

Endemic Plants of Kipahulu Valley, Maui, Hawaiian Islands Hawaiian Plant Studies 36¹

HAROLD ST. JOHN²

MUCH OF THE MOUNTAIN HALEAKALA on Maui is of easy access and has a flora quite well known. Kipahulu Valley is an outer valley at the southeast corner of the great volcano. It is remote, difficult of access, and its middle and upper parts have a dense, wet, virgin vegetation. An attempt is now being made to acquire title to it and to preserve it as a wilderness or nature preserve.

Botanical explorations of it were made in 1919 by C. N. Forbes, in 1936 by H. St. John and R. J. Catto, in 1945 by H. St. John and A. L. Mitchell, in 1967 by C. H. Lamoureux and R. E. DeWreede, and in 1969 by J. Henrickson. The writer has made a close study of many of these collections, and here announces the discovery among them of the following 15 new species and 5 new varieties.

GRAMINEAE

Panicum lamiatile sp. nov. (sect. *Turfosa*)

Fig. 1

DIAGNOSIS HOLOTYPI: Planta perennis breve stolonifera sed pulvinos densos ad 3 dm diametro semisummersos formanti, culmis 5–10 cm altis filiformibus, internodis 2–6 mm longis, vaginis 7–10 mm longis glabris cum nervis longitudinalibus elevatis, ligula ut linea pilis 0.2 mm longis albis, laminis 10–15 (–20) mm longis 1.5–1.8 mm latis lancei-ligulatis glabris crebre nervosis marginibus involutis praecipue in dimidio apicali, panicula 3–12-florifera parte $\frac{1}{2}$ – $\frac{2}{3}$ basali vulgo in vaginis inclusa, rhachide albipilosulo, pedicelis 2–3 mm longis glabris, spiculis 2–2.3 mm longis glabris, gluma prima $\frac{1}{4}$ – $\frac{1}{3}$ tam longa quam spicula ovata trinervosa, gluma secunda 1.8–2 mm longa elliptica 7-nervosa subviridi, lemma sterili 2 mm longa elliptica 7-nervosa, lemma fertili 1.5 mm longa

elliptica, granis 1.7 mm longis ellipsoideis stramineis.

DIAGNOSIS OF HOLOTYPE: Perennial, forming dense tussocks up to 3 dm in diameter, partly submerged, at the margins of the tussock short stoloniferous; culms 5–10 cm tall, filiform; internodes 2–6 mm long; sheaths 7–10 mm long, glabrous, with raised longitudinal nerves; ligule a line of white hairs 0.2 mm long; blades 10–15 (–20) mm long, 1.5–1.8 mm wide, lance ligulate, glabrous, strongly veined, the margins involute and completely so for at least the outer half; panicle 3–12-flowered, usually the lower $\frac{1}{2}$ – $\frac{2}{3}$ enclosed in the leaf sheaths; rhachis white pilosulous; pedicels 2–3 mm long, glabrous; spikelets 2–2.3 mm long, glabrous; first glume $\frac{1}{4}$ – $\frac{1}{3}$ as long as the spikelet, ovate, 3-nerved; second glume 1.8–2 mm long, 7-nerved, greenish; sterile lemma 1.5 mm long, elliptic, 7-nerved; fertile lemma 1.3–1.5 mm long, elliptic; grain 1.7 mm long, ellipsoid, stramineous.

HOLOTYPE: Hawaiian Islands, Maui Island, Haleakala, Wai Anapanapa, Kipahulu-Kuhiwa divide, 6,700 ft. alt., forming tussocks up to 3 dm in diameter, stoloniferous at margins, partly submerged in tiny open bog on divide, with *Oreobolus*, *Viola maviensis*, *Carex montiseeka*, Aug. 16, 1945, H. St. John and A. L. Mitchell 21,032 (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, Haleakala, bog below Waianapanapa, Aug. 20, 1919, C. N. Forbes 1,174 (BISH); n. w. slope of Haleakala, $1\frac{1}{2}$ miles n. e. of Paliku Cabins, in bog at e. end of *Deschampsia* grassland, forming low mats between clumps of *Oreobolus*, with *Carex svenonis*, *C. montiseeka*, 7,400 ft. alt., July 18, 1969, J. Henrickson 3,896 (BISH).

DISCUSSION: *P. lamiatile* is a member of the section *Turfosa*, as is its closest relative, *P. koolauense* St. John and Hosaka, of Oahu, a

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² B. P. Bishop Museum, Honolulu, Hawaii 96818, U. S. A.

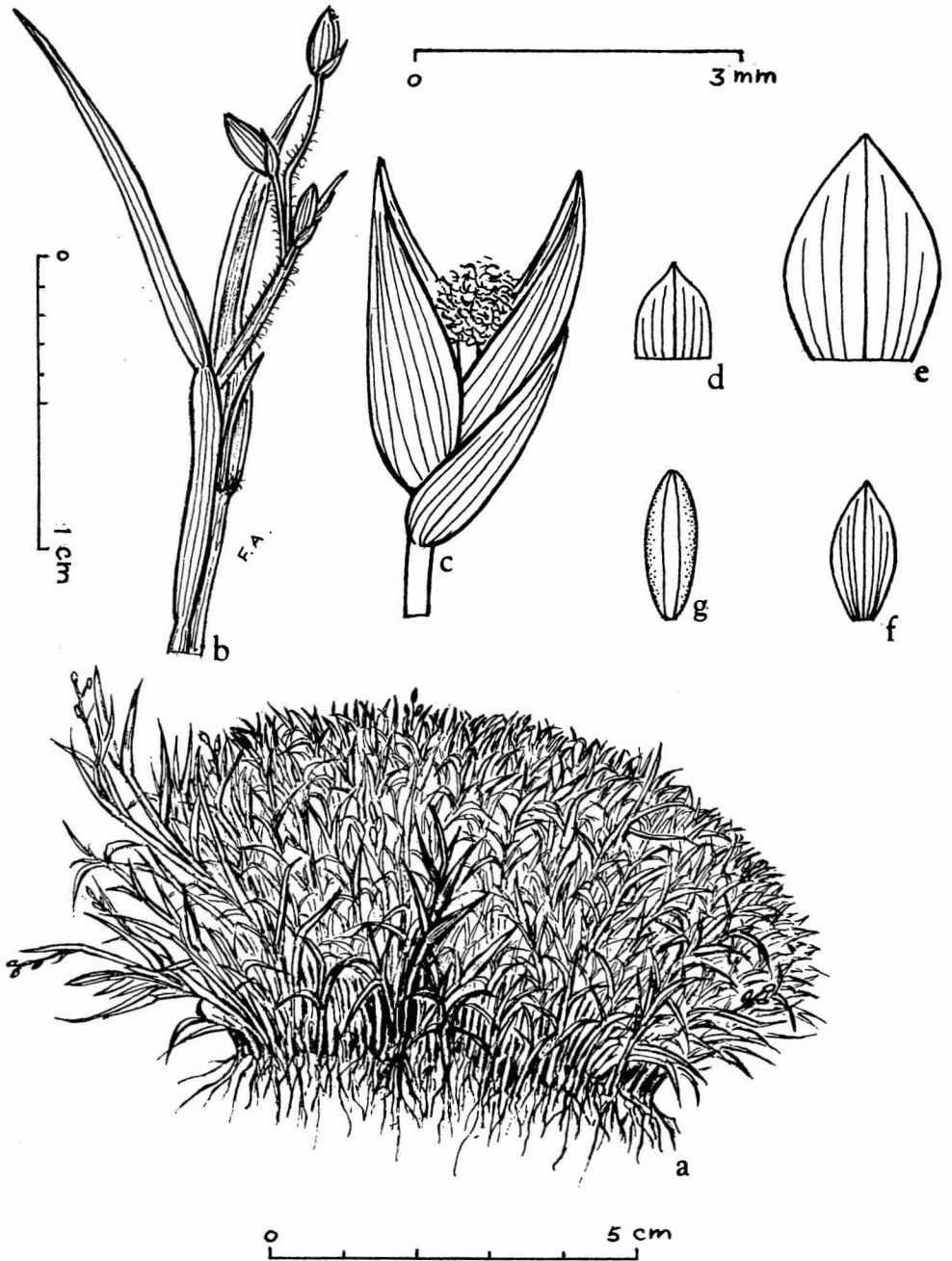


FIG. 1. *Panicum lamiatile* St. John, from holotype. *a*, habit, $\times 1$; *b*, inflorescence, $\times 4$; *c*, spikelet, $\times 15$; *d*, first glume, $\times 15$; *e*, second glume, $\times 15$; *f*, sterile lemma, $\times 15$; *g*, fertile lemma, $\times 15$.

species with the inflorescence a raceme of 2–3 (–6) spikelets (rarely a panicle), mostly shorter than or equalling the leaves; rhachis glabrous; pedicels 0.3–0.9 mm long; first glume $\frac{1}{2}$ – $\frac{3}{5}$ as long as the spikelet; second glume 9-nerved; leaf sheaths pilosulous at base, shorter than the internodes, the margins pilose ciliate. *P. lamiatile* has the inflorescence a panicle of 3–12 spikelets, and usually the lower $\frac{1}{2}$ – $\frac{2}{3}$ enclosed by the leaf sheaths; rhachis white pilosulous; pedicels 2–3 mm long; first glume $\frac{1}{4}$ – $\frac{1}{3}$ as long as the spikelet; second glume 7-nerved; leaf sheaths glabrous, longer than the internodes.

The new epithet is formed from the Latin, *lama*, bog; and the suffix *-atilis*, growing on, and it refers to the habitat.

Panicum lustriale sp. nov. (sect. *Turfosa*)

Fig. 2

DIAGNOSIS HOLOTYPE: Planta perennis pulvinos formanti sine stolonibus est, culmis 2–3 dm altis filiformibus, internodis 8–33 mm longis, vaginis 11–22 mm longis gracilibus in basi et proxima apicem pilosulis et in trienti supero sparse minute gracile puberulis nervis longitudinalibus elevatis, ligulis cum pilis 0.3 mm longis albis, laminis 15–29 mm longis 1.2–1.7 mm latis pallide viridibus anguste ligulatis in trienti apicali in apice acuto deminuenti marginibus plerumque revolutis praecipue ad apicem ut videtur glabris sed supra omnino et infra ad apicem in sulcis minutissime adpresse albi-puberulis, panicula 7–11-florifera et 15–20 mm longa exserta, pedunculo minoriter adscendente albi-puberulo, rhachide 10–15 mm longo minoriter adscendente albi-puberulo, pedicellis 1–3 mm longis puberulo sed pilis brevioribus, spiculis 3–3.2 mm longis glabris cum glumis viridibus vel rubri-purpureis, gluma prima $\frac{3}{5}$ tam longa quam spicula late ovata naviculari 5-nervosa, gluma secunda 2.5–2.7 mm longa elliptica 7-nervosa, lemma sterili 3–3.2 mm longa elliptica 7-nervosa, lemma fertili 2 mm longa elliptica eburnea, antheris 0.4 mm longis.

DIAGNOSIS OF HOLOTYPE: Plant perennial forming cushions, without stolons; culms 2–3 dm tall, filiform; internodes 8–33 mm long; sheaths 11–22 mm long, slender, pilosulous at

base, on the margins and near the apex, and sparsely minute slender puberulous on the upper third, the remainder glabrous, with raised longitudinal nerves; ligule pilose with white hairs 0.3 mm long; blades 15–29 mm long, 1.2–1.7 mm wide, light green, narrowly ligulate, tapering in the outer $\frac{1}{3}$ to the acute tip, the margins tending to be revolute, particularly towards the tip, appearing glabrous but the upper surface throughout and the lower surface towards the apex microscopically white appressed puberulous in the furrows between the veins; panicle 7–11-flowered, and 15–20 mm long, well exserted; peduncle finely ascending white puberulous; rhachis 10–15 mm long, fine ascending white puberulous; pedicels 1–3 mm long, similarly puberulous but the hairs even shorter; spikelets 3–3.2 mm long, glabrous; the glumes green or reddish purple; first glume $\frac{3}{5}$ as long as the spikelet, broadly ovate, navicular, 5-nerved; second glume 2.5–2.7 mm long, elliptic, 7-nerved; sterile lemma 3–3.2 mm long, elliptic, 7-nerved; fertile lemma 2 mm long, ivory-colored, elliptic; anthers 0.4 mm long.

HOLOTYPE: Hawaiian Islands, Maui Island, bog below Wai Anapanapa, Haleakala, in cushions in open bog makai of lake, Aug. 20, 1919, C. N. Forbes 1,174a.M. (BISH).

DISCUSSION: *P. lustriale* is a member of the section *Turfosa*, as is its closest relative, *P. Hillebrandianum* Hitchc., of the bogs of the west Maui mountains, a species with the leaf sheaths pilose, and the collar and the base of the blade long hairy; ligule hairs 2 mm long; blades 30–60 mm long, 3.5–7.5 mm wide; panicle 5–10 cm long, many-flowered; spikelets 2.2–3 mm long; first glume $\frac{1}{3}$ – $\frac{2}{5}$ the length of the spikelet; sterile lemma 2.7–2.9 mm long. *P. lustriale* has the leaf sheaths pilosulous at base, on the margins, and near the apex; ligule hairs 0.3 mm long; blades 15–29 mm long, 1.2–1.7 mm wide; panicle 1.5–2 cm long, 7–11-flowered; spikelets 3–3.2 mm long, first glume $\frac{3}{5}$ as long as the spikelet; sterile lemma 3–3.2 mm long.

This species and *P. lamiatile* St. John were both collected in the same bog near Waianapanapa, and both entered as Forbes 1,174. Because of the floral and vegetative differences the two

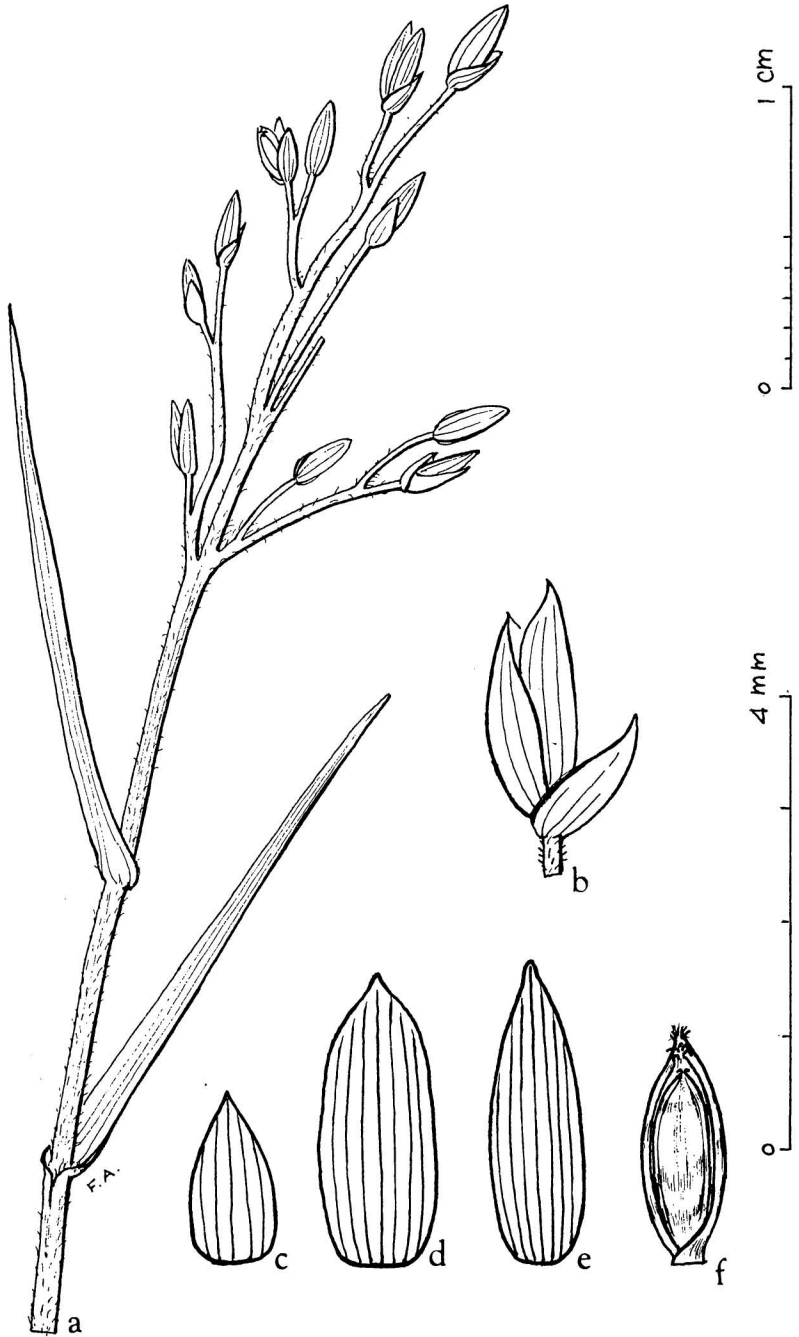


FIG. 2. *Panicum lustriale* St. John, from holotype. *a*, inflorescence, $\times 4$; *b*, spikelet, $\times 15$; *c*, first glume, $\times 15$; *d*, second glume, $\times 15$; *e*, sterile lemma, $\times 15$; *f*, fertile lemma and palea, $\times 15$.

sheets are now separated, and the one here described is renumbered as 1,174a.M.

The new epithet is from the Latin *lustrum*, a bog, and *-atilis*, concerning the place of growth.

PIPERACEAE

Peperomia kipabuluensis St. John and C. Lamoureux, sp. nov. (subgen. *Sphaerocarpidium*)

Fig. 3

DIAGNOSIS HOLOTYPI: Caules 23–43 cm alti glabri erecti ex basi brevi repenti sunt, dimidio apicali cum ramis verticillatis (vel dichotomis), internodis in parte $\frac{3}{4}$ infera 3–8.5 cm longis, foliis (3–) 4–5 in verticillis et in nodis principalibus cum verticillo secundo vix elevatis et hinc cum 8–10 in verticillo simulanti, laminis 7–17 mm longis 4–10 mm latis obovatis supra obscure viridibus infra pallide viridibus glabris (excepta in juveni margine apicali ciliato sed rapide glabrato) crassis carnosis sed in sicco coriaceis 1-nervis in basi cuneatis, petiolis 3–8 mm longis glabris, cicatricibus semiorbicularibus, fasciculis 3, spicis terminalibus parte fertili 2 cm longa, pedunculo 7 mm longo glabro, rhachidi glabro, bracteis 0.5 mm diametro suborbicularibus peltatis lenticulari-glandulosis, stigmatibus licet uno et subapicali, fructu 1.3 mm longo ellipsoideo capitati-glanduloso-viscidi apice obliquo.

DIAGNOSIS OF HOLOTYPE: Stems 23–43 cm tall, erect, from a short repent base, the upper half with whorled (or dichotomous) branching, wholly glabrous; internodes of the lower $\frac{3}{4}$ part 3–8.5 cm long; leaves in whorls of (3–) 4–5, and at the middle and principal nodes with a second whorl only slightly elevated and hence appearing to be 8–10 in a whorl; blades 7–17 mm long, 4–10 mm wide, obovate, dark green above, pale green below, glabrous, except when very young, the apical margin is ciliate, but this is quickly glabrate, thick and fleshy, but when dried coriaceous, 1-nerved, as only the midrib is visible, the base cuneate; petioles 3–8 mm long, glabrous; leaf scars semiorbicular; bundle scars 3; spikes terminal, the fertile part 2 cm long; peduncle 7 mm long, glabrous; rhachis glabrous; bracts 0.5 mm in diameter, suborbicular, peltate, closely lenticular glandular; stigma apparently 1 and subapical; fruit 1.3 mm

long, ellipsoid, capitate glandular viscid, the apex oblique.

HOLOTYPE: Hawaiian Islands, Maui Island, Haleakala, s. rim of Kipahulu Valley, Kuiki, common in dense ferny woods, 5,500 ft. alt., Aug. 30, 1945, *H. St. John and A. L. Mitchell 21,233* (BISH).

DISCUSSION: *P. kipabuluensis* seems most closely related to *P. eekana* C. DC., of the mountains of west Maui, a species with the stems up to 30 cm tall, the upper stem and branches densely hirsute; leaf blades 6–12 mm wide, oval-obovate or elliptic, rarely orbicular, the base cuneate, 3-nerved, sparingly hirsute when young or with a few hairs persisting at base; petioles 2–4 mm long, densely hirsute; peduncles hirsute; fruit 1 mm long, ovoid to obovoid. *P. kipabuluensis* has the stems 23–43 cm tall, glabrous; leaf blades 4–10 mm wide, obovate, the base cuneate, 1-nerved, glabrous (but when very young the apex ciliate, soon glabrate), petioles 2–4 mm long; peduncles glabrous; fruit 1.3 mm long, ellipsoid.

DISCUSSION: Because of the oblique apex of the fruit, this new species is assigned to the subgenus *Sphaerocarpidium*. This character and the nature of the stigma, whether single or twinned, provide the characters used by Yuncker in his monograph (1933, p. 15) to delimit this subgenus from his new one, *Hawaiiana*. Over several decades the writer has tried to apply these characters to Hawaiian species, either with fresh or dried material. These characters never seem to work, and the value of the subgenus *Hawaiiana* is here questioned. In this instance the only close relative of the new species is *P. eekana* which Yuncker assigned to the other section, *Hawaiiana*.

The new epithet is formed from the name of the type locality, Kipahulu, by the addition of *-ensis*, the Latin adjectival place suffix.

