms not seen); corolla lobes orange to yellow, ovate or more or less oblong, 4 mm. long, 2.5 mm. broad, long-apiculate or acuminate, pubescent on the outer surface, papillate within. Stamens with short filaments, epipetalous a trifle above the middle of the corolla tube; anthers linear, dorsifixed, introrse, 5–5.1 mm. long, slender, blunt at apex, basal sterile portion constricted and bilobed. Ovary turbinate, 3–3.5 mm. long, hairy, 2-locular with numerous ovules on axile placentae; style slender, 1.8 cm. long, stigma lobes flattened, fleshy, 7.5–8 mm. long. Berry ellipsoidally elongate, 1.2–2 cm. long, pubescent when young, becoming nearly glabrous, without lenticels, calyx segments deciduous but the nectariferous disc persistent as a blunt, conical knob; seeds minute, reticulate, blackish brown, 0.64–0.77 mm. long, 0.43–0.63 mm. broad, with 3–6(–9) foveae in the areoles of the testa.

DISTRIBUTION. This species is endemic to Mindanao where it grows at an elevation of 150 to 450 meters above sea level. Elmer collected it in flower and fruit in July, 1912, and no more recent collections seem to have been made, although he stated that it is "fairly well scattered in wet earth and upon rock ledges of the wooded banks of the Catangan Creek."

Philippine Islands. MINDANAO: Agusan Prov., Cabadbaran (Mt. Urdaneta), *Elmer 13304* (A–lectotype; GH, NY, US–isotypes).

Only the isotypes were available for examination. From these the specimen deposited in the herbarium of the Arnold Arboretum is designated as the lectotype. Elmer describes the stipules as "quite variable in size, brown, membranous, deciduous, strigose hairy on the outside, 5 to 8 mm. long, gradually tapering from the expanded base to the setiform apex, occasionally split." The stipule in fact is much longer, 10–11 mm. in length, bifurcate more than 1/2 way from the apex in all examples examined.

This species seems to be allied to *Mussaenda palawanensis*, though it differs much in the form of the leaf, inflorescence, etc. It agrees in the character of the stipule except for its hairiness and the banded glands inside. Other common characters are the deciduous calyx, ovate-acuminate corolla lobes, size of the seed, and foveae in the areoles of the testa. It is distinguished from other species by the obovate-oblong leaves with recurved, abruptly acuminate apices and the decurrent-attenuate bases; deeply bifurcate, oblong-ovate stipules with glands at the base within a continuous band; acuminate-apiculate, ovate corolla lobes; glabrous, ellipsoid berries

(not lenticellate) with a pointed, conical, persistent, nectariferous disc at the apex, and minute seeds with 3–6(–9) foveae in the areoles of the testa.

5. **Mussaenda benguetensis** Elmer, Leafl. Philip. Bot. 1: 13. 1906 (TYPE: *Elmer 5935*); Merrill, Enum. Philip. Fl. Pl. 3: 518. 1923. FIG. 1, l; FIG. 3, x, y, z, aa.

Shrub, sometimes tree-like, 1–4 m. tall with ferruginous-pubescent branches. Leaves clustered toward the ends of branches, ovate, oblong or oblong-lanceolate, 5–15 cm. long, 2.3–5.2 cm. broad, acute or acuminate, abruptly cuneate at base, rounded or decurrent-acuminate, appressed pubescent on both surfaces, scantily on the upper surface, more densely especially on the prominent veins of the lower surface, lateral veins 8–11 pairs, ascending; petiole 0.5–2.5 cm. long, densely hirsute. Stipules subpersistent, broadly oblong-ovate, 7–10 mm. long, 6.8–8 mm. broad, bifurcate from apex for about 1/2 their length, rami gradually tapering and diverging into 2 acuminate lobes, hairy on the outer surface, glabrous within except for a few hairs at the apices of the divergent lobes and at the base between numerous glands occurring in 2 groups. Inflorescence a terminal, subcorymbose cyme barely exceeding the leaves in length, pubescent, ultimate branches terminating in clusters of 3 to 5 flowers; bracts and bracteoles lanceolate, 4–13 mm. long, 0.7–2 mm. broad, pubescent on the outer surface, scantily hairy or glabrous within, bracteoles bifid or trifid, lateral lobes shorter. Flowers heterostylous, fragrant, on stout, pubescent pedicels shorter than the ovaries. Calyx lobes linear-acuminate gradually tapering to an acute apex, 5–9.5 mm. long, pubescent on the outer surface, scantily pubescent or glabrous within with 2 or 3 pairs of glands at the base of each; petaloid sepal whitish, small, ovate or elliptic, 3.8–5.2 cm. long, 2–2.8 cm. broad, scantily pubescent on the upper surface, densely pubescent especially on the veins of the lower surface; "petiole" short, stout, 0.5 cm. long, hirsute. Corolla yellow, the tube 2.7–3.6 cm. long, hairy on the outer surface, hairy within 1/2–5/9 way down from the top in long-styled forms, 1/4–1/3 way in short-styled forms, hairs not tufted at the mouth and shorter in long-styled forms; corolla lobes ovate or suborbicular, 4–5 mm. long, 3.4–6 mm. broad at the base, acute, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous about 1/2 way on the tube in long-styled forms, 2/3–3/4 way up from the base in short-styled forms; anthers linear, dorsifixed, introrse, 5–7 mm. long, bilobed at the base, lobes diverging. Ovary broadly fusiform, 5–6 mm. long, pubescent, 2-locular with numerous ovules on axile placentae; style and stigma lobes 1.75–2.2 cm. and 8.7–12 mm. long respectively in long-styled forms, 4–6 mm. and 3–3.5 mm. long in short-styled forms. Berry ellipsoid-fusiform, 1.5–2.5 cm. long, strigose, lenticellate with subpersistent calyx segments; seeds minute, reticulate, 0.7–0.77 mm. long, 0.53–0.63 mm. broad, with 4–6(–8) foveae in the areoles of the testa.

DISTRIBUTION. This species is endemic to Luzon and grows on open

slopes and in thickets or ravines from 900 to 2300 meters elevation. Elmer comments in his field notes that the plant grows ". . . in ravines but usually in open places; or skirting dense hardwood jungles of the limestone region at 4500 feet; . . ." It has been collected in flower from January to June, October, and November; in fruit from January to June and in December.

Philippine Islands. LUZON: Mountain Prov., Baguio, *Steiner 22585* (PNH), *35835* (PNH, US), *41617* (PNH), *Elmer 5935* (PNH–holotype, NY–isotype), *8431* (A, NY, US), *Williams 1006* (GH, NY, US), *Sulit 7722* (PNH), *Walker 7501* (US), *Topping 64* (US), *Santos 34* (A); Mancayan to Baguio, *Ramos & Edano 40504* (A); Mt. Santo Tomas, *Sinclair & Edano 55365* (PNH), *Quisumbing 2193* (A, PNH), *Garcia 34977* (PNH), *Elmer 6536* (NY, US), *Clemens 51845* (A, US); Barrio Agawa, Besao, *Santos 5497* (US); Mt. Libbing, *Mendoza 40936* (PNH); Mt. Polis, *Steiner 41580* (PNH); Benguet Subprov., Papuai, *Santos 31880* (NY), *32026* (A), *Merrill 713* (US); Bontoc, Mt. Santo Tomas, *Walker 7543* (US); Mt. Polis, *Ramos & Edano 37633* (A); Lepanto Dist., Balili (Mt. Data), *Merrill 4639* (US); Ifugao, Mt. Polis, *McGregor 19779* (US). CULTIVATED: Trinidad, *Loher 1523* (US).

As in the case of *Mussaenda pinatubensis*, the holotype of *M. benguetensis* was not destroyed in World War II.

The collection *Vanoverbergh 190* (A) is interesting, for it possesses the stipules and leaf characters of *Mussaenda lanata* and the floral characters of *M. benguetensis*. Its stipules are triangular-acuminate, 13 mm. long, 7.5 mm. broad, not bifid at the apex, hairy on both sides, with numerous glands at the base within. The corolla tube is 2.5 cm. long, larger than that of *M. lanata* but smaller than in *M. benguetensis*. It was collected in Bontoc Subprovince, Luzon, where the two species overlap.

One sheet of *Williams 1006* bore two abnormal flowers one of which was dissected. It had a calyx and corolla of 10 segments each but 15 stamens and 3 ovaries fused together with 7 stigma lobes. The filaments of the innermost stamens were longer, about 5 mm. in length.

It has been observed that several fruits with mature seeds bore calyx segments while in others the calyx segments have been shed. Elmer refers to the petaloid sepal as a "persistent bract" but does not comment on the other sepals. It is probable that the calyx is subpersistent on the fruit.

Mussaenda benguetensis is distinguished from other species by its smaller leaves confined to the ends of branches with prominent veins on the lower surface, oblong-ovate stipules with diverging apical lobes, larger elliptic-fusiform, lenticellate berries with or without calyx segments, and somewhat larger seeds with 4–6(–8) foveae in the areoles of the testa.

6. **Mussaenda chlorantha** Merr. Philip. Jour. Sci. Bot. **8**: 47. 1913 (TYPE: *Merrill 770*); Merrill, Enum. Philip. Fl. Pl. **3**: 518. 1923. FIG. 1, b, c; FIG. 2, d, e.

Tree 6–8 m. tall with glabrous, reddish-brown, lenticellate branches, the younger ones appressed pubescent. Leaves broadly ovate, 9.5–16 cm.

long, 6–9.5 cm. broad, sparsely hirsute on the upper surface, puberulous beneath and appressed hirsute on the midrib and lateral veins, short acuminate at apex, abruptly cuneate and somewhat decurrent at base; lateral veins 7–12 pairs, arcuate; petiole 1–4 cm. long, hirsute. Stipules 8.5–10 mm. long, 4.5–6.5 mm. broad at the base, triangular-ovate or oblong-ovate, entire or bifid at apex, densely hirsute on both surfaces with numerous glands in 2 groups or in a continuous band at the base within. Inflorescence a terminal, hirsute, many-flowered, corymbose cyme; bracts and bracteoles linear-oblong to oblong-lanceolate, 4–7 mm. long, hairy on both surfaces, bracteoles larger, trifid, the lateral lobes reduced to stubs. Flowers on stout, pubescent pedicels shorter than the ovaries. Calyx lobes 6–12 mm. long, 1.2–2.2 mm. broad, lanceolate, acuminate, pubescent on the outer surface, glabrous or pubescent within with 1 or 2 pairs of glands at the base of each; petaloid sepal white, broadly ovate, 5–8 cm. long, glabrous on the upper surface, hairy on veins beneath, "petiole" about 2 cm. long, hirsute. Corolla tube green, 1.7–2 cm. long, hirsute on the outer surface, clothed with short hairs (0.5 mm. long) within for 3/4 the length of the tube, basal 1/4 glabrous, hairs not tufted at the mouth; corolla lobes yellow, broadly ovate, 3–4.5 mm. long, 3.5–4.5 mm. broad, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous 1/2 way or higher up on the tube; sometimes filaments free (for about 2.5 mm.) as short loops midway between the base of the corolla tube and the stamens; anthers linear, dorsifixed, introrse, 3.5–5 mm. long, acute, bifid at base. Ovary oblong-turbinate, 5–6 mm. long, appressed pubescent, 2-locular, with a thick wall and axile placentation; style and stigma lobes 1–1.4 cm. and 5–6.5 mm. long respectively; stigmas stout, linear, diverging, above the anthers or placed at the same level as the anthers and surrounded by them. Berry (immature) obovoid, 1 cm. long, glabrescent, calyx lobes deciduous; seeds minute, reticulate, 0.7–0.83 mm. long, 0.5–0.56 mm. broad with 4–12 foveae in the areoles of the testa.

DISTRIBUTION. This species was collected in flower in May by Merrill and by Elmer in Luzon at an altitude of about 1800 meters; it has not been recollected.

Philippine Islands. LUZON: Benguet Subprov., Mt. Tanglon, *Merrill 770* (US–lectotype), May 1911; Pampanga Prov., Camp Stotsenburg (Mt. Pinatubo), *Elmer 21940* (GH, PNH), May 1927; Twin Peaks, *Elmer 6318* (US), May 1904.

Elmer's collections differ slightly from the type in the bifid stipules with glands in two groups at the base within and sepals hairy on both surfaces. Otherwise the collections resemble each other closely. *Mussaenda chlorantha* is allied to *M. macrophylla* Wall. var. *brevipilosa* Jayaweera, particularly *Fenix 3770* (NY, US), but differs in its shorter corolla tube and the position of the stigma lobes.

Mussaenda chlorantha is distinguished by its broadly ovate leaves; entire or bifid, densely hirsute, triangular-ovate stipules; oblong-lanceolate sepals; short corolla tube with broadly ovate lobes; large, oblong-turbinate ovary, stout stigma lobes, and 4 to 15 foveae in the areoles of the testa.

