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New or Otherwise Noteworthy Plants from the Hawaiian Islands

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Earl Edward Sherff

IN THE course of a monographic study of the genus *Pittosporum* Banks insofar as it is represented in the Hawaiian Islands, I have found various new species and varieties, many of which are set forth in the following pages. To these are added descriptions of a few novelties and certain notes pertaining to established entities in the genera *Phyllostegia* Benth., *Stenogyne* Benth., *Railliardia* Gaud., *Lipochaeta* DC., and *Bidens* L.²

Pittosporum halophilum Rock, College Hawaii Publ. Bull. 1: 16, pl. 4. 1911.—Rock originally, in his herbarium determination, named the material of this species, *Pittosporum halophilum* (I have before me a cotype so named from the Bishop Museum). This was indeed an appropriate name, since the specimens had been collected along the beach of the Island of Molokai, "on the windward side of the Island within the spray of the sea." The trivial name was unaccountably altered to the meaningless spelling *halophylum* when published. In the interests of orthographic accuracy, it should stand corrected as *halophilum*.

Pittosporum halophiloides sp. nov.—Arbor ± 5 m. alta, ramulis juvenibus adpresse griseo-vel brunneo-tomentosis. Folia ad ramulorum apices plus minusve verticillate disposita, primum (juvenia) aureo-flava demum atro-brunnea, anguste petiolata petiolo adpresse tomentoso ± 1 cm. longo; lamina obovata, apice obtusa vel parce subacuminata, marginibus plus minusve revoluta, supra coriacea demum glabra et venulis impressis reticulata, infra persistenter tomentosa (tomento rubro-brunneo) venis majoribus elevatis, plerumque 4–8.5 cm. longa et 2–4 cm. lata. Inflorescentia pro sexu femineo terminalis corymboideo-racemiformis (pedunculo usque ad 2 cm. longo) brunneo-tomentosa ± 12 -flora floribus moderate fragrantibus. Pedicelli graciles, saltem 4–8 mm. longi. Sepala lanceolato-ovata, acuta, densissime brunneo-tomentosa, 4–6.5 mm. longa. Corollae tubus circ. 8–9 mm. longus, lobis 4–5 mm. longis;

¹ Received for publication July 24, 1940.

² The following abbreviations are used for the depositories of specimens cited in this paper: Arn., Arnold Arboretum, Jamaica Plain; Berl., Berlin Botanical Garden; Bish., Bernice Pauahi Bishop Museum, Honolulu; Corn., Cornell University Herbarium, Ithaca; Deg., herbarium of Otto Degener, Honolulu; Del., Delessert Herbarium, Geneva; Field, Field Museum of Natural History, Chicago; Goth., Arboretum of Gothenburg; Gray, Gray Herbarium of Harvard University, Cambridge; Kew, Royal Botanical Gardens, Kew; Minn., University of Minnesota Herbarium, Minneapolis; Mo., Missouri Botanical Gardens, St. Louis; N. Y., New York Botanical Garden; Par., Museum of Natural History, Paris; U. S., United States National Museum, Washington.

To conform with the usage employed throughout my previous writings, the term *cotype* is used to connote a duplicate of the type, as shown usually by the fact that the duplicate bears the same collector's name and number and same habitat-data. The term as here used is thus the equivalent of *paratype* or *isotype* as used by certain other authors.

staminibus quam tubo dimidio brevioribus. Capsula ei *Pittospori glabri* H. & A. similis compressa valvis 2 circumambitu cordato-rotundatis extus pro parte glabratis pro parte tomentellis longitudinaliter mediano-sulcatis aliter obscure rugosis vel transverse vix scrobiculatis 1.6–2 cm. longis (stylo residuo circ. 2 mm. longo excluso) et parce latoribus. Inflorescentia masculina ignota.

Tree ± 5 meters tall, young branchlets appressedly gray- or brown-tomentose. Leaves disposed more or less in whorls at tips of branchlets, when very young golden-yellow, finally blackish-brown, narrowly petiolate; petiole appressed-tomentose, ± 1 cm. long; blade obovate, at apex obtuse or scarcely subacuminate, at margins more or less revolute, on upper surface coriaceous also finally glabrous and reticulate with small impressed veins, on lower surface persistently tomentose (tomentum red-brown) and with salient, larger veins, commonly 4–8.5 cm. long and 2–4 cm. wide. Inflorescence of female flowers terminal, corymboid-racemiform (peduncle up to 2 cm. long), brown-tomentose, ± 12 -flowered with moderately fragrant flowers. Pedicels slender, at least 4–8 mm. long. Sepals lanceolate-ovate, acute, very densely brown-tomentose, 4–6.5 mm. long. Corolla-tube about 8–9 mm. long, -lobes 4–5 mm. long; stamens a half shorter than tube. Capsule similar to that of *Pittosporum glabrum* H. & A., compressed; valves 2, in outline cordate-rounded, outwardly in part glabrate in part tomentellous, longitudinally marked with a median groove otherwise obscurely rugose or transversely somewhat wrinkled, 1.6–2 cm. long (exclusive of residual style, this about 2 mm. long) and scarcely wider. Male inflorescence unknown.