RUTACEAE

Pelea anapanapaensis sp. nov. (sect. *Megacarpa*)

Fig. 4

DIAGNOSIS HOLOTYPI: Arbor fruticosa 7 m alta 15 cm diametro est, novellis densiter fuscis-

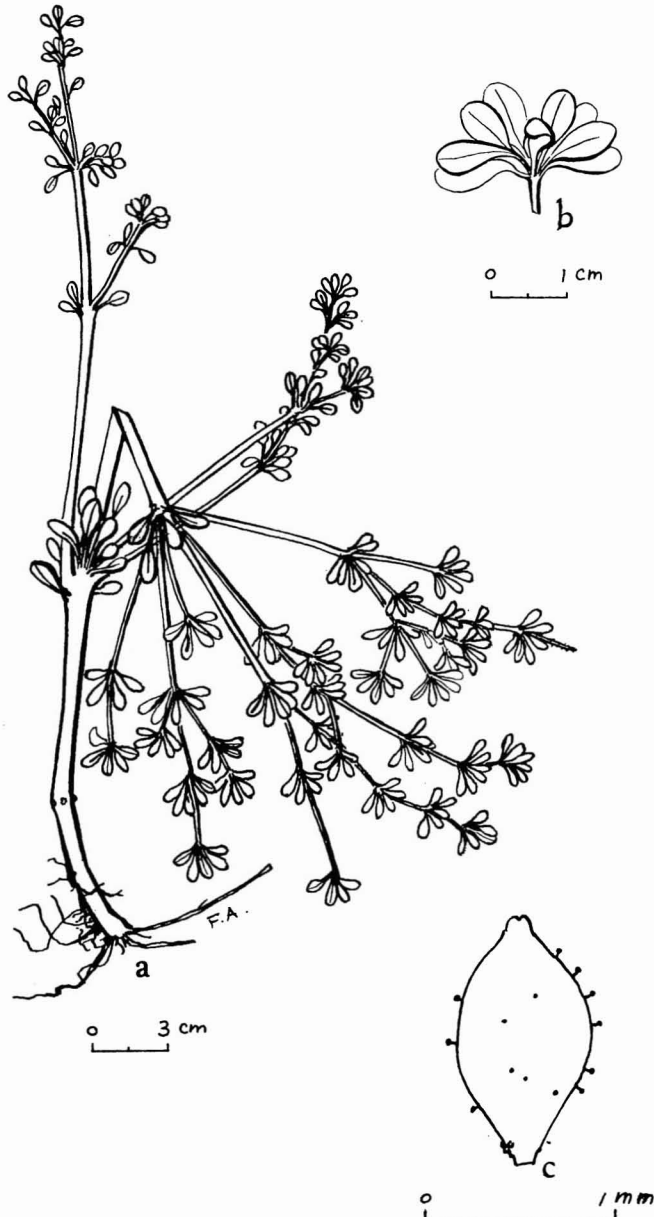


FIG. 3. *Peperomia kipahuluensis* St. John and C. Lamoureux, from holotype. *a*, habit, $\times 1/3$; *b*, stem and leaves, $\times 1$; *c*, fruit, $\times 25$.

pilosulis pilis adscendentibus divergentibusve, ramulis 4–5 mm diametro quadrilateralibus, cortice brunneo glabro tessellato, internodiis 10–22 mm longis, ramulis foliosis pilosis, foliis oppositis, petiolis 7–17 mm longis crassis supra sulcatis divergente fuscipilosulis, laminis 2.5–6.5 cm longis 1.5–4.9 cm latis obovatis vel

latiter ellipticis apice integro obtuso vel paululum emarginato crasse coriaceis supra viridibus et glabris infra pallidioribus et in midnervo cum pilis persistentibus, inflorescentia 2–3.8 cm longa cymosa 3–9-florifera densiter pilosula, pedunculo 7–10 mm longo, bracteis 3 mm longis lanceolatis caducis, pedicelis 2–7 mm

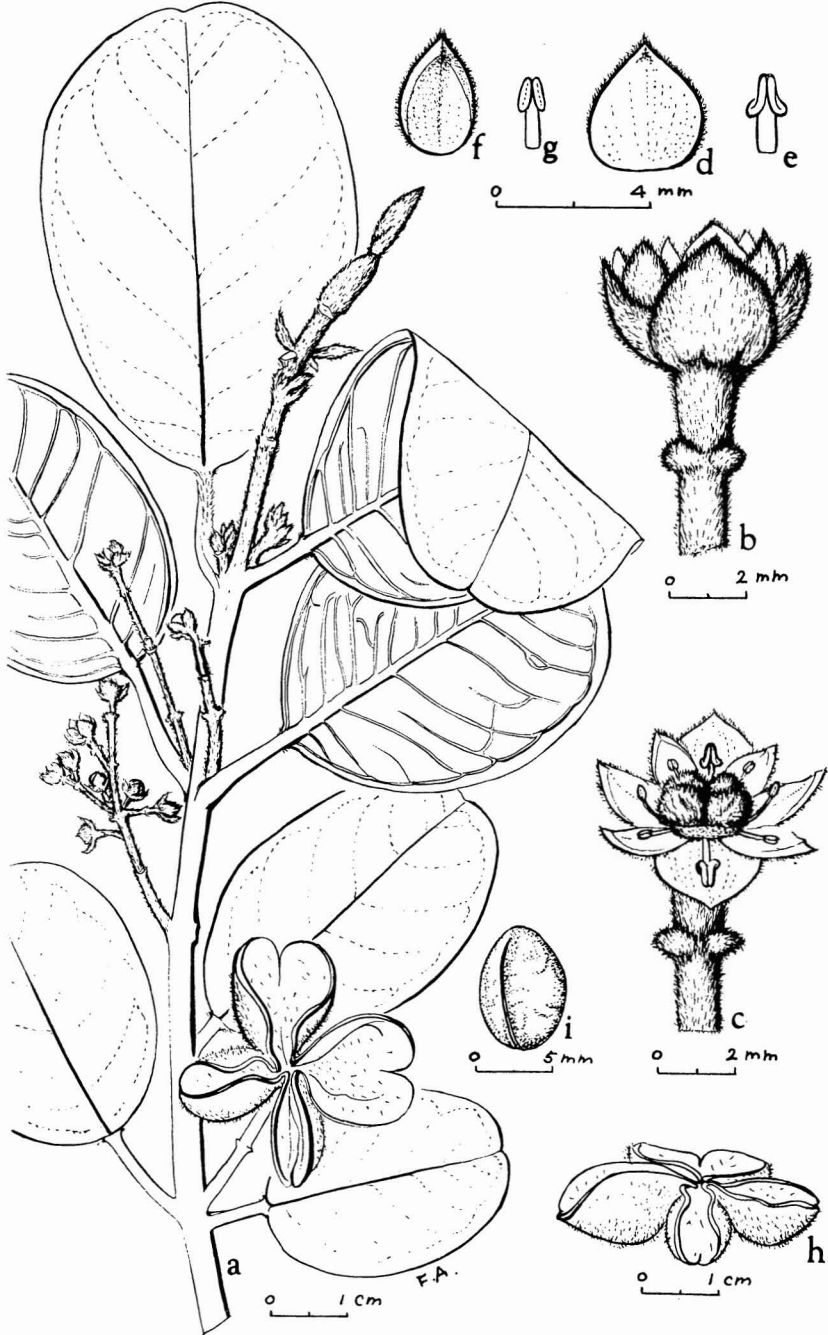


FIG. 4. *Pelea anapanapaensis* St. John, from holotype. a, habit, $\times 1$; b, c, staminate flower, $\times 5$; d, sepal, $\times 5$; e, its stamen, $\times 5$; f, petal, $\times 5$; g, its stamen, $\times 5$; h, capsule, $\times 1$; i, seed, $\times 2$.

longis et supra medium cum bracteis oppositis, floribus masculis cum sepalis 3.3 mm longis 4.3 mm latis cordati-ovatis subacutis dense subadpresso pilosulis, petalis 2.8 mm longis 2.4 mm latis ovatis subacutis, staminibus ad sepala oppositis, antheris 0.7 mm longis oblongi-ellipsoideis, staminibus ad petalas oppositis 1.3 mm longis, antheris 0.5 mm longis sagittati-ovatis, 4 lobis ovarii 0.8 mm longis et cum pilis densis velatis in basi cum disco glabro, capsulis 3 cm diametro axi 8 mm alto $\frac{3}{4}$ lobatis dense cinereipuberulentis ut videtur ex latere lobis ellipticis, endocarpio 0.2 mm crasso stramineo intra minore albi-piloso, seminibus solitariis 7 mm longis 6.5 mm latis late ellipsoideis subcompressis obscure rubri-brunneis lucidis.

DIAGNOSIS OF HOLOTYPE: Shrubby tree 7 m tall, 15 cm in diameter; young shoots densely tawny pilosulous, the hairs ascending or diverging; branchlets 4–5 mm in diameter, distinctly 4-sided; bark brown, glabrous, finely checked; internodes 10–22 mm long; leafy branchlets long retaining the pilosity; leaves opposite; petioles 7–17 mm long, stout, channeled above, tawny spreading pilosulous; blades 2.5–6.5 cm long, 1.5–4.9 cm wide, obovate or broadly elliptic, the apex entire, obtuse or slightly emarginate, thick coriaceous, above green and glabrous, below paler green, and with pilosity persisting on the midrib; inflorescence 2–3.8 cm long, cymose, 3–9-flowered, densely pilosulous; peduncle 7–10 mm long; the bracts 3 mm long, lanceolate, caducous; pedicels 2–7 mm long, with paired bracts at or above the middle; staminate flowers with sepals 3.3 mm long, 4.3 mm wide, cordate ovate, subacute, densely subappressed pilosulous; petals 2.8 mm long, 2.4 mm wide, ovate, subacute; stamens opposite the sepals 1.5 mm long, the anthers 0.7 mm long, oblong ellipsoid; the stamens opposite the petals 1.3 mm long, the anthers 0.5 mm long, sagittate ovate; the 4 ovary lobes 0.8 mm long, obscured by a dense pilosity and attached on a glabrous disk; capsules 3 cm in diameter, the axis 8 mm high, lobed $\frac{3}{4}$ way, closely cinereous puberulent, the lobes elliptic from the side view, endocarp 0.2 mm thick, stramineous, with fine white pilosity over the inner surface; seeds single, 7 mm long, 6.5 mm wide, broadly ellipsoid, slightly compressed, dark reddish brown, shining.

HOLOTYPE: Hawaiian Islands, Maui Island, Haleakala, Wai Anapanapa, Kipahulu-Kuhiwa divide, rain forest at tree line, 6,600 ft. alt., Aug. 16, 1945, *H. St. John and A. L. Mitchell 21,037* (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, Haleakala, between upper and lower Wai anapanapa lakes, in rain forest, 6,700 ft. alt., June 18, 1969, *J. Henrickson and R. Vogel 3,572* (BISH); n. slope of Haleakala Crater, n. of Puu Alaea, 2.1 air miles n. of Paliku Cabin, frequent, rain forest, 6,200 ft. alt., June 21, 1969, *Henrickson and Vogel 3,690* (BISH).

DISCUSSION: In the key in Stone's "Genus *Pelea*," this new species runs close to *P. kauaensis* St. John, but that species differs in its larger leaves, larger capsules, etc.

The closest relative of *P. anapanapaensis* is considered to be *P. macropus* Hbd., a species which is a glabrous tree, with blades 4–10 cm long, 2.1–5.2 cm wide, glabrous except for the quickly glabrate midrib, elliptic to oval, firm chartaceous, the base rounded or somewhat cuneate; petioles 3–9 mm long; peduncles 2–4 mm long; pedicels 24–30 mm long, very clavate; flowers single; capsules lobed more than $\frac{1}{2}$ way, the lobes acute, exocarp mostly sparsely appressed puberulent, but towards the base and along the back somewhat hirsute; endocarp glabrous; seeds 5–6 mm long, broadly ovoid, reddish black. *P. anapanapaensis* is a tree with young shoots tawny pilosulous, and the leafy branchlets pilose; blades 2.5–6.5 cm long, 1.5–4.9 cm wide, glabrous above, but below with the midrib pilose, obovate or broadly elliptic, thick coriaceous, the base rounded; peduncles 7–10 mm long; pedicels 2–7 mm long, tapering slightly upwards; flowers 3–9 in a cyme; capsules lobed $\frac{3}{4}$ way, closely cinereous puberulent, the lobes obtuse; endocarp with fine white pilosity over the inner surface; seeds 7 mm long, broadly ellipsoid, dark reddish brown.

The epithet is taken from the name of the small mountain lake, Waianapanapa, the type locality.

Pelea clusiaefolia Gray var. *minor* St. John, var. nov., *minor* forma

Fig. 5 a–f

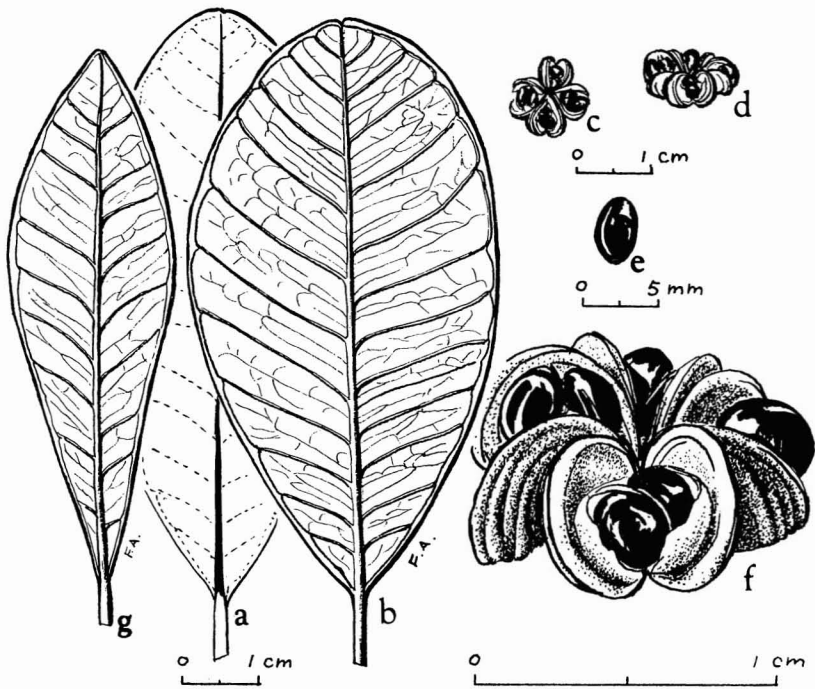


FIG. 5. a-f. *Pelea clusiaefolia* Gray, var. *minor* St. John, forma *minor*, from holotype. a, b, leaf, $\times 1$; c, d, capsule, $\times 1$; e, seed, $\times 2$; f, capsule, $\times 4$; g, forma *stenophylla* St. John, from holotype, leaf, $\times 1$.

DIAGNOSIS HOLOTYPI: A var. *cuneata* differt in capsulis 7.5-9 (-10) mm diametro, seminibus 2.5-3 (-3.5) mm longis.

DIAGNOSIS OF HOLOTYPE: Differs from *P. clusiaefolia* var. *cuneata* by having the mature capsules 7.5-9 (-10) mm in diameter; seeds 2.5-3 (-3.5) mm long; but, like it, having the cuneate blades obovate to broadly oblanceolate, and having the new shoots glabrous or minutely whitish appressed puberulous but quickly glabrate. The var. *cuneata* has the capsules 12-14 mm in diameter and the seeds 4-5 mm long.

HOLOTYPIUS: Hawaiian Islands, Maui Island, Kipahulu Valley, west part of valley, 3,000 ft. alt., C. H. Lamoureux and R. E. DeWreede 3,864 (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, north slope of Haleakala, west ridge of Haipuaena, June 28-30, 1920, C. N. Forbes 2,639.M (BISH).

The new epithet is the Latin adjective *minor*, smaller, and it is given with reference to the smaller fruit characteristic of this variety.

Pelea clusiaefolia Gray var. *minor* St. John, forma *stenophylla* forma nova

Fig. 5 g

DIAGNOSIS HOLOTYPI: A var. *minor* f. *minor* differt in foliis 5-10 cm longis, 1.8-2.6 cm latis anguste oblanceolatis.

DIAGNOSIS OF HOLOTYPE: Differs from var. *minor* f. *minor* by having the leaves 5-10 cm long, 1.8-2.6 cm wide, narrowly oblanceolate. It is a tree 4 m tall.

HOLOTYPIUS: Hawaiian Islands, Maui Island, Kipahulu Valley, west part of valley, Aug. 9, 1967, C. H. Lamoureux and R. E. DeWreede 3,979 (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, 2 1/2 miles e. of Olinda, rain forest, 4,200 ft. alt., June 27, 1969, J. Henrickson 3,741 (BISH).

The new epithet is formed from the Greek words, *stenos*, narrow, and *phullon*, leaf, and it is given with reference to the characteristic narrower leaves.

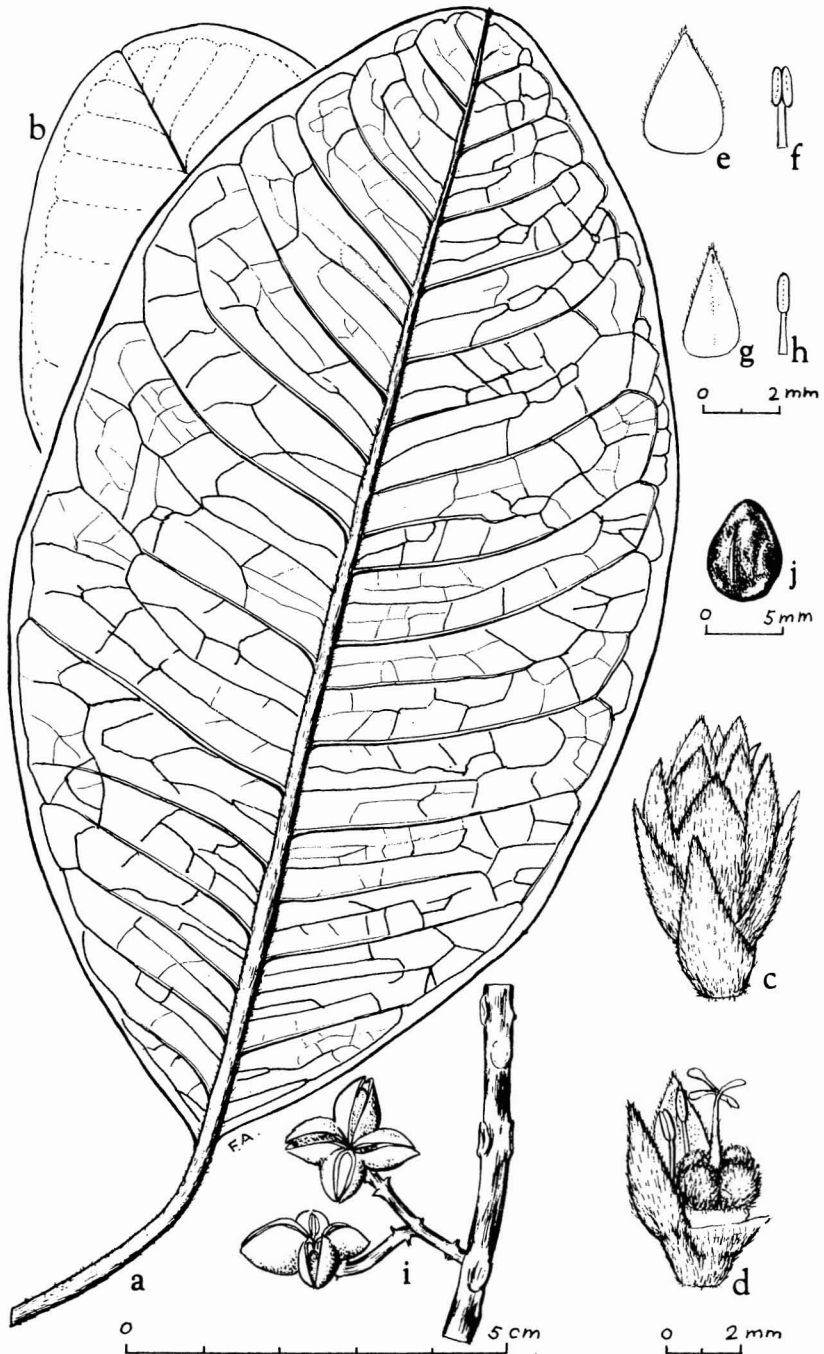


FIG. 6. *Pelea kipabuluensis* St. John, from holotype. *a*, *b*, leaf, $\times 1$; *c*, perfect flower, with bracts, sepals, and petals, $\times 5$; *d*, perfect flower, showing sepal, petal, stamens, and pistils, $\times 5$; *e*, sepal, $\times 5$; *f*, its stamen, $\times 5$; *g*, petal, $\times 5$; *h*, its stamen, $\times 5$; *i*, fruiting cyme with capsules, $\times 1$.

Pelea kipabuluensis sp. nov. (sect. *Megacarpa*)

Fig. 6

DIAGNOSIS HOLOTYPI: Frutex 2 m altus cum ramis longis descendentibus est, novellis in caulibus dense adpresse albi- vel fusci-hirsutulis sed in laminis pilosis, ramis foliosis subadpresse albi-hirsutulis, internodis 7–14 mm longis, foliis oppositis, petiolis 25–47 mm longis crassis divergentibus subteretibus sed supra canaliculatis subadpresse albi-hirsutulis, laminis 10–15 cm longis 5.4–8.4 cm latis late ellipticis subtilibus rigidis coriaceis supra glandulosi-punctatis glabris olivaceis infra pallidioribus et in midnervo densiter hirsutulo sed in nervis minoribus sparse hirsutulis in apice mucronulatis vel obtusis vel submarginatis basi rotundata vel subcuneata nervis elevatis reticulatis in paginis ambis nervis secundariis principalibus 9–11 in dimidio quoque adscendentibus tum arcuatis et interconnectis medio curvi 2–2.5 mm ex margine, inflorescentia cymosa 5–9-florifera 21–30 mm longa omnino dense subadpresse hirsutula, pedunculo 6–8 mm longo in apice cum jugo bracteorum uno abortivo altero 4–5 mm longo crasso lanceolato, pedicelis 3–6 mm longis infra medium bibracteolatis, floribus perfectis (vel foemineis?), sepalis 2.5–3 mm longis crasse lanceolatis rigidis dense cinereis, petalis 4 mm longis 1.4 mm latis anguste lanceolatis carnosis glabris, staminibus 1.5–2 mm longis, disco 2.3–2.5 mm alto glabro, ovario composito 1.5 mm alto 2.5 mm lato 4-lobato dense albi-pilosulo, stylo 2 mm longo infra medium pilosulo, stigmatibus 4 et 0.5–0.8 mm longis linearibus, capsulis 14–18 mm diametro $\frac{2}{3}$ lobato, lobis rotatis obtusis glabris pallide brunneis, axili 4–5 mm alto, endocarpio intra albi-puberulento, seminibus 6 mm longis ellipsoideis lucidis obscure rubiis.