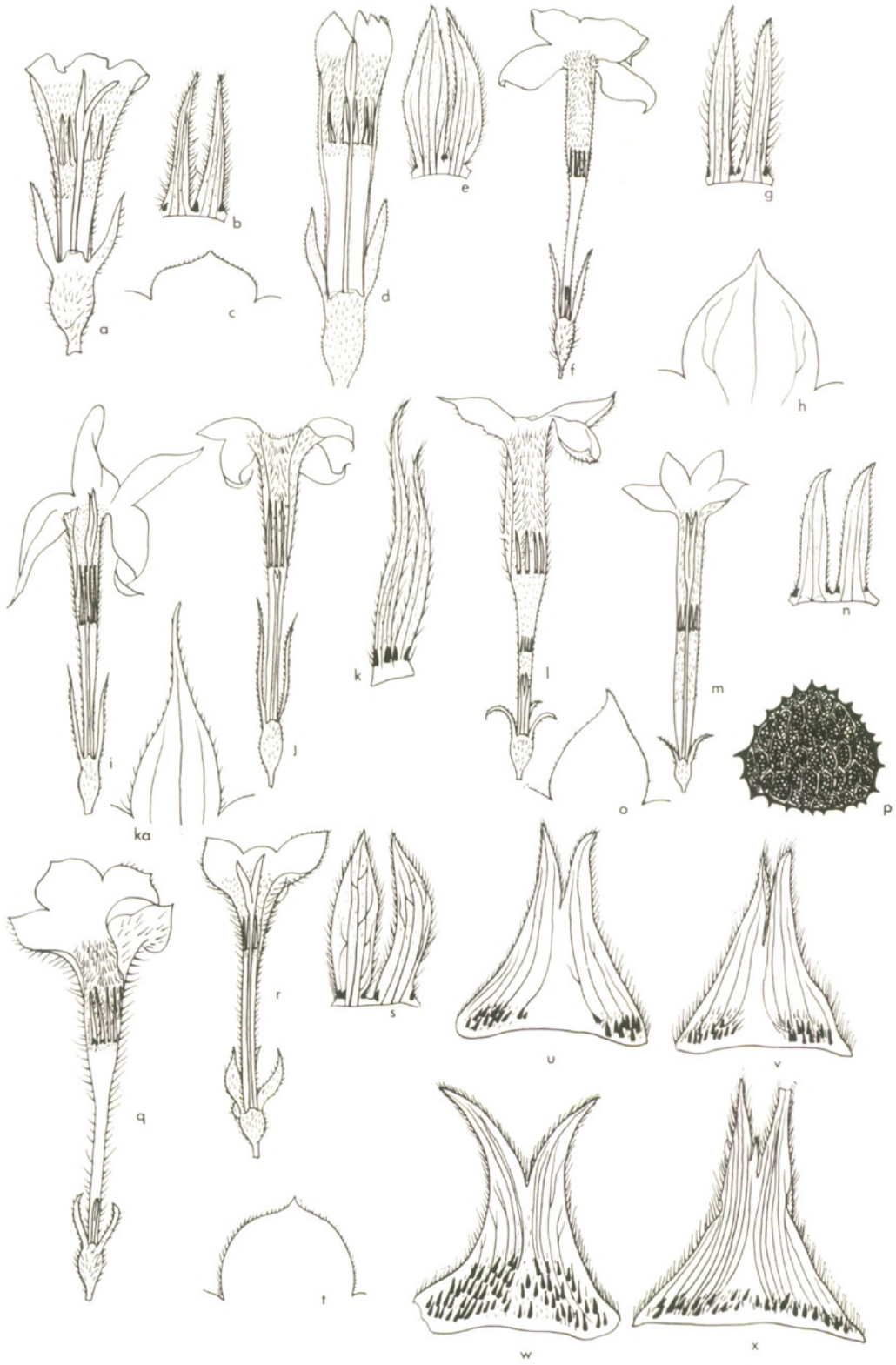

FIG. 2. Longitudinal sections of long-styled and short-styled flowers of some Philippine species of *Mussaenda* with calyx and corolla lobes seen from within, and a seed of *M. scandens*. a–c, *M. lanata*: a (*Merrill 1768*) × 2; b (*idem*), calyx lobes, × 2½; c (*idem*), corolla lobe, × 6. d, e, *M. chlorantha*: d (*Elmer 21940*), × 2; e (*idem*), calyx lobes, × 3. f–h, *M. magallanensis*: f (*Elmer*

7. **Mussaenda grandifolia** Elmer, Leafl. Philip. Bot. 1: 12. 1906 (TYPE: *Merrill 817*); Merrill, Enum. Philip. Fl. Pl. 3: 518. 1923. FIG. 1, q; FIG. 4, a, b, c.

Shrub 3–4 m. high with densely pubescent younger branchlets. Leaves ovate, oblong or oblanceolate, 16–32 cm. long, 7.5–15 cm. broad, acute at apex, cuneate or long attenuate at base, pubescent on both surfaces, densely so beneath and on the 11–14 pairs of lateral veins; petiole 1–2.5 cm. long, villous. Stipules small, slenderly acuminate from a broad base, bifurcate at the apex, hairy on both surfaces with numerous glands in 2 groups or in a continuous band at the base within. Inflorescence terminal, shorter than leaves, pubescent, trichotomously branched, branches straight, divaricate, diffuse, terminal flowers sessile and others subsessile; bracts and bracteoles small, ovate, 1.5–2 mm. long, 0.5–1.5 mm. broad, acuminate, hirsute on both surfaces. Calyx lobes small, lanceolate, 1.2–2.5 mm. long, 0.7–1 mm. broad, acuminate, hairy on both surfaces with 1–3 pairs of glands at the base of each; petaloid sepal yellowish white, broadly ovate, 4.5–7 cm. long, 4–4.5 cm. broad, puberulous on the upper surface and hirsute beneath especially on veins, "petiole" 1 cm. long, hirsute. Corolla yellow, the tube 2.9 cm. long, densely hairy on the outer surface, glabrous within except for a few short hairs in 5 groups at the bases of the corolla lobes; corolla lobes ovate, 4 mm. long, acuminate, hairy on the outer surface. Stamens with short filaments, epipetalous at slightly different levels about 1/2 way on the tube or a little below in the long-styled forms; anthers linear, dorsifixed, introrse, 3.2–4.2 mm. long, of different sizes in the same flower, acute at apex and bifid at the base. Ovary broadly fusiform, 4.5 mm. long, densely hirsute, 2-locular with numerous ovules on axile placentae; style 2.2 cm. long, stigma lobes 1 cm. long and stout in long-styled forms. Berry ellipsoid, 1 cm. long, pubescent with small, persistent calyx segments; seeds (immature) minute, reticulate, 0.64–0.77 mm. long, 0.43–0.53 mm. broad, with 1–4 foveae in the areoles of the testa.

DISTRIBUTION. This species is endemic to Palawan where it grows in forests at lower elevations. It has been collected in flower and fruit in February and March.

Philippine Islands. PALAWAN (Paragua): Point Separacion, *Merrill 817* (US–lectotype); Panalingajan River, *Edano 77424* (A).

Only two collections were available for examination, of which one was

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12451), × 1½; g (*idem*), calyx lobes, × 4½; h (*idem*), corolla lobe, × 4½. i–ka, *M. nervosa*: i (*Elmer 10510*), × 2¼; j (*Ramos & Edano 26422*), × 1⅛; k (*idem*), calyx lobes, × 2; ka (*idem*), corolla lobe, × 3. l–p, *M. scandens*: l (*Wenzel 3354*), × 1½; m (*Elmer 11291*), × 1½; n (*idem*), calyx lobes, × 4; o (*idem*), corolla lobe, × 6; p (*idem*), seed, × 23. q–x, *M. vidalii*: q (*Ramos & Edano 39035*), × 1½; r (*Sulit 6098*) × 1; s (*idem*), calyx lobes, × 3; t (*idem*), corolla lobe, × 4; u–x, stipules, u (*Sulit 6280*), × 3½; v (*Elmer 11309*), × 3½; w (*Sulit 6098*), × 3; x (*Ramos & Edano 39035*), × 3¼.

an isotype (which now becomes the lectotype). Both collections were long-styled forms, and heterostyly of the species is not established, though it is quite likely that a short-styled form exists which has not been collected up to now. Elmer's description of the pubescence of the calyx segments and the corolla tube is not accurate. He says that the calyx segments are "glabrous on the inner surface" and the corolla tube "lanose on the interior." An examination of the lectotype specimen shows that the calyx segments are pubescent on the inner surface and the corolla tube glabrous on the interior. The species does not seem to be allied to any of the Philippine mussaendas though it resembles *M. vidalii* in its inflorescence and sessile terminal flowers. It is distinguished from the other species by the large, pubescent leaves; small stipules; sessile terminal flowers in the forks of the peduncles; corolla tube glabrous on the interior surface; pubescent fruits with small, persistent calyx segments; and minute seeds with 1 to 4 foveae in the areoles of the testa.

8. **Mussaenda lanata** C. B. Robinson, Philip. Jour. Sci. Bot. 6: 357. 1911 (TYPE: *Merrill 6681*); Merrill, Enum. Philip. Fl. Pl. 3: 518. 1923. FIG. 1, a; FIG. 2, a, b, c.

Shrub or small tree 2–5 m. high with greenish-gray, pubescent branchlets. Leaves unequal at nodes, ovate, oblong or orbicular, 10.5–30 cm. long, 6.5–16.5 cm. broad, abruptly acute or acuminate at the apex, cuneate at the base, hirsute on both surfaces, more densely so beneath, with 8–13 pairs of lateral veins; petiole 0.8–7.5 cm. long, stout, hairy. Stipules ovate, long acuminate, 10–18.5 mm. long, 6–8.5 mm. broad at the base, faintly bifid at apex, hairy on both surfaces, with numerous glands in 2 groups or in a continuous band at the base within. Inflorescence a terminal, dichotomously branched, densely pubescent, many-flowered, subcorymbose cyme; bracts and bracteoles lanceolate, 3–7 mm. long, hairy on both surfaces. Flowers heterostylous, on stout, densely pubescent pedicels shorter than the ovaries. Calyx lobes lanceolate, 5.5–6.5 mm. long, 1–1.2 mm. broad, acute, hairy on both surfaces, with a pair of thin glands at the base of each lobe; petaloid sepal white, oval, 4.5–5.5 cm. long, 3–3.7 cm. broad, hirsute on both surfaces, 5-veined, "petiole" 1.4 cm. long, hirsute. Corolla tube 1.1–1.3 cm. long, campanulate, yellow-tomentose on the outer surface, hairy within to 1/2 the length of the tube in long-styled forms and 1/3 the length of the tube from the top in short-styled forms, glabrous at base; hairs of the throat long (1.5–1.7 mm.) in short-styled forms and short (1 mm. long) in long-styled forms, not tufted at the mouth; corolla lobes broader than long, somewhat truncate, 1.2–1.5 mm. long, 2.2–3 mm. broad, mucronate or abruptly apiculate at the apex, brown-tomentose on the outer surface, papillate within. Stamens with short filaments epipetalous 3/4 way up on the tube in short-styled forms, (lower down) about 1/2 way up in long-styled forms; anthers linear-lanceolate, dorsifixed, introrse, 3–4 mm. long, acute at the apex, bilobed at the base. Ovary turbinate, 3.5–4.5 mm. long, densely hairy, 2-locular,

with numerous ovules on cushion-shaped, axile placentae, nectariferous disc well developed; style and stigma lobes 5–7 mm. and 5 mm. long respectively on long-styled forms, 1.6 mm. and 1.8 mm. long in short-styled forms. Berry ovoid, with a fruity fragrance, 1.2–1.7 cm. long, scantily pubescent, lenticellate, with deciduous calyx segments; seeds minute, reticulate, angularly rounded, 0.43–0.56 mm. long, 0.36–0.43 mm. broad, with 3–6 foveae in the areoles of the testa.

DISTRIBUTION. This species is endemic to Luzon and grows in thickets along streams from 900 to 1600 meters elevation. It has been collected in flower in March, April, May, August, October, and December; in fruit in October, November, and December.

Philippine Islands. LUZON: Abra, *Ramos 7254* (NY, US); Bontoc, *Ramos & Edano 38134* (A); Benguet, Sablan, *Elmer 6195* (NY, US), *Williams 1558* (GH, NY, US), *Merrill 6681* (US–lectotype); Baguio, *Mabesa 35292* (PNH), *Elmer 8976* (A, NY, US), *Curran 5078* (US); Sabang, *Fenix 12588* (US); Itogon, *Williams 1011* (GH, NY, US), *Merrill 1768* (GH, NY), *Loher 1524* (US), *Clemens 17249* (NY); Ilocos Spur, Mt. Tirad Concepcion, *Santos 5678* (US); Lepanto, Cervantes Trail, *Ramos & Edano 38103* (GH); Zambales, *Ramos 5044* (NY, US).

All collections of *Mussaenda lanata* are similar in their distinguishing characters, having large, membranous, densely pubescent leaves, acuminate stipules which are hairy and faintly bifid at the apex, crowded inflorescence with short campanulate flowers and small corolla lobes, and larger fruits bearing small seeds with 3 to 6 or 2 to 5 foveae in the areoles of the testa. The usual variations are in the size and shape of the leaf and in the fruit. The seeds are small and characterized by 3 to 6 foveae in the areoles of the testa. The collection, *Ramos 5044*, however, differs slightly in that its seeds are larger (0.64–0.67 mm. long, 0.5–0.56 mm. broad) and contain 2 to 5 foveae in the areoles of the testa.