Specimens examined: *Rock & Hammond* 8,109, tree 16 feet tall, flowers somewhat fragrant, leaves golden-yellow when young, dark chocolate-brown when old, Mahana Valley, Island of Lanai, July 31, 1910 (type, Arn.: cotypes, Berl.; Bish.; Field, 2 sheets; Kew).

The type sheet bears two sprays, the lower one having two branchlets. One of these branchlets bears a single terminal capsule,³ accompanied by a few fruitless pedicels 6 or 8 mm. long. Lower down on the specimen, however, are two clusters of old, fruitless pedicels. These are especially slender and are mostly 1.4–1.6 cm. long. Whether these perchance represent staminate inflorescences I cannot say.

The species is named in allusion to its resemblance to *Pittosporum halophilum* Rock. From that species, which is a small shrub, not a tree (and which is unknown as to its fruit), *P. halophiloides* differs at once in its proportionately narrower leaf-blades and in having a terminal, not cauline inflorescence. *P. halophiloides* bears a strong superficial resem-

³ One cotype sheet in Field Museum bears a cluster of six mature capsules. A sheet at Berlin has four in one cluster.

blance to *P. confertiflorum* var. *Mannii* from which it differs in not having strongly rugose capsules.

Pittosporum kauaiense phaeocarpum var. nov.—Ramuli foliaque novella conspicue brunneo-tomentosa, folia demum (interdum etiam supra tarde) plus minusve glabrata. Capsula ± 1.6 cm. longa crassa, valde tuberculato-rugosa, dense breviterque brunneo-tomentella, demum interdum plus minusve glabrata atraque.

Young branchlets and leaves conspicuously brown-tomentose, leaves finally (at times tardily, even above) more or less glabrate. Capsule ± 1.6 cm. long and thick, strongly tuberculate-rugose, densely and shortly brown-tomentellous, sometimes finally more or less glabrate and dull-black.

Specimens examined: *Charles Noyes Forbes* 828-K, Waimea Drainage Basin, west side, Kauai, July 3–Aug. 18, 1917 (Bish., 2 sheets); *Forbes* 988-K, same place and date (Bish.; Field); *Joseph F. Rock* 14 (5,827), in woods above Makaweli, Kauai, Sept. 28, 1909 (Bish.); *Rock* 17 (2,023), Halemanu, Kauai, Feb. 14–26, 1909 (Field); *Rock* 5,803, Olokele Canyon, Kauai, Sept. 30, 1909 (Bish.); *Rock* 5,872, woods above Makaweli, Kauai, Sept. 28, 1909 (type, Gray: cotypes, Bish.; N. Y.); *Rock* 6,080, Halemanu Mountain, Kauai, Oct. 14, 1909 (Bish.); *Harold St. John* 13,809, slender, bushy tree, 20 feet tall, in moist forest, Kumuwela Ridge, Waimea, Kauai, Dec. 28, 1933 (Bish.; Field); *Carl Skottsberg* 1,008, in forest around Kokee, Kauai, Oct. 28, 1922 (Bish.).

Rock (Indig. Trees Haw. Isls. 171. 1913) referred to *Pittosporum kauaiense* Hillebr., trees that had been observed by him at Olokele Canyon and at Makaweli (both localities on the Island of Kauai). He noted that they differed from the type in having wrinkled capsules but stated that they were "otherwise the same." *Rock's* specimens, however, are seen to possess a brownish or brown, not or but slightly and irregularly white, tomentum covering their capsules, which are rougher or even tuberculate. Moreover, their young leaves and branches are much more conspicuously tomentose and with a tomentum not only denser but darker, usually a cinnamon-brown. There appears little doubt that *Rock's* specimens, matched by those collected more recently by *Forbes*, by *Skottsberg*, and by *St. John*, represent a fairly well marked variety.

Pittosporum kauaiense repens var. nov.—Plus minusve ecaulescens, ramis gracilibus ($\pm 2-5$ mm. crassis), elongatis, primum dense adpresso-hispidulis demum glabratis griseo-albescentibusque. Folia obovata, membranacea, supra mox glabra sed infra plus minusve persistenter subtiliter porriginoso-floccosa vel -strigosa, lamina 5–8.5 cm. longa et 2.5–4.5 cm. lata, apice obtusa, petiolo gracili sub 1.7 cm. longo. Ovarium (capsula matura ignota) 8–10 mm. longum latumque, rugosum, moderate vel pro areolis sparsim albo-pubescent.

More or less stemless, branches slender ($\pm 2-5$ mm. thick), elongate, at first densely appressed-hispidulous finally glabrate and whitish-gray. Leaves obovate, membranaceous, presently glabrous

above but beneath more or less permanently covered with a scurfy-floccose or -strigose, exceedingly thin coating; blade 5–8.5 cm. long and 2.5–4.5 cm. wide, apically obtuse; petiole slender, under 1.7 cm. long. Ovary (mature capsule unknown) 8–10 mm. long and wide, rough, moderately or in small patches sparsely white-pubescent.