DIAGNOSIS OF HOLOTYPE: Shrub 2 m tall, with long sprawling branches; young shoots densely appressed, white to tawny hirsutulous on the stems, pilose on the blades; leafy stems white, subappressed hirsutulous; internodes 7–14 mm long; leaves opposite; petioles 25–47 mm long, stout, divergent, subterete but channeled above, subappressed white hirsutulous; blades 10–15 cm long, 5.4–8.4 cm wide, broad elliptic, thin, stiff coriaceous, glandular punctate above, glabrous and olive green, below paler and

densely hirsutulous on the midrib, sparsely so on the smaller veins, at apex mucronulate, obtuse or slightly emarginate, the base rounded or subcuneate, the vein network raised reticulate on both surfaces, the principal secondary veins 9–11 on a side, ascending, then arched and interconnected, the middle of the loop 2–2.5 mm from the margin; inflorescence cymose, 5–9-flowered, 21–30 mm long, densely subappressed hirsutulous throughout; peduncle 6–8 mm long, at apex with a pair of bracts, one aborted, the other 4–5 mm long, thick, lanceolate; pedicels 3–6 mm long, bibracteolate below the middle; flowers perfect (or functionally pistillate?); sepals 2.5–3 mm long, thick lanceolate, rigid, densely cinereous; petals 4 mm long, 1.4 mm wide, narrowly lanceolate, fleshy, glabrous; stamens 1.5–2 mm long; disk 2.3–2.5 mm wide, glabrous; compound ovary 1.5 mm high, 2.5 mm wide, 4-lobed, densely white pilosulous; style 2 mm long, pilosulous below the middle; the 4 stigmas 0.5–0.8 mm long, linear; capsules 14–18 mm in diameter, lobed $\frac{2}{3}$ way, the lobes rotate, broadly ovate in outline, obtuse, glabrous, pale brown, the axis 4–5 mm high; endocarp white puberulent within; seeds 7 mm long, 6 mm wide, broadly ellipsoid, smooth, shining, black.

EXPANDED DESCRIPTION: Shrub or small tree 2–4 m tall; young shoots densely appressed white to tawny hirsutulous on the stems, pilose on the blades; leafy stems white subappressed hirsutulous; internodes 7–92 mm long; leaves opposite; petioles 25–56 mm long, stout, divergent or ascending, subterete but channeled above, subappressed white hirsutulous; blades 10–18.5 cm long, 5.4–14.2 cm wide, broad elliptic, thin stiff coriaceous, glandular punctate, above glabrous and olive green, below paler and densely hirsutulous on the midrib, sparsely so on the smaller veins, at apex mucronulate, obtuse, or emarginate, the base rounded (or subcuneate), the veins network raised reticulate on both surfaces, the principal secondary veins 9–12 on a side, ascending, then arched and interconnected, the middle of the loop 2–4 mm from the margin; staminate cymes 23–53 mm long, 7–11-flowered, densely appressed white hirsutulous; peduncle 11–21 mm long, at the apex with 2 bracts 2–4 mm long, ovate; pedicels

4–6 mm long, at the middle with a pair of collarlike bracts; sepals 2.3–3 mm long, lanceolate, densely appressed white hirsutulous; petals 5–6 mm long, fleshy, greenish, the basal half lanceolate, the apical half lance-linear; stamens 3–5 mm long; anthers 0.7–1 mm long, ellipsoid, mucronate; pistillate inflorescences cymose, 5–9-flowered, 21–30 mm long, densely subappressed hirsutulous throughout; peduncle 6–8 mm long, at apex with a pair of bracts, one aborted, the other 4–5 mm long, thick, lanceolate; pedicels 3–6 mm long, bibracteolate below the middle; flowers perfect (or functionally pistillate?); sepals 2.5–3 mm long, thick, lanceolate, rigid, densely cinereous; petals 4 mm long, 1.4 mm wide, narrowly lanceolate, fleshy, glabrous; stamens 1.5–2 mm long; disk 2.3–2.5 mm wide, glabrous; compound ovary 1.5 mm high, 2.5 mm wide, 4-lobed, densely white pilosulous; style 2 mm long, pilosulous below the middle; the 4 stigmas 0.5–0.8 mm long, linear; capsules 14–18 mm in diameter, lobed $\frac{2}{3}$ way, the lobes rotate, broadly ovate in outline, obtuse, glabrous, pale brown, the axis 4–5 mm high; seeds solitary, 7 mm long, 6 mm wide, broadly ellipsoid, smooth, shining, black.

HOLOTYPE: Hawaiian Islands, Maui Island, Kipahulu Valley, west part of valley, 3,000 ft. alt., Aug. 6, 1967, *C. H. Lamoureux and R. E. DeWreede* 3,884 (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, Kipahulu Valley, west part of valley, 3,000 ft. alt., staminate, Aug. 6, 1967, *Lamoureux and DeWreede* 3,866 (BISH); Kipahulu Valley, along Palikea Stream, above the waterfall at 3,200 ft. alt., Aug. 1967, *R. E. Warner* 1 (BISH).

DISCUSSION: Stone (1966, p. 153) transfers *P. Wawraeana* Rock from section *Cubicarpa* to section *Megacarpa*, and lists as a synonym *P. waipioensis* St. John. After reexamining both type specimens, it is seen that these two actions were erroneous. Rock described his species as having the "capsule cuboid, scarcely notched, 12–14 mm in diameter, . . . endocarp glabrous." This exactly describes the holotype in the Gray Herbarium, and the clastotype that the writer obtained for the Bishop Museum. *P. Wawraeana* belongs in *Cubicarpa*, and *P. waipioensis* in

Megacarpa sensu Stone, or in its corresponding segregate group *Microcarpae*, sensu Rock, and St. John.

P. kipabuluensis is a member of the section *Megacarpa*, as is its closest relative, *P. waipioensis* St. John, an Oahu species with the blade midrib sparsely appressed hirsutulous below, the blade elsewhere glabrous; blades 4.5–9.5 cm long, obovate, the base subcuneate, the apex emarginate or obtuse; pistillate cymes 7–13-flowered; sepals 1.5–2 mm long; petals 4–4.5 mm long, lance ovate; capsules 13–15 mm in diameter, lobed $\frac{2}{3}$ way, the axis 3.5–4 mm high. *P. kipabuluensis* has the blade midrib densely hirsutulous below and the smaller veins sparsely so; blades 10–15 cm long, broadly elliptic, the apex obtuse or emarginate, the base rounded or subcuneate; pistillate cymes 5–9-flowered; sepals 2.5–3 mm long; petals 4 mm long, narrowly lanceolate; capsules 14–18 mm in diameter, the axis 4–5 mm high.

The new epithet is formed from the name of the type locality, Kipahulu, by the addition of *-ensis*, the Latin adjectival place ending.

PRIMULACEAE

Lysimachia kipabuluensis sp. nov. (sect. *Fruticosae*)

Fig. 7

DIAGNOSIS HOLOTYPI: Frutices 1–2 m alti sunt, caulibus infra lignosis supra subherbaceis erectis glabris teretibus plerumque in parte supera pluri-ramosis proxima basem subrubris 4–7 mm diametro, ramulis 1–1.3 mm diametro subcarnosis tum in sicco rugosis viridibus, internodiis foliosis 1–4 mm longis nuper extensis, cicatricibus protrusis, foliis alternatis glabris, petiolis 1–3 mm longis brunnei-rubris, laminis 1–3 cm longis 2.5–6 mm latis angustiore ellipticis apice subacuto basi cuneata crassis sed in sicco subcoriaceis supra viridibus infra pallide viridibus sed midnervo et nervis secundariis obscure brunnei-rubris (vel viridibus), floribus axillaribus solitariis, pedicelis 8–14 mm longis filiformibus glabris adscendentibus, calyce 4–5 mm longo fere ad basim partito (5–) 6 (–7) lobis 1.5–2.3 mm latis lancei-ovatis circinatis et cum marginibus albis membranaceis, corollis 8 mm longis intra et extra ad basim obscure

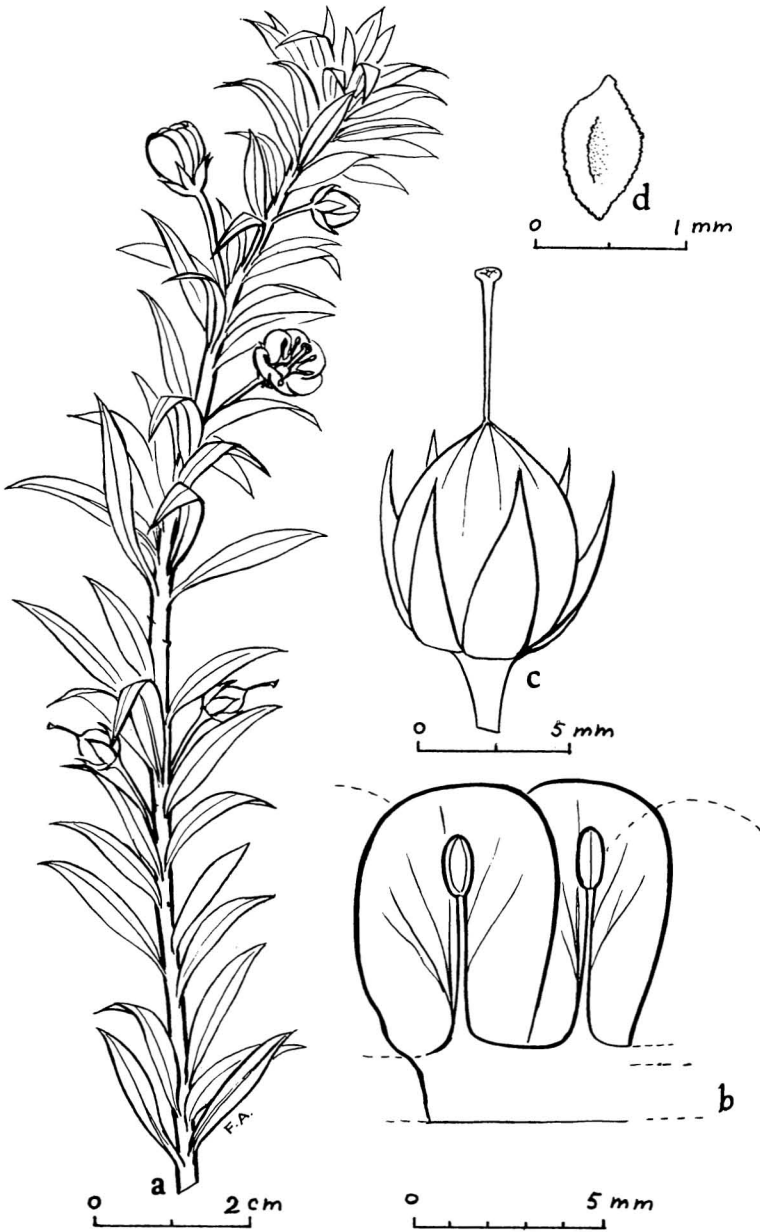


FIG. 7. *Lysimachia kipahuluensis* St. John, from holotype. *a*, habit, $\times 1$; *b*, corolla lobes and stamens, $\times 5$; *c*, sepals and capsule, $\times 4$; *d*, seed, $\times 20$.

naphthalene-violaceis sed extra ad $\frac{2}{3}$ punctum lutescentibus et ibi lividi-purpureis tum parte $\frac{1}{3}$ apicali ecru-olivacea cum nervis fortibus adscendentibus nigris, tubo 1.5 mm longo, lobis circinnatis late ellipticis cum 5 nervis fortibus paucis furcatis, staminibus cum lobis

corollae aequantibus, filamentis in basi unitis et tubam 1.5 mm longam formantibus infra laevibus sed supra glandulosi-atomiferis partibus liberis 3.2–3.5 mm longis subulatis sed in basi dilatatis et glandulosi-atomiferis, antheris 1.5 mm longis oblongi-ellipsoideis, connectivo ob-

scuro, ovario 3 mm longo ovoideo, stylo 4.5–5 mm longo anguste cylindrico, stigmata pauca majori et discoideo integro vel fere lobato, capsulis 4–5 mm longis subglobosis acutis, ad medium vel infra in 6 valvis dehiscentibus, seminibus 0.8–1.8 mm longis ovoidei-deltaideis fere laevibus rubri-brunneis.

DIAGNOSIS OF HOLOTYPE: Shrubs 1–2 m tall; stems woody below, subherbaceous above, erect, glabrous from the beginning, terete, with several branches, mostly in the upper part, near the base reddish, 4–7 mm in diameter, the branchlets 1–1.3 mm in diameter, somewhat fleshy and wrinkled on drying, green; leafy internodes 1–4 mm long, later elongating; leaf scars salient; leaves alternate, glabrous; petioles 1–3 mm long, dull maroon; blades 1–3 cm long, 2.5–6 mm wide, very narrowly elliptic, the apex subacute, the base cuneate, thick and when dried subcoriaceous, above green, below pale green, but the midrib and secondary veins dull maroon (or green); flowers axillary, solitary; pedicels 8–14 mm long, filiform, glabrous, ascending; calyx 4–5 mm long, green, parted almost to the base, the lobes (5–) 6 (–7) and 1.5–2.3 mm wide, lance-ovate, circinate, with white membranous margins; corolla 8 mm long, inside and outside towards the base dark naphthalene violet (Ridgway pl. 36), but outside shading and lightening upwards to the $\frac{2}{3}$ point where livid purple (pl. 36), then the upper $\frac{1}{3}$ ecru-olive (pl. 30) with strong black ascending veins, the tube 1.5 mm long, the 6 lobes circinate, broadly elliptic, with 5 heavy veins, sparingly forking; stamens of the same number as the corolla lobes, the filament bases united into a tube 1.5 mm long, smooth below, but glandular atomiferous near the rim, free filament tips 3.2–3.5 mm long, subulate but dilated at base and there glandular atomiferous; anthers 1.5 mm long, oblong ellipsoid, the connective dark colored; ovary 3 mm long, ovoid; style 4.5–5 mm long, narrowly cylindrical; stigma slightly larger, discoid, entire or slightly cleft; capsules 4–5 mm long, subglobose, acute, the 6 valves dehiscing to the middle or below; seeds 0.8–1.8 mm long, ovoid-triangular, smoothish, reddish brown.

HOLOTYPE: Hawaiian Islands, Maui Island, Haleakala, Wai Anapanapa, Kipahulu-Kuhiwa

divide, in low thicket, crest of divide, 6,700 ft. alt., Aug. 13, 1945, *H. St. John and A. L. Mitchell* 20,980 (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, n. slope of Haleakala near Wai Anapanapa, very common on ridge, pali, and above lake, Aug. 20, 1919, *C. N. Forbes* 1,195.M. (BISH); ditto, 7,100 ft. alt., 1969, *J. Henrickson* 3,905 (BISH); and 3,540; 3,554; 3,913; and 3,915 (BISH); e. edge Haleakala Crater, $\frac{3}{4}$ way up pali, $\frac{1}{4}$ mile s. e. of Paliku Cabin, infrequent, with *Styphelia*, *Vaccinium*, *Sadleria*, 6,800 ft. alt., June 16, 1969, *Henrickson* 3,509 (BISH); upper e. section of Kaupo Gap, $1\frac{1}{2}$ miles s. of Paliku Cabin, with *Dodonaea*, *Metrosideros*, 4,900 ft. alt., July 16, 1969, *Henrickson* 3,884 (BISH); Haleakala, Paliku, Aug. 5, 1939, *O. Degener* 17,753 (BISH); cliffs s. e. of Haleakala Mountain, in Keanae Gap, dryish ledge, Aug. 11, 1939, *Degener* 17,755 (BISH); n. of Kuiki, just outside Haleakala Section of Park, foggy region, Aug. 9, 1939, *Degener* 17,670 (BISH); Kipahulu Valley, upper portion of central ridge, common, Aug. 24, 1967, *R. E. DeWreede* 53 (BISH). The characters of these specimens all fall within the limits recorded for the holotypic collection.

DISCUSSION: *L. kipahuluensis* is a member of the section *Fruticosae*, as is its closest relative, *L. Hillebrandi* Hook. f. in Gray, var. *subherbacea* Hbd., of Molokai, a variety with the plant 3–6 dm tall; pedicels and young stems sparsely pilose; blades 2.5–8.2 cm long, 4–12 mm wide, acute; pedicels 25–43 mm long; capsules 6–7 mm long. *L. kipahuluensis* is a plant 1–2 m tall, wholly glabrous; having blades 1–3 cm long, 2.5–6 mm wide, subacute; pedicels 8–14 mm long; and capsules 4–5 mm long.

The new epithet is formed from the name of the type locality, Kipahulu, and *-ensis*, the Latin adjectival place ending.

GESNERIACEAE

Cyrtandra kipahuluensis sp. nov. (sect. *Schizocalyces*)

Fig. 8

DIAGNOSIS HOLOTYPI: Frutex est, ramulis 3–7 mm diametro quadrangularibus, novellis solum

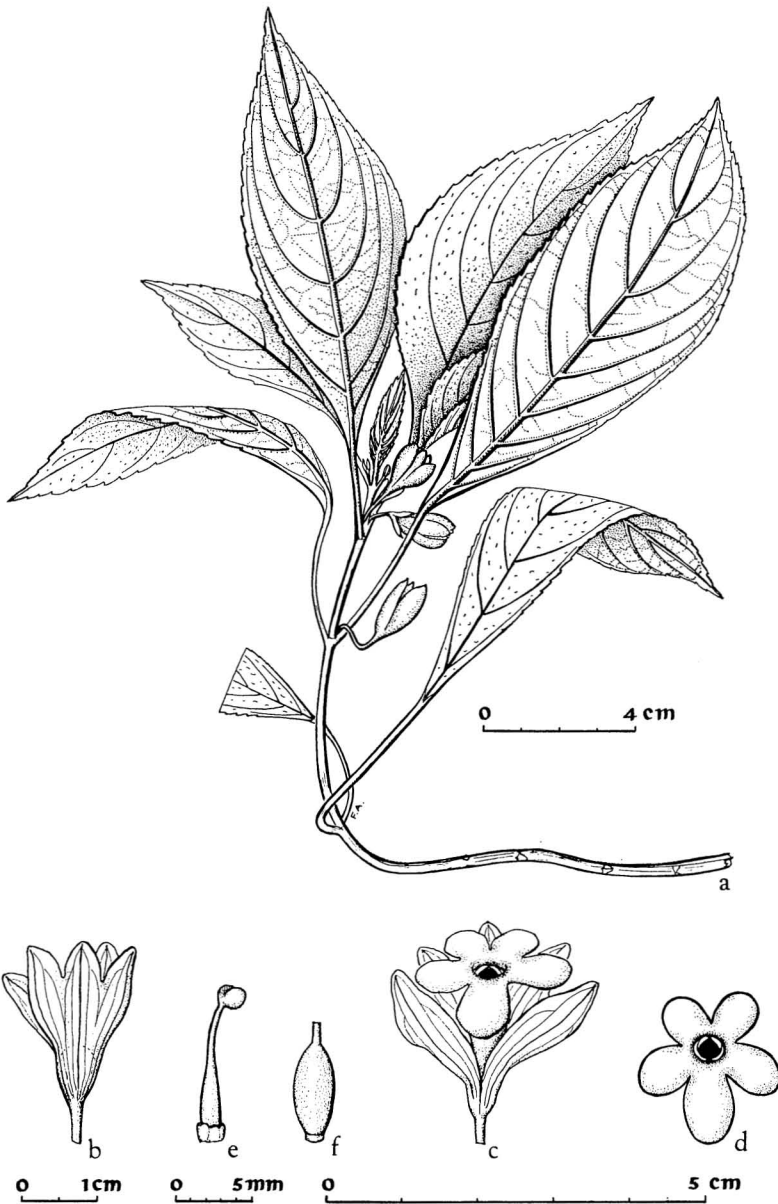


FIG. 8. *Cyrtandra kipabuluensis* St. John, from holotype. *a*, habit, $\times \frac{1}{2}$; *b*, bud, $\times 1$; *c*, flower, $\times 1$; *d*, corolla, face view, $\times 1$; *e*, pistil, $\times 4$; *f*, berry, $\times 2$.

in apice adpresse subbrunneis puberulis sed pilis caducis, ramulis foliosis glabris, cicatricibus 3–4 mm altis scutelliformibus pallidis, fasciculis 5, internodis 20–48 mm longis; foliis oppositis remotis et separatis in nodis 5 superis affixis inaequalibus uno $\frac{1}{5}$ majori, petiolis 4.5–7.5 cm longis mox glabratiss, laminis 8–21 cm longis

4–8 cm latis subtiliter chartaceis ellipticis apice acuminato basi cuneata et longe decurrenti dimidiis fere aequalibus supra obscure viridibus et sparse catenulati-villosis apicibus pilarum dehiscentibus basibus fortibus persistentibus infra in midnervo et nervis secundariis adpresse catenulati-villosulis densiter in juveni sparse in vetu-

stati-marginibus in parte $\frac{3}{4}$ apicali serratis serris cum hydathodis excurrentibus, nervis secundariis 7–10 in dimidio quoque adscendentibus subarcuatis apicibus interconnectis et nervis tertiis in serris excurrentibus, cymis axillaribus 1–5-floriferis glabris, pedunculis 0–8 mm longis, bracteis 7–9 mm longis lineari-lanceolatis foliosis, pediculis 10–25 mm longis, alabastris angustiore campanulatis, calyce in flore 18–23 mm longo (in sicco) pallide subviridibus ultime albis anguste infundibuliformibus glabris bilabiatis, tubo 5 mm longo campanulato, labia supera trilobata lobis 3–4 mm longis 4 mm latis ovatis umbonatis trinervatis sparse in nervis adpresse puberulentis, labia infera bilobata lobis 11 mm longis 6–6.5 mm latis ellipticis simulantibus sed 5-nervosis, corolla alba glabra tubo (quando bullito) 11 mm longo 5 mm diametro recto in basi minime contracto, lobis superis binis 6 mm longis 5 mm latis oblongi-ellipticis, labia infera trilobata lobis lateralibus 7 mm longis 6 mm latis latiter ellipticis, loba infera 9 mm longa 6.5 mm lata latiter elliptica, staminibus inferis binis perfectis filamentis in tubo 3 mm ex orificie affixis parte libera 2 mm longa spiraliter adscendenti tereta crassa, antheris 2.3 mm longis 1.5 mm latis obliquiter ovatis apicibus connatis, connectivo 0.5 mm lato lanceoloideo, staminodiis lateralibus in tubo 4 mm ex orificie affixis parte libera 0.3 mm longa subulata capitulata, stylo 6 mm longo glabro, stigmatum cum lobis binis 1 mm longis suborbicularibus, ovario in basi cum disco cupulato 1.2 mm alto cincto, bacca 7 mm longa ellipsoidea.