Robinson (1911) stated that this species is allied to *Mussaenda anisophylla* and *M. villosa* Wall. It seems to me that its affinities are rather with *M. magallanensis* and to a lesser degree with *M. anisophylla* and not at all with *M. villosa*. The species agrees with *M. magallanensis* in the important characters of the stipule, calyx lobes, stamens, ovary, and seed. *Mussaenda villosa*, on the other hand, is a climber with broadly lanceolate bracts and bracteoles, recurved calyx lobes, and slender corolla tube, bearing smaller, glabrous berries with oblong, spiny seeds containing 2 to 8 foveae in the areoles of the testa. None of these characters are common to the two species.

9. **Mussaenda macrophylla** Wall. var. **brevipilosa**, var. nov. (TYPE: *Fenix 3770*).

M. macrophylla sensu Merr. Philip. Jour. Sci. Bot. 3: 437. 1908 and Enum. Philip. Fl. Pl. 3: 518. 1923, non Wall.

A typo differt stipulis et calycibus minoribus; pilis ad faucem corollae

longistylae brevibus, ad orifaceum non penicillatis; ovario obconico; fructibus lenticellatis; seminibus minoribus.

A large, subscandent shrub with stout branches densely pubescent with grayish hairs becoming rufous-brown when dry. Leaves ovate, elliptic, oblong, or elliptic-lanceolate, 10–26 cm. long, 5–15 cm. broad, glabrous on both surfaces but hairy on the veins beneath or pubescent on the upper surface and hirsute below, short-acuminate, cuneate at base, somewhat decurrent on the petiole, lateral veins 8–13 pairs, conspicuous beneath; petiole 0.6–4.2 cm. long, hairy. Stipules large, ovate or acuminate from a broad base, 7–12 mm. long, 3.5–7 mm. broad at the base, bifurcate to 1/4–2/3 their length from the apex, lobes straight, hairy on the outer surface, glabrous or pubescent within with numerous glands in 2 groups or in a continuous band. Inflorescence a terminal, spreading or somewhat compact, trichotomously branched, pubescent cyme; bracts and bracteoles lanceolate or ovate, acuminate, hairy, bracteoles deeply trilaciniate into lanceolate, acuminate lobes and broader at the base. Flowers large, heterostylous, nearly sessile or on very short, stout, pubescent pedicels shorter than the ovaries. Calyx lobes triangular-lanceolate or oblong-lanceolate, 3.2–8 mm. long, 1–2.5 mm. broad, acute or acuminate, hairy on both surfaces or on the outer surface only, glabrous within except at apex, with 1–5 pairs of glands at the base of each; petaloid sepal white, ovate, oblong or orbicular-ovate, 6.5–9 cm. long, 3.3–7 cm. broad, short-acuminate, acute or obtuse at apex, cuneate at base, glabrous on both surfaces except on veins beneath or puberulous on the upper surface and hirsute beneath, "petiole" 1–4 cm. long, hirsute. Corolla tube 2–3 cm. long, hairy on the outer surface, hairy within as far as the bases of anthers, hairs long in short-styled forms, short in long-styled forms and not tufted at the mouth of the tube; corolla lobes broadly ovate or orbicular, acute or apiculate, pubescent on the outer surface, papillate on the inner. Stamens with short filaments, epipetalous about 1/2 way or a little below the middle of the tube in long-styled forms, 3/5–2/3 of the way up in short-styled forms; anthers linear, dorsifixed, introrse, 5.5–6.7 mm. long, bilobed at the base. Ovary 4–5.5 mm. long, fusiform or obconical, hairy, 2-locular, with numerous ovules on cushion-shaped, axile placentae; style and stigma lobes 1.9 cm. and 0.7 cm. long respectively in long-styled forms, 3.8–8 mm. and 3–3.5 mm. long in short-styled forms. Berry ovoid or oblong-ovoid, 1.1–1.2 cm. long, lenticellate, sparsely hirsute with very broad nectariferous scars, calyx lobes deciduous; seeds minute, reticulate, 0.67–0.87 mm. long, with 2–6 foveae in the areoles of the testa.

DISTRIBUTION. This variety of *Mussaenda macrophylla* is confined to the islands of the Philippine group. It has been collected in flower from April to July and in fruit from August to October.

Philippine Islands. BATAN: *Fenix 3770* (NY–holotype, US–isotype), *Ramos 80071* (A). CALAYAN: *Velasco 26650* (US). CAMIGUIN: *Edano 79343* (A). LUZON: *Edano 79448* (A), *Ramos & Edano 29719* (A, US); Bohol, *Ramos*

42577 (A). MINDANAO: *Ramos & Edano 85008* (A); Camiguin de Mindanao, *Ramos 14604* (US).

This variety differs in a number of characters from *Mussaenda macrophylla* var. *macrophylla* which is distributed from Nepal and Assam to Yunnan. It has smaller stipules, flowers, and calyx segments; the hairs inside the corolla tube in long-styled forms are short and not tufted at the mouth as compared to the long hairs which are tufted at the mouth in the typical form of var. *macrophylla*; the seeds are smaller, although the number of foveae in the areoles of the testa is the same in both varieties.

10. **Mussaenda magallanensis** Elmer, Leafl. Philip. Bot. 3: 996. 1911 (TYPE: *Elmer 12451*); Merrill, Enum. Philip. Fl. Pl. 3: 519. 1923. FIG. 1, d; FIG. 2, f, g, h.

M. macrophylla sensu Vidal, Phan. Cuming. Philip. 118. 1885, non Wall.

Shrub about 2–3 m. high with terete, densely pilose branches, hairs almost at right angles to the stem. Leaves oblong or elliptic, 6.5–28.5 cm. long, 3.5–13(–19.5) cm. broad, abruptly acuminate, base cuneate to obtuse, decurrent on petiole, hirsute on both surfaces with 10–13 pairs of lateral veins conspicuous beneath; petiole 0.6–3.5(–7.5) cm. long, stout, pilose. Stipules triangular-ovate, acuminate from a broad base, 7.5–16 mm. long, 4.5–9 mm. broad at the base, apex entire or bifid, densely hairy on the outer surface, pubescent within with numerous glands in a continuous band at the base. Inflorescence a terminal, hairy, di- or trichotomously branched corymbose cyme; bracts and bracteoles lanceolate, 5.5–11 mm. long, 1–2.2 mm. broad, hairy on both surfaces or on the outer surface only, bracteoles trilaciniate, lobes subulate. Flowers heterostylous on stout, pubescent pedicels shorter than the ovaries. Calyx lobes narrowly oblong-lanceolate or linear, 3.5–6 mm. long, 0.6–1.5 mm. broad, gradually tapering to a point, 3-striate towards the base, hairy on both surfaces with 1 or 2 pairs of glands at the base of each sepal. Petaloid sepal white, orbicular-oblong, elliptic or broadly ovate, acute, cuneate at base, glabrous, except on veins, on both surfaces, "petiole" 1.2–3.5 cm. long, hirsute. Corolla tube 2–3 cm. long, glabrous or with only straggling hairs on the outer surface, hairy within as far as the bases of the anthers or to about 1 mm. lower; hairs not tufted at the mouth, long in short-styled forms covering about 1/3 the tube from the top, short in long-styled forms extending to about 1/2 the length of the tube; corolla lobes orange, suborbicular-ovate, 3–3.5 mm. long, 2.7–4 mm. broad, rounded or apiculate, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous 2/3 way up on the tube in short-styled forms and 1/2 way up in long-styled forms; anthers linear, dorsifixed, introrse, 3–4.5 mm. long, bifid at the base. Ovary turbinate, 3.2–4.5 mm. long, densely hairy, 2-locular with numerous ovules on axile placentae; style and stigma lobes 1.6 cm. and 6.5 mm. long respectively in long-styled forms, 1.5–6 mm. and 1.5–2.7 mm. long in short-styled forms. Berry ellipsoid, 1.2–2.2 cm. long, hairy when

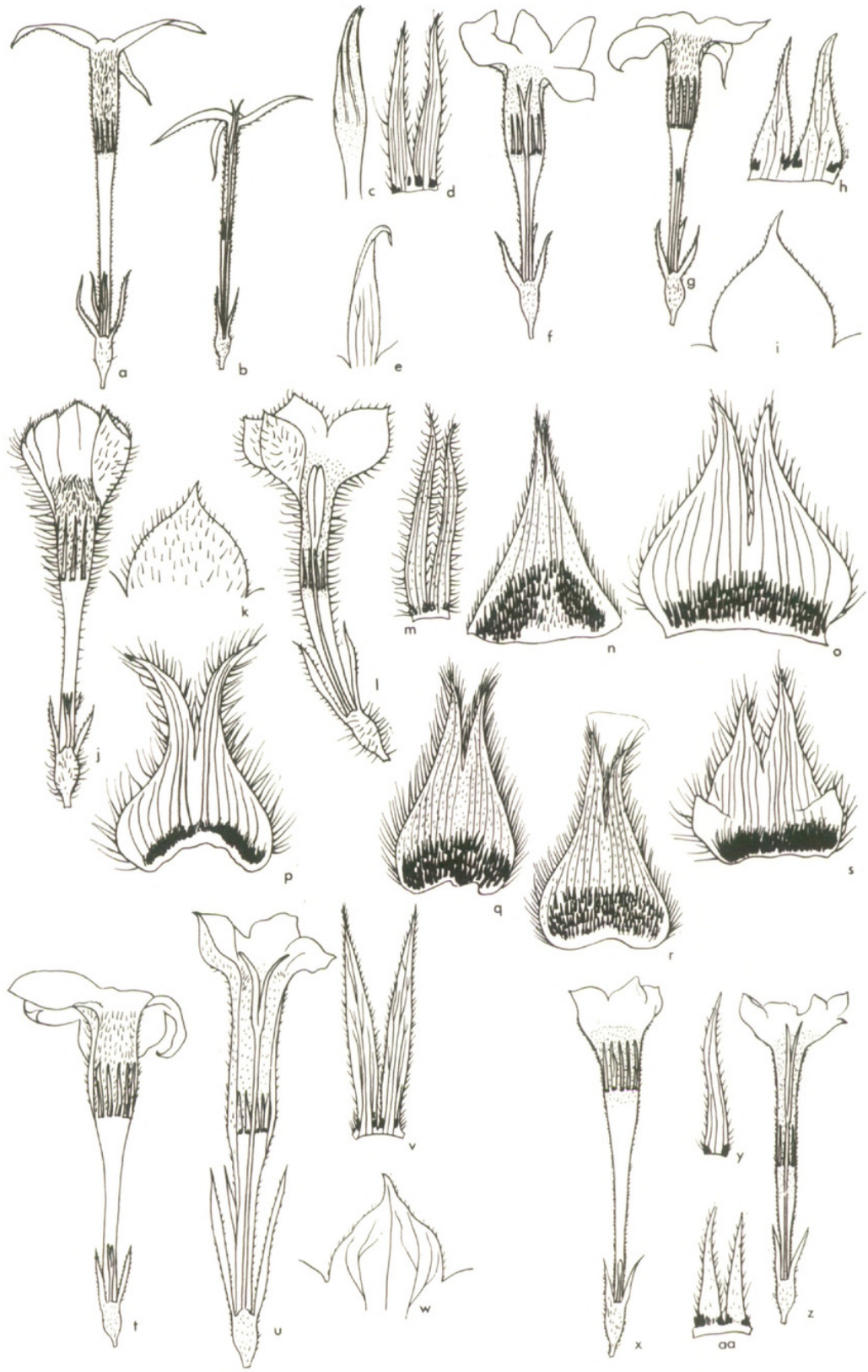

FIG. 3. Longitudinal sections of the long-styled and short-styled flowers of some Philippine species of *Mussaenda*, calyx and corolla lobes seen from within, and variations in the stipules of *M. anisophylla*. a–e, *M. albiflora*: a (*Ramos & Edano 31107*), × 1; b (*Dias 29885*), × 1; c (*idem*), apical portion of a flower

young, becoming sparsely pubescent, lenticellate, calyx lobes deciduous; seeds minute, reticulate, 0.5–0.67 mm. long, 0.33–0.53 mm. broad, oblong or oblong-ovate with 3–6 or 4–12 foveae in the areoles of the testa.

DISTRIBUTION. *Mussaenda magallanensis*, up to now considered as endemic to Mindoro and Sibuyan Islands, seems to extend to the neighboring islands of Luzon, Panay, and Leyte, growing along rivers, on mountain slopes, and in brushland from sea level up to an elevation of 300 meters. It has been collected in flower from January to May, in August, and from October to December; in fruit in January and from August to November.

