

The Native Hawaiian Species of *Morinda* (Rubiaceae) Hawaiian Plant Studies 94¹

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AS ON MOST OTHER ISLANDS in the tropical Pacific *Morinda citrifolia* L. occurs on the Hawaiian Islands. It was an economic plant for the aboriginal people who used it as a dye plant and as a medicine. It is now not uncommon in the lowlands, and it continues to propagate itself. However, its occurrence is mostly in the vicinity of present or former habitations of the Hawaiians. It seems evident that this species, the "noni" of the natives, was purposely brought here by the early Polynesian immigrants. It occurs from Africa, southern Asia, the Indian Ocean islands, and the tropical Pacific islands

eastward to Hawaii.

Besides the introduced *Morinda citrifolia*, there are native species in the Hawaiian Islands. *Morinda trimera* of Maui was published by Hillebrand in 1888, and *Morinda sandwicensis* and its var. *glabrata* were published by Degener in 1936. Subsequent collections and the present investigation now add to this total. Species or varieties are known on east Maui, west Maui, Lanai, the Waianae Mts. of Oahu, and the Koolau Range of Oahu. A single sterile collection has also been made on Kauai.

KEY TO SPECIES AND VARIETIES

- A. Blade surfaces both glabrous,
 - B. Stipule lobes 3.5–4 mm long, acute to acuminate; tertiary veins not hairy tufted; corolla lobes 4, ligulate, acute. West Maui. *M. waikapuensis*.
 - B. Stipule lobes 2–2.5 mm long, broadly deltoid, acute; tertiary veins with basal axillary puberulous tufts; corolla lobes 3, lanceolatè. Waianae Mts., Oahu. *M. sandwicensis*, var. *glabrata*.
- A. Blades pubescent below,
 - C. Tertiary veins below with basal axillary puberulent tufts,
 - D. Blades puberulent below; stipule tube 5–6 mm long; corolla lobes 3(–4) and 3.5–5 mm long. Waianae Mts., Oahu. *M. sandwicensis*, var. *sandwicensis*.
 - D. Blades early glabrate; stipule tube 6–8 mm long; corolla lobes 4 and 3 mm long. Koolau Range, Oahu. *M. sandwicensis*, var. *Hosakae*.
 - C. Tertiary veins below without axillary basal hairy tufts,
 - E. Stipule lobes 3–3.5 mm long, narrowly deltoid, acuminate; corolla tube 4 mm long, the lobes lanceolate, puberulous. East Maui. *M. trimera*.
 - E. Stipule lobes 5–6.5 mm long, lanceolate, acuminate; corolla tube 5–6 mm long, the lobes ligulate, acute, glabrous. Lanai. *M. lanaiensis*.

Morinda lanaiensis sp. nov. (sect. *Morinda*)

Figure 1

DIAGNOSIS HOLOTYPE: Arbor est, ramulis 2.5–4 mm diametro glabris 4-lateralibus, internodis 5–26 mm longis, ramis vetustioribus fuscis, stipulis glabris tubo 3 mm longo lobis 6.5 mm longis lanceolatis acuminatis, petiolis 14–22 mm longis, laminis 11–13.5 cm longis 3.7–4.3 cm latis firme

¹ Manuscript received 1 June 1976.
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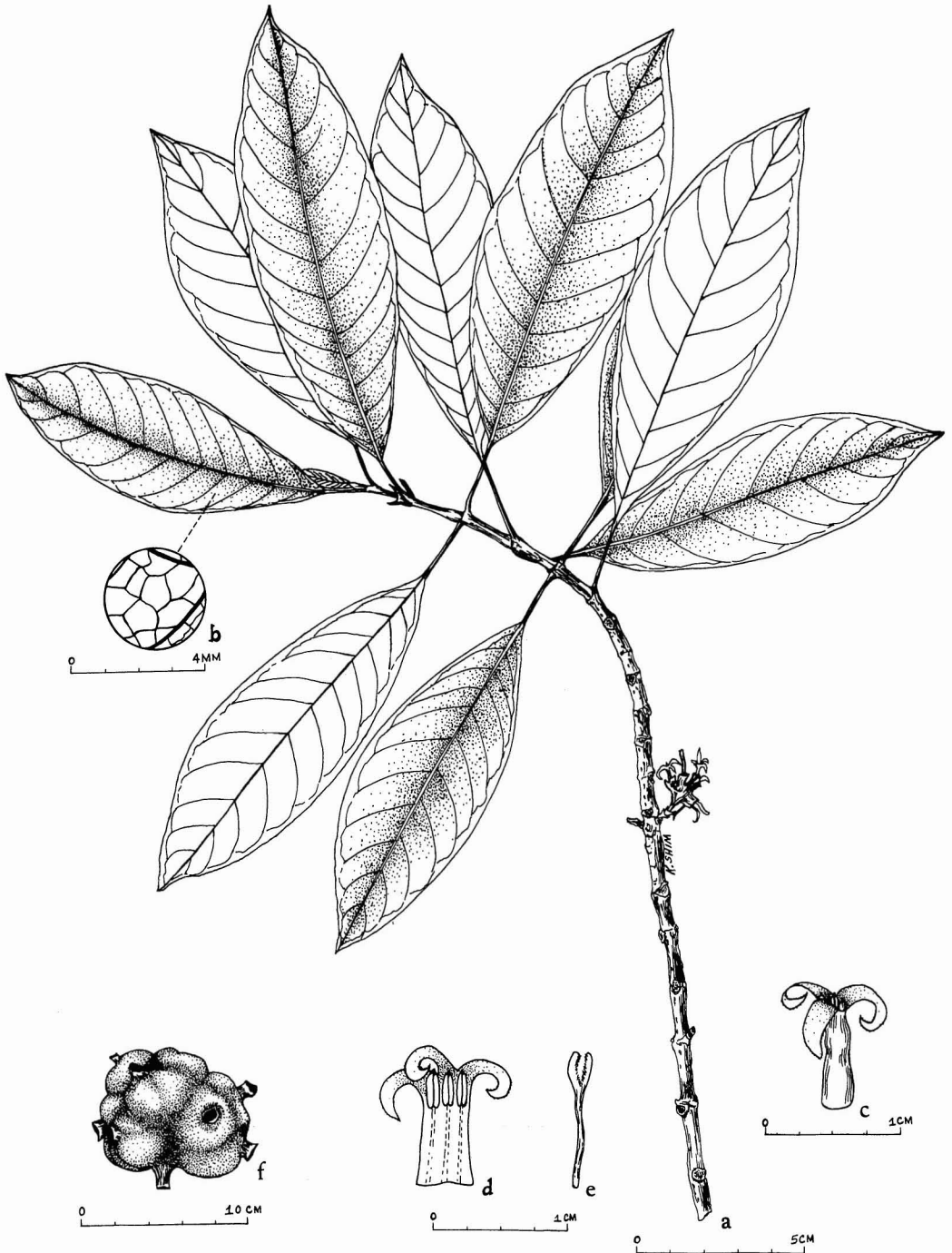