DIAGNOSIS OF HOLOTYPE: Shrub; branchlets 3–7 mm in diameter, 4-angled and square in cross section; young shoots only at apex covered with brownish appressed puberulence, but this quickly caducous; leafy stems glabrous; leaf scars 3–4 mm high, shield-shaped, pale; bundle scars 5; internodes 20–48 mm long; leaves opposite, remote and well spaced, borne at the 5 upper nodes, those of a pair unequal, and one of the pair $\frac{1}{5}$ the larger; petioles 4.5–7.5 cm long, very early glabrate; blades 8–21 cm long, 4–8 cm wide, thin chartaceous, elliptic, the tip acuminate, the base cuneate and long decurrent, the 2 halves nearly equal, above dark green and sparsely catenulate villous, and in age those hairs that are broken off leave the 1–2 fat

basal cells projecting from the surface like small hassocks, below appressed catenulate villosulous on the midrib and secondary veins, densely so when young, sparsely so later, except in the lower $\frac{1}{4}$ the margins serrate, the teeth with villosulous excurrent hydathodes, the secondary veins 7–10 on a side, ascending, gently arcuate, inarched, and the tertiary veins salient in the serrae; cymes axillary, 1–5-flowered, glabrous; pedicles 0–8 mm long; bracts 7–9 mm long, linear-lanceolate, foliaceous; pedicels 10–25 mm long; buds very narrowly campanulate; calyx in anthesis 18–23 mm long (when dried), pale greenish, becoming white, narrowly funnel-form, glabrous, 2-lipped; calyx tube 5 mm long, campanulate; the upper lip 3-lobed, the lobes 3–4 mm long, 4 mm wide, ovate, umbonate, 3-nerved, sparsely appressed puberulent mostly on the nerves; lower lip 2-lobed, the lobes 11 mm long, 6–6.5 mm wide, elliptic, similar but 5-nerved; corolla white, glabrous, (when boiled) the tube 11 mm long, 5 mm in diameter, straight, slightly contracted at base; upper lobes two, 6 mm long, 5 mm wide, oblong elliptic; lower lip 3-lobed, the lateral lobes 7 mm long, 6 mm wide, broadly elliptic; lower lobe 9 mm long, 6.5 mm wide, broadly elliptic; the 2 lower stamens perfect, their filaments adnate to the corolla tube to within 3 mm of the throat, the free portion 2 mm long, spirally upcurved, terete, stout, the two perfect anthers 2.3 mm long, 1.5 mm wide, obliquely ovate, the tips connate, the connective 0.5 mm wide, lanceoloid; lateral staminodia adnate to the corolla tube to within 4 mm of the throat, the free portion 0.3 mm long, subulate, capitulate; style 6 mm long, glabrous; stigma lobes 2, and 1 mm long, suborbicular; ovary surrounded at base by a cupulate disk 1.2 mm high; berry 7 mm long, ellipsoid, white, smooth.

HOLOTYPE: Hawaiian Islands, Maui Island, (Haleakala), ridge on right side of Kipahulu Valley, common on top in shade of *Asp. [plenium] sandwicense* and dense tangle of low shrubbery, Nov. 20, 1919, C. N. Forbes 1,692.M. (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui, (Haleakala), ridge at right side of Kipahulu Valley, dense shade under ferns below

a rock wall, Nov. 17, 1919, *Forbes 1,655.M.* (BISH); ditto, *Forbes 1,656.M.* (BISH).

DISCUSSION: *C. kipabuluensis* is a member of the section *Schizocalyces*, as is its closest relative, *C. macrocalyx* Hbd., of Molokai, a species with the cymes 1–2-flowered, pilose; peduncles 12–23 mm long; lobes of upper calyx lip 12–13 mm long, lanceolate; corolla tube 17 mm long, pilose; leafy stems villous; petioles 1.2–3.5 cm long; blades 8–14 cm long. *C. kipabuluensis* has the cymes 1–5-flowered, glabrous; peduncles 0–8 mm long; lobes of upper calyx lip 3–4 mm long, ovate; corolla tube 11 mm long, glabrous; leafy stems glabrous; petioles 4.5–7.5 cm long; blades 8–21 cm long.

The new epithet is formed from the name of the type locality, Kipahulu, and *-ensis*, the Latin adjectival place ending.

Cyrtandra paludosa Gaud. var. *irrostrata* var. nov.

DIAGNOSIS HOLOTYPE: A var. *paludosa* differt in novellis adpressiter pilosis brunneis sed mox glabratiss et in maturitate caulibus petioli laminisque omnino glabris, cymis enim in juvenute glabris, alabastris glabris fusiformibus vel ellipsoideis sensa rostro, labia supera calycis cum 3 lobis 2–3 (–5) mm longis late deltoideis ad lancei-ovatis obtusis.

DIAGNOSIS OF HOLOTYPE: Differing from the typical var. *paludosa* by having the young shoots appressed brown pilose, but early glabrate, and the fully grown stems, petioles, and blades without hairs; cymes glabrous, even when very young; buds glabrous, fusiform to ellipsoid, not beaked; calyx upper lip with 3 lobes 2–3 (–5) mm long, broadly deltoid to lance-ovate, obtuse.

HOLOTYPE: Hawaiian Islands, Hawaii Island, Alakahi Kawainui, along ditch trail, July 13, 1909, *J. F. Rock 4,473* (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Hawaii Island, Kohala Mts., Waipio, head of Koiawe Valley, Sept. 9, 1938, *L. M. Cranwell, Selling and Skottsberg 3,184*; Kohala, near Honokanenui Valley, Feb. 18, 1952, *O. Degener and A. Greenwell 21,909*; Kohala For. Res., very damp region, 4,000 ft. alt., Feb. 11, 1959, *E. Pung*; Kohala Mts., Waimea, Sept. 7, 1911, *C. N.*

Forbes 485.H.; Waimea, June 10, 1910, *J. F. Rock 8,318*; Kohala Mts. above, Waimea, 29/9/1922, *C. Skottsberg 719*; Alakahi ditch, June 1910, *Rock 8,318*; and *8,513*; Alakahi Kawainui Ditch trail, July 13, 1909, *Rock 4,465*; and *4,466*; along Saddle Road, 7 miles from Hilo, rich woods at 2,000 ft. alt., Sept. 5, 1949, *Degener, Murashige and Kerr 20,153*; near Kulani Prison Road, dense forest, 4,000 ft. alt., Feb. 3, 1952, *Degener 21,774*; South Hilo Dist., Punahoa, Kulani Prison Camp road, ohia woods, 3,000 ft. alt., Dec. 19, 1954, *H. St. John 25,336*; Hilo, April 1871, *W. Hillebrand and J. M. Lydgate*; Olaa Flume, June 2, 1915, *Forbes 656.H.*; kipuka in 1855 Flow near Haleloulou, June 4, 1915, *Forbes 701.H.*; Puna Dist., Kaniahiku, forest of *Metrosideros* and *Dicranopteris emarginata*, 600 ft. alt., Dec. 23, 1949, *St. John 23,927*; 2 miles s. of Pahoa, Kiahialaka, wet ohia woods, 900 ft. alt., Dec. 21, 1931, *St. John, R. S. Bean, and E. Y. Hosaka 11,233*; near Pahoa, Puna, forest, Feb. 2, 1952, *Degener 21,766*; Puna, in forest on old aa lava, 1,000 ft. alt., June 1, 1957, *L. W. Bryan*; Hilo-Kilauea road at 23 miles, Sept. 13, 1938, *Cranwell, Selling and Skottsberg 3,236*; Volcano Road, July 2, 1915, *Forbes 1,040.H.*; Kilauea, Kalanilehua, May 1912, *Rock 10,343*; Kilauea, rim of Napau Crater, wet forest, 800 m. alt., 8/29/1933, *F. R. Fosberg 10,100*; Hawaii National Park, Kilauea, Napau Lava Tree Trail, 11/25/42, *G. O. Fagerlund and A. L. Mitchell 190*; ditto, Kane Nui o Hamo, 3,000 ft. alt., 9/1/43, *Fagerlund and Mitchell 834*; ditto, Makaopuhi, creeper in wet forest, 2,900 ft. alt., 9/1/43, *Fagerlund and Mitchell 829*; Kilauea, Hawaii National Park, Chain of Craters, Napau Trail, open forest, 2,700 ft. alt., Dec. 20, 1931, *St. John, Bean, and Hosaka 11,206*.

Maui Island: West Maui, Mt. Kukui, lower slope forest, 9/24/16, *G. C. Munro 429*; ridge of Puu Kukui, *Munro 597*; East Maui, Haikuuka Boundary Trail, near Kailiili, natural forest, 3,000 ft. alt., Nov. 11, 1933, *J. H. Hofmann 29*; n. slope of Haleakala, Papaea, June 14, 1920, *Forbes 2,514.M.*; Halehaku ridge, rt. side of valley, June 16, 1920, *Forbes 2,541.M.*; Kipahulu Valley, along Palikea Stream, above the waterfall at 3,200 ft. alt., Aug. 1967, *R. E. Warner 8*; and *13*. All the above collections are in (BISH).

The closest relative of *C. paludosa* var. *irrostrata* is the var. *paludosa*, which variety has the branchlets brown pilose, the hairs persisting on about half of the leafy part of the stem; petioles appressed brown pilose, later subglabrate; blades below pilosulous on midrib and laterals; cymes, pedicels, and buds appressed brown pilose; buds with ellipsoid body and a 6–9 mm beak; calyx upper lip with 3 lobes 2–6 mm long, linear lanceolate, or often the lobes not separating and the beak turning to one side as the calyx splits open laterally and falls from the developing berry. The var. *irrostrata* has the young shoots appressed brown pilose, but early glabrate, and the fully grown stems, petioles, and blades without hairs; cymes glabrous even when very young; buds glabrous, fusiform to ellipsoid, not beaked; calyx upper lip with 3 lobes 2–3 (–5) mm long, broadly deltoid to lance-ovate, obtuse.

The new epithet is from the Latin *ir-*, non; *rostratus*, beaked, and it is given with reference to the beakless buds.

Cyrtandra rotata sp. nov. (sect. *Schizocalyces*)

Fig. 9

DIAGNOSIS HOLOTYPI: Frutex cum ramulis 2–4 mm diametro quadrangularibus est, novellis densiter adpresse fulvi-pilosis, ramulis foliosis ad basim glabratibus, cicatricibus 2.5–4 mm altis scutatis, fasciculis 7, internodis 1.5–5.5 cm longis, foliis oppositis remotis in 4–5 nodis superis productis inaequalibus uno $\frac{1}{5}$ majori, petiolis 2.5–5 cm longis pilosis tandem fere glabratibus, laminis 9–14.5 cm longis 4–6.5 cm latis subtiliter chartaceis latiter oblanceolatis acuminatis basi cuneata decurrenti et ibi inaequalibus supra obscure viridibus et remote adpresse pilosis catenulatis infra albi-viridibus et cum pilis simulantibus copiose in midnervo sparsim in nervis lateralibus in parte $\frac{3}{4}$ apicali grosse serratis vel duplo-serratis, nervis secundariis 7–9 in dimidio quoque sursum curvatis interconnectis nervis tertiis in serris salientibus, cymis axillaribus 5-floriferis omnino sparse albi-villosis, pedunculis 15 mm longis, bracteis 11–14 mm longis anguste lanceolatis foliaceis, pedicelis 8–13 mm longis, alabastris infundibuliformibus, calyce in flore 14 mm longo (in sicco) campanulato pallide subviridi extra sparse albi-piloso intra glabro fere ad basim 5-partito sed paulum bilabiato, labia

supera trilobata lobis 14–17 mm longis 3–3.5 mm latis elliptici-oblongis trinervatis midnervo in apice incrassato umbonato excurrenti sparse puberulentis, labia infera bilobata lobis 10 mm longis 2–2.5 mm latis anguste ellipticis, corolla alba tubo 12 mm longo 4 mm diametro subcylindrico recto sed ad basim deminuenti infra glabro ad apicem extra pilosulo, lobis superis binis 3.5 mm longis et latis quadrati-suborbicularibus, labia infera trilobata lobis lateralibus 4.5 mm longis 3.5 mm latis late ellipticis, loba infera 6 mm longa 5.5 mm lata elliptica in orificio glandulosi-atomifera, staminibus inferis binis perfectis cum antheris 2.5–3 mm longis stylo nullo, ovario 7 mm longo lineari-lanceoloideo glabro, baccis incognitis.

DIAGNOSIS OF HOLOTYPE: Shrub; branchlets 2–4 mm in diameter, quadrangular; young shoots densely appressed tawny pilose, the leafy shoots glabrate towards the base; leaf scars 2.5–4 mm high, shield-shaped; bundle scars 7; internodes 1.5–5.5 cm long; leaves opposite, remote and well spaced, borne at the 4–5 upper nodes, those of a pair unequal and one of the pair $\frac{1}{5}$ the larger; petioles 2.5–5 cm long, pilose, becoming nearly glabrate; blades 9–14.5 cm long, 4–6.5 cm wide, thin chartaceous, broadly oblanceolate, acuminate, the base cuneate decurrent, and there the 2 sides unequal, above dark green and remotely appressed catenulate pilose, below whitish green and with similar hairs abundant on the midrib and sparse on the lateral veins, the margins coarsely serrate or doubly serrate except in the lower quarter, the secondary veins 7–9 on a side, arching upwards, interconnected and with tertiary branches salient in the serrae; cymes axillary, 5-flowered, sparsely white villous throughout; peduncles 15 mm long; bracts 11–14 mm long, narrowly lanceolate, foliaceous; pedicels 8–13 mm long; buds funnelliform; calyx in anthesis 14 mm long (when dried), campanulate, pale greenish, without sparsely white pilose, within glabrous, 5-parted almost to the base, but perceptibly 2-lipped, the upper lip 3-lobed, the lobes 14–17 mm long, 3–3.5 mm wide, elliptic oblong, 3-veined, and with the midrib at apex thickened and umbonate excurrent, sparsely puberulent; lower lip 2-lobed, the lobes 10 mm long, 2–2.5 mm wide, narrowly elliptic; corolla white, the tube 12 mm long, 4



FIG. 9. *Cyrtandra rotata* St. John, from holotype. *a*, habit, $\times \frac{1}{2}$; *b*, bud, $\times 1$; *c*, flower, $\times 1$; *d*, corolla, face view, $\times 1$; *e*, pistil, $\times 2$.

mm in diameter, subcylindric, straight but narrowing towards the base, glabrous below, but towards the throat pilosulous without; upper lobes two, 3.5 mm long and wide, quadrate suborbicular; lower lip 3-lobed, the lateral lobes 4.5 mm long, 3.5 mm wide, broadly elliptic; lower lobe 6 mm long, 5.5 mm wide, elliptic, glandular atomiferous in the throat; two lower stamens perfect, their anthers 2.5–3 mm long; style wanting; ovary 7 mm long, linear-lanceoloid, glabrous; berry unknown.

HOLOTYPE: Hawaiian Islands, Maui Island, (Haleakala), ridge right side of Kipahulu Valley, Nov. 17, 1919, *C. N. Forbes 1,662.M.* (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, (Haleakala), Kipahulu, Dec. 1, 1919, *Forbes 1,740.M.* (BISH).

DISCUSSION: *C. rotata* is a member of the section *Schizocalyces*, as is its closest relative, *C. lysiosepala* (Gray) C. B. Clarke, var. *Grayi* Rock, of Waihee, west Maui, a variety with the peduncles 20–22 mm long; bracts 8 mm long; calyx 10–11 mm long, the lobes 2–3 mm wide, linear oblanceolate, acute, closely puberulent; petioles 6.5–7 cm long, pilose; blades subequal, elliptic, cuneate at both ends, below pilosulous on veins and intervals. *C. rotata* has the peduncles 15 mm long; bracts 11–14 mm long; calyx 14 mm long, the lobes 3–3.5 mm wide, elliptic oblong, sparsely puberulent; petioles 2.5–5 cm long, subglabrate; blades unequal, broadly oblanceolate, cuneate at base, acuminate at apex, below appressed pilose on midrib (and lateral veins).

The new epithet is the Latin adjective *rotatus*, rotate, and it is given with reference to the rotate or widespreading lobes of the corolla.

Cyrtandra spatulata sp. nov. (sect. *Schizocalyces*)

Fig. 10

DIAGNOSIS HOLOTYPI: Frutex 3.3 m altus est, ramulis 4–6 mm diametro subquadrangularibus; novellis densiter pilosulis subbrunneis divergentibus et ita in ramulis foliosis, cicatricibus 2.5–3 mm altis late scutelliformatis confluentibus pallidis, fasciculis 7, internodis 5–13 mm longis, foliis oppositis congregatis et imbri-

catis et in 3–4 nodis superis productis inaequalibus uno $\frac{1}{3}$ majore, petiolis 12–33 mm longis crebre hirtellis divergentibus, laminis 5–15 cm longis 2.9–6 cm latis crasse et firme chartaceis ellipticis apice subacuminato basi cuneata et decurrenti dimidiis aequalibus supra obscure viridibus et in pagina sparse villosulis catenulatis sed densiter in midnervo infra subdense pilosulis albis et in midnervo et nervis secundariis salebrositer pilosulis marginibus in parte $\frac{3}{4}$ apicali serrulatis et pilosulis ciliatis, nervis secundariis 7–9 in dimidio quoque et curvatis adscendentibus et apicibus interconnectis, nervis tertiis in serrulis salientibus, cymis axillaribus 5–9-floriferis crebre pilosulis albis, pedunculis 20–28 mm longis, bracteis 12–16 mm longis oblanceolatis ad late ellipticis foliosis, pedicellis 10–19 mm longis, alabastris campanulatis, calycibus in flore 13–16 mm longis (in sicco) subalbis infundibuliformatis extra dense pilosulis et intra ad marginem sparse pilosulis, tubo 1–1.2 mm longo cupulato, labia supra trilobata lobis 14 mm longis 6.5 mm latis et 7 mm partitis lobis 14 mm longis 6.5 mm latis, labia infera obtusa bipartita lobis 14–15 mm longis 4.5–5 mm latis ellipticis; corollis 21.5 mm longis albis tubo 15.5 mm longo 4 mm diametro subarcuate cylindrico deflexo extra glabro intra glabro excepta in orificie in parte distali sparse pilosulo, lobis extra albi-pilosulis intra fere glabris sed capitati-glandulosi-puberulis, 2 lobis superis 4 mm longis et latis suborbicularibus, 2 lobis lateralibus 5 mm longis 4 mm latis late ellipticis, loba infera 7 mm longa 6 mm lata latiter elliptica, staminibus perfectis in tubo corollae 6 mm ex orificie affixis, parte libera 3 mm longa subulata spiraliter ascendenti, antheris 2.8 mm longis 1.3 mm latis obliquiter cordati-ovatis compressis cellula una minori, staminodiis lateralibus 0.3 mm longis subulatis in tubo corollae 6 mm ex orificie affixis cum antheridio cordato, stylo nullo, lobis stigmatis binis 1.7 mm longis ovatis, ovario 6.5 mm longo anguste lanceoloideo glabro in basi disco cupulato 0.9 mm alto cincto, fructu incognito.