Philippine Islands. LUZON: Laguna Prov., Mt. Banajao, *Ocampo 27899* (US), *Sulit 18877* (PNH, US); Isabela Prov., San Mariano, *Ramos & Edano 46977* (NY). MINDORO: Puerta Galera, *Britton 19422* (PNH), *Santos 5212* (US), *Ramos 46385* (NY); Baco River, *McGregor 131* (US, NY), *Merrill 4072* (US, NY), *1212* (US); Calapan, *Merrill 986* (GH, NY, US), *Merritt 6904* (US), *8779* (US); Bongabon and Pinamalayan, *Maliwanag 113* (PNH); Sablayan, Ligaya, *Reed 40896* (PNH), *40892* (PNH). SIBUYAN: Capiz Prov., Magallanes (Mt. Giting-giting), *Elmer 12451* (A–lectotype; GH, NY, US–isotypes). PANAY: Capiz Prov., *Edano 46114* (NY), *Escritor 21240* (US). LEYTE: *Wenzel 442* (A, US); Dagami, *Ramos 15328* (US).

Mussaenda magallanensis has affinities with *M. anisophylla* Vid. in the pubescence of the stem and leaves but differs from it in the entire or slightly bifid stipules, the 3-striate, linear or oblong-lanceolate sepals tapering to a point at the apex, and the glabrous or straggly-hairy corolla tube. Also it seems to be allied to *M. chlorantha* Merr. by the character of its stipules. *Wenzel 442* and *Ramos 15328* from Leyte differ from the type in the large leaves with longer petioles and seeds with testa bearing 3 to 6 foveae in the areoles. The specimen *Ramos & Edano 46977* differs slightly in its large leaves, the petaloid sepals, and the smaller calyx lobes.

This species is distinguished by the more or less horizontal pubescence on its stems and branches, the characteristic sepals and stipules, the large fruits with deciduous calyx segments, and the small seeds.

USES. The leaves of this species are used as a substitute for tobacco.

11. **Mussaenda milleri** Elmer, Leafl. Philip. Bot. 10: 3780. 1939.

Laxly branched undershrub about 3 m. high with few, widely spreading, subterete, gray to brown brittle branches, rebranching toward their ends.

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bud, × 2¾; d (*idem*), calyx lobes, × 3; e (*idem*), corolla lobe, × 1¾. f–i, *M. philippica*: f (*Elmer 7045*), × 1; g (*Ramos 17447*), × 1⅕; h (*idem*), calyx lobes, × 3½; i (*idem*), corolla lobe, × 4. j–s, *M. anisophylla*: j (*McGregor 23006*), × 1¼; k (*idem*), corolla lobe from back, × 2½; l (*Elmer 17481*), × 1; m (*idem*), calyx lobes, × 2½; n–s, stipules, n (*Merrill 2508*), × 2¾; o (*McGregor 23006*), × 3; p (*Elmer 17481*), × 2¾; q (*Borromeo 25602*), × 2¾; r (*Meyer 3020*), × 1¾; s (*Elmer 9154*), × 2½. t–w, *M. philippinensis*: t (*Sulit 18877*), × 1½; u (*Sulit & Conklin 17652*), × 1¾; v (*idem*), calyx lobes, × 2; w (*idem*), corolla lobe, × 5. x–aa, *M. benguetensis*: x (*Santos 5497*), × 1; y (*idem*), calyx lobe, × 3½; z (*Loher 1523*), × 1; aa (*idem*), calyx lobes, × 2½.

Leaves more or less clustered at the ends of branchlets, elliptic to ovate- or oblong-elliptic, 7–12 cm. long, 3–6 cm. broad, sharply acute or acuminately recurved at apex, cuneate at base, pubescent on both surfaces, densely so on veins beneath, midrib straight, sunken along the upper surface and filled with reddish-brown hairs; veins 5–11 pairs, ascending, curved, cross bars numerous, very evident on the lower surface; petiole 1–2 cm. long, reddish brown, hirsute. Stipules broadly lanceolate, 9–12 mm. long, 5–5.5 mm. broad, bifurcate 1/2 way or more, lobes lanceolate, covered densely on both surfaces with reddish-brown hairs, the base within somewhat glabrous with large, linear glands in 2 groups covered with finer hairs, base of the outer surface red streaked along with the hairs. Inflorescence terminal, corymbosely paniculate, hirsute, basal pair of branches subtended by foliaceous bracts, the upper branchlets with linear bracts similarly pubescent. Flowers on short, pubescent pedicels; calyx segments 3–5 mm. long, setaceously pointed; petaloid sepal occasional, yellowish white, subelliptic on a slender "petiole"; corolla slenderly tubular, 2–3 cm. long, hairy on the outer surface, lobes elliptic, orange-red, glabrous on the upper surface. Berry ellipsoid, narrowing towards the pedicel, 1.5 cm. long, lenticellate, reddish strigose-pubescent, calyx segments deciduous; seeds minute, reticulate, triangular-ovate, broader than long, 0.6–0.7 mm. long, 0.67–0.8 mm. broad, with 2–4(–6) foveae in the areoles of the testa.

DISTRIBUTION. This species is endemic to Luzon, and grows upon the summit mountain ridge at about 1067 meters above sea level. It has been collected in flower in March and in fruit in August and September.

Philippine Islands. LUZON: Nueva Ecija Prov., Mt. Umingan, *Ramos & Edano 26468* (NY, US), Aug.–Sept. 1916, in fruit only.

The isotypes of *Mussaenda milleri* apparently were not distributed to herbaria in the U. S. A. and were unavailable for examination. *Ramos & Edano 26468* is nearest to the original description, agreeing with it in the form and pubescence of the leaves and stipules, but differing from it in the number of pairs of lateral veins in the leaf. As in the original description, the midrib is sunken on the upper surface and filled with reddish-brown pubescence. This collection was made much earlier than the type but not described, probably because of insufficient material. The holotype was destroyed in World War II; if isotypes are not located *Ramos & Edano 26468* (NY) should become the neotype.

Mussaenda milleri is similar to *M. nervosa* in its small leaves, midrib sunken on the upper surface, short corolla lobes, and fruits with deciduous calyx segments, but differs from that species in the characters of the stipules, calyx segments, and pubescence of the fruit. The species is distinguished from others by the smaller leaves with sunken midrib on the upper surface filled with reddish-brown pubescence, recurved leaf apices; characteristic broadly lanceolate stipules, hirsute with reddish-brown pubescence and streaked red on the outside; ellipsoid, lenticellate, strigose berries with deciduous calyx segments.

12. **Mussaenda multibracteata** Merr. Philip. Jour. Sci. Bot. 11: 34. 1916 (TYPE: *Ramos 23585*); Merrill, Enum. Philip. Fl. Pl. 3: 519. 1923. FIG. 4, f–n.

Shrub or small tree, 2–4 m. high with terete stems and densely hirsute branches, leaves, and inflorescences. Leaves membranous, ovate, oblong-ovate, or lance-elliptic, 9.5–30 cm. long, 4–16 cm. broad, acuminate at apex, cuneate at base or long attenuate and decurrent on petiole, prominently hirsute with spreading hairs on both surfaces especially along the veins, lateral veins 8–11 pairs, conspicuous beneath; petiole 1–9.5 cm. long, hirsute. Stipules ovate, 12.5–14 mm. long, 8–10 mm. broad at the base, acuminate, bifurcate from the apex for about 1/2–2/3 their length, hairy on the outer surface, usually glabrous within or hairy at the base only, with numerous glands in 2 groups. Inflorescence a terminal, di- or trichotomously branched, diffuse, densely hairy, cymose panicle; bracts and bracteoles subpersistent, numerous, crowded, lanceolate, 5–13 mm. long, acuminate, entire, bifid or trifid at apex, lateral lobes much shorter than the central one, hirsute on the outer surface, glabrous within with a tuft of hairs at the base. Flowers heterostylous, on stout, densely hirsute pedicels shorter than the ovaries. Calyx lobes broadly lanceolate, 6.7–28 mm. long, 1–6 mm. broad, acuminate, hirsute on the outer surface, sparingly pubescent or glabrous within with a tuft of hairs and 1 or 2 pairs of glands at the base of each; petaloid sepal ovate or elliptic, 5.5–10.5(–12.5) cm. long, 3–6(–9) cm. broad, acute or subacute at apex, cuneate at base, hirsute on both surfaces and 5-veined, "petiole" 2 cm. long, densely hirsute. Corolla yellow, the tube stout, 2.5–3.3 cm. long, densely hirsute on the outer surface with hairs almost horizontally spreading, hairy within 3/4 way down from the mouth of the tube in long-styled forms and 1/2 way in short-styled forms; hairs within not tufted at the mouth and shorter in long-styled forms; corolla lobes ovate or orbicular, 3.5–6 mm. long, 4.5–6 mm. broad, hairy on the outer surface, glabrous within. Stamens with short filaments, epipetalous below the middle of the tube 2/5–1/2 way up in long-styled forms and above the middle (2/3 way up) in short-styled forms; anthers linear, dorsifixed, introrse, 4.5–5 mm. long, bifid at the base. Ovary broadly or cylindrically turbinate, 4.5–6 mm. long, densely hirsute, 2-locular with numerous ovules on cushion-shaped, axile placentae; style and stigma lobes 1.7–2 cm. and 8.5–10 mm. long respectively in long-styled forms, 3 mm. and 2.5 mm. long in short-styled forms. Berry oblong or elliptic, 1.2–2 cm. long, hairy, lenticellate with persistent calyx segments; seeds minutely obnapiform, reticulate, 0.53–0.67 mm. long, 0.46–0.56 mm. broad, faintly spiny but not obvious, with 4–11 foveae in the areoles of the testa.

DISTRIBUTION. This species grows by streams or on damp slopes in the primary forests of Luzon and Catanduanes from 150 to 2100 meters elevation. It has been collected in flower from May to August, in fruit from July to September, November, and December.

Philippine Islands. LUZON: Albay, Mayon Volcano, *Mendoza 18431* (PNH,

US), *18376* (PNH); Tabayas, Mt. Binuang, *Ramos & Edano 28687* (A, US), *28783* (A, US); Mt. Tulaog, *Ramos & Edano 29093* (A, US); Casiguran, *Ramos & Edano 45480* (NY); Camarines Sur, Her-it River, *Edano 76425* (NY); Pili, Mambugna (Mt. Isarog), *Convocar 2820* (A, PNH); Cagayan, Mt. Dos Cuernos, *Ramos 77006* (PNH); Camarines Norte, Minasag River, *Edano 40230* (PNH); Isabela, *Clemens 17011* (NY); Sorsogon, *Ramos 23715* (US), *Ramos 23585* (NY–lectotype). CATANDUANES: *Ramos 30509* (A, US), *30262* (US); Mt. Tagmasuso, *Ramos & Edano 75259* (NY), *75159* (NY); Bato Trail to Viga, *Ramos & Edano 75143* (NY, US).

This species resembles *Mussaenda philippinensis* in its persistent, lanceolate sepals which are hairy on both surfaces. It differs considerably, however, in its characteristic pubescence, deeply bilobed stipules, longer corolla tube with lobes which are glabrous within, and the larger stamens, ovaries, fruits, and smaller seeds. *Mussaenda multibracteata* is characterized and distinguished from other species by its pubescence; large leaves; numerous, crowded, subpersistent bracts and bracteoles; large stipules which are glabrous within; broadly lanceolate, persistent sepals; hirsute petaloid sepals; corolla lobes glabrous within; large, hairy, lenticellate fruits and small, faintly spiny seeds with 4–11 foveae in the areoles of the testa.

13. **Mussaenda nervosa** Elmer, Leafl. Philip. Bot. 3: 994. 1911 (TYPE: *Elmer 10510*); Merrill, Enum. Philip. Fl. Pl. 3: 519. 1923.
FIG. 1, e; FIG. 2, i, j, k, ka.

Shrub 3 m. high with much-branched stems and erect branchlets. Leaves ovate-oblong or lance-elliptic, 6–15 cm. long, 2.5–5 cm. broad, acute or acuminate at apex, cuneate, acute or obtuse, and sometimes decurrent at the base, rugose and glabrous or pubescent on the upper surface, hairy on veins on the lower surface with 10–15 pairs of parallel curved-ascending lateral veins, very prominent beneath but sunken into the blade on the upper surface; petiole 0.5–4 cm. long, pubescent. Stipules deciduous, ovate-acuminate, 4–5.5 mm. long, 3.5 mm. broad at the base, bifurcate from the apex for about 1/2 their length, lobes slightly diverging, hirsute on the outer surface, glabrous within with a few glands in 2 groups at the base. Inflorescence an erect, terminal, dichotomously branched, pubescent cyme; bracts and bracteoles setose-acuminate, 0.7–1 mm. long, glabrous within. Flowers heterostylous, not clustered, on very short, stout, pubescent pedicels. Calyx lobes linear, laciniate, 11–16.5 mm. long, 0.7–1 mm. broad, with a prominent midvein terminating in a fine point, pubescent on the outer surface, glabrous or pubescent within, with or without a tuft of hairs, and with 1 or 2 pairs of glands at the base; petaloid sepal ovate, 5–8 cm. long, 3–5.2 cm. broad, glabrous on the upper surface, hirsute on veins beneath, cuneate at the base, "petiole" 1.2–3 cm. long, hirsute. Corolla tube 2.5–3 cm. long, subfalcate, hairy on the outer surface, hairy within as far as the bases of anthers or a little lower; hairs long in short-styled forms and short in long-styled forms, not tufted at the mouth. Corolla lobes

deep yellow, ovate-lanceolate or elliptic-acuminate, 8.5–9 mm. long, 4.5–5 mm. broad, hairy on the outer surface, granular within and 3- or 5-parallel-veined. Stamens with short filaments, epipetalous on the tube about 1/2 way up in short-styled forms, below the middle of the tube (about 2/5 way up from the base) in long-styled forms; anthers linear, dorsifixed, introrse, 6.5–7.5 mm. long, acute at apex and bifid at the base. Ovary broadly turbinate, 4–4.5 mm. long, hairy, 2-locular with numerous ovules on cushion-shaped, axile placentae; style and stigma lobes 1.7 cm. and 8.5 mm. long respectively in long-styled forms, 1.45 cm. and 2 mm. long in short-styled forms. Berry ellipsoid or globular, 1 cm. long, hairy when young, glabrous at maturity, lenticellate, calyx segments deciduous; seeds minute, reticulate, angularly globose, 0.46–0.6 mm. long, 0.36–0.43 mm. broad, with 4–12 foveae in the areoles of the testa.