FIGURE 1. *Morinda lanaiensis* St. John, a-e from holotype. a, habit, $\times \frac{1}{2}$; b, leaf venation, $\times 5$; c, corolla, $\times 2$; d, opened corolla and anthers, $\times 2$; e, style and stigmas, $\times 2$; f, from Forbes 326.L., fruit, $\times 1$.

chartaceis integris elliptici-oblancoelatis apice subacuminato basi breve cuneata supra glabris infra in initio sparse omnino puberulis pilis praesertim ad midnervum durantibus axilibus nervorum secundariorum puberulis axilibus tertiorum glabris, inflorescentiis axilaribus in ramis nudis, pedunculo 8–12 mm longo supra nudo sed dimidio infero cum 2 nodis cum tubis stipularum et bracteis 10 mm longis linearibus vel 25–30 mm longis foliaceis, capiti in flore 2 cm diametro globoso cum 7–9 floribus connatis, tubo calycis 2.5–3 mm longis cum 2–3 lobis vadose deltoideis latoribus, tubo corollae 6 mm longo, 3 lobis corollae 5 mm longis late ligulatis acutis recurvatis, 3 antheris 2.3 mm longis in fauce corollae et paulo exsertis, stylo 8 mm longo bifido, 2 stigmatibus 1 mm longis anguste ellipsoideis, ovariis coherescentibus in flore 7 mm diametro in fructu 2–2.4 cm diametro subgloboso.

DIAGNOSIS OF HOLOTYPE: Tree; branchlets 2.5–4 mm in diameter, glabrous, 4-sided; internodes 5–26 mm long; older branchlets buff-colored; stipules glabrous, the tube 3 mm long, its lobes 6.5 mm long, lanceolate, acuminate; petioles 14–22 mm long; blades 11–13.5 cm long, 3.7–4.3 cm wide, firm chartaceous, entire, elliptic-oblancoelate, the apex subacuminate, the base short cuneate, above glabrous, below at first sparsely puberulous throughout, and the hairs persisting especially near the midrib, and the basal axils of the secondary veins puberulent tufted, but the axils of the tertiary veins glabrate; inflorescences axillary, on the naked older branchlets; peduncle 8–12 mm long, naked above, but the lower half with 2 nodes bearing stipular tubes and bracts, either 10 mm long and linear, or 25–30 mm long and foliaceous; head in flower 2 cm in diameter, globose, of 7–9 connate flowers; calyx tube 2.5–3 mm long, with 2–3 lobes, very broad and low deltoid; corolla tube 6 mm long; 3 corolla lobes 5 mm long, broad ligulate, acute, recurving; 3 anthers 2.3 mm long, in the corolla throat, slightly protruding; style 8 mm long, bifid; 2 stigmas 1 mm long, narrowly ellipsoid; the coalescent

ovaries in flower 7 mm in diameter, in fruit 2–2.4 cm in diameter, subglobose.

EXPANDED DESCRIPTION: Internodes 5–65 mm long; stipule tube 3–4.5 mm long, the lobes 4–6.5 mm long; petioles 10–22 mm long; blades 8.5–15.5 cm long, 2.9–5 cm wide; peduncles 6–12 mm long; heads of 5–11 flowers; corolla tube 5–6 mm long; fruiting head 2 cm in diameter, subglobose and with each of the persistent calyces projecting.

HOLOTYPE: Hawaiian Islands, Lanai Island, Kahinahina, 14 June 1915, G. C. Munro 262 (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Lanai Island, mountains near Koele, June 1913, C. N. Forbes 126.L (BISH); Dog Valley, September 1911, Forbes 326.L (BISH); valley connecting Koele and Maunalei gulches, 2 December 1914, Forbes 365.L (BISH); Wahani, 2 December 1914, Munro 74 (BISH); Kahinahina, 4 June 1915, Munro (BISH); Papalahoomoe, rare, 13 April 1928, Munro 310 (BISH).

DISCUSSION: The new epithet is formed from the name of the type locality, Lanai, and *-ensis*, the Latin geographic adjectival ending.

Morinda sandwicensis Degener, var. *sandwicensis*, Fl. Haw., Fam. 332, 7/3/36, illustrated.