DIAGNOSIS OF HOLOTYPE: Shrub 3.3 m tall; branchlets 4–6 mm in diameter, slightly quadrangular; young shoots densely brownish spreading pilosulous as are the leafy stems; leaf scars 2.5–3 mm high, broad shield-shaped, confluent, pale; bundle scars 7; internodes 5–13 mm long;

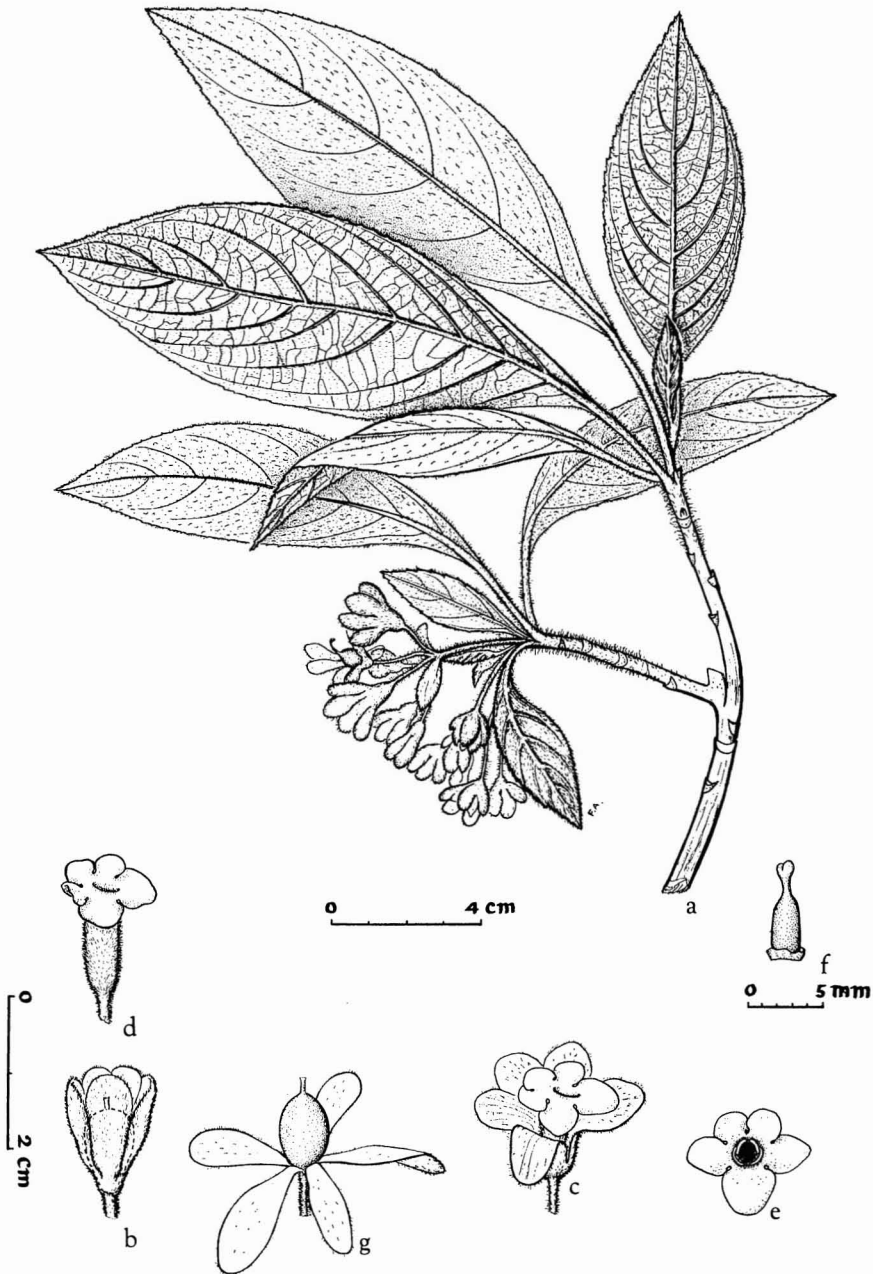


FIG. 10. *Cyrtandra spatulata* St. John, from holotype. *a*, habit, $\times \frac{1}{2}$; *b*, bud, $\times 1$; *c*, flower, $\times 1$; *d*, corolla, $\times 1$; *e*, corolla, face view, $\times 1$; *f*, pistil, $\times 2$; *g*, calyx and berry, $\times 1$.

leaves opposite, crowded and overlapping, borne at the 3-4 upper nodes, those of a pair very unequal, and one of the pair $\frac{1}{3}$ the larger; petioles 12-33 mm long, densely spreading hirtellous; blades 5-15 cm long, 2.9-6 cm wide, thick and

firm chartaceous, elliptic, the apex subacuminate, the base cuneate and decurrent, the two halves equal, above dark green and sparsely catenulate villous on the surface, densely so on the midrib, below rather densely white pilosulous and shag-

gily so on the midrib and secondary veins, the margins serrulate except in the lower quarter, the margins pilosulous ciliate, the secondary veins 7-9 on a side, curved ascending and in-arched, and the tertiary veins salient in the serrulations, cymes axillary, 5-9-flowered, densely white pilosulous; peduncles 20-28 mm long, bracts 12-16 mm long, oblanceolate to broadly elliptic, foliaceous; pedicels 10-19 mm long; buds campanulate; calyx in anthesis 13-16 mm long (when dried), whitish, funnelform, densely pilosulous without, sparsely so within near the upper rim; calyx tube 1-1.2 mm long, cupulate; the limb indistinctly 2-lipped, the upper lip 3 lobed, the lobes 14 mm long, 6.5 mm wide, cleft to within 7 mm of the base, obovate; lower lip 2-parted, the lobes 14-15 mm long, 4.5-5 mm wide, elliptic; corolla 21.5 mm long, white, the tube 15.5 mm long, 4 mm in diameter, subarcuate cylindric and deflexed, glabrous without, except just below the throat on the distal side where it is sparsely pilosulous, within glabrous; corolla lobes white pilosulous without, nearly glabrous within, and there only capitate glandular puberulous; the 2 upper lobes 4 mm long and wide, suborbicular; the two lateral lobes 5 mm long, 4 mm wide, broadly elliptic; the lower lobe 7 mm long, 6 mm wide, broadly elliptic; fertile filaments fused to the corolla tube to within 6 mm of the throat, the free portion 3 mm long, subulate, spirally upcurved; anthers 2.8 mm long, 1.3 mm wide, obliquely cordate-ovate, flattened, one cell slightly the smaller; lateral staminodia 0.3 mm long, subulate, with a cordate antheridium, adnate to the corolla tube to within 6 mm of the throat; style wanting; stigma lobes 2, and 1.7 mm long, ovate; ovary 6.5 mm long, narrowly lanceoloid, glabrous, the base surrounded by a cupulate disk 0.9 mm high; fruit unknown.

EXPANDED DESCRIPTION (*St. John and Mitchell 21,239*): Berries 1.7-2 cm long, ellipsoid, soft, white, glabrous; seeds 0.35-0.5 mm long, 0.2-0.25 mm wide, ellipsoid or asymmetrically so, pale honey-colored, with brown umbonate ends, the surface with raised hexagonal cellular reticulations $\frac{1}{5}$ - $\frac{1}{6}$ as long as the seed.

HOLOTYPE: Hawaiian Islands, Maui Island, Haleakala, ridge, right side of Kipahulu, Nov. 20, 1919, *C. N. Forbes 1,686.M.* (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, Kipahulu Valley, above the plantation, Nov. 13, 1919, *Forbes 1,629.M.* (BISH); ditto, ridge, left side, Nov. 15, 1919, *Forbes 1,646.M.* (BISH); ditto, ridge, right side, Nov. 20, 1919, *Forbes 1,693.M.* (BISH); 20 miles w. of Hana, along Hy. 36, infrequent, with *Eucalyptus*, *Cibotium*, *Touchardia*, 1,200 ft. alt., June 26, 1969, *J. Henrickson 3,726* (BISH); Kipahulu Valley, central pali, 2,800 ft. alt., Aug. 7, 1967, *C. H. Lamoureux and R. E. DeWreede 3,919* (BISH); ditto, 2,900 ft. alt., *Lamoureux and DeWreede 3,942* (BISH); ditto, s. rim of Kipahulu Valley, Kuiki, 4,500 ft. alt., shallow side draw on ridge, in rain forest, Aug. 30, 1945, *H. St. John and A. L. Mitchell 21,239* (BISH); Kupau Valley, of Haleakala, Papaaea, June 14, 1920, *Forbes 2,514.M.* (BISH); e. Maui, Honomanu, May 1911, *J. F. Rock* (BISH); upper ditch trail, [Olinda], 13/10/22, *C. Skottsberg 807* (BISH).

DISCUSSION: *C. spathulata* is a member of the section *Schizocalyces*, and a relative in that section is *C. lysiosepala* (Gray) C. B. Clarke, var. *lysiosepala*, of Maui and Hawaii, a plant with the calyx 20 mm long, green, puberulous, the lobes lanceolate to spatulate; corolla 16-18 mm long; and the young shoots closely appressed pilosulous. *C. spathulata* has the calyx 13-16 mm long, whitish, pilosulous, the lobes elliptic to obovate; corolla 21 mm long; young shoots densely spreading pilosulous.

The new epithet is the Latin adjective *spatulata*, spatulate, and it is given with reference to the shape of the narrowed calyx lobes.

LOBELIACEAE

Clermontia kakeana Meyen var. *orientalis* var. nov.

Differt a typo in perianthio extra pilosulo.

Differing from the typical var. *kakeana* by having the perianth finely pilosulous, while the var. *macrocarpa* has the perianth glabrous. The latter also often has longer and broader leaves, but this is not a constant difference.

HOLOTYPE: Hawaiian Islands, Maui Island, Kipahulu Valley, above the plantation, 1,625 ft. alt., Nov. 13, 1919, *C. N. Forbes 1,625.M.* (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, Oopulua, stream bed near lower ditch trail, in forest, July 7, 1927, *O. Degener* 7,951 (BISH); Keanae Valley, in forest near ditch trail, July 19, 1927, *Degener* 7,952 (BISH); Olinda, 6/24/18, *G. C. Munro* (BISH); edge of forest below Olinda, 4/24/18, *Munro* 651 (BISH); Kula pipe line, on ridge in thick fern forest, 4,250 ft. alt., Nov. 25, 1927, *Munro* 735 (BISH); Kula pipe line, Olinda, Sept. 5–6, 1919, *C. N. Forbes* 1,289.M. (BISH); Haleakala, Oct. 1910, *J. F. Rock* 8,688 (BISH); Honomanu ditch trail, May 1911, *Rock* 8,815 (BISH); Kailua, Nov. 16, 1908, coll. for *Rock* (BISH). All of the above collections form a homogeneous set, and come from the rain forests of the north-east or east slopes of Haleakala in east Maui.

There are two other collections that are similar to the above, but their leaves are thicker and firmer, and all the herbage is more densely pilosulous. Their leaves are a little shorter and broader than usual. They also come from east Maui, but are from the southern or dry side of Haleakala. Their differences may well be due to growing in a more arid habitat. No certain basis is found to justify separating them from the variety here described. These are: Maui, above Puu Poni, March 8, 1920, *Forbes* 1,888 (BISH); Haleakala, southern slopes, Nov. 1910, *Rock* 8,688 (BISH).

C. kakeana var. *kakeana* is abundant and characteristic of the forests of Oahu, of Molokai, and of the mountains of west Maui. All of the collections from east Maui have proven to be of the new var. *orientalis*, with one exception, *Crosby & Anderson* 1,800, from 1/2 mile e. of Puua Kaa State Park, between Hana and Kahului. This seems to be genuine var. *kakeana*.

Since writing up this variety, another variant, from Keanae Valley, east Maui, has been described by E. Wimmer, as *C. kakeana* forma *gracilis* (Pflanzenreich IV, 276c, 826, 1968). It is given a detailed diagnosis, but nearly all of the characters stated are exactly those of *C. kakeana* var. *kakeana*. The only apparent difference mentioned is: leaves 3.5 cm wide, while both Rock and Wimmer say that in the species they are 5–8 cm wide. However, the abundant collections in the Bishop Museum of the typical *C. kakeana* from Oahu show extremes of leaf width from 3 to 9 cm, so this degree of leaf

width does not seem significant. There is no mention of pubescence on the corolla. Since the holotype has not been seen by the present writer, he cannot be certain of the relationship between the forma *gracilis* E. Wimm. and the var. *orientalis* St. John, here described as new.

The new epithet is the Latin adjective *orientalis*, eastern, and it is chosen with reference to east Maui, where the variety occurs.

Clermontia rosacea sp. nov. (sect. *Clermontia*)

Fig. 11

DIAGNOSIS HOLOTYPI: Frutex 5 m altus est, ramulis crassis densiter albi-puberulentis, eis et foliis cum succo lactaceo, foliis alternatis, petiolis 11–22 mm longis albi-puberulentis, laminis 8–10.5 cm longis 3.1–4 cm latis oblanceolatis crasse chartaceis supra obscure viridibus glabris excepta midnervo puberulento rubri infra pallide viridibus et stabiliter albi-pilosulis marginibus crenatis dentibus cum apicibus rubris incurvatis, cymis axillaribus 2-floriferis, pedunculis 4–6 mm longis crassis puberulentis et cum bracteis apicalibus 15–18 mm longis glabris, hypanthio in flore 12–14 mm longo viridi glabro urceolato et cum labro 3–4 mm alto infundibuliformi, lobis calycis licet 5 caducis, lobis corollae 5–5.5 cm longis 2–3 mm latis subcurvatis ligulatis acutis subtilibus et fere membranaceis rosaceis glabris, tubo filamentarum 4.3 cm longo glabro, antheris superis 12 mm longis glabris, antheris inferis 10 mm longis penicillatis pilis 1.5–2 mm longis albis, stylo quam staminibus longiori, stigmatibus 1.5–2 mm diametro suborbicularibus divergentibus, fructu incognito.

DIAGNOSIS OF HOLOTYPE: Shrub 5 m tall; branchlets densely white puberulent, stout, they and the foliage containing milky sap; leaves alternate; petioles 11–22 mm long, white puberulent; blades 8–10.5 cm long, 3.1–4 cm wide, oblanceolate, thick chartaceous, above dark green and glabrous except for the puberulent red midrib, below pale green and permanently white pilosulous, margins crenate and the teeth ending in red, incurved points; cymes axillary, 2-flowered; peduncle 4–6 mm long, stout, puberulent, with apical bracts 3–4 mm long, lanceolate; pedicels 15–18 mm long, glabrous; hypanthium in flower 12–14 mm long, green, glabrous, urceolate and with the apical rim 3–4 mm high,

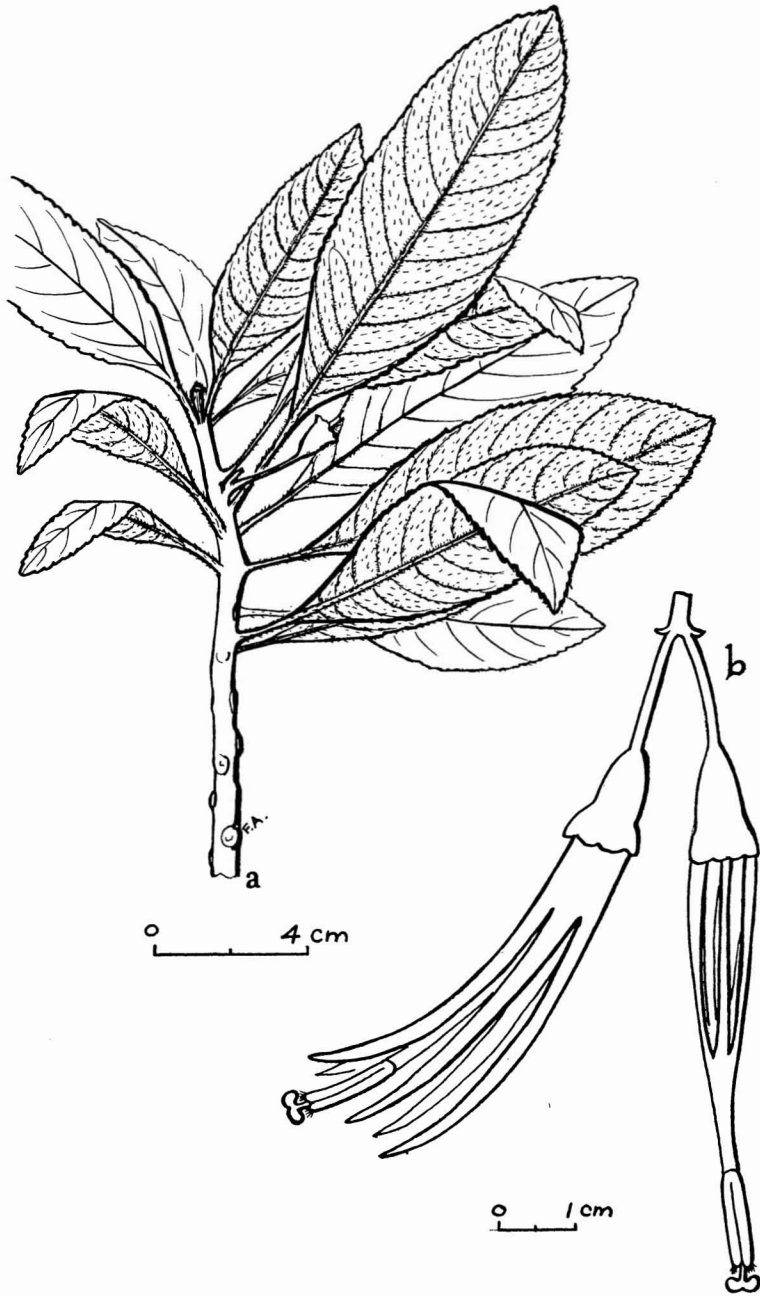


FIG. 11. *Clermontia rosacea* St. John, from holotype. *a*, habit, $\times \frac{1}{2}$; *b*, flowers, $\times 1$.

funnelform; calyx lobes apparently 5, caducous; the corolla lobes 5–5.5 cm long, 2–3 mm wide, gently curved, the lobes with the tips at 40° from their bases, ligulate, acute, thin, almost membranous, rose-colored throughout, glabrous; staminal tube 4.3 cm long, glabrous; upper an-

thers 12 mm long, glabrous; lower anthers 10 mm long, penicillate, the white bristles 1.5–2 mm long; style exceeding the stamens; stigmas 1.5–2 mm in diameter, suborbicular, divergent; fruit unknown.

HOLOTYPE: Hawaiian Islands, Maui Island,

s. rim of Kipahulu Valley, Kuiki, Haleakala, ferny rain forest, 5,500 ft. alt., Aug. 30, 1945, *H. St. John and A. L. Mitchell 21,246* (BISH).

DISCUSSION: *C. rosacea* is a member of the section *Clermontia*, as is its closest relative, *C. montis-loa* Rock, of Mauna Loa, Hawaii Island, a species usually epiphytic; the blades 10–18 cm long, 2.5–3.5 cm wide, narrowly oblanceolate, coriaceous; petioles 3–4.5 cm long; pedicels 5–12 mm long; corolla 35 mm long, light purplish green, the lobes thick and fleshy; upper anthers 11 mm long. *C. rosacea* is terrestrial; the blades 8–10.5 cm long, 3.1–4 cm wide, oblanceolate, thick chartaceous; petioles 1.1–2.2 cm long; pedicels 15–18 mm long; corolla 50–55 mm long, thin, rose-colored, glabrous; upper anthers 12 mm long.

The new epithet is the Latin adjective *roseaceus*, rose-colored, and it is given with reference to the color of the flowers.

Cyanea bicolor sp. nov. (sect. *Palmaeformes*)

Fig. 12

DIAGNOSIS HOLOTYPE: Caulis 3.3–6.7 m altus simplex est, foliis et floribus in acervo terminali, petiolis 2–3 cm longis muricatis et adpresse hirsutulis, laminis 38–41 cm longis 8–9.8 cm latis elliptici-oblanceolatis chartaceis supra obscure viridibus et in nervis sparse muriculatis infra pallide viridibus et densioriter pallide puberulentis midnervo infra adpresse puberulento in dimidio basali marginibus irregularibus et minute denticulatis in dimidio apicali sinuatis, inflorescentiis axillaribus 10–13-floriferis, pedunculo 10–15 mm longo sparse adpresse hirsutulo, rhachide 2–3 cm longo dense adscendente adpresse hirsutulo, bracteis 5–12 mm longis linearilanceolatis crassis carnis adpresse hirsutulis, pedicelis 13–23 mm longis gracilibus adpresse hirsutulis sine bracteis, hypanthio 12 mm longo oblanceoloideo densiter adpresse albi-hirsutulo, lobis calycis 7–11 mm longis 2–4 mm latis oblongis vel anguste ellipticis acutis herbaceis viridibus sparse adpresse hirsutulis sed plerumque in dimidio basali inaequalibus 3 superis majoribus, corolla intra alba extra rubra sed in sicco obscure rubra, alabastris 6–6.2 cm longis subcurvatis densiter adpresse adscendente pallidi-hirsutulis, tubo corollae 3–3.3 cm longo 5–6 mm diametro, lobis reflexis binis superis 3 cm longis 2–2.5 mm latis linearibus extra

sparse hirsutulis illis 3 inferis 2.5 cm longis simulantibus, tubo filamentarum 5.3–5.5 cm longo glabro, antheris 3 superis 13 mm longis glabris illis 2 inferis 10–10.5 mm longis in apice penicillatis pilis 3–3.2 mm longis rigidis albis, stylo 3–4 mm exserto et cum 2 stigmatibus 2 mm longis suborbicularibus.

DIAGNOSIS OF HOLOTYPE: Stem single, 3.3–6.7 m tall, unbranched, bearing all the leaves and flowers in a cluster at the apex; petioles 2–3 cm long, muricate and appressed hirsutulous; blades 38–41 cm long, 8–9.8 cm wide, elliptic oblanceolate, chartaceous, above dark green and sparingly muriculate on the veins, below pale green and rather densely pale puberulent, the midrib appressed puberulent, the margins of the basal half uneven and minutely denticulate, of the apical half sinuate; inflorescences axillary, diverging, 10–13-flowered; peduncle 10–15 mm long, sparsely appressed hirsutulous; rhachis 2–3 cm long, densely ascending appressed hirsutulous; bracts 5–12 mm long, linear lanceolate, thick and fleshy, appressed hirsutulous; pedicels 13–23 mm long, slender, appressed hirsutulous, bractless; hypanthium 12 mm long, oblanceoloid, densely appressed white hirsutulous; calyx lobes 7–11 mm long, 2–4 mm wide, oblong or narrowly elliptic, acute, herbaceous, green, sparsely appressed hirsutulous, mostly on the basal half, unequal, the 3 upper ones slightly the longer; corolla white within, deep red without, drying blackish red; buds 6–6.2 cm long, gently curved, densely pale appressed ascending hirsutulous; corolla tube 3–3.3 cm long, 5–6 mm in diameter, corolla lobes reflexing, the 2 upper ones 3 cm long, 2–2.5 mm wide, linear, sparsely hirsutulous without; the 3 lower ones 2.5 cm long, similar; filament tube 5.3–5.5 cm long, glabrous; the 3 upper anthers 13 mm long, glabrous, the 2 lower anthers 10–10.5 mm long, the apex penicillate with a brush of stiff white hairs 3–3.2 mm long; style protruding 3–4 mm, with 2 suborbicular stigmas 2 mm long.

HOLOTYPE: Hawaiian Islands, Maui Island, Kipahulu Valley, closed wet forest, n. e. exposure, on thin mud soil, on sides of steep gulches, infrequent, 6,000 ft. alt., *P. H. Baldwin 11* (BISH).