DISTRIBUTION. This species grows on the islands of Luzon and Mindanao in forests up to an elevation of about 1200 meters above sea level. Elmer's type specimen was gathered from the densely forested basin of Mt. Apo in Todaya District. The species has been collected in flower in May, June, and July; in fruit in August and September.

Philippine Islands. LUZON: Nueva Ecija Prov., *Ramos & Edano 26422* (A, NY, US). MINDANAO: Bukidnon Subprov., *Ramos & Edano 39077* (A, US); Davao Dist., Todaya (Mt. Apo), *Elmer 10510* (A–lectotype; GH, NY, US–isotypes).

Mussaenda nervosa seems to be distantly allied to *M. philippinensis* with which it agrees only in the long calyx segments, and from which it differs considerably in the characters of the stipules, petals, and fruits. On the other hand it shows affinity to *M. milleri* in that both species are shrubs of comparable size, with the veins of the leaves sunken on the upper surface, which occur in the same locality in Luzon. *Mussaenda nervosa* differs from *M. milleri*, however, in the ovate-acuminate, short stipules, longer calyx segments, subfalcate corolla tube, smaller and glabrous fruits, and smaller seeds with a greater number of foveae in the areoles of the testa.

Mussaenda nervosa is distinguished from other species by the small leaves, with the midrib and 10 to 15 pairs of lateral veins sunken on the upper surface; small stipules glabrous within and with fewer glands; laciniate calyx segments; subfalcate corolla tube; glabrous and globular or ellipsoid berries with deciduous calyx segments, and small seeds with 4 to 12 foveae in the areoles of the testa.

14. **Mussaenda palawanensis** Merr. Philip. Jour. Sci. Bot. 10: 103. 1915 (TYPE: *Fenix 15531*); Merrill, Enum. Philip. Fl. Pl. 3: 519. 1923. FIG. 1, k.

Erect shrub 2–3 m. tall, more or less ciliate-hirsute in all parts with reddish-brown, terete, glabrous branches, the younger ones hirsute. Leaves oblong or oblong-ovate, 7–18 cm. long, 3–10 cm. wide, abruptly acuminate

at apex, rounded or cuneate at base, hairy on both surfaces, upper surface with scattered stiff hairs, lower surface with paler hairs also scattered, margins ciliate, lateral veins 9–14 pairs; petiole stout, 0.5–0.9 cm. long, hirsute. Stipules lanceolate, 8–10 mm. long, 4.5–8.5 mm. broad at the base, acuminate and bifurcate more than 1/2 their length from the apex,

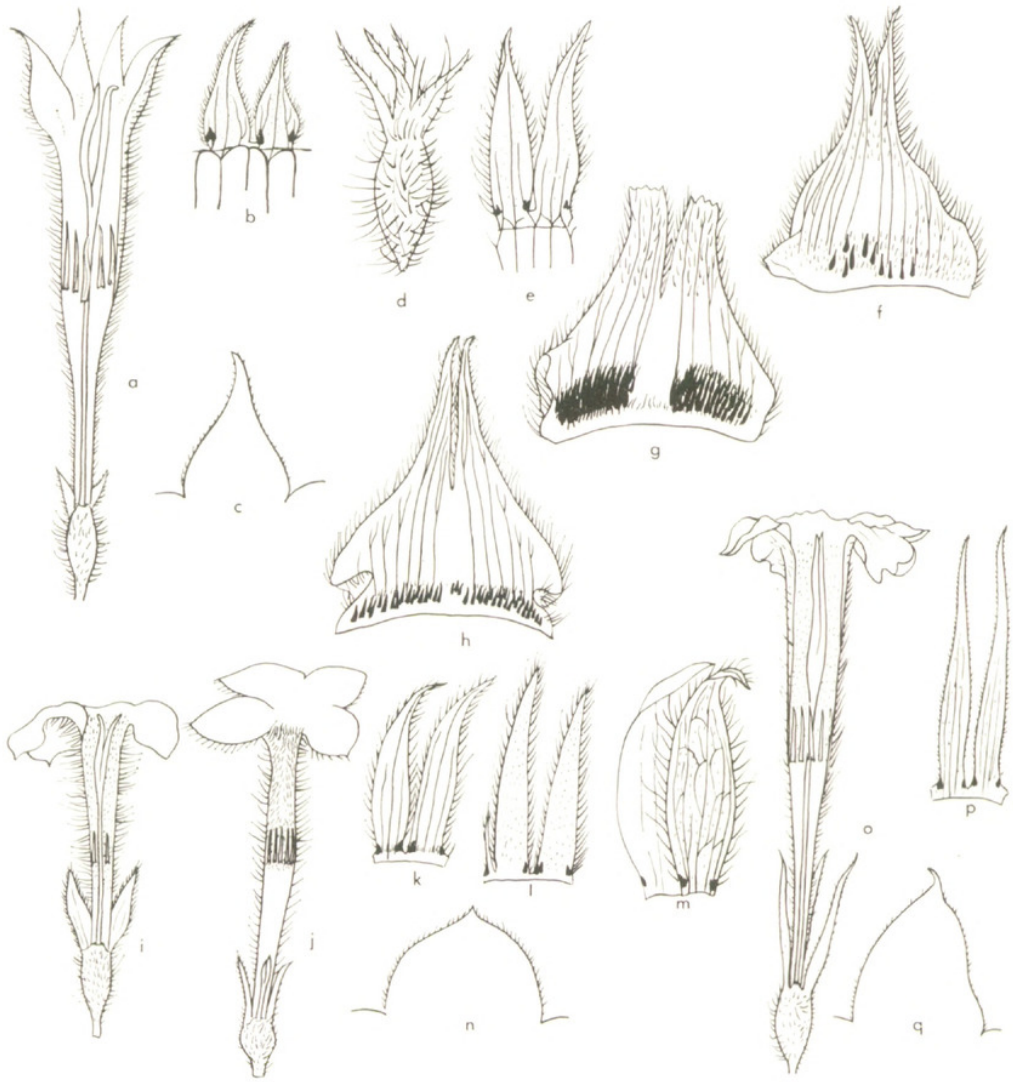

FIG. 4. Longitudinal sections of the long-styled and short-styled flowers of some Philippine species of *Mussaenda*, their calyx and corolla lobes seen from within and variations in the stipules of *M. multibracteata*. a–c, *M. grandifolia*: a (*Merrill 817*), × 1¾, corolla tube glabrous within; b (*idem*), calyx lobes, × 5, note pubescence within; c (*idem*), corolla lobe, × 4¾. d, e, *M. setosa*: d (*Merrill 9496*), ovary with persistent calyx lobes, × 2½; e (*idem*), calyx lobes from within, × 4½. f–m, *M. multibracteata*: f–h, stipules; f (*Convocar 2820*), × 2½; g (*Ramos & Edano 28783*), × 2½; h (*Ramos & Edano 29093*), × 2; i (*Convocar 2820*), × 1; j (*Ramos & Edano 28783*), × 1; k (*idem*), calyx lobes, × 2¾, glabrous within except for band of hairs at base; l (*Ramos & Edano 29093*), calyx lobes, × 2, hairy within; m (*Convocar 2820*), calyx lobes, × 2, note width and hairiness (hairs omitted from 1 lobe); n (*idem*), corolla lobe, × 3½. o–q, *M. acuminatissima*: o (*Ramos 33133*), × 2; p (*idem*), calyx lobes, × 2½; q (*idem*), corolla lobe, × 4½.

lobes subulate and diverging, hirsute on the outer surface, glabrous within except at the base among the few glands occurring in 2 groups. Inflorescence of terminal, few-flowered, densely hirsute cymes, flowers usually in crowded terminal clusters; bracts and bracteoles lanceolate, 3.5–6 mm. long, hairy on both surfaces, bracteoles trifid, lateral lobes very short. Flowers heterostylous on stout, pubescent pedicels shorter than the ovaries. Calyx lobes lanceolate, 6.7–10.5 mm. long, 2–2.5 mm. broad, slenderly acuminate, hairy on both surfaces, hairs shorter within and scantier, with 3 or 4 pairs of glands at the base of each; petaloid sepal white, broadly ovate, 6–12 cm. long, 4–9 cm. broad, bluntly acuminate at the apex, cuneate at the base, puberulous on the upper surface, hirsute beneath; "petiole" 1–1.5 cm. long, hirsute. Corolla white to bright orange, the tube 2–2.2 cm. long, infundibuliform, appressed hirsute on the outer surface, hairy within 1/2 way in long-styled forms and 1/3 way from the top in short-styled forms, hairs not tufted at the mouth and shorter in long-styled forms; corolla lobes ovate, 6 mm. long, 4 mm. broad, prominently acuminate or caudate, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous on the tube just above the middle in long-styled forms and 2/3 way up in the broader portion in short-styled forms; anthers linear, dorsifixed, introrse, 5–6.5 mm. long, bifid at the base. Ovary cylindric-turbinate, 4.5–6 mm. long, densely hirsute, 2-locular with numerous ovules on axile placentae; style and stigma lobes 1.4 cm. and 6.5 mm. long respectively in long-styled forms, 3.5 mm. and 3.2 mm. long in short-styled forms. Berry ovoid or obovoid, 1.2–1.4 cm. long, pubescent, lenticellate, calyx segments deciduous; seeds minute, reticulate, broadly triangular-ovate, broader than long, 0.6–0.77 mm. long, 0.73–0.83 mm. broad; with 3–6(–8) foveae in the areoles of the testa.

DISTRIBUTION. This species is endemic to Palawan where it occurs in thickets and old clearings up to an elevation of about 150 meters above sea level. It has been collected in flower in February, July, August, and December; in fruit in December.

Philippine Islands. PALAWAN: San Antonio Bay, *Merrill 867* (US); Baraki, *Fox 13354* (A, PNH); Mt. Ibusi, *Ebalo & Conklin 1227* (A); Point Separacion, *Fenix 15531* (US–lectotype); Puerto Princesa, *Kondo & Edano 36685* (PNH); Mt. Kabangaan, *Edano 77718* (A); Brooke's Point, *Edano 244* (A, PNH).

Of the collections examined *Ebalo & Conklin 1227* differs from the lectotype in that its leaves are larger (18 cm. long), petaloid sepals 12 cm. long, stipules broader, and it bears orange flowers while it agrees in all other characters. The fruits of *Fox 13354* are larger (1.2–1.4 cm. long) than described for the type. *Kondo & Edano 36685* also possesses larger fruits but its leaves are obovate-lanceolate, resembling those of *Mussaenda attenuifolia*.

The species is closely allied to *Mussaenda philippica* from which it differs in the pubescence of the leaves, size and form of calyx and corolla segments, and in the seeds which, however, resemble those of *M. benguetensis*. It is distinguished from the other species by the characteristic

ciliation of its short-petioled leaves; lance-acuminate, bifurcate stipules with diverging, subulate lobes; broadly lanceolate sepals; short, thick, appressed-hirsute corolla tube; and scantily pubescent, ovoid berries with deciduous calyx segments.

15. **Mussaenda philippica** A. Rich. Mém. Soc. Hist. Nat. Paris **5**: 245. 1834 (TYPE: *Perrottet*); Merrill, Enum. Philip. Fl. Pl. **3**: 519. 1923. FIG. 1, j; FIG. 3, f, g, h, i.

M. acutiflora Bartling ex DC. Prodr. **4**: 370. 1830.
Calycophyllum grandiflorum Meyen, Reise **2**: 234. 1835.
M. frondosa sensu Blanco, Fl. Filip. 167. 1837; ed. 2. 118. 1845; ed. 3. **1**: 211. *pl. 58*. 1877, non L.
M. glabra sensu Fernandez-Villar, Novis. App. 108. 1880, non Vahl.
M. grandiflora Rolfe, Jour. Linn. Soc. Bot. **21**: 311. 1884.