ORIGINAL DIAGNOSIS: "Arbor 10 m. alta, foliis 13–18 cm. longis et 6–8 cm. latis, corolla 15 mm. longa, petalis 3–4, anthera 4 mm. longa."

Added to this there is a long and detailed description, and a good and detailed illustration. Hence, there is no need to print another illustration.

SUPPLEMENTARY DESCRIPTION: Blades 8–18 cm long, 4–8 cm wide, oblanceolate to oblance-elliptic, above glabrous, below puberulent throughout and puberulent tufted in the basal axils of the secondary and the tertiary veins; stipule tube 5–6 mm long, the

lobes 2 mm long, broadly deltoid, the 3(-4) corolla lobes 3.5-5 mm long.

Degener states in his diagnosis that the flowers are 15 mm long; and in his description that the corolla tube is 8 mm long, and the lobes 7 mm long. On the contrary, his detailed figure shows the tube 5-6 mm long, and the lobes 5 mm long. The corolla is fleshy and it shrinks on drying. The dried flowers on the holotype have the corolla tube 5 mm long and the lobes 3.5-5 mm long.

HOLOTYPE: Hawaiian Islands, Waianae Mts., "On the summit near spur dividing Makua Valley from Kahanaiki Valley, Oahu." On the type label there is added, "Dense wet forest of large trees, 10 July 1932, *O. Degener*, *K. Park*, & *Y. Nitta* 9,423 (BISH)."

SPECIMENS EXAMINED: All in the Bernice P. Bishop Museum and all from Hawaiian Islands, Oahu, Waianae Mts.: southeast corner Makua Valley, 27 September 1932, *O. Degener* & *C. Judd* 9,427; west central branch Makaleha Valley, forest, 23 October 1936, *Degener*, *Krauss* & *Martinez* 11,053; west side Makaleha Valley, on trail meeting Piko Trail, 21 July 1935, *Degener*, *Park*, *Potter*, *Bush* & *Topping* 11,512; east branch of East Makaleha Valley, forested side gulch, 1,800 ft alt., 30 July 1950, *Degener* 20,804; Mokuleia, mauka of Peacock Flats, dark gulch, 2,000 ft alt., 23 April 1962, *O.* & *I. Degener* 27,938; Makaha-Waianae Kai, xerophytic forest, 670 m alt., 19 June 1972, *W. C. Gagné* & *J. Obata* 633; Mokuleia, west branch of East Makaleha Valley, *Diospyros* forest, 1,700 ft alt., *W. H. Hatheway* & *Degener* 412; Mt. Kaala, 14 September 1924, *J. M. Horner* D38; Kukuiala Valley, 1,000-1,200 ft alt., 16 September 1933, *N. H. Krauss*; Puu Kalena side of Haleauau Valley, 2,400-2,600 ft alt., 15 October 1933, *Krauss*; Mokuleia Forest Reserve, 2,160 ft alt., May 1967, *M. Landgraf*; Makaleha Valley, 30 August 1922, *H. L. Lyon* D72; Mt. Kaala, moist ravine, 1,600 ft alt., 14 August 1927, *L. H. MacDaniels* 928; Maunauna Valley, 3 miles southeast of Puu Hapapa, 2,500 ft alt., 6 October 1958, *G. Pearsall* 312; Puu Hapapa, Honouliuli, moist wooded valley,

1,400-2,878 ft alt., 16 March 1930, *H. St. John* 10,433; Puu Hapapa, 1,500 ft alt., 25 October 1931, *St. John* 11,132; Puu Kalena, Waianaeuka, wooded gulch, 1,600 ft alt., 5 November 1933, *St. John* 13,383; between Kaala and Kolekole Pass, 25 September 1938, *O. Selling* 3,658.

Morinda sandwicensis Degener, var. *glabrata* (Degener) comb. nov.

M. sandwicensis Degener, forma *glabrata* Degener, Fl. Haw., Fam. 332, 7/3/36.

ORIGINAL DIAGNOSIS: "Frutex." To this was added, "This plant differs from the species in being a glabrate, loosely branching shrub about 2-3 meters high."

EXPANDED DESCRIPTION: Shrub or tree to 16 m in height and 15 cm in diameter; blades 13-17 cm long, 3.5-7.3 cm wide, elliptic to oblance-elliptic, above glabrous, below glabrous except for the puberulent tufts at the basal axils of the secondary veins and of some of the tertiary veins; stipule tube 3-5 mm long, the lobes 2-2.5 mm long, broadly deltoid; the 3 corolla lobes 4 mm long, lanceolate.

HOLOTYPE: Hawaiian Islands, Waianae Mts., "Near end of Schofield Fire-break Trail at base of Kaala, Oahu" (BISH). The type label also reads: "in wet dark forest, shrubby tree, not uncommon," 13 March 1932, *O. Degener*, *K. Park*, *D. Topping*, & *O. Swezey* 4,150.