DISCUSSION: *C. bicolor* is a member of the

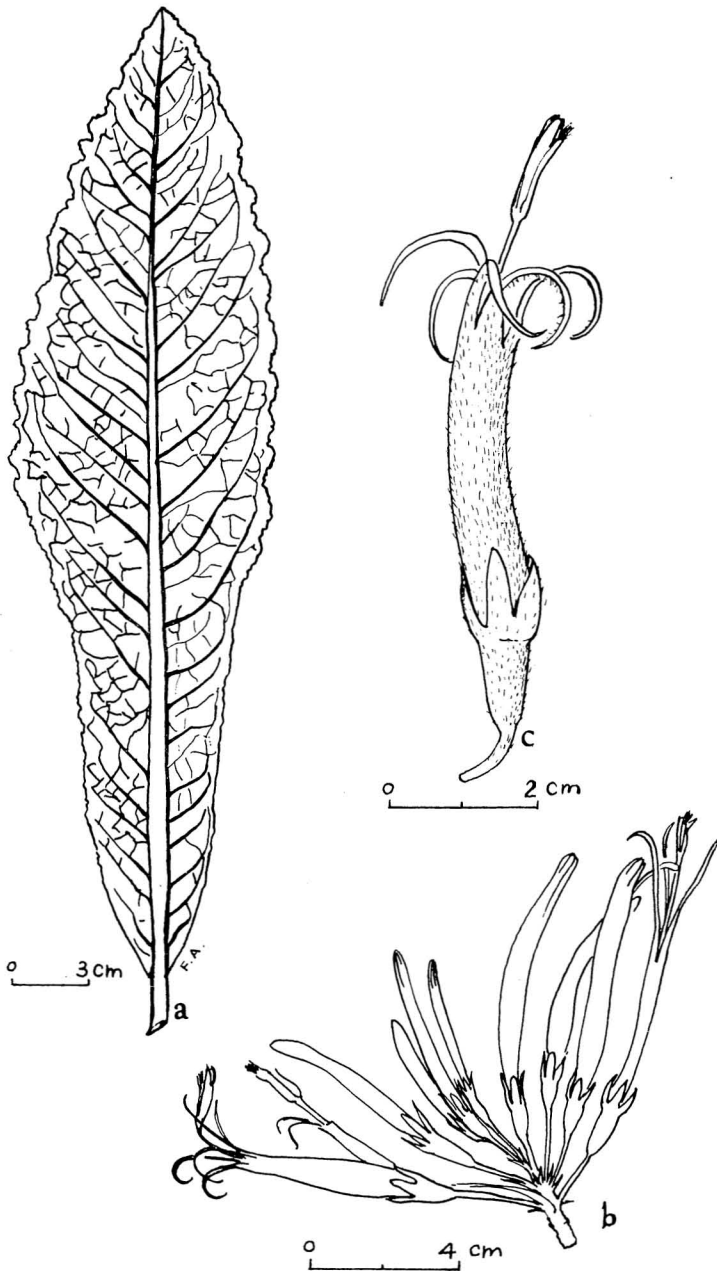


FIG. 12. *Cyanea bicolor* St. John, from holotype. *a*, leaf, $\times \frac{1}{3}$; *b*, inflorescence, $\times \frac{1}{2}$; *c*, flower, $\times 1$.

section *Palmaeformes*, as its close relative, *C. atra* Hbd., of the mountains of west Maui, a species with the trunk 1.3–2 m tall; petioles 5–11 cm long; blades 40–50 cm long, oblanceolate, the margins crenulate, below the midrib spreading puberulent, the surface sparsely pu-

berulent, mostly on the veins, pedicels with bracts at the middle; calyx lobes 12–25 mm long, obtuse; corolla tube and lobes densely spreading or reflexing hirsute. *C. bicolor* has the trunk 3.3–6.7 m tall; petioles 2–3 cm long; blades 38–41 cm long; elliptic oblanceolate, the

margins of the apical half sinuate, below the surface rather densely pale puberulent, the midrib appressed puberulent, the bracts of the pedicel wanting; calyx lobes 7–11 mm long, acute; corolla tube densely pale appressed ascending hirsutulous.

The new epithet is coined from the Latin *bi-*, twice; *color*, colored, and it is given with reference to the different colors of the outside and the inside of the corolla lobes.

Cyanea haleakalaensis sp. nov. (sect. *Deliseoideae*)

Fig. 13

DIAGNOSIS HOLOTYPE: Frutex 1–2 m altus ramosus est, succo lactoso aurantiaco, ramulis 3–5 mm diametro tandem subglabratis, internodiis 2–5 cm longis, novellis subadpresse puberulentis albis, petiolis 3.5–10 cm longis subadpresse puberulentis albis, laminis 10–20 cm longis 4.7–8.2 cm latis subtiliter chartaceis flaccidis late oblancei-ellipticis (vel lancei-ellipticis) apice acuminato basi anguste subcordata (vel cuneata) marginibus minute sinuosi-denticulatis supra obscure viridibus et remote adpresse puberulentis albis et in midnervo densiter ita infra subalbiviridibus et abundanter cum pilis simulantibus in nervis et in pagina, racemis axillaribus solitariis 3–12-floriferis et 4–10 cm longis adpresse puberulis albis, pedunculis 15–18 mm longis in flore adscendentibus sed in fructu cernuis, rachide 10–35 mm longo, bracteis 3 mm longis linearibus foliosis, pedicelis 4–9 mm longis rectis, hypanthio 6–8 mm longo oblanceoloideo viridi, lobis calycis 3–4 mm longis deltoideilanceolatis viridibus et sparse adpresse puberulis, corolla 37–39 mm longa salmoni-colorata proxima basem 2.5–3 mm diametro in flexione 4–6 mm diametro recta tum in puncto $\frac{2}{3}$ deflecta parve adpresse puberula alba in sunu ventrali per 14–16 mm partita, 2 lobis superis 7 mm longis 2 lobis lateralibus 4 mm longis ovatis, loba infera 3 mm longa, columna staminalibus 33 mm longa glabra, antheris 5.5–8 mm longis spuma-lactei-aurantiacis eis 3 superis glabris illis 2 inferis penicillatis cum pilis 0.5–0.7 mm longis rigidis albis, stylo 3.9–4 cm longo, stigmatibus 2.5 mm longis protrusis ellipticis albis curvatis divergentibus, baccis 7–8 mm longis aurantiacis, seminibus multis 0.5 mm longis 0.3 mm latis

0.2 mm crasis ellipsoideis laevibus lucidis mellicoloratis et rubri-striatis.

DESCRIPTION OF ALL SPECIMENS EXAMINED: Shrub 1–2 m tall, branching; sap milky, orange; branchlets 3–5 mm in diameter, becoming subglabrate; internodes 2–5 cm long, young shoots subappressed white puberulent; petioles 2.5–10 cm long, subappressed white puberulent; blades 10–20 cm long, 4.3–8.4 cm wide, thin chartaceous, flaccid, broadly oblance-elliptic (or lance-elliptic), the apex acuminate, the base narrowly subcordate (or cuneate), the margins minutely sinuous denticulate, the upper surface dark green and remotely white appressed puberulent but on the midrib densely so, the lower surface whitish green and with more abundant similar pubescence, the secondary veins abundantly so, the intervals more so than above, but the hairs spaced; racemes solitary in the axils, 3–12-flowered, 4–10 cm long, appressed white puberulous; peduncles 15–18 mm long, ascending in flower, but in fruit cernuous descending; rachis 10–35 mm long; bracts 3 mm long, linear, foliaceous; pedicels 4–9 mm long, straight; hypanthium 6–8 mm long, oblanceoloid, green; calyx lobes 3–4 mm long, deltoid-lanceolate, green and sparsely appressed puberulous; corolla 37–39 mm long, salmon-colored, 2.5–3 mm in diameter near the base, 4–6 mm in diameter at the bend, straight, then gently down curved at $\frac{2}{3}$ way out, finely white appressed puberulous, the ventral sinus cut down for 14–16 mm, the 2 upper lobes 7 mm long, the 2 lateral ones 4 mm long, ovate, the lower lobe 3 mm long; staminal column 33 mm long, glabrous; anthers 5.5–8 mm long, creamy orange, the 3 upper ones glabrous, the 2 lower ones penicillate, the stiff white hairs 0.5–0.7 mm long; style 3.9–4 cm long; stigmas 2.5 mm long, protruded, elliptic, white, divergent curving; berries 7–8 mm long, orange; seeds numerous, 0.5 mm long, 0.3 mm wide, 0.2 mm thick, ellipsoid, smooth, shining, honey-colored, with a few red streaks.

HOLOTYPE: Hawaiian Islands, Maui, Olinda Pipeline Road, lower fork road, wet *Metrosideros* forest, 4,600 ft. alt., Dec. 25, 1951, *G. Y. Kikudome* 454 (BISH). At the same time and locality there were collected: *A. K. Chock and Kikudome* 299; and *H. St. John* 24,732 (BISH).

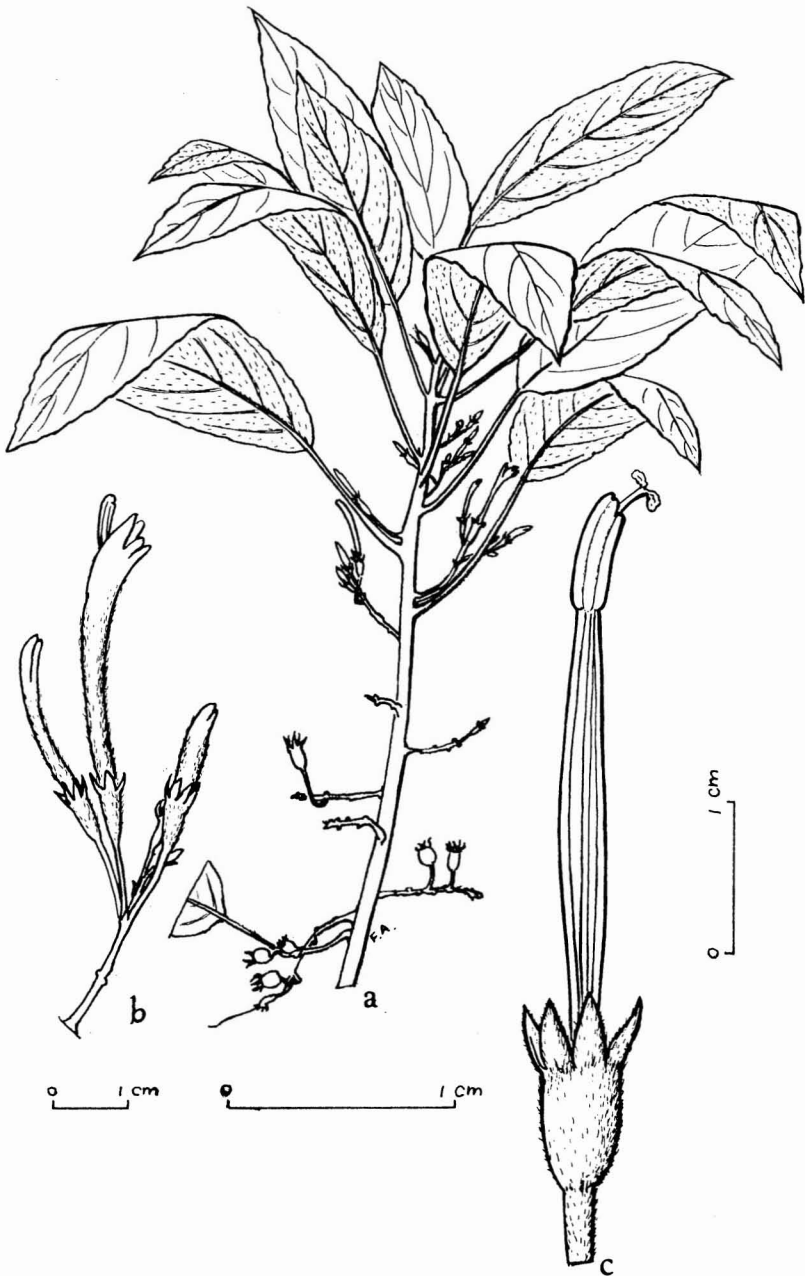


FIG. 13. *Cyanea haleakalaensis* St. John, from holotype. *a*, habit, $\times \frac{1}{3}$; *b*, inflorescence, $\times 1$; *c*, calyx, stamens, and stigmas, $\times 2$.

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, ridge, left side of Kipahulu Valley, Nov. 18, 1919, *C. N. Forbes 1,680.M.* (BISH); ditto, *1,708.M.* (BISH); ditto, e. part of valley on banks of stream below central pali,

Aug. 7, 1967, *C. H. Lamoureux and R. E. DeWreede 3,917* (BISH); Waikamoi trail, June 25, 1920, *Forbes 2,616.M.* (BISH); mts. above Hana, July 5, 1920, *Forbes 2,675.M.* (BISH); E. Maui, n. slopes of Haleakala, between upper

and lower trail, west of Waikamoi gulch, Feb. 2, 1954, *J. F. Rock 25,660* (BISH).

Insulis Sandwich: 1909, *Faurie 576* (BISH).

DISCUSSION: *C. haleakalaensis* is a member of the section *Delisseoideae*, as is its closest relative, *C. Copelandii* Rock, of Hawaii Island, a species with the calyx lobes 2–3 mm long, becoming curled revolute; corolla yellowish flesh-colored; blades 14–27 cm long, 3.5–8 cm wide, narrowly elliptic, shortly acuminate, the base cuneate, the upper surface with reddish brown pubescence. *C. haleakalaensis* has the calyx lobes 3–4 mm long, ascending or diverging; corolla salmon-colored, straight for the lower $\frac{1}{2}$ – $\frac{2}{3}$; blades 10–20 cm long, 4.3–8.4 cm wide, broadly oblance-elliptic, the apex acuminate, the base narrowly subcordate (or cuneate); the pubescence of the plant all white.

The collections of this species made by Forbes have long been available, and in recent years there were several other collections. Forbes determined his specimens as *Cyanea Copelandii* Rock, a species from the Kilauea region on the island of Hawaii. Wimmer in 1936 saw the Forbes nos. 2,616.M. and 2,375.M, and determined them as *C. multispicata* Lévl., a species of Kauai. Rock in 1954 collected the species himself, thought it new, prepared a photograph of it, completed a description, and chose a name for it, but in 1957 he retracted all this, left it unpublished, and labeled it and the Forbes collections from Maui again as *C. Copelandii*. To the present writer it seems clear that this plant of the windward rain forests of Haleakala, Maui, is distinct from *C. Copelandii* of the rain forests of Hawaii, differing in stem stature, branching; leaf shape, size, pubescence color, calyx size and posture, and corolla color and curvature.

One of the specimens here cited, *Faurie 576*, from the Insulis Sandwich or Hawaiian Islands, was one of the two collections upon which *C. multispicata* Lévl. was based. As Rock pointed out (1919, p. 269) this specimen differed from the diagnostic characters given by Léveillé by having much smaller leaves. It can also be seen that the leaves and corolla are not villosulous. The duplicate of this number in the Bishop Museum is quite a good specimen, with stem, leaves, peduncles, buds, and a flower. They

match well the Maui specimens here described as the new *C. haleakalaensis*, and are here so determined. By this action only one collection, *Faurie 594*, from Waimea, Kauai, is left in *C. multispicata* Lévl., and thus it automatically becomes the lectotype of that species.

Hillebrand (1888) gave names to three subdivisions of the genus *Cyanea*, which he described without indicating their rank. Rock (1919) accepted them, called them sections, and added two more. He gave no key to these sections, and his short descriptions of them are so overlapping and lacking in clear contrasts that no one else has been able to key them. Wimmer (1956) accepted only the three sections of Hillebrand, and gave a key to them by which two of the three are identifiable. Following Wimmer's revision our new species falls into the section *Delisseoideae*.

Trematobelia macrostachys (H. & A.)
Zahlbr. var. *haleakalaensis* var. nov.

Fig. 14

DIAGNOSIS HOLOTYPUS: A specie differt in foliis minus anguste lanceolatis, laminis 12–16 cm longis 15–22 mm latis, petiolis 8–12 mm longis, pedicelis 1.5–2 cm longis, lobis calycis 10–15 mm longis 2 mm latis ligulatis subacutis, corollis subcurvatis rosaceis 5 cm longis, tubo minime puberulo, columna filamentarum in 5 lineis remote pilosa, antheris in basi pilosis.

DISCUSSION: The new var. *haleakalaensis* differs from var. *macrostachys* by having the leaves less narrowly lanceolate, the blades 12–16 cm long, 15–22 mm wide; petioles 8–12 mm long; pedicels 1.5–2 cm long; calyx lobes 10–15 mm long, 2 mm wide, ligulate, subacute; corolla gently curved, pink to deep rose-colored, 5 cm long, the tube finely puberulous; filament column remotely pilose in 5 lines and anthers at base pilose tufted. The var. *macrostachys* has the leaves very narrowly lanceolate, the blades 11–27 cm long, 14–22 mm wide; petioles 25–60 mm long, pedicels 2.5–3 cm long; calyx lobes 3–6 mm long, 2–3 mm wide, ovate to lanceolate, obtuse; corolla 5–6 cm long, the tube glabrous; filament column pilose in lines; anthers densely pilose at base.

HOLOTYPUS: Hawaiian Islands, Maui, Kipahulu Valley, west part of valley, sites exposed to

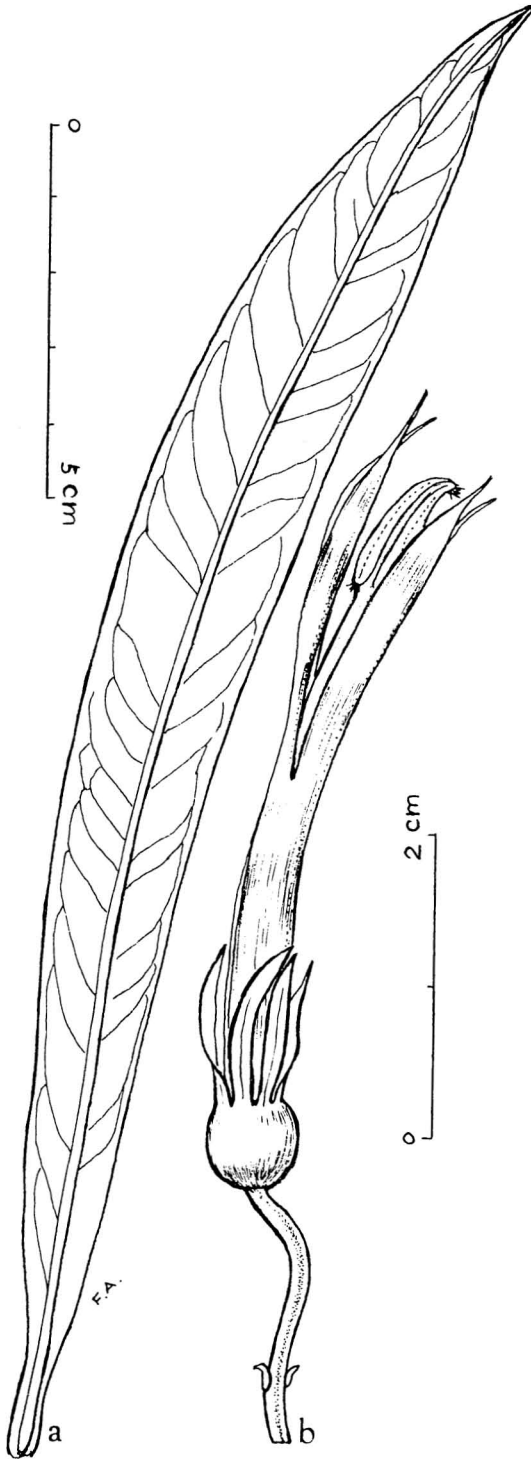


FIG. 14. *Trematolobelia macrostachys* (H. and A.) Zahlbr. var. *haleakalaensis* St. John, from holotype. *a*, leaf, $\times 1$; *b*, flower, $\times 2$.

wind, 3,200 ft. alt., Aug. 6, 1967, C. H. Lamoureux and R. E. DeWreede 3,859 (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui, mauka of Makawao, June 26, 1927, O. Degener 7,975 (BISH); Ukulele, lower trail, Sept. 4, 1919, C. N. Forbes 1,252 (BISH); Mts. above Hana, Puu Paki swamp, July 5, 1920, Forbes 2,685.M. (BISH); Waikamoi Forest Reserve, above no. 1 Dam, July 26, 1951, H. Inciong (BISH); Haiku Uka, edge of Waikamoi Gulch, below dam, 4,400 ft. alt., Aug. 4, 1943, H. St. John 20,356 (BISH).

The new epithet is formed from the name of the mountain, Haleakala, and *-ensis*, the Latin adjectival place suffix.

COMPOSITAE

Argyroxiphium Forbesii sp. nov.