Shrub or small tree 2–8 m. tall with terete or subterete, more or less pubescent or nearly glabrous, brown or gray, ascending, lenticellate branches. Leaves very variable, ovate, oblong-ovate or -lanceolate or obovate-oblanceolate, strongly conduplicate on the upper side, 3.5–23.5 cm. long, 1.7–12 cm. broad, acuminate at apex, cuneate or long attenuate at base, glabrous or scantily pubescent on the upper surface, glabrate on the lower surface, minutely pubescent or hirsute especially along the veins, lateral nerves 6–15 pairs, arcuate; petioles 0.3–2.5(–7.5) cm. long, minutely appressed pubescent or hirsute. Stipules oblong-ovate or acuminate from a broad base, 3–10.5(–12.5) mm. long, 2.2–7 mm. broad at the base, bifurcate from apex 1/4–3/4 their length, lobes not diverging and somewhat straight, pubescent on the outer surface, glabrous within, hairy throughout or at the base only and among the glands occurring in 2 groups. Inflorescence a terminal, di- or trichotomously branched, many- or few-flowered cyme; bracts and bracteoles lanceolate or ovate, 3–5 mm. long, hairy on the outer surface, glabrous within. Flowers heterostylous on stout, pubescent pedicels shorter or longer than the ovaries. Calyx lobes triangular or lance-acuminate, 1.2–7.5 mm. long, 0.5–1.5 mm. broad, hairy on the outer surface, glabrous or pubescent within with 2–5 pairs of glands at the base of each; petaloid sepal ovate or orbicular-ovate, 4–13 cm. long, 3–8.5 cm. broad, acute or subacute at apex, abruptly cuneate at base, glabrous on both surfaces or puberulous on the upper surface and hairy beneath, "petiole" 1–2 cm. long, pubescent. Corolla tube pale green, 2–3.5 cm. long, minutely appressed pubescent or hirsute on the outer surface, hairy within as far as the bases of the anthers, hairs within longer in short-styled forms than in long-styled forms, not tufted at the mouth; corolla lobes orange, lanceolate, ovate, or orbicular, 2.5–8(–12) mm. long, 2–5.5 mm. broad, apiculate, acuminate or somewhat caudate, hairy outside, papillate within. Stamens with short filaments epipetalous on the corolla tube 1/2–3/4 way up in short-styled forms and at about the middle in long-styled forms; anthers narrowly linear or lance-linear, dorsifixed, introrse, 6–8.5 mm. long in short-styled forms, 4–6 mm. long in long-

styled forms, acute or blunt at apex, bilobed at the base. Ovary broadly fusiform, oblong-turbinate or oblong, 3.5–7.5 mm. long, minutely appressed pubescent or hirsute; style and stigma lobes 1.5–2.9 cm. and 3–7.5 mm. long respectively in long-styled forms, 2.5–8.5 mm. and 2–4.5 mm. long in short-styled forms. Berry globular, 1–1.6 cm. long, glabrous or scantily pubescent, lenticellate, calyx segments deciduous; seeds minute, reticulate, not spiny, 0.6–1.0 mm. long, 0.39–0.8 mm. broad, testa with 2–5(–7) foveae in the areoles.

ILLUSTRATIONS. Blanco, Fl. Filip. ed. 3. 1: *pl. 58.* 1877; Vidal, Synopsis de familias. Atlas *pl. 56, f.* 1883 (not seen); Sulit, Philip. Jour. Forestry 2(1): 43. *pl. 3, fig. 2.* 1939.

DISTRIBUTION. This species has a very wide distribution. It occurs in almost all the islands of the Philippines, extending from Luzon to Palawan and Mindanao, eastward to Palau and Yap islands of the Caroline Group, and southward in the Solomon and Fiji islands, from sea level to an altitude of about 700 meters. It is a common shrub found along forested ridges, slopes and streams in old second-growth jungles and also in rugged, open, rolling country. It has been collected in flower and fruit throughout the year.

Philippine Islands. BATAN: Mt. Iraya, *Ramos 80283* (A). LUZON: Cagayan Prov., Littoc, *Adduru 142* (A, US); Lagum, *Adduru 218* (A, US); *Velasco 24852* (NY); Rizal Prov., Antipolo, *Vidal 389c* (A), *Ramos & Edano 29536* (A, US), *45292* (NY), *Reillo 19245* (US); west of Famy, *Brenner, Jr. 2584* (PNH), *Ramos 34* (US), *13573* (US); San Mateo, *Ahern's Collector 119* (US); Bosoboso, *Merrill 2655* (NY, US), *Vidal 1457d* (A); Camarines Prov., Nueva Caceres, *Vidal 1457bis* (A); Dalupaon-Paracao, *Ahern 818* (US), *802* (US); Dact, *Hallier* (NY); Kamugong River, *Edano 75879* (NY); Paracale, *Ramos & Edano 33520* (US), *33469* (NY); Carambola, Pili, *Convocar 2945* (A, PNH); Mt. Isarog, *Merrill, Species Blancoanae 413* (A, GH, NY, US); Sorsogon Prov., *Curran 10535* (NY, US); Irosin, *Edano & Gutierrez 37744* (PNH), *38555* (A, PNH); Mt. Bulusan, *Elmer 14388* (A, C, GH, NY, US); Tabayas Prov., *Manuel 23486* (US); Guinayangan, *Vidal 801* (A); Baler, *Escritor 21192* (US); Lucena, *Merrill 2890* (NY, US); Sariaya, *Whitford 559* (US); Bulacan Prov., Quingua, *Vidal 1457c* (A); Angat, *Vidal 389e* (A); Malinto, *Robinson & Merritt 6128* (GH); Laguna Prov., Los Banos, *Elmer 8134* (NY), *Steiner 40063* (PNH), *Holman 43* (GH); Mt. Makiling, *Elmer 17670* (A, GH, NY, US), *Sulit 9747* (A, PNH), *Mendoza 12224* (US); Makiling National Park, *Salvoza 3214* (PNH); Pangil, *Ramos 39882* (PNH); Bataan Prov., *Pascual 28682* (A), *23071* (A); Mt. Mariveles, *Elmer 6673* (NY); Lamao River, *Williams 127* (NY, US), *Whitford 388* (NY, US), *524* (NY, US), *Borden 1220* (NY, US), *Bartlett 14653* (A); Bagac, *Udasco 27292* (A); Albay Prov., Mayon Volcano, *Mendoza 18350* (PNH); Isabela Prov., Palanan, *McGregor 10726* (NY); Apayao Subprov., *Fenix 28234* (A, US); Cavite Prov., *Ramos & Deroy 22518* (US); Manila, San Francisco, *Loher 1520* (US); Novaliches, *Loher 1519* (US). ALABAT: *Ramos & Edano 48089* (NY). CATANDUANES: *Ramos 30452* (US). MARINDUQUE: *Vidal 1457* (A). MINDORO: Mansalay, *Merrill 912* (GH, NY, US); Mt. Yagaw, *Sulit & Conklin 16840* (A), *16875* (PNH); Sablayan, Ligaya, *Reed 40895* (PNH); Bulalacao, Padam Mt., *Ebalo 254* (A). SAMAR: *Vidal 389bis* (A), *Ramos 17447* (US); Catubig River,

Edano 24806 (US), *Sablaya 45* (A), *Ramos 24174* (A, US); Tubabau Island, *Quisumbing 2045* (A); Matuguinao, Baruz, *Gachalian 15483* (PNH); Oras, Cadapnan, *Castro & Anonuevo 5782* (A); Catarman, Mt. Cansayao, *Sulit 14449* (PNH), *Alcasid & Oano 39863* (PNH); Laquilacon, *McGregor 43797* (NY), *Sulit 6125* (A, PNH); Borongan, Tagaslian, *Castro & Anonuevo 5810* (A), Pinamgasan, *Castro & Anonuevo 5853* (PNH). BILIRAN: *McGregor 18813* (A, US). BUSUANGA: *Ramos 41262* (A), *41236* (A, US). CULION: *Bermejos 182* (GH, NY, PNH, US). PANAY: Capiz Prov., *Edano 46220* (NY); Dumarao, *Taleon 22279* (PNH), *33828* (PNH); Libacao, *Martelino & Edano 35331* (NY); Antique Prov., *McGregor 32540* (US). GUIMARAS: *Gammill 261* (NY, US). LEYTE: *Wenzel 57* (A, GH, US), *179* (A, GH, US); Palo, *Elmer 7045* (A, NY). NEGROS: Mt. Katugasan, *Edano 21809* (PNH), *21782* (PNH); Dumaguete (Cuernos Mts.), *Elmer 10121* (A, NY, US). PALAWAN: *Foxworthy 605* (GH, NY, PNH, US), *691* (NY, US), *Bermejos 350* (GH, NY, US), *Curran 4517* (NY, US); Taytay, *Merrill 9332* (A, GH, NY, US); Puerto Princesa, *Cenabre 29149* (A); *Danao 19907* (NY, US); Mt. Pulgar, *Elmer 12792* (A, GH, NY, US). MINDANAO: *Devore & Hoover 172* (US), *163* (US); Agusan Prov., Cabadbaran (Mt. Urdaneta), *Elmer 13301* (A, GH, NY, US); Davao Prov., Madam, *Edano 1312* (A, PNH); Catalnan, *Kanehira 2497* (NY); Magdug River, *Edano 11074* (A); Santa Cruz, *Williams 2854* (NY, US); Cotabato-Dansalan, *Zwickey 34* (A, NY); Davao Dist., *Copeland 355* (NY, US); Surigao Prov., *Ahern 339* (US); Mt. Cantugas, *Ramos & Convocar 83500* (A); Butuan Subprov., *Miranda 20580* (US); Misamis Prov., Mt. Malindang, *Mearns & Hutchinson 4716* (NY, US); Zamboanga Prov., Margosa Tubig, *Guerrero 29549* (A); Dikus, *Frake 38115* (A, PNH), *Frake 36058* (PNH). BALABAC: *Vidal 389[d]* (A); *Mangubat 481* (US). CAGAYAN: Sulu, *Mearns 36* (US), *37* (US), *Warburg 14896* (A). PALMAS: *Merrill 5338* (NY, US).

Caroline Islands. YAP: Mt. Matade, *Fosberg 25555* (NY); Balabat, *Takamatsu 1872* (A). PALAU: *Fosberg 25769* (NY); *Takamatsu 1151* (A).

Solomon Islands. BOUGAINVILLE: Kupei Gold Field, *Kajewski 1666* (A). SANTA YSABEL: Meringe, *Brass 3538* (A). OWA RIKI: *Brass 3075* (A).

Fiji Islands. WAYA: *Fosberg 18008* (A).

From an examination of over 200 collections of this species from the different islands of the Philippines, the Caroline Group, Fiji, and the Solomon Islands it is evident that some are allied to *Mussaenda glabra*, others to *M. palawanensis*, and still others rather distantly to *M. macrophylla*, *M. philippinensis*, *M. pinatubensis*, and *M. anisophylla*.

The collections *Elmer 12792*, from Palawan; *Brass 3538* and *3078*, from the Solomon Islands; *Merrill 912*, from Mindoro; *Elmer 14388*, *Curran 10535*, *Fenix 28234*, *Merrill 413*, *Convocar 2945*, etc., from Luzon; and *Fosberg 25555*, *25769*, *Takamatsu 1151*, *1872*, from the Caroline Islands, bear resemblance to *Mussaenda glabra* in that their leaves are glabrate, minutely appressed pubescent on veins beneath, their stipules small and lanceolate with few glands at the bases within, and the corolla tubes are also minutely pubescent with short, lanceolate lobes. They differ, however, in the size and the venation of the leaves, the length of the corolla tubes, petals, anthers, etc.

The collections *Adduru 142*, *Elmer 17670*, *Whitford 524*, *Ramos 29882*, *Robinson & Merritt 6128*, etc., are allied to *Mussaenda palawanensis*. Their leaves are pubescent on both surfaces, densely so on the lower sur-

face, the sepals are broadly lanceolate, acuminate, hairy on both surfaces, and the petals are ovate and prominently acuminate. They differ in their longer petioles, shorter calyx lobes, and less hirsute corolla tubes.

One collection, *Merrill 5338*, from Palmas Islands, bears sepals similar to those of *Mussaenda philippinensis* but differs in numerous other characters which establish that it is *M. philippica*. *Edano 46220* and *Warburg 14896* have some resemblance to *M. macrophylla* in the pubescence of their stems and inflorescences, and in their orbicular-apiculate petals. *Merrill 2655*, from Luzon, bears affinities to *M. pinatubensis* in that its branchlets are erect, opposite, and terminated by leaves and the flower-bearing portion. It has small leaves, and the older pairs of stipules are fused around their nodes. The specimen *Edano & Gutierrez 37744* has spreading hairs on the stem and deeply bifurcate stipules hairy on both sides, characters of *M. anisophylla*.

The collections *Brass 3075* and *3538*, from the Solomon Islands, which resemble *Mussaenda glabra* in external characters, are related by other characters to *M. frondosa* L. in that the throat hairs of the corolla tube are long in the long-styled forms and extend below the bases of the anthers.