SPECIMENS EXAMINED: All on Hawaiian Islands, Oahu Island, Waianae Mts.: valley southeast of Puu Hapapa, dense forest, 30 October 1932, *O. Degener*, *K. Park*, *T. Yamamoto*, & *Y. Iwasaki* 9,424; mauka of Kahanaiki and Makua Valleys, dense forest, *Degener* & *Y. Nitta* 9,425; small valley northeast of Puu Hapapa, 7 August 1932, *Degener* & *Park* 9,426; Palehua, 1-4 April 1911, *C. N. Forbes* 1,698.O; left branch of Mokuleia, 26 April-16 May 1912, *Forbes* 1,769.O; Kaluaa Gulch, east side, between Puu Kanehoa and Puu Hapapa, forest, 500 m alt., 26 April 1970, *W. C. Gagné* 505; 630 m alt., 21 May 1972, *Gagné* 627; Mokuleia

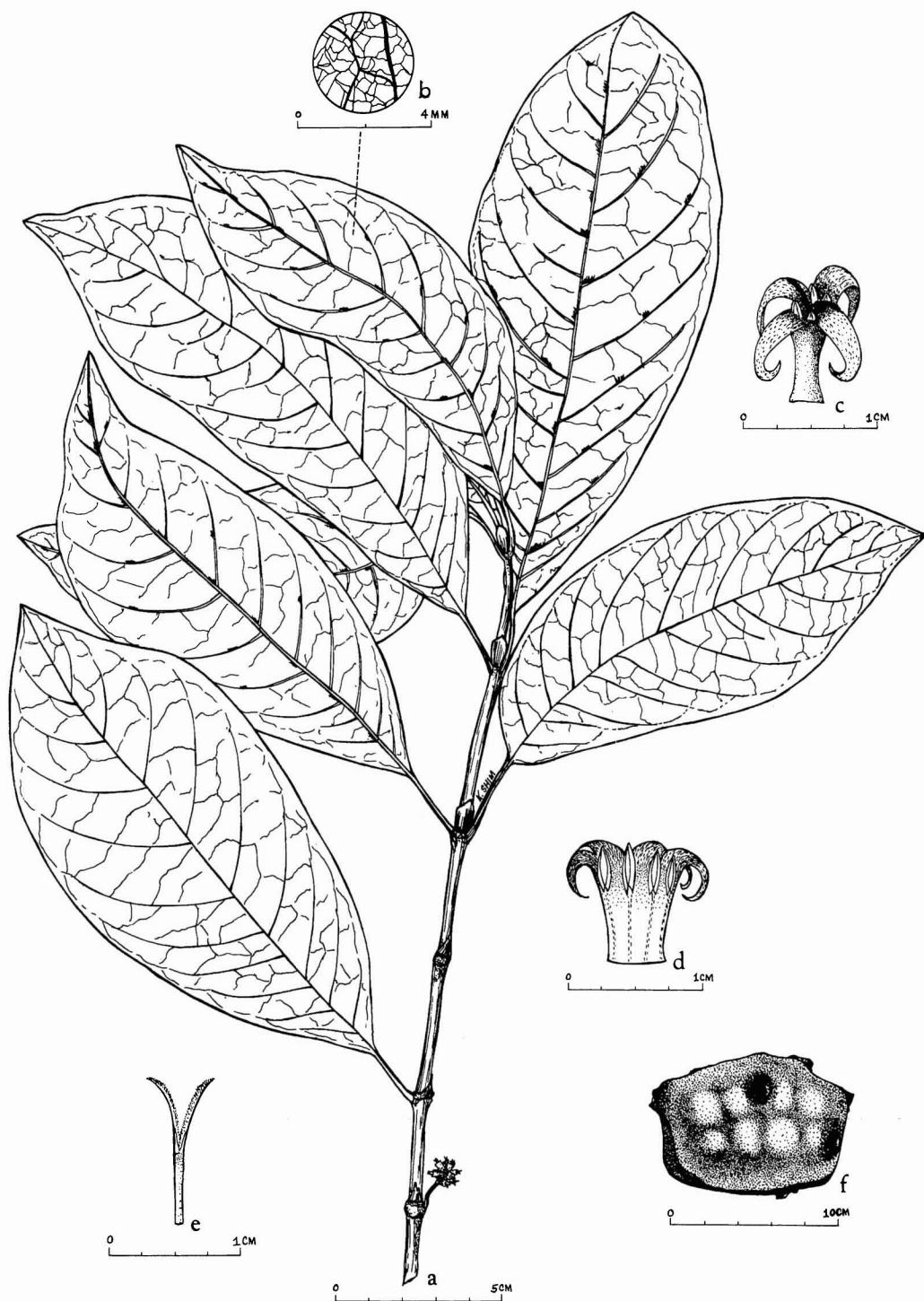


FIGURE 2. *Morinda sandwicensis* Degener, var. *Hosakae* St. John, from holotype. *a*, habit, $\times \frac{1}{2}$; *b*, leaf venation, $\times 5$; *c*, corolla, $\times 2$; *d*, opened corolla and anthers, $\times 2$; *e*, style and stigmas, $\times 2$; *f*, fruit, $\times 1$.

Forest Reserve, May 1967, *M. Landgraf*; between Puu Hapapa and Puu Kanehoa, near bottom of gulch, 2,200 ft alt., 31 May 1972, *K. Nagata* 1,020; valley between Kanehoa and Puu Kaua, Kunia, 2,600 ft alt., 1 September 1959, *G. A. Pearsall* 467a; Firebreak Trail, back of Schofield firing range, 3 June 1960, *Pearsall* 517; Kanehoa, October 1929, *G. W. Russ*; Waianae [Mts.], February 1930, *Russ*; Makua, May 1930, *Russ*; Kunia trail, east of Puu Kanehoa, 2,000 ft elev., 26 March 1960, *B. C. Stone* 3,244.

DISCUSSION: From more numerous recent collections, it is now known that the variety is also arboreous, so Degener's sole diagnostic character no long holds. However, the tree has differences in leaf pubescence, in the stipule tube, and in the corolla lobes. Its range largely coincides with that of the species, but because of its several differences in morphology, it is here raised to the rank of a variety.

Morinda sandwicensis Degener, var. *Hosakae* var. nov.