Fig. 15

DIAGNOSIS HOLOTYPI: Planta perennis 4–5 dm alta est, rosula 3 dm diametro, caule unico erecto in apice 2 cm diametro, foliis numerosis et in flore ad apicem congregatis sessilibus 15–19 cm longis 3–4 mm latis integris crassis coriaceis lineari-ligulatis compressis supra planis infra subconvexis marginibus acribus in parte $\frac{1}{3}$ basali paululum angustioribus apice subito deminuenti sed obtuso in pagina infera midnervo elevato in pagina supra cum sulcis angustis supra 5 nervis subglabratis infra adpresse albipilosulis praecipue ad apicem marginibus densiter pilosuli-ciliatis, foliis rosulatis 26–27 cm longis 4–5 mm latis plus pubescentibus, racemo 22–28 cm longo terminali erecto densiter glandulosi-pilosis violaceis pilis 1–1.5 mm longis, racemo cum 19–31 capitulis cernuis, bracteis foliaceis eis inferis 12 cm longis 6–7 mm latis illis superis 5 cm longis 2 mm latis, pedunculis 4–8 cm longis subverticalibus capitulis omnibus (eo terminali excepta) 10–15 mm diametro, phyllariis fere 21 in seriebus binis et 14–16 mm longis 1.5–2.2 mm latis anguste oblanceolatis acutis viridibus per $\frac{2}{3}$ connatis et involucrem anguste cylindricum 7–10 mm diametro formantibus, disco convexo nudo, floribus radiatis paucis femineis fertilibus, achaeneis radiatis 11 mm longis a phyllario sustento lineari-oblanceoloideis 1.5 mm latis 1 mm crassis triangularibus brunneis laevibus lucidis, squamis pappi distalis glabris ad apicem marginibus laceratis,

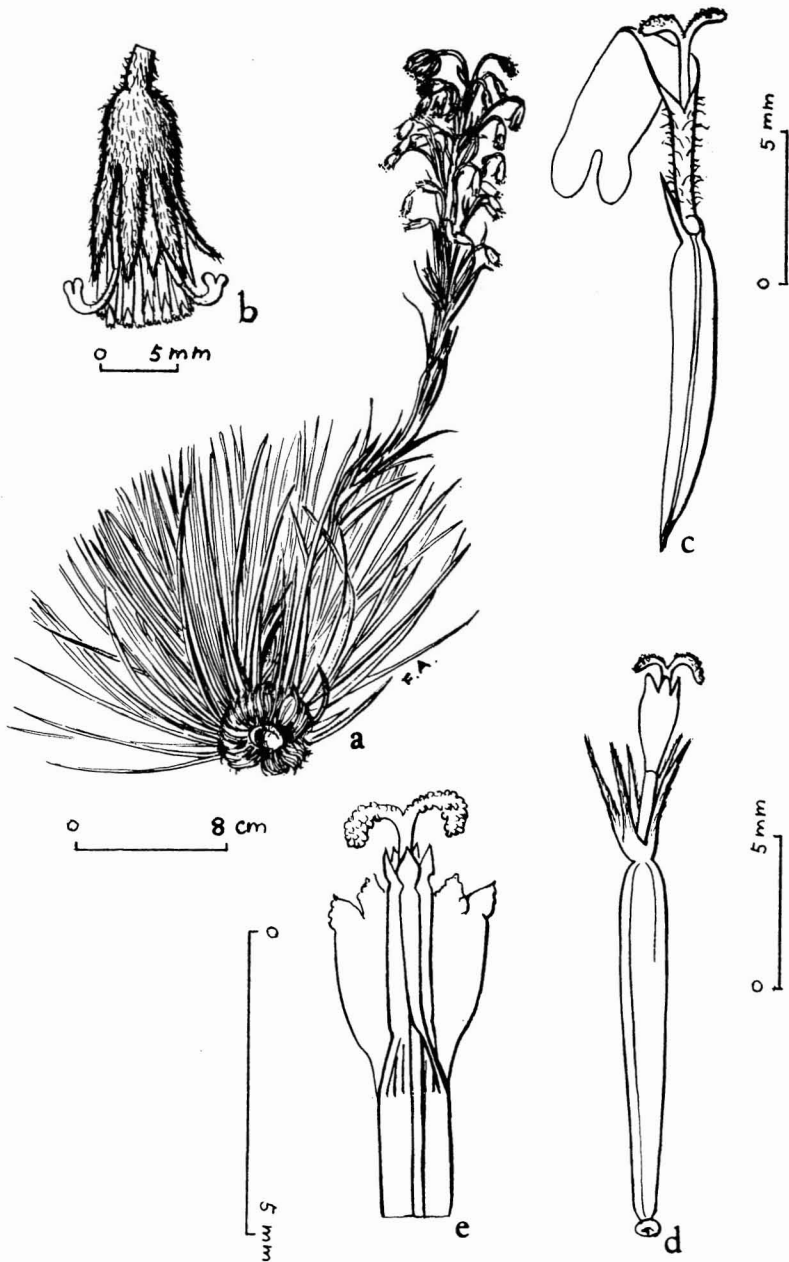


FIG. 15. *Argyroxiphium Forbesii* St. John, from holotype. *a*, habit, $\times \frac{1}{4}$; *b*, head, $\times 2$; *c*, ray flower and achene, $\times 4$; *d*, disk flower and achene, $\times 4$; *e*, disk corolla, stamens, stigmas, $\times 8$.

tubo corollae radiatae 2.8 mm longo anguste cylindrico albi-piloso multicellulari, lamina radiata 3.5 mm longa 2.5 mm lata pallide lavandula in apice per 1.6 mm bifida vel trifida lobis ovatis, floribus disci purpureis perfectis fertilibus, achenis disci 9.7–10 mm longis 1.3 mm latis 0.8

mm crassis tetragularibus 4-costatis suboblancei-prismaticis compressis brunneis laevibus, squamis pappi disci 2.5–5 mm longis inaequalibus lineari-lanceolatis minute ciliatis, tubo corollae disci 4–4.5 mm longo sparse pilosulo, limbo 2.3 mm longo anguste ellipsoideo lobis 5 et

0.4 mm longis ovatis crassis, stylo paululum exserto, stigmatibus 2 luteis 1 mm longis oblancei-filiformibus, filamentis per 2 mm ad basim cum corollam adnatis tum per 2 mm liberis, antheris 1.5 mm longis linearibus et cum apice lancei-ovato; capitula terminali 18 mm diametro, phyllariis 2-3 mm latis $\frac{1}{2}$ connatis, involucre 18 mm diametro campanulato, floribus achaenisque disci simulantibus.

DIAGNOSIS OF HOLOTYPE: Perennial 4-5 dm tall; rosette 3 dm in diameter; stem erect and single, the apex 2 cm in diameter; leaves numerous, crowded in a terminal plume, sessile, and in mature plants 15-19 cm long, 3-4 mm wide, entire, thick and coriaceous, linear ligulate, compressed, flat or concave above, low convex below, sharply edged, slightly narrower in the lower third, the apex abruptly narrowed but obtuse, on the lower surface the midrib elevated, on the upper with narrow longitudinal furrows above the 5 veins, the upper surface nearly glabrate, the lower appressed white pilosulous ciliate, especially towards the apex, the margins densely pilosulous ciliate; (the leaves of young plants in the rosette stage are 26-27 cm long, 4-5 mm wide, and more hairy on both surfaces); raceme 22-28 cm long, terminal, erect, densely violet glandular pilose, the hairs 1-1.5 mm long, the inflorescence bearing 19-31 nodding heads; bracts of the raceme foliaceous, the lower ones 12 cm long, 6-7 mm wide, the upper ones 5 cm long, 2 mm wide; peduncles 4-8 cm long, ascending almost vertically; all the heads (except the terminal one) 10-15 mm across; phyllaries about 21, in 2 series, and 14-16 mm long, 1.5-2.2 mm wide, narrowly oblanceolate, acute, green, connate for $\frac{2}{3}$ their length into a narrowly cylindrical involucre 7-10 mm in diameter; disk convex, naked; ray flowers few, pistillate, fertile, the achene 11 mm long, subtended by an inner phyllary, and linear oblanceoloid, 1.5 mm wide, 1 mm thick, 3-angled, 3-ribbed, and deltoid in cross section, brown, smooth, shining; pappus scale distal, solitary, 1.5 mm long, lanceolate, stramineous, glabrous, the margins lacerate near the tip; corolla tube 2.8 mm long, narrowly cylindrical, white multicellular pilose; ray 3.5 mm long, 2.5 mm wide, pale lavender, at apex bifid or trifid for 1.6 mm into 2 or 3 ovate lobes; disk flowers purplish,

perfect and fertile; disk achene 9.7-10 mm long, 1.3 mm wide, 0.8 mm thick, 4-ribbed, 4-angled, slightly oblance prismatic and compressed, brown, smooth; pappus of 5-9 chaffy unequal scales 2.5-5 mm long, linear lanceolate, finely ciliate; disk corolla tube 4-4.5 mm long, sparsely pilosulous, the corolla limb 2.3 mm long, narrowly ellipsoid, the 5 lobes 0.4 mm long, ovate, thick; the style exerted slightly, the 2 yellow stigmas 1 mm long, oblance filiform; filaments fused to the lower corolla tube for 2 mm and free for about the same distance; anthers 1.5 mm long, linear, with a lance-ovate apex; terminal head 18 mm across; phyllaries 2-3 mm wide, connate for half their length into a campanulate involucre 18 mm in diameter; disk flowers and achenes similar.

HOLOTYPE: Hawaiian Islands, Maui Island, n. slope of Haleakala, edge of Kipahulu Valley, Aug. 17, 1919, C. N. Forbes 1,170.M. (BISH).

The closest relative of *A. Forbesii* is *A. virescens* of the crater and north slope of Haleakala, a species with the plant 1-2 m tall; rosette leaves 10-30 cm long, 3-8 mm wide; raceme with 50-100 heads; peduncles 6-15 cm long; involucre broadly campanulate to cupulate; rays 6 mm long, 2 mm wide; ray achenes 4-angled; disk corolla tube 2 mm long; disk achenes 4-5-angled. *A. Forbesii* is 4-5 dm tall; rosette leaves 26-27 cm long, 4-5 mm wide; raceme with 19-31 heads; peduncles 4-8 cm long; involucre cylindrical; rays 5.3 mm long, 2.5 mm wide; ray achenes 3-angled; disk corolla tube 4-4.5 mm long; disk achenes 4-angled.

This collection was studied by D. D. Keck, identified as *A. virescens*, cited, and its characters merged in his description (1936, p. 17-18) with those of that other Maui species.

The new epithet is chosen to honor the collector, Charles Noyes Forbes (1883-1920), first staff botanist of the Bishop Museum.

Argyroxiphium virescens Hbd. var. *paludosa* var. nov.

Fig. 16

DIAGNOSIS HOLOTYPEI: Planta erecta arboriformis 1-2 m alta est, caule 2-4 cm diametro solitario simplici erecto brunneo infra nodo prope a bordinis inferis exsertis cicatriciorum circumdato, foliis sessilibus alternatis sed multi-

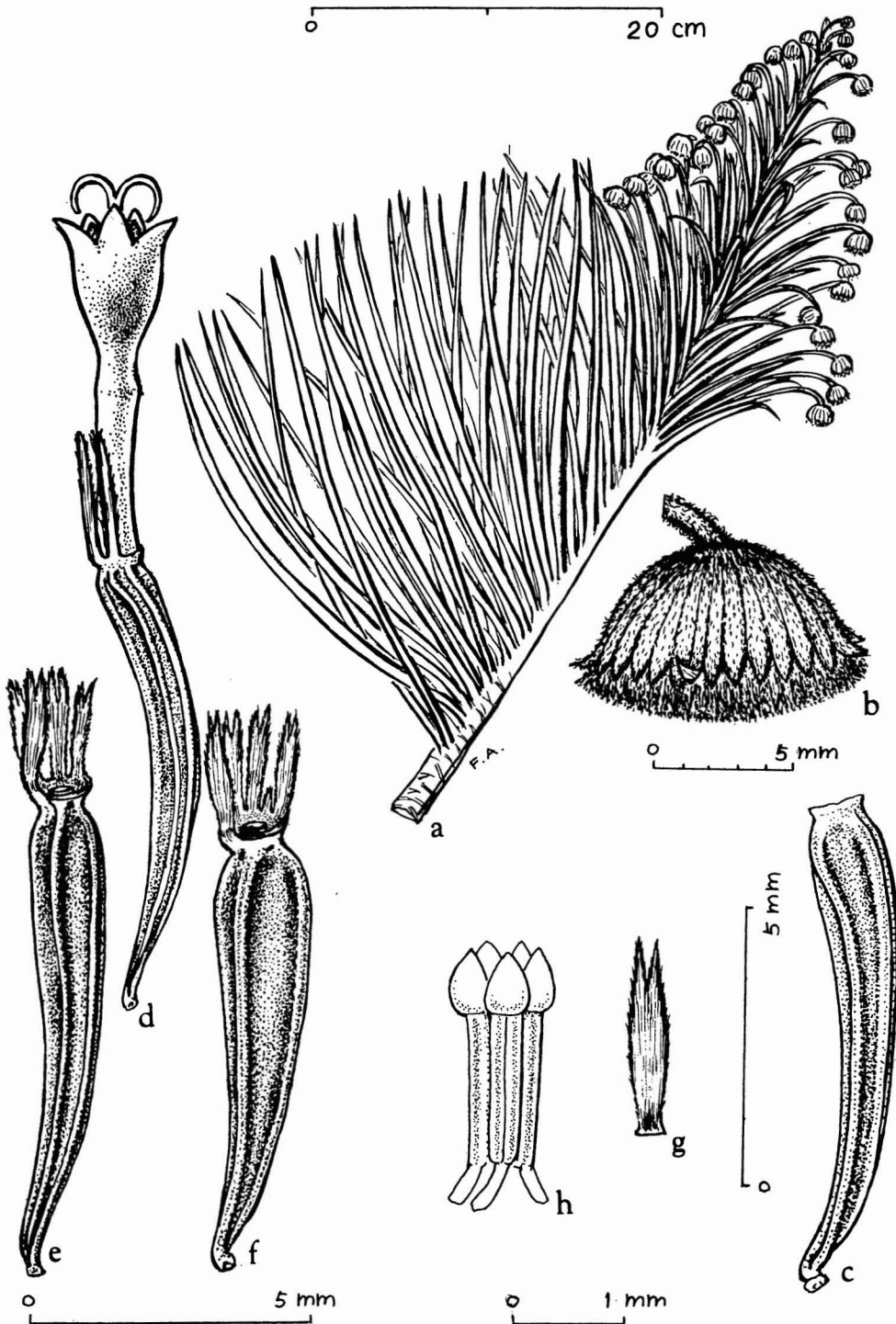


FIG. 16. *Argyroxiphium virescens* Hbd. var. *paludosa* St. John, from holotype. *a*, habit, $\times \frac{1}{4}$; *b*, head, $\times 4$; *c*, ray achene, $\times 8$; *d*, disk flower and achene, $\times 8$; *e*, *f*, disk achenes, $\times 8$; *g*, disk pappus, $\times 16$; *h*, disk stamens, $\times 16$.

tudinis et in parte supera 30–35 cm longa congregatis, foliis in sectione $\frac{3}{4}$ infera 27–30 cm longis 7–9 mm latis integris ligulatis sed in parte $\frac{1}{4}$ basali 3–4 mm latis subcuneatis apice subito acuto, lamina coriacea crassa firma supra glabrata infra sparse adpresse albi-pilosula et in bordinis densiore pilosula, nervis 7–9 parallelis infra elevatis evidentis supra sulcatis, foliis supra deminentibus ad inflorescentiam et eis superis fere 10 cm longis 4–5 mm latis, racema fere 60 cm longa densiter glandulosi-pilosula pilis ad 1 mm longis, bracteis foliosis eis inferis 7–8 cm longis 7–8 mm latis illis superis 5–6 cm longis 4–5 mm latis, pedunculis 5–15 cm longis adscendentibus in 45° ; capitulis cernuis multis 20–25 mm diametro, phyllariis 16–23 et 12–14 mm longis oblanceolatis acutis viridibus et densiter glandulosi-hirsutulis et in parte $\frac{3}{4}$ infera connatis et crateriformibus, paleis verticillatis connatis et crateriformibus ad phyllarios subaequalibus glabris gracilibus pallidis, radiis lutei-viridibus et lavanduli-tinctis, achaeneis radiorum 9 mm longis 1 mm diametro lunatilinearibus tetrangularibus quadratis ad apicem in collo deminentibus apice infundibuliformi rotundato sine pappo, disco luteo cum fere 190 floribus, tubo corollae glabro per 2.7–3 mm cylindrico tum per 2–2.5 mm apicali distento et anguste campanulato et cum lobis 0.5 mm longis deltoideis, achaeneis disci 8–8.5 mm longis 0.8–1 mm latis 0.3–0.5 mm crassis 4–5-costatis et -angulosis arcuatis anguste prismaticis brunneis laevibus, 5 paleis pappi 1–2 mm longis inaequalibus lineari-lanceolatis.

DIAGNOSIS OF HOLOTYPE: Plant erect, tree-like, 1–2 m tall; stem 2–4 cm in diameter, single, undivided, erect, brown, naked below, closely ringed by the projecting lower edge of the leaf scars; leaves sessile, alternate but numerous and crowded, borne on the upper 30–35 cm of the stem, forming a dense plume; leaves of the lower $\frac{3}{4}$ of the plume 27–30 cm long, 7–9 mm wide, entire, ligulate but in the basal $\frac{1}{4}$ subcuneate and narrowing to 3–4 mm width, the apex abruptly acute, the blade coriaceous, thick and firm, green, above glabrate, below sparsely appressed white pilosulous, and more densely pilosulous ciliate on the margins, the 7–9 parallel nerves raised and evident below and marked above by narrow furrows; the cau-

line leaves diminishing and those at the base of the inflorescence as small as 10 cm long and 4–5 mm wide; raceme about 60 cm long, densely glandular pilosulous, the hairs up to 1 mm in length; bracts leafy, the lower ones 7–8 cm long, 7–8 mm wide, the upper ones 5–6 cm long, 4–5 mm wide, similar; peduncles 5–15 cm long, ascending at about 45° ; heads nodding, numerous, 20–25 mm wide; phyllaries 16–23 and 12–14 mm long, 1.2–1.5 mm wide, oblanceolate, acute, green, and densely glandular hirsutulous, the phyllaries connate for $\frac{3}{4}$ their length into a bowl-shaped involucre; the chaff scales verticillate and united to form a bowl or cup enclosing the disk florets, formed of scales in number and length and shape about equal to the phyllary cup but glabrous, thin and pale; ray flowers subtended by the phyllaries, (the rays noted when fresh as yellowish green with lavender tinge); ray achenes 9 mm long, 1 mm in diameter, lunate linear, 4-angled, quadrate narrowed to a neck below the apex which ends in a funnel which is rounded but apparently without pappus; disk yellow; disk flowers about 190; corolla tube glabrous, cylindrical for 2.7–3 mm, then for the last 2–2.5 mm expanding and narrowly campanulate, including the 0.5 mm deltoid lobes; disk achenes 8–8.5 mm long, 0.8–1 mm wide, 0.3–0.5 mm thick, 4–5-ribbed and -angled, arcuate narrow prismatic, brown, smooth; pappus of 5 chaffy unequal scales 1–2 mm long, linear lanceolate.

HOLOTYPE: Hawaiian Islands, Maui Island, Haleakala, Kipahulu-Kuhiwa divide, among sedges in swamp, 6,400 ft. alt., Aug. 21, 1945, *H. St. John and A. L. Mitchell 21,100* (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, n. slope of Haleakala, bog below Wai Anapanapa, Aug. 23, 1919, *C. N. Forbes 1,235.M.* (BISH); Waiala Lake, Kipahulu-Kuhiwa divide, Aug. 1945, *St. John and Mitchell 21,042* (BISH).

DISCUSSION: *A. virescens* Hbd. var. *virescens* is characterized by having its leaves lightly pilose and viscid above, glabrate below; ray achenes 10–11.5 mm long; disk achenes 10–11.5 mm long; disk corolla tube puberulous; and the disk achene paleae 2–4 mm long. The var. *paludosa* has the leaves glabrate above, sparsely

appressed pilosulous below; ray achenes 9 mm long; disk achenes 8–8.5 mm long; disk corolla tube glabrous; disk achene paleae 1–2 mm long.

The related species, *A. virescens* (Fig. 17), was described by Hillebrand in 1888, from a specimen collected on the northern slope of Haleakala, at from 8,000 to 9,000 feet altitude. Its holotype was formerly in the Berlin herbarium, and the writer photographed it there in 1935. It has since been destroyed. Its label revealed that it was collected by John M. Lydgate.

The new epithet is the Latin adjective *paludosa*, marshy, and it is chosen with reference to the habitat of the variety.

Keyseria lavandula sp. nov. (tribe *Astereae*)

Fig. 18

DIAGNOSIS HOLOTYPI: Frutex 4–5 dm altus est sed ramis 7–8 dm vel plus longis decumbentibus, ramis vetustioribus 4–7 mm diametro glabrato sed cum reliquis marcescentibus basium foliorum semivelatis, ramulis juvenalibus pilosulis, foliis sessilibus alternatis non rosulatis sed per 6–10 cm partis superioris dispersis, laminis 3–5.5 cm longis 7–12 mm latis crasse subcoriaceis supra obscure viridibus infra albi-viridibus spatulatis mucronati-acutis parte terminali grosse serratis in latere quoque cum 4–5 dentibus pagina supra et marginibus glandulosi-pilosulis infra midnervo et nervis lateralibus in toto adpresse pilosulis pagina glabra, scapo 25–42 cm longo infra sparse pilosulo sed ad apicem densiter impilicite albi-pilosulo et cum 4–5 bracteis foliosis foliis simulantibus sed inferis 4–5 cm longis superis 8–11 mm longis ligulatis, capitulis solitaris 1.3–1.6 cm diametro, involucre 6–7 mm alto, tegulis in seriebus tribus subaequalibus 6–7 mm longis 0.8–1.5 mm latis fere ligulatis acutis marginibus glandulose capitati-puberulis alibi glabris vel in midnervo partim puberulis subviridibus marginibus firmis, floribus radiatis femineis multis, radii salientibus reflexis plerumque integris, tubo corollae 0.5 mm longo sursum latere distali glandulose capitati-puberulento, radio 2.5 mm longo albo cum lavandula tincto ligulato in apice obtuso deminuenti, stylo 1.8 mm longo lobis stigmatis binis 0.3 mm longis, achaeneis radorum 3–3.2 mm longis oblanceoloideis compressis parte $\frac{1}{4}$ supra capitata glandulose

puberulenta, disco 16–17 mm lato hemisphaerico lavandulaceo multiflorifero, floribus disci 3 mm longis tubo corollae 2.7 mm longo anguste tubuloso per 1.2 mm basali tum distento anguste campanulato, 4 lobis 0.7 mm longis ovatis crasse marginatis et intra lenticulari-papillois, 4 staminibus cum filamentis in medio tubi corollae affixis, filamentis 0.5–0.8 mm longis contortis, antheris 0.8 mm longis luteis acutis, stylo 2.5 mm longo, stigmati 1 mm longo digitiformi erecto densiter puberulo albo, ovariis disci 2 mm longis lineari-oblanceoloideis compressis capitata glandulose puberulis sterilibus.