Throughout the species the seed character seems to be constant, though the seeds themselves vary in size and shape. The testa is foveolate with 3–5(–7) foveae in the areoles. *Cortez & Fernandez 34388* bears smaller fruits (0.8 cm. long) and somewhat spiny seeds with 3 to 10 foveae in the areoles of the testa, while *Frake 36058* also bears smaller fruits but has larger seeds (0.73–0.93 mm. long) with rugose testa.

From the foregoing it is evident that at least two genetic lines are involved in the evolution of this species: *M. glabra* coming down from the mainland of China and *M. palawanensis* from Palawan.

Mussaenda philippica is distinguished from other species by its ascending, freely rebranching branchlets; its glabrous or pubescent leaves recurved and strongly conduplicate; its erect green inflorescences and corolla tubes; its large anthers; its glabrous, lenticellate fruits with deciduous calyx segments; and its small, smooth seeds with reticulate testa bearing 2–5(–7) foveae in the areoles.

USES. The plant is used medicinally for stomach-ache in the Fiji Islands. The juice of the bark is used as a cure for headache in Mindoro. The leaf is employed as a substitute for tobacco, while in Mindanao the whole plant is used in agricultural rituals.

Mussaenda philippica forma **aurorae** (Sulit), stat. nov.

M. philippica A. Rich. var. *aurorae* Sulit, Philip. Jour. Forestry 2(1): 39. *pl. 3, fig. 1.* 1939 (TYPE: *Mabesa 24876*).

Shrub 1–3 m. high with terete, pubescent branches. Leaves ovate or elliptic, 8–16 cm. long, 3.2–8.5 cm. broad, abruptly acuminate, cuneate at base, glabrate on the upper surface, pubescent beneath with 8–10 pairs of lateral veins; petiole 0.7–1.5 cm. long, hirsute. Stipules ovate, 7–9 mm. long, 5–6 mm. broad at the base, hairy on the outer surface, glabrous

within except below the glands, acuminate, bifurcate from apex 1/3–1/2 their length. Inflorescence a terminal, pubescent, few-flowered cyme; bracts and bracteoles lanceolate, 3.5–4 mm. long, hairy. Calyx lobes when unexpanded linear or lanceolate, 3–6 mm. long, 1 mm. broad; when expanded white, oblong, "petioled," 3.5–9 cm. long, ± 1.5–5.5 cm. broad, pubescent on both surfaces, 5-veined, stipe ± 1 cm. long, hairy. Corolla tube 2.5–3 cm. long, broader at the top, hairy on the outer surface, hairy within as far as the bases of the anthers; corolla lobes yellow, ovate, 4.5–6 mm. long, 4–5 mm. broad, apiculate, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous 2/3–3/5 way up on the corolla tube; anthers linear, dorsifixed, introrse, 7–8 mm. long, blunt at apex, bilobed at the base. Ovary turbinate, 3.5 mm. long, hairy, 2-locular and with axile placentation; style and stigma lobes each 3.5 mm. long, the latter appressed on their receptive surfaces.

DISTRIBUTION. *Mussaenda philippica* forma *aurorae* was first collected by Mabesa at the foot of Mt. Balong-bulo, Laguna Province, in 1915. It was collected in 1930 by Curran in Sitio Buot, Makiling National Park, growing at an elevation of 100 meters above sea level. Now it is much cultivated as an ornamental shrub. It has never set seed and all plants in cultivation have been raised vegetatively from Curran's plant which was transplanted into the Forestry Nursery and propagated.

Philippine Islands. LUZON: Laguna Prov., *Mabesa 24876* (A–lectotype; US–isotype); Los Banos, Forestry College, *Walker 7456* (US), *Steiner 1743* (PNH); Manila Garden, *Quisumbing 2101* (PNH), *Steiner 2950* (A); Malacanan Grounds, *Quisumbing 4334* (A).

Forma *aurorae* differs from *Mussaenda philippica* forma *philippica* in the one to five expanded calyx segments in the flowers of an inflorescence but resembles it in all other characters. It is a short-styled form and has never produced fruit. Though the ovary contains ovules, the stigma lobes seem to remain appressed on their receptive surfaces, preventing pollination. Cuttings of this plant sent by Dr. L. H. McDaniels to the Fairchild Tropical Garden, Florida, from the Philippine Islands in 1959, were successfully rooted and multiplied. As a male parent it has been used to good effect in the Philippine Islands in crosses with *M. erythrophylla* Schum. & Thonn., an African species with the petaloid sepal crimson, producing a number of cultivars. The two most outstanding of these are called *Mussaenda* 'Luz' or 'Dona Luz' and *Mussaenda* 'Alicia' or 'Dona Alicia,' both of which are much cultivated for their ornamental qualities. In the former all five calyx segments are deep rose-purple and petaloid while in the latter only one segment is petaloid.

16. **Mussaenda philippinensis** Merr. Philip. Jour. Sci. Bot. 3: 264. 1908 (TYPE: *Merrill 4139*); Merrill, Enum. Philip. Fl. Pl. 3: 520. 1923. FIG. 1, n, o, p; FIG. 3, t, u, v, w.

Shrub 1–4 m. high with more or less hirsute, terete branches. Leaves

membranous, oblong-elliptic, 9.5–20 cm. long, 3.8–10 cm. broad, nearly glabrous or scantily pubescent on the upper surface, hirsute on veins of the lower surface with scattered hairs on the lamina, acuminate at apex, cuneate at base or long decurrent on the petiole, veins 8–12 pairs, petiole 0.3–4 cm. long, hairy. Stipules lance-ovate, acuminate, 9–13 mm. long, 4.5 mm. broad at the base, hairy on both surfaces, entire or faintly bifid at the tip with numerous glands in a continuous band at the base, ascending in the middle. Inflorescence a terminal, hirsute, dichotomously branched, somewhat compact, cymose panicle; bracts and bracteoles deciduous, linear-lanceolate, hirsute; bracteoles trilaciniate, lobes narrow, acuminate. Flowers heterostylous on stout, pubescent pedicels shorter than the ovaries. Calyx lobes narrowly lanceolate, 10.5–15 mm. long, 1 mm. wide, hairy on the outer surface, glabrous within or pubescent with 2 or 3 pairs of glands at the base of each sepal; petaloid sepal white, ovate or elliptic, 5–9 cm. long, 3–6 cm. broad, acute or subacute at apex, cuneate at the base, glabrous on the upper surface, hirsute on veins beneath, "petiole" 1.7–2.5 cm. long, hirsute. Corolla tube yellow, 2–2.5 cm. long, pubescent on the outer surface with short appressed hairs mixed with few long spreading ones, hairy within as far as the bases of the anthers, not tufted at the mouth; hairs shorter in long-styled forms than in short-styled forms, glabrous below the anthers; corolla lobes ovate, 1.5–3 mm. long, 2.2–3 mm. broad, acute or acuminate, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous on the tube below the middle, 2/5 way up in long-styled forms and 3/5 way up in short-styled forms; anthers linear, dorsifixed, introrse, 3–5 mm. long, abruptly acute at apex, bifid at base. Ovary obconical or turbinate, 3–3.5 mm. long, scantily appressed hairy, 2-locular with numerous ovules on cushion-shaped, axile placentae; style and stigma lobes 1.9 cm. and 6.5 mm. long respectively in long-styled forms, 1–2 mm. and 1.5–2 mm. in short-styled forms. Berry elliptic, 1.3–1.5 cm. long, rugose, scantily pubescent with persistent calyx segments; seeds minute, reticulate, broadly oblong or angularly globose, 0.6–0.67 mm. long, 0.46–0.6 mm. broad, with 3–8 foveae in the areoles of the testa.

DISTRIBUTION. This species grows in partial shade along creeks and ridges of second-growth forests from 10 to 300 meters elevation above sea level. It is confined to the islands of Luzon, Alabat, Mindoro, Semirara, and Panay. It has been collected in flower from April to July; in fruit in June, November, and December. The original description is based on a single collection from Semirara.

Philippine Islands. LUZON: Apayao Subprov., Mt. Duraragan, *Edano 19875* (PNH), alt. 300 m. ALABAT: *Merrill 10437* (A, NY, PNH, US). MINDORO: Mt. Yagaw (eastern slope), *Sulit & Conklin 17652* (A, PNH), alt. 267 m., *16875* (A), alt. 300 m.; Oyon Creek, *Paniza 9436* (A, PNH), alt. 10 m., *Ebalo 193* (A, PNH). SEMIRARA: *Merrill 4139* (NY–lectotype). PANAY: *McGregor 32449* (A, US).

Several collections have been erroneously placed in this species which should be referred to *Mussaenda magallanensis*. The collection *Merrill*

10437 (A, NY, PNH, US) from Alabat Island possesses large, lance-elliptic leaves with the characteristic pubescence and hairy, lenticellate berries with persistent calyx segments, apparently resembling this species, but an examination of the seed indicates that it is nearer *M. magallanensis*. Its seeds are black, smaller (0.46–0.6 mm. long), obtusely 3- or 4-sided, testa faintly spiny with 4–12 foveae in the areoles. *McGregor 32449* (A, US) from Panay seems to be a variation from the type collection, differing from it in the shorter calyx segments (8 mm. long) and larger, acuminate petals (6 mm. long).

Mussaenda philippinensis seems to be allied to *M. magallanensis*, on the one hand, and to *M. wrayii* King, from the Malay Peninsula, on the other. It is distinguished by its entire or almost entire stipules, compact inflorescence, long, persistent calyx lobes, large fruits with small seeds, and 3–8 foveae in the areoles of the testa.

17. **Mussaenda pinatubensis** Elmer, Leafl. Philip. Bot. 9: 3210. 1934 (TYPE: *Elmer 21978*).

Shrub with spreading main branches dividing to terminate in glabrous, subangular, erect, short branchlets. Leaves opposite, often unequal, 4–8.3 cm. long, 2–3.7 cm. broad, slenderly or sharply acuminate at the apex but obtuse in many of the smaller leaves, cuneate at base, glabrous or puberulous on the upper surface, short-hairy on veins and venules beneath, lateral veins 6–11 pairs, ascending; petiole 3–10 mm. long, grooved above, sparsely strigose beneath. Stipules lanceolate, 5–8.5 mm. long, 2.5–5 mm. broad at the base, bifid from the apex for about 1/5 their length, teeth terminating in a gland, hairy on the outer surface, hairy within at the base and apex, glands many in 2 groups, opposite pairs of older stipules fusing at their edges at the base to form a ring around each node. Inflorescence a terminal, dichotomously branched, many-flowered, minutely appressed-pubescent cyme almost equalling the leaves in length; bracts and bracteoles lanceolate or linear, 5–6 mm. long, hairy. Flowers probably heterostylous on stout, appressed-pubescent pedicels about 3 mm. long. Calyx lobes persistent, linear subulate, 7.7–8 mm. long, 1 mm. broad at the base, hairy on the outer surface, glabrous within; petaloid sepal yellowish-white, ovate or broadly lanceolate-elliptic, 5–8 cm. long, 2.5–3.6 cm. broad, acuminate, cuneate at base, glabrous on both surfaces, pubescent on the veins beneath; "petiole" 0.5–1.3 cm. long, hairy. Corolla deep yellow or orange, the tube 2–3 cm. long, appressed pubescent outside except at the subglabrous base, inside hairy as far as the bases of stamens, hairs long in short-styled forms (long-styled forms not seen), not tufted at the mouth; corolla lobes ovate, 4.5 mm. long, 4.2 mm. broad, apex acuminate-subcuspidate, strigose-hairy outside, papillate within. Stamens with short filaments, epipetalous 2/3 way up on the tube in short-styled forms; anthers linear, sub-basifixed, introrse, 5.5–10 mm. long, blunt at the apex and bifid at the sterile base. Ovary oblong, 4 mm. long, appressed pubescent, 2-locular with numerous

ovules on axile placentae; style 4 mm. long and stigma lobes 2.5 mm. long in short-styled forms. Berry not seen.

DISTRIBUTION. This species is endemic to Luzon where it grows on hot and dry river embankments at an elevation of about 1065 meters above sea level. It has been collected in flower in May.

Philippine Islands. LUZON: Pampanga Prov., Zambales Mountains (Mt. Pinatubo), *Elmer 21978* (PNH–holotype; A, GH, NY–isotypes).

At first no trace of Elmer's original collection was found, but a closer examination of the material available revealed that it had been placed under an unpublished name. Happily, the holotype of *Mussaenda pinatubensis* is still in existence, apparently having been on loan during World War II. It is allied to *M. nervosa* by its leaf and stipule characters and also to *M. philippica* but differs from the latter in the smaller leaves, longer calyx segments, and faintly bifid stipules. The species is distinguished from others in the small, glabrous or subglabrous leaves; lanceolate stipules faintly bifid at apex, each pair fusing at the base to form a ring around the node; linear-subulate, persistent calyx segments; ovate, subcuspidate corolla lobes; and oblong, scantily appressed-pubescent ovaries.