Figure 2

DIAGNOSIS HOLOTYPE: A specie differt in laminis infra sparse puberulis mox glabratis, stipulis cum tubis 6–8 mm longis.

DIAGNOSIS OF HOLOTYPE: Differing from the species in having the blades below sparsely puberulous, but early glabrate; the basal axils of the secondary and tertiary veins below puberulent tufted; the stipule tube 6–8 mm long, and the lobes 2 mm long, broadly deltoid; the corolla tube 8 mm long, and the 4 lobes 3 mm long, lanceolate, acute.

HOLOTYPE: Hawaiian Islands, Oahu Island, Koolau Range, south ridge of Kipapa Gulch, in wet wooded gulch, 1,600 ft elev., 16 April 1933, *E. Y. Hosaka* 963 (BISH).

SPECIMENS EXAMINED: All from Hawaiian Islands, Oahu Island, Koolau Range: upper Wahiawa, 17–18 December 1910, *C. N. Forbes* 1,620.O; Kipapa Gulch, second north fork, along wet stream bed, 1,500 ft elev., 11

June 1933, *Hosaka* 1,075 (BISH); Kauaiiki trail, 30 November 1957, *G. Kitamura* (BISH).

DISCUSSION: The new epithet is given in honor of Edward Yataro Hosaka (1906–1961), a former student of the writer's, and assistant, or agronomist at the Bernice P. Bishop Museum, and the University of Hawaii. His taxonomic and ecologic exploration and publication on Kipapa Gulch is a classic in Hawaiian botanical literature.

Morinda trimera Hbd., Fl. Haw. Is. 177, 1888.

Figure 3

ORIGINAL DIAGNOSIS: "A tree 20 ft. high, with yellowish wood, the pale terete branches covered with numerous warts or lenticels. Leaves opposite, elliptico- or obovato-oblong, 4–6' × 1½–2¼', on petioles of 1–1½', equally acuminate at both ends; chartaceous to membranous, pubescent underneath, particularly along the nerves and in their axils, almost black when dry. Stipules 3'', acuminate, connate into a deep sheath. Peduncles in the axils of old leaves and cauline, 1½–2' long, pluribracteate at the base—the bracts connate, apiculate or subulate—and often with a pair of leaflets at the middle. Flowers 8–12 in a glomerule, connate with their bases. Calyx 1–1½'', free from the ovary, urceolate or cupular, truncate, with 3-toothlets. Corolla 4'', coriaceous, puberulous, tubular-ventricose, shortly 3-toothed, the teeth or lobules induplicate-valvate or cucullate. Anthers 3, subsessile on the lower third of the corolla, oblong, included. Ovary small, globose-depressed, immersed in an annular disk at the bottom of the calyx. Style about the length of the calyx, bifid, with one branch shorter than the other. Drupe or berry of 4 distinct woody pyrenas, fleshy, adherent with and enclosed within the globose calyx, each pyrena with 1 erect seed, and the calices connate into a syncarpium which measures about 1' in diameter."

REVISED DIAGNOSIS OF LECTOTYPE AND CLASTOTYPE: Tree 6.6 m tall; branchlets 2–4 mm in diameter, glabrous, somewhat 4-