DIAGNOSIS OF HOLOTYPE: Shrubby, only the youngest shoots appearing herbaceous; plant 4–5 dm tall, but the stems 7–8 or more dm long, and decumbent at base, the older stems 4–7 mm in diameter, glabrate but lightly clothed with marcescent remnants of the leaf bases; young stems pilosulous; leaves sessile, alternate, not forming a rosette but loosely distributed for 6–10 cm along the upper stems; blades 3–5.5 cm long, 7–12 mm wide, thick subcoriaceous, above dark green, below whitish green, spatulate, mucronate acute, the apical half coarsely serrate with 4–5 teeth on each side, the upper surface and margins glandular pilosulous, the midrib and lateral veins below appressed pilosulous from base of tip, elsewhere glabrous; scape 25–42 cm long, sparsely pilosulous below, but towards and at the tip densely matted white pilose, with 4–5 foliaceous bracts, resembling the leaves, but the lowest one 4–5 cm long, and the uppermost one 8–11 mm long, ligulate; heads solitary, 1.3–1.6 cm across; involucre 6–7 mm high; tegules in 3 rows and subequal, 6–7 mm long, 0.8–1.5 mm wide, almost ligulate, acute, the margins capitata glandular puberulous, the rest glabrous or the midrib partly puberulous, greenish, the margins firm; ray flowers pistillate, numerous and the rays salient, reflexed, mostly entire; ray corolla tube 0.5 mm long, capitata glandular puberulent up the distal side, the ray 2.5 mm long, white, tinged with lavender, ligulate, tapering to the obtuse apex; style 1.8 mm long, the 2 stigmatic lobes 0.3 mm long; ray achenes 3–3.2 mm long, oblanceoloid, compressed, the upper $\frac{1}{4}$ capitata glandular puberulent; disk 16–17 mm wide, hemispheric, lavender, many flowered; disk flowers with the

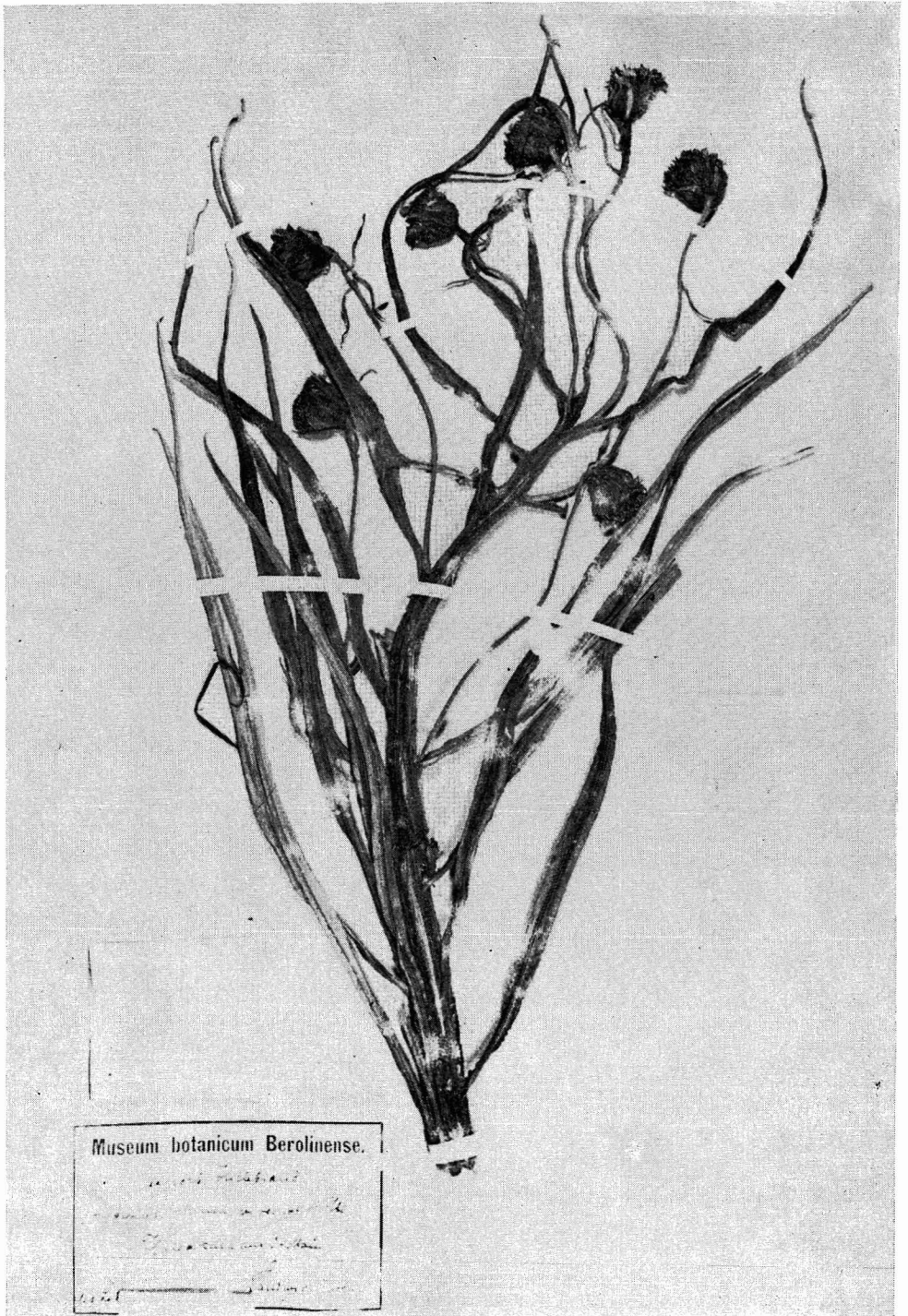


FIG 17. *Argyroxiphium virescens* Hbd., holotype, once in Berlin herbarium, from Haleakala auf O.[st] Maui, Lydgate.

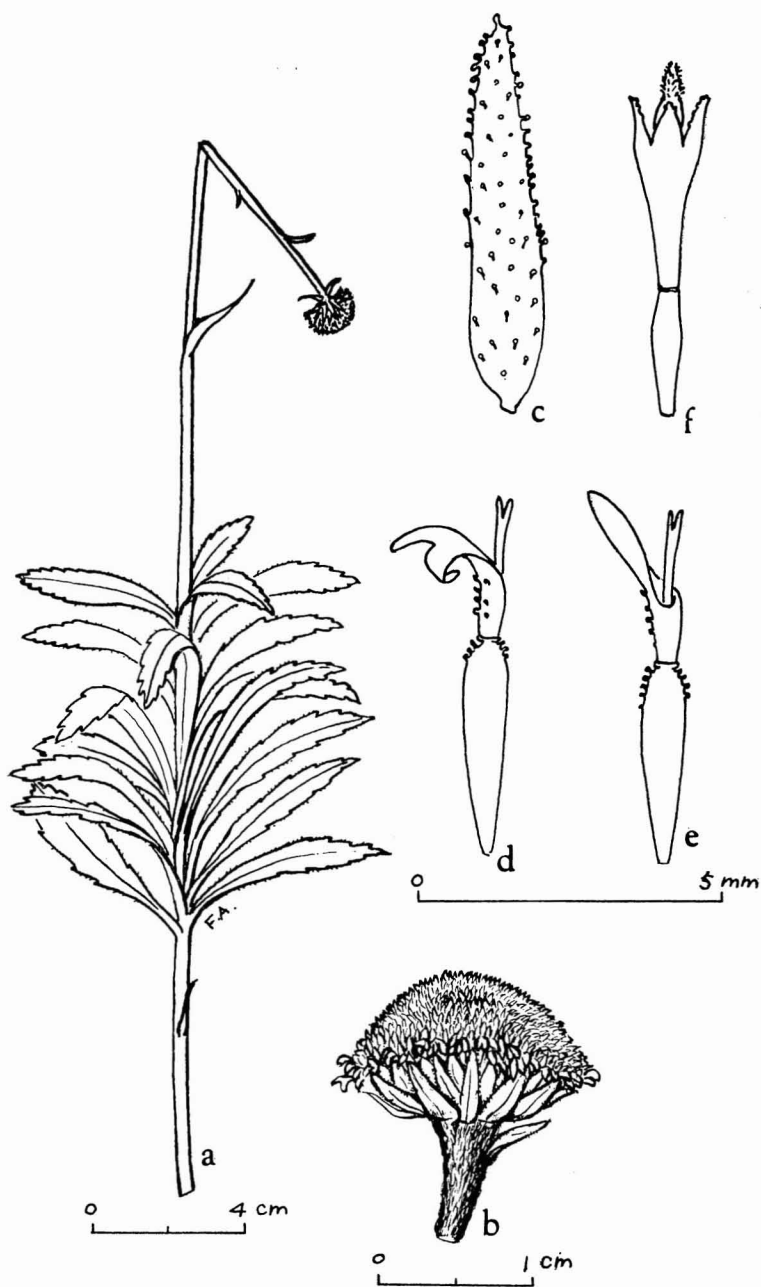


FIG. 18. *Keysseria lavandula* St. John, from holotype. *a*, habit, $\times \frac{1}{2}$; *b*, head, $\times 2$; *c*, tegule, $\times 8$; *d*, *e*, ray flowers, $\times 8$; *f*, disk flower, $\times 8$.

corolla 3 mm long, the tube 2.7 mm long, narrowly tubular for 1.2 mm, then expanding and narrowly campanulate, the 4 lobes 0.7 mm long, ovate, thick margined and lenticular papillose within; the 4 stamens with their

filament attached to the corolla tube half way from its base, the filaments 0.5–0.8 mm long, contorted; anthers 0.8 mm long, yellow, acute; style 2.5 mm long; stigma 1 mm long, finger-like, erect, densely white puberulous; disk

ovaries 2 mm long, linear oblanceoloid, compressed, and capitate glandular puberulous near the apex, sterile.

HOLOTYPE: Hawaiian Islands, Maui Island, Crater of Haleakala, Kaeanae [=Keanae] Gap, growing on hummock with *Coprosma ernodeoides*, Aug. 3, 1919, C. N. Forbes 1,020.M. (BISH).

SPECIMENS EXAMINED: Hawaiian Islands, Maui Island, Crater of Haleakala, on the eastern cliffs in company with *Plantago pachyphylla*, *Lysimachia*, etc., Oct. 23, 1910, J. F. Rock 8,613 (BISH).

DISCUSSION: *K. lavandula* is most closely related to *K. maviensis* Mann, of Puu Kukui and Mt. Eke, west Maui mts., a species with the stems 10–30 cm tall; leaves in a basal rosette, 7–15 mm wide, spatulate to broadly spatulate or obovate; scape 6–25 cm tall; rays entire (but emarginate in forma *emarginata*), reddish purple; corolla tube 1.5 mm long, capitate glandular puberulent throughout; style 2.7 mm long; ray achenes 4–4.5 mm long, 0.7–0.8 mm wide, oblanceoloid, narrowed to the apex but scarcely beaked; disk florets with the corolla 3.5 mm long, the tube 1.5 mm long. *K. lavandula* has the stems 40–50 cm tall; leaves scarcely rosulate, mostly spaced along the lower $\frac{1}{3}$ – $\frac{1}{2}$ of the upright stem, 7–12 mm wide, spatulate; scape 25–42 cm tall; rays mostly entire, white, tinged with lavender; corolla tube 0.5 mm long, capitate glandular puberulent up the distal side; style 1.8 mm long; ray achenes 3–3.2 mm long, oblanceoloid, not beaked; disk florets with the corolla 3 mm long, the tube 2.7 mm long.

The new epithet is the Latin adjective *lavandula*, lavender, and it is given with reference to the color tint of the rays.

Keyseria maviensis (Mann) Cabrera, forma *emarginata* (Forbes) comb. nov.

Lagenophora maviensis Mann, forma *emarginata* Forbes, Occasional Papers of the Bernice P. Bishop Museum, vol. 6, no. 5, p. 58, pl. 2, 1918.

A. L. Cabrera (Blumea 14, pp. 285–308, 1966) in his monograph of *Lagenophora* characterizes the genus by its pentamerous disk flowers and its slender beaked achenes. As he

indicates the three previously known Hawaiian species differ from that genus in having the disk florets tetramerous and the achenes beakless. He placed these species, properly, it seems, in the genus *Keyseria*. This genus now contains 13 species, and occurs in Borneo, the Celebes, New Guinea, Fiji, and Hawaii.

Lagenophora viridis sp. nov. (sect. *Lagenophora*)

Fig. 19

DIAGNOSIS HOLOTYPI: Planta suffrutescens est, caulibus 4–9 dm longis erectis vel decumbentibus parte foliosa puberulenta parte vetustiori glabrata 3–4 mm diametro lignosa et reliquis marcescentibus foliorum longinquiter persistentibus foliis non rosulatis sed per 10–15 cm in parte supera caulinis dispersis alternatis sessilibus, foliis 4–6 cm longis 7–13 mm latis sessilibus crasse subcoriaceis supra obscure viridibus infra albi-viridibus spatulati-oblanceolatis dimidio apicali grosse serrato in dimidio quoque cum 4–6 dentibus apice mucronato pagina supera et marginibus puberulis pagina infera fere glabra sed proxima basem in juvente pilosula tum glabrata, scapo 22–27 cm longo sparse puberulo cum 4–6 bracteis foliaceis inferis 3 cm longis superis 6 mm longis et sublinearibus, capitulis 1.5–2 cm diametro solitariis, involucrio 6–7 mm alto viridi, tegulis subaequalibus in seriebus tribus 5.5–7 mm longis 1.5–2 mm latis anguste lanceolatis 1-nervis, midnervo incrassato obscuro et glandulosi-puberulo lateribus viridibus glabris marginibus membranaceis capitate glandulose puberuli-ciliatis et ad apicem laceratis, floribus radiatis paucis, tubo corollae 0.8 mm longo tubuloso laevi, radio 1.4 mm longo viridi vel cum apicibus rubris ligulati-elliptico apice integro cucullato, stylo 1.5 mm exserto, stigmatibus binis 0.3–0.4 mm longis cylindricis, floribus disci multis cum ovariis 2–2.5 mm longis anguste ellipsoideis proxima apicem capitate glandulose puberulentis alibi glabris, tubo 1.2 mm longo cylindrico cum pilis paucis capitatis glandulosi, limbo 1.5 mm longo infundibuliformi 5 lobis ovari-deltaeideis, stylo minime exserto, stigmatibus binis 0.4–0.6 mm longis cylindricis, filamentis proxima basem corollae affixis, antheris 1.3 mm longis linearibus obtusis, achaenis disci 3.8–4.2 mm longis 0.7–1 mm

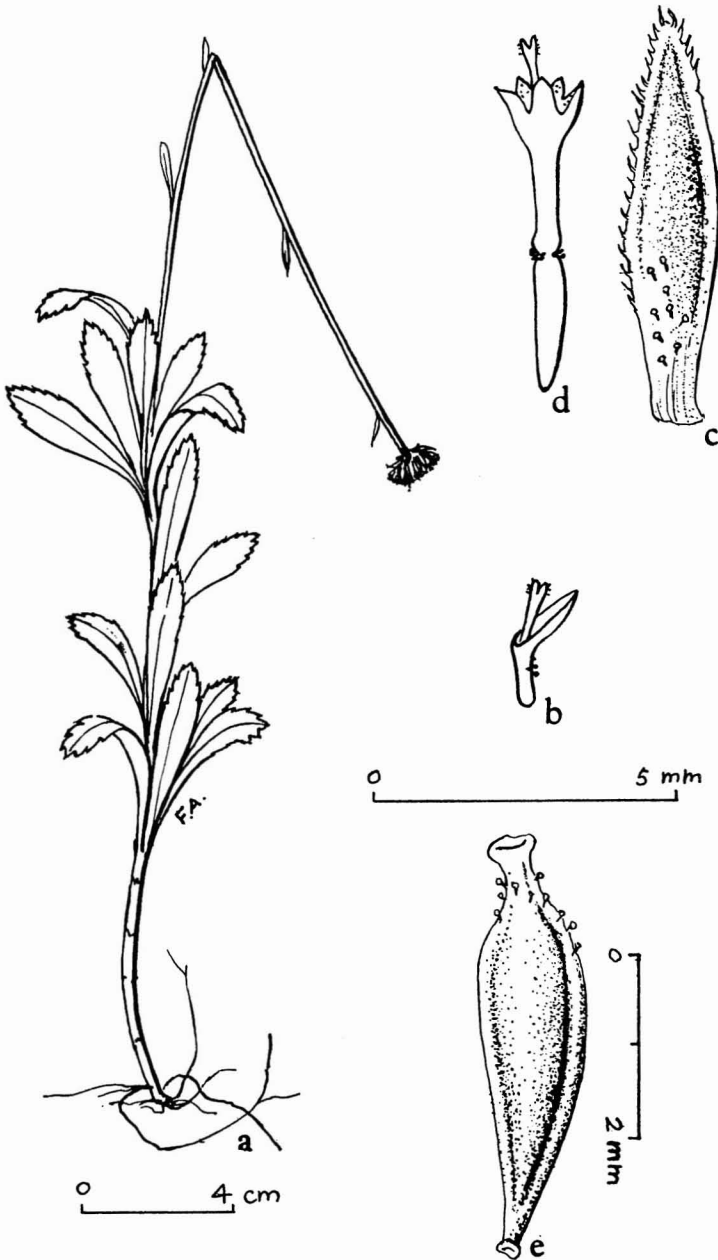


FIG. 19. *Lagenophora viridis* St. John, from holotype. *a*, habit, $\times 1/2$; *b*, ray flower, $\times 8$; *c*, tegule, $\times 8$; *d*, disk floret, $\times 8$; *e*, disk achene, $\times 12$.

latis subtilibus oblanceolatis compressis lateribus binis subviridibus costis marginalibus crassis stramineis ad apicem capitate glandulose puberulis alibi glabris.

DIAGNOSIS OF HOLOTYPE: Suffrutescent; stems

4-9 dm long, erect or decumbent at base, the leafy part being puberulent, the older part glabrate, 3-4 mm in diameter, woody, long retaining marcescent parts of the leaf bases; leaves not forming a rosette, rather scattered

along the upper stems for 10–15 cm, alternate, sessile; leaves 4–6 cm long, 7–13 mm wide, sessile, thick subcoriaceous, above dark green, below whitish green, spatulate-oblongate, the apical half coarsely serrate with 4–6 teeth on each side, the apex mucronate, the upper surface and margins puberulous, the lower surface nearly glabrous except that near the base in youth it is pilosulous, later glabrate; scape 22–27 cm long, sparsely puberulous, with 4–6 foliaceous bracts resembling the leaves, but the lowest ones 3 cm long, and the uppermost 6 mm long and almost linear; heads solitary, 1.5–2 cm across; involucre 6–7 mm high, green; tegules in 3 rows and subequal, 5.5–7 mm long, 1.5–2 mm wide, narrowly lanceolate, 1-nerved, the midrib thickened, dark, and glandular puberulous, the sides green, glabrous, the margins membranous, capitate glandular puberulous ciliate and towards the tip lacerate; ray flowers few, the corolla tube 0.8 mm long, tubular, smooth; the ray 1.4 mm long, green or green with magenta tips, ligulate-elliptic, the apex entire, cucullate; style projecting 1.5 mm; the 2 stigmas 0.3–0.4 mm long, cylindrical; the numerous disk flowers with the ovary 2–2.5 mm long, narrowly ellipsoid, capitate glandular puberulous near the summit, glabrous elsewhere; corolla tube 1.2 mm long, cylindrical, with a few capitate glandular short hairs, the limb 1.5 mm long, funnel-form, the 5 lobes ovate-deltoid; style slightly exerted, the 2 stigmas 0.4–0.6 mm long, cylindrical, filaments attached near base of the limb; anthers 1.3 mm long, linear, obtuse; disk achenes 3.8–4.2 mm long, 0.7–1 mm wide, thin, compressed, oblongate, the two sides greenish, the thick marginal ribs stramineous, near the apex capitate glandular puberulous, glabrous elsewhere.

HOLOTYPE: Hawaiian Islands, Maui Island, Haleakala, s. rim of Kipahulu Valley, Kuiki, on ground or on mossy trees, 5,000 ft. alt., Aug. 30, 1945, *H. St. John and A. L. Mitchell* 21,243 (BISH).

DISCUSSION: *L. viridis* is related to *L. stipitata* (Labill.) Druce var. *stipitata*, of Tasmania, Victoria, and Papua, a species with the scape hirsute; leaves 2.5–3 cm long, 8–11 mm wide, subrosulate on lower part of stem, narrowed to a short petiole, densely hirsute on both sides,

the margin with coarse crenations or shallow lobes extending $\frac{1}{3}$ way to the middle; scape 4–12 (–17) cm long, with a few linear bracts; involucre 5 mm high; phyllaries acute; rays white to pink, numerous; disk florets male, the limb narrowly ellipsoid, longer than the puberulent tube; ray achenes 3–4 mm long. *L. viridis* has the scape puberulent, finally glabrate below, evenly or loosely leafy on lower $\frac{1}{3}$ – $\frac{1}{2}$ of the stem; leaves 4–6 cm long, 7–13 mm wide, sessile, spatulate-oblongate, the upper surface and margins puberulous, the lower surface in youth pilosulous at base, soon glabrate, the margin with slender serrulations or mucros, extending $\frac{1}{6}$ – $\frac{1}{5}$ way to middle; scape 22–27 cm long, with foliaceous bracts resembling the leaves; involucre 6–7 mm high; phyllaries subobtusate; rays green or green with magenta tips, few; disk florets perfect, the limb wide campanulate, shorter than the glabrous tube; disk achenes 3.8–4.2 mm long.

This new species is now the only *Lagenophora* recognized in Hawaii, the four previous species having been transferred by Cabrera (Blumea 14, p. 307, 1966) to *Keysseria*, on account of their having the disk corollas 4-lobed, with 4 anthers, and a beakless achene. The genus *Lagenophora*, as it now stands, contains 15 species, and it occurs in Asia from India eastward to Vietnam, China, and Japan, Philippines, Indonesia, New Guinea, Australia, Tasmania, New Zealand, Hawaii, Guatemala to Venezuela, Juan Fernandez, Chili, southern Argentina, Tristan de Cunha, and Gough Islands.

The new epithet is the Latin adjective, *viridis*, green, and it is given with reference to the green floral rays.

Raillardia demissifolia Sherff var. *dolichophylla* var. nov.

DIAGNOSIS HOLOTYPI: Frutex 1 m altus est, foliis 4–6.5 cm longis 4–7 mm latis ligulatis sensim acutis in margine quoque cum 2–5 denticibus anguste oblongis callosis adscendentibus.

DIAGNOSIS OF HOLOTYPE: Shrub 1 m tall; leaves 4–6.5 cm long, 4–7 mm wide, ligulate, gradually acute, each margin with 2–5 narrowly oblong, callous tipped ascending teeth, otherwise like var. *demissifolia*.

HOLOTYPE: Hawaiian Islands, Maui Island,

Wai Anapanapa, Kipahulu-Kuhiwa divide, opening in upper woods, 6,400 ft. alt., Aug. 21, 1945, *H. St. John and A. L. Mitchell 21,096* (BISH).

DISCUSSION: This new variety is related to *R. demissifolia* var. *demissifolia*, but that variety is a shrub 3 dm tall; the leaves 1.8–3.5 cm long, 5–9 mm wide, lance-oblong, the margins entire or with 1–2 short denticulations.

The new epithet is formed from the Greek adjective *dolichos*, long; and the noun *phullon*, leaf, and it is coined with reference to the longer leaves of this variety.

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