18. **Mussaenda scandens** Elmer, Leafl. Philip. Bot. 3: 992. 1911 (TYPE: *Elmer 11291*); Merrill, Enum. Philip. Fl. Pl. 3: 518. 1923. FIG. 1, g; FIG. 2, l, m, n, o, p.

M. villosa sensu Merrill, Philip. Jour. Sci. Bot. 5: 243. 1910 and Elmer, Leafl. Philip. Bot. 3: 992. 1911, non Wall.

Climber with numerous, curved, interlaced, lenticellate branches. Leaves ovate-elliptic or broadly oblong, 6–13.3 cm. long, 3–8 cm. broad, abruptly acute at apex, cuneate at base, obtuse or subrotund, pubescent on the upper surface, hairs short with few longer scattered ones, finely pubescent on the veins beneath with 6–10 pairs of lateral veins; petiole 0.3–1.5 cm. long, subglabrous or pubescent. Stipules deciduous, ovate-acuminate, 7–8 mm. long, 5 mm. broad at the base, bifurcate from apex more than 1/2 their length, lobes subulate, diverging, hairy on both surfaces, hairs within shorter with few glands in 2 groups at the base. Inflorescence a terminal, di- or trichotomously branched, appressed-pubescent, many-flowered, corymbose cyme; bracts and bracteoles lanceolate, acuminate, hairy on both surfaces, bracteoles broader, longer, and trilobed at apex. Flowers heterostylous, on stout, finely pubescent pedicels shorter than the ovaries. Calyx lobes linear-oblong, recurved, 3.5–5.5 mm. long, 0.8–1 mm. broad, sharply acuminate, hairy on both surfaces with 1 or 2 pairs of glands at the base of each sepal within; petaloid sepal ovate-elliptic, 6–7 cm. long, 3.8–4.5 cm. broad, puberulous on both surfaces, hairy on veins beneath, "petiole" 1–1.5 cm. long, pubescent. Corolla tube slender, 2–2.5 cm. long, hairy on the outer surface, hairy within 4/5 way down, glabrous at base;

hairs long in short-styled forms and short in long-styled forms, not tufted at the mouth; corolla lobes yellow, ovate, 2.5 mm. long, 2–2.5 mm. broad, acute, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous on the tube about 1/2 way in long-styled forms and a little higher in short-styled forms, adherent filaments free as loops on the tube for about 2 mm. midway between the base and the stamens; anthers linear, dorsifixed, introrse, 3.5–4.5 mm. long, bilobed at the base. Ovary turbinate, 3–3.5 mm. long, finely appressed pubescent, 2-locular with numerous ovules on cushion-shaped, axile placentae; style and stigma lobes 1.3 cm. and 6 mm. long respectively in long-styled forms, 4 mm. and 2.5 mm. long in short-styled forms. Berry ellipsoid, 1–1.3 cm. long, glabrous, calyx lobes deciduous; seeds minute, reticulate, ovoid, 0.83–0.9 mm. long, 0.67–0.7 mm. broad, spiny, with 3–9 foveae in the areoles of the testa.

DISTRIBUTION. This species is endemic to the island of Mindanao and grows in forests along streams at an altitude of 600 to 800 meters. It has been collected in flower in May, July, and August; in fruit in August, October, and November.

Philippine Islands. MINDANAO: Davao Dist., Todaya (Mt. Apo), *Elmer 11291* (GH–lectotype; A, NY, US–isotypes); Surigao, *Wenzel 3354* (A, GH, NY); Zamboanga Dist., Malangas, *Ramos & Edano 37307* (A).

In both habit and appearance this species is closely allied to *Mussaenda villosa* Wall., of Siam, Malaya, Sumatra, and Borneo. The resemblance is so great that *Clemens 562* from Mindanao was identified by Merrill as *M. villosa*, an error later rectified. Close examination of the collections *Ramos 1836, 1783* (US), etc., of *M. villosa* from British North Borneo, shows that the characters of the Philippine plant are sufficiently distinct for its treatment as a separate species. Both *M. villosa* and *M. scandens* are climbers with elliptic, pubescent leaves, slender flowers in terminal, pubescent cymes, glabrous fruits with deciduous calyx segments and spiny seeds. The flower buds of *M. villosa* are rounded at the top, somewhat constricted at the neck between the corolla tube and the lobes. Its sepals are lanceolate and corolla tube glabrous on the outer surface below the level of the stamens. *Mussaenda scandens* on the other hand bears flower buds which are elliptic at the top and not constricted at the neck. Its sepals are linear-oblong and the corolla tube entirely hairy on the outer surface. The hairs on the leaves of the former are long. *Wenzel 3354* from Surigao differs slightly from the type in its longer sepals and corolla tube. The species may be distinguished from others by its climbing habit, ovate-elliptic or -oblong, pubescent leaves; slender corolla tube pubescent on the outer surface, hairy within 4/5 way down; sharply acuminate, linear-oblong sepals; ovate-acuminate stipules with diverging lobes; glabrous berries with deciduous calyx segments, and spiny seeds with 3 to 9 foveae in the areoles of the testa.

19. **Mussaenda setosa** Merr. Philip. Jour. Sci. Bot. **10**: 104. 1915 (TYPE: *Merrill 9496*). FIG. 1, m; FIG. 4, d, e.

Shrub or small tree, 3–4 m. high with terete, pale grayish-brown branches, the younger ones hirsute. Leaves in equal or subequal pairs, oblong-elliptic, elliptic, or ovate, 12–25 cm. long, 6–13 cm. broad, acuminate, rounded or decurrent-acuminate at base, setose on both surfaces, the margins ciliate, lateral veins 15–18 pairs, prominent on the lower surface; petiole 0.5–3 cm. long, hirsute. Stipules ovate, acuminate, 6–8 mm. long, 6.5 mm. broad at the base, bifurcate from apex for about 1/2 their length, lobes subulate, diverging, hirsute on the outer surface, glabrous within except at the base and among numerous glands occurring in 2 groups. Inflorescence a terminal, divaricate, few-flowered, hirsute-ciliate cyme; bracts and bracteoles small, lanceolate, about 3.5 mm. long, hairy on both surfaces, tufted at the base within, bracteoles broader, trifid. Flowers probably heterostylous, subsessile or on stout, pubescent pedicels shorter than the ovaries. Calyx lobes persistent, linear-lanceolate, 4–7 mm. long, 1 mm. broad, hairy on both surfaces with 2 pairs of glands within at the base of each; petaloid sepal white, broadly ovate, 7 cm. long, slightly acuminate, puberulent on the upper surface, hirsute on veins beneath, "petiole" 1 cm. long, hirsute. Corolla tube white, cylindric, 3 cm. long, hairy outside, inside hairy as far as the bases of the anthers, hairs not tufted at the mouth and short in the long-styled forms (short-styled form not seen); corolla lobes yellow, broadly ovate, about 2.5 mm. long, abruptly acuminate, hairy on the outer surface, glabrous within. Stamens with short filaments, epipetalous on the tube a little below the middle in long-styled forms; anthers linear-lanceolate, dorsifixed, introrse, 4.5 mm. long, blunt at the apex and bilobed at the sterile base. Ovary broadly fusiform, setose-ciliate, 2-locular with numerous ovules on axile placentae; style 1.6 cm. long, stigma lobes stout, 7.5 mm. long in the long-styled form. Berry ellipsoid, 1.5 cm. long, sparingly hirsute, black when dry, calyx lobes persisting until nearly ripe.

DISTRIBUTION. This species is endemic to Palawan where it grows on forested ridges at an altitude of about 700 meters. It has been collected in flower in April.

Philippine Islands. PALAWAN: Mount Capoas, Malampaya Bay, *Merrill 9496* (US–lectotype), April 1913.

The only specimen available for examination was the isotype from the United States National Museum belonging to the long-styled form and this is chosen as the lectotype, the holotype having been destroyed. The species seems to be distantly allied to *Mussaenda palawanensis* in the stipule and petal characters while differing from it in numerous other characters. It is, however, distinguished from other species by its characteristic setose indumentum, large leaves with 15–18 pairs of lateral veins which are prominent on the lower surface; ovate, bifurcate stipules; long, slender

corolla tubes, and sparingly hirsute, ellipsoid berries with persistent calyx segments.

20. **Mussaenda vidalii** Elmer, Leafl. Philip. Bot. 3: 993. 1911 (TYPE: *Elmer 11309*); Merrill, Enum. Philip. Fl. Pl. 3: 520. 1923.

FIG. 2, q, r, s, t, u, v, w, x.

Scandent shrub or small tree, 3–4 m. tall with lax, somewhat drooping, lenticellate, ferruginous pubescent branches. Leaves ovate, oblong-ovate or elliptic, 9–25.5 cm. long, 4.3–15.2 cm. broad, abruptly acute at apex, broadly obtuse, cuneate or rounded at base, ferruginous hairy on the upper surface, densely so on the lower surface with 6–11 pairs of lateral veins; petiole 1–5 cm. long, hirsute. Stipules deciduous, triangular-lanceolate, 6.5–10.5 mm. long, 6–9 mm. broad at the base, bifurcate from the apex 1/3–1/2 their length, lobes erect or slightly diverging, hirsute on the outer surface, glabrous or scantily hairy within at the base with few or numerous glands. Inflorescence a terminal, dichotomously branched, hairy, many-flowered cyme; bracts and bracteoles linear, or broadly lanceolate, 3–5 mm. long, hairy on the outer surface, glabrous or pubescent within, bracteoles broader, trifid at the apex. Flowers heterostylous on stout, densely hairy pedicels shorter than the ovaries. Calyx lobes oblong or ovate, 4–10 mm. long, 1–3.2 mm. broad, tapering to an acute apex, hairy on both surfaces, hairs on the outer surface longer and more dense; petaloid sepal whitish, 5–10 cm. long, 2.5–8.5 cm. broad, subacute, short cuneate at base, hirsute on both surfaces, 5-veined, "petiole" 2–2.5 cm. long, hirsute. Corolla tube yellowish green, 2.2–3 cm. long, curved, broad above, tapering to a narrow base, densely hairy on the outer surface, hairs long and spreading more or less at right angles to the tube, hairy within as far as the bases of anthers or lower, not tufted at the mouth; hairs extending as far as 1/2 the length of the tube in long-styled forms and 2/5 the length of the tube from the top in short-styled forms; corolla lobes pink to orange-red or yellow, broadly orbicular, 2–3 mm. long, 4–6 mm. broad, abruptly acute, hairy on the outer surface, papillate within. Stamens with short filaments, epipetalous 1/2–2/3 way up on the tube in long-styled forms and 3/5 way up in short-styled forms; anthers linear, dorsifixed, introrse, 5–6.2 mm. long, slightly bent, bilobed at the base. Ovary turbinate, 3.5–5.5 mm. long, densely hairy, 2-locular, with numerous ovules on cushion-shaped, axile placentae; style and stigma lobes 1.7–2.8 cm. and 6–8 mm. long respectively in long-styled forms, 2.5 mm. and 2 mm. long in short-styled forms. Berry ellipsoid, 1.5–2.2 cm. long, ferruginous pubescent, lenticellate, calyx lobes deciduous; seeds minute, reticulate, 0.53–0.73 mm. long, with 3–8 foveae in the areoles of the testa.

DISTRIBUTION. This species grows along the margins of humid forests or in the secondary growth of open rolling country at elevations between 150 and 600 meters above sea level in the islands of Mindanao, Leyte, and Samar. The type collection was made at 1140 meters elevation. Material

has been collected in flower between March and August; in fruit in March, June, and July.

Philippine Islands. SAMAR: Catubig River, *Ramos 24485* (A); Loquilocon, *Sulit 6098* (A); Mt. Cansayas, *Sulit 14366* (A); Bagacay, *Sulit 6280* (A). LEYTE: *Wenzel 667* (A); Ormoc, Antilao River, *Edano 11873* (A, PNH); Lake Danao, *Edano 11926* (PNH). MINDANAO: Bukidnon Prov., Pigtaoranan, *Anonuevo 13516* (A, PNH); Tangculan and vicinity, *Ramos & Edano 39050* (A), *39186* (A, US), *39035* (GH, US); Davao Dist., Todaya (Mt. Apo), *Elmer 11309* (GH–lectotype; A, NY, US–isotypes); Mt. Apo, *Clemens 15279* (NY, US).

This species shows the greatest variation in the collections from Leyte. They differ from the type collection in that they are small trees, with broader bracts and bracteoles in the inflorescence, ovate sepals somewhat resembling those of *Mussaenda macrophylla*, broader petals, and larger anthers and fruits. The seeds are identical with those of the typical form both in size and in the number of foveae in the areoles of the testa.

Mussaenda vidalii may be distinguished from other species by the spreading, ferruginous pubescence on stems, leaves, and flowers, the oblong or ovate sepals, short petals, large pubescent fruits with deciduous calyx segments, and the small seeds with 2 to 8 foveae in the areoles of the testa.

USES. The water in which the leaves of *Mussaenda vidalii* have been soaked for a few muintes is used as an eye wash; and the macerated leaves are applied to the head to allay drunkenness.

ROYAL BOTANIC GARDENS,
PERADENIYA, CEYLON