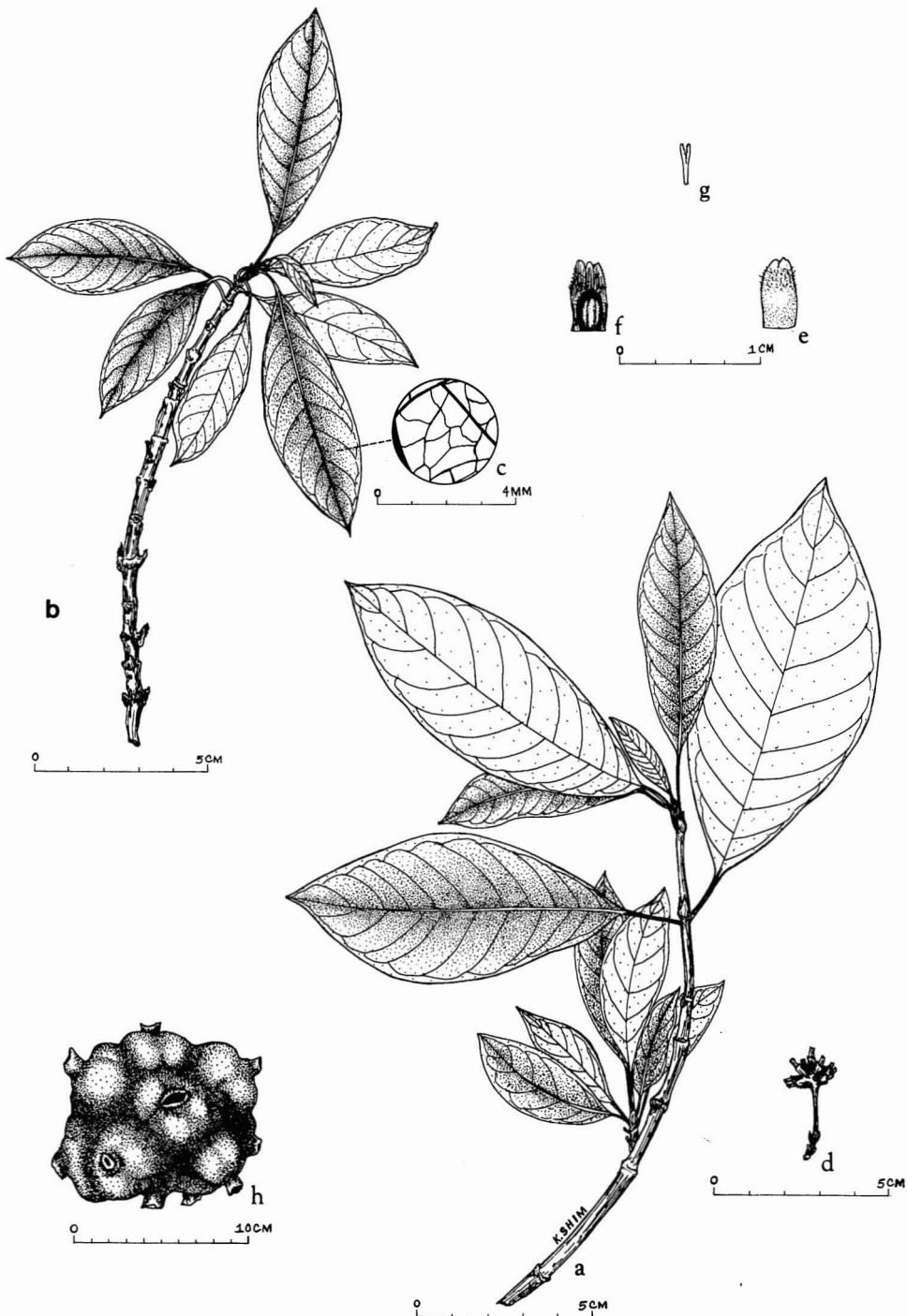


FIGURE 3. *Morinda trimera* Hbd., *a, d, e, f, g* from Makawao, May 1911, *J. F. Rock*; *b, c* from lectotype; *h*, from *Rock* 8,628; *a, b*, habit, $\times \frac{1}{2}$; *c*, leaf venation, $\times 5$; *d*, inflorescence, $\times \frac{1}{2}$; *e*, corolla in bud, $\times 2$; *f*, opened corolla and anthers, $\times 2$; *g*, style and stigmas, $\times 2$; *h*, fruit, $\times 1$.

sided; internodes 4–16 mm long, buff-colored, corky; stipules with the tube 3 mm long, the lobes 3 mm long, lanceolate, acute or acuminate; petioles 7–13 mm long; blades 8–11.7 cm long, 2.3–5 cm wide, firm chartaceous, elliptic, entire, the apex subacuminate, the base short cuneate, above glabrous, below puberulent throughout, more densely so along the secondary veins and the midrib, and the basal axils of the secondary veins puberulent tufted; inflorescences axillary on the naked older branchlets; peduncle about 19 mm long, the upper part naked, the lower part bracteate, the uppermost bracts with the stipule tube 0.3 mm long, the lobes 2 mm long, lanceolate, the bracts 4.5–5 mm long, linear; head in large bud 1.8 mm in diameter, globose, with 9 flowers; in fruit 2–2.5 cm in diameter, subglobose; calyx tube 2.3–2.5 mm long, at base minutely puberulous, the apex truncate or sinuously notched; corolla in large bud 5–5.5 mm long, and at apex showing the tips of the 3 lobes.

EXPANDED DESCRIPTION: Branchlets 2–4 mm in diameter, terete or slightly 4-sided, glabrous; older branchlets buff to gray; stipules with the tube 3 mm long, the lobes 3–3.5 mm long, narrowly deltoid, acuminate; petioles 15–40 mm long; blades 7–17 cm long, 3.5–7.3 cm wide, elliptic to oblance-elliptic, the apex abruptly acute, the base shortly cuneate, firm chartaceous, above glabrous, below at first puberulent throughout, and the hairs persistent near the midrib, the basal axils of the secondary veins puberulent tufted, but the axils of the tertiary veins not tufted; inflorescences axillary on the naked older branchlets; peduncles 15–60 mm long; head in flower 15 mm in diameter, with 8–12 flowers; calyx tube 2.5–3 mm long, with 3 low, very broad deltoid lobes; corolla tube 4 mm long, fleshy, puberulous.

HOLOTYPE: "Collected by Mr. Lydgate in the forests of Hamakua and Waikapu, Maui!" (B). Now destroyed.

LECTOTYPE: Hawaiian Islands, east Maui, Hamakua, *J. M. Lydgate*, ex herb. Hillebrand (BISH).

SPECIMENS EXAMINED: Hawaiian Islands,

east Maui, Haleakala, near Honomanu Gorge, along ditch trail, 1910, *J. F. Rock* 8,628 (BISH); Makawao, May 1911, *Rock* (BISH).

Morinda waikapuensis sp. nov. (sect. *Morinda*)

Figure 4

DIAGNOSIS HOLOTYPE: Arbor 5 m alta est, cortice cinnamomei-badio, ramis in angulo acuto adscendentibus, ramulis 2.5–4 mm diametro 4-lateratis, internodis 5–25 mm longis, tubo stipulae 4 mm longo lobis 3.5–4 mm longis deltoideis acutis, petiolis 22–25 mm longis, laminis 13–14 cm longis 5.5–6.5 cm latis crasse chartaceis integris late oblancei-ellipticis vel ellipticis subito acutis basi cuneata supra glabris infra in axilibus venularum principalium puberulis, inflorescentiis axilaribus in ramis nudis, pedunculo 8–10 mm longo in dimidio infero cum paribus bracteis compluribus eis infimis 3 mm longis ovatis illis superis cum apice ligulato 3 mm longo, capiti in flore 23 mm diametro globoso cum 8–11 floribus connatis, tubo calycis 4 mm longo cum 2 lobis vadose deltoideis latissimis, tubo corollae 7 mm longo, 4 lobis corollae 4 mm longis ligulatis acutis recurvatis, apicibus antherarum paulo exsertis, 4 antheris 2 mm longis 0.5 mm latis elliptici-oblongis, filamentis cum tubo corollae adnatis, stylo 5 mm longo, lobis stigmatibus 0.3–0.2 mm longis inaequalibus.

DIAGNOSIS OF HOLOTYPE: Tree 5 m tall; bark cinnamon-brown; branches tend to ascend at an acute angle; branchlets 2.5–4 mm in diameter, 4-sided; internodes 5–25 mm long; stipule tube 4 mm long, the lobes 3.5–4 mm long, deltoid, acute; petioles 22–25 mm long; blades 13–14 cm long, 5.5–6.5 cm wide, thick chartaceous, entire, broadly oblance-elliptic or elliptic, abruptly acute, the base cuneate, above glabrous, below with puberulent tufts in the axils of the principal veins; inflorescences from axils on the naked, older branchlets; peduncle 8–10 mm long, with several pairs of bracts on the lower half, the lowest ones 3 mm long, ovate, the upper ones with ligulate

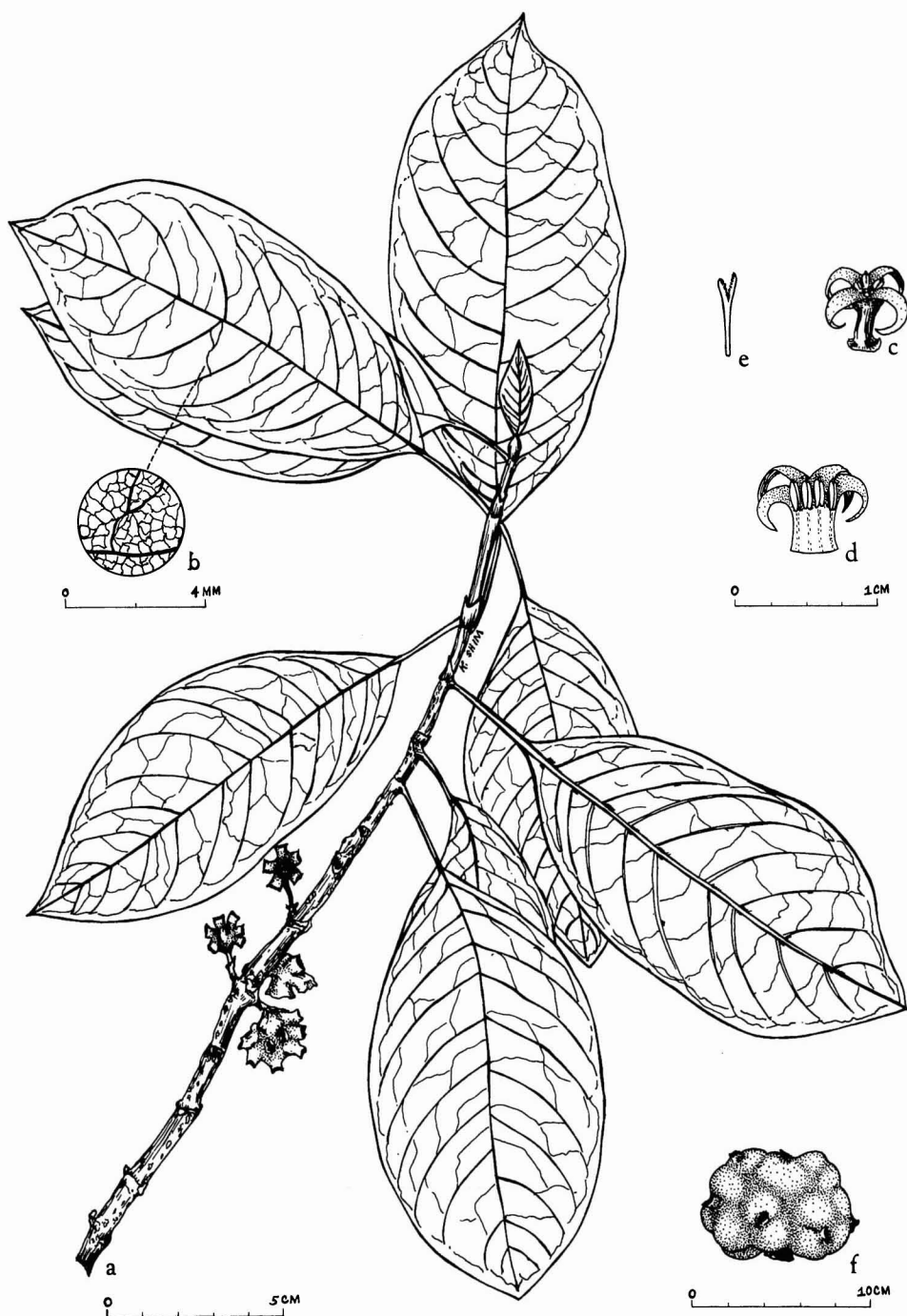


FIGURE 4. *Morinda waikapuensis* St. John, from holotype. *a*, habit, $\times \frac{1}{2}$; *b*, leaf venation, $\times 5$; *c*, corolla, $\times 2$; *d*, opened corolla and anthers, $\times 2$; *e*, style and stigmas, $\times 2$; *f*, fruit, $\times 1$.

tips 3 mm long; head in flower 23 mm in diameter, globose, of 8–11 connate flowers; calyx tube 4 mm long, tubular, with 2 very low and broad deltoid lobes; corolla tube 7 mm long, 4 corolla lobes 4 mm long, ligulate, acute, recurved; anther tips barely exerted; 4 anthers 2 mm long, 0.5 mm wide, elliptic-oblong, the filaments fused to the corolla tube; style 5 mm long; stigmatic lobes 0.3–0.2 mm long, unequal.

EXPANDED DESCRIPTION: Internodes 5–40 mm long; stipule tube 3.5–4 mm long, the lobes 3–4 mm long, broadly deltoid to lanceolate, acuminate; petioles 11–25 mm long; blades 6.5–14 cm long, 2.5–6.5 cm wide; peduncle 7–10 mm long; head in fruit 2 cm in diameter, the calyx almost immersed.

HOLOTYPE: Hawaiian Islands, west Maui Island, Waikapu Valley, June 1910, C. N. Forbes 133.M (BISH).

SPECIMENS EXAMINED: Hawaiian Islands,

west Maui Island, Waikapu, *W. Hillebrand & J. M. Lydgate*, ex herb. Lydgate (BISH). Of this there are three sheets, one labeled "Hamakua," and two labeled "Waikapu or Hamakua." Hillebrand selected them as duplicates and sent them back to Lydgate in Hawaii. These were part of Hillebrand's basis for his *M. trimera*, but they all have glabrate blades, and it seems clear that they were a part of Lydgate's collection from Waikapu in west Maui. The writer is selecting the Lydgate collection with the blades puberulent beneath, from Hamakua (BISH) as the lectotype of *M. trimera* Hbd.

Morinda sp.

In the Bishop Museum is a solitary collection by J. M. Lydgate from Kauai that seems to be a native member of the genus *Morinda*. Since it lacks inflorescence and fruit, it is not capable of precise identification.

HAWAIIAN ISLANDS ASSEMBLED

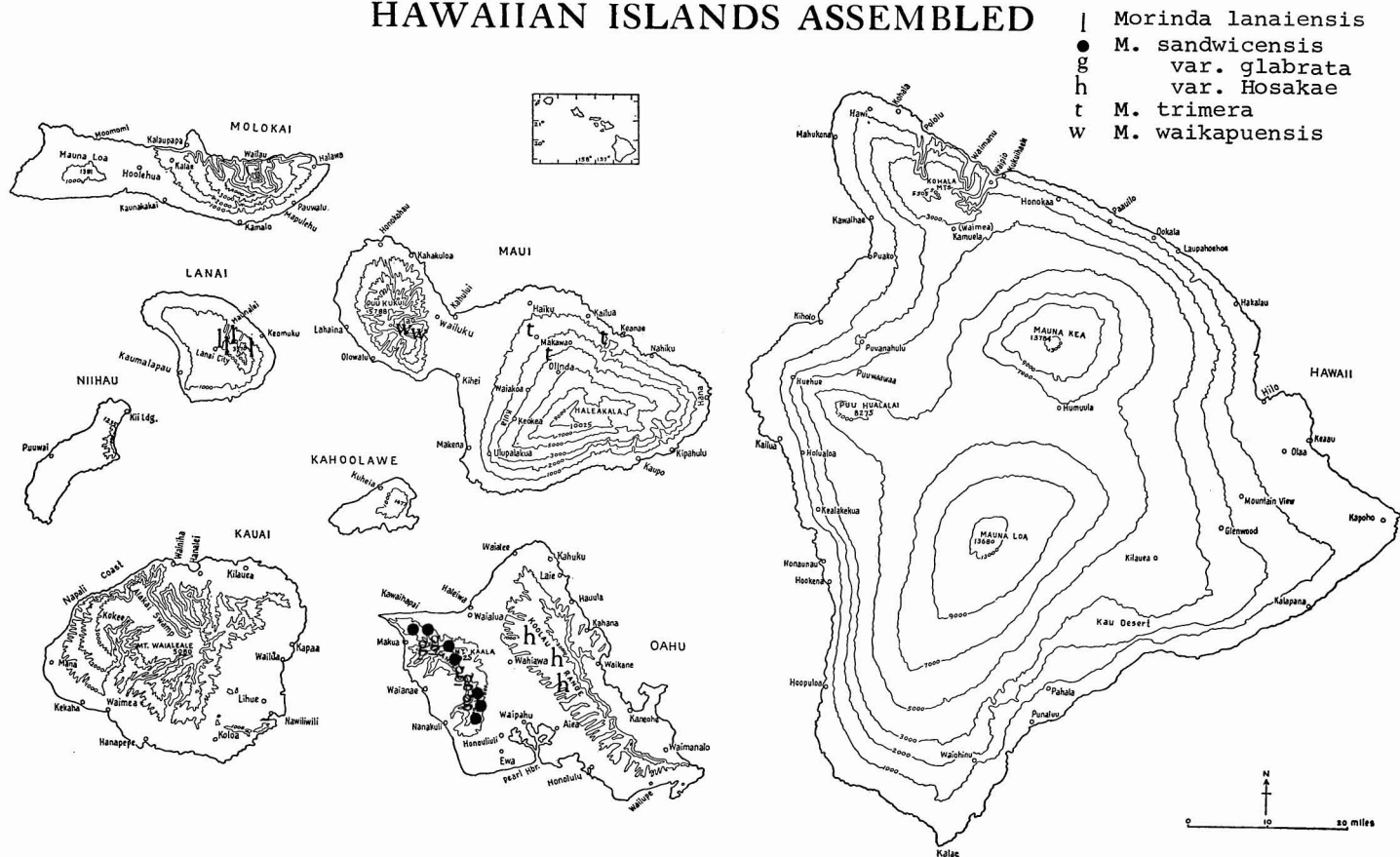


FIGURE 5. Distribution map of the Hawaiian species of *Morinda*.