Specimens examined: *Rev. J. M. Lydgate* 3, Olokele Valley, Kauai, January, 1912 (type, Bish.).

Rock (Indig. Trees Haw. Isls. 171. 1913) failed to mention this variety; whether because he was unfamiliar with it or because, not being really a tree, it did not come within the scope of his book, I cannot say. However, *Hillebrand* was evidently aware of it through a specimen collected by *Valdemar Knudsen*. *Hillebrand* (Fl. Haw. Isls. 25. 1888) cited *Knudsen* 157, which had been labeled "stemless, with creeping branches." He described these as "slender and straggling, the leaves glabrate." The specimen, according to *Hillebrand*, "offers an analogon to the varieties β and ϵ of *Metrosideros polymorpha*" listed in his text. If it be borne in mind that *Hillebrand* (*op. cit.* 126) was very emphatic in regarding his proposed varieties of *Metrosideros polymorpha* as definite and valid entities, it may well be supposed that with more complete material at hand he would have ventured to designate the *Knudsen* plant as a distinct variety.

Three immature capsules are on the type, placed about 6 dm. back from the tip of one branch. The leaves are brownish-green above and grayish beneath. They appear glabrate as described by *Hillebrand*, but a careful inspection with the lens reveals the lower surface to be coated with a very thin, silvery-grayish, skin-like or scurfy investiture in which the appressed setulae are here and there with difficulty evident. In a very few small spots this investiture has sloughed away.

Pittosporum insigne Lydgatei var. primum nomin.; *P. insigne* var. β *Hillebr.* Fl. Haw. Isls. 26. 1888.—Arbor, nunc ± 5 m. nunc 11–12.5 m. alta. Folia plerumque sed non semper paulo majora et magis nitida. Pedunculi elongati (3–10 cm. longi). Pedicellorum bractee angustius lineares. Sepala irregulariter tomentosa, interdum omnino glabrata margine forsitan excepto.

Tree, now ± 5 now 11–12.5 meters tall. Leaves averaging somewhat larger and more glossy, but not consistently so. Peduncles elongate (3–10 cm. long). Bracts of pedicels more narrowly linear. Sepals irregularly tomentose, at time entirely glabrate unless at margin.

Specimens examined: *William Hillebrand & Rev. J. M. Lydgate*, Hamakua, East Maui (cotype, Bish.); *Joseph F. Rock* 8,509, common in the forest of Hamakua, alt. 4,000 feet, East Maui, September, 1910 (Arn., 2 sheets); *Rock* 8,611, tree, 35 to 40 feet tall, in lower forest, alt. 2,600–3,000 feet, Makawao, East Maui, October, 1910 (Arn.; Berl.; Bish., 2 sheets; Field; Gray; Kew; N. Y.); *Rock & Curran* 10,077, in forest above Makawao, East Maui, May, 1911 (Bish.).

Rock (Indig. Trees Haw. Isls. 169. 1913) referred to this variety as "a small tree, 15 to 18 feet in height." His no. 8,611 (above cited), however, had been determined by himself as this variety ("var. β " of Hillebrand) and in the Arnold Arboretum, where fuller data are present for his *Pittosporum* collections, the label says "35 to 40 feet tall."

Pittosporum acuminatum leptopodium var. nov.—Folia quam in forma typica angustiora tenuioraque, pedunculo graciliore et paulo longiore etiam primum glabrato; pedicellis gracilioribus, paulo longioribus, glabratis; bracteis filiformibus; sepalis lanceolatis.

Leaves narrower and thinner, peduncle more slender and a little longer also glabrate from the first; pedicels more slender, a little longer, glabrate; bracts filiform; sepals lanceolate.

Specimens examined: *Abbé Urbain Faurie* 1, alt. 1,000 meters, Waimea, Kauai, March, 1910 (type, Par.: cotypes, Arn., 2 sheets; Del., 3 sheets); *Joseph F. Rock* 2,030, Kaholuamanu, Kauai, Mar. 3–10, 1909 (Field); *Rock* 17,139, Kaholuamanu, October, 1916 (Bish.).

Pittosporum acuminatum Degeneri var. nov.—Bracteae ramorum novellorum angustissime lineares perspicuae plus minusve glabrae usque ad 2 cm. longae. Sepala (saltem florum sterilium) late ovata, apice obtusa vel interdum acuta acuminatave, tergo glabra vel plus minusve pulverulenta, 2.5–3.5 mm. longa. Capsula ignota.

Bracts of the youngest branches very narrowly linear, conspicuous, more or less glabrous, up to 2 cm. long. Sepals (at least those of sterile flowers) widely ovate, at apex obtuse or sometimes acute or acuminate, dorsally glabrous or more or less pulverulent, 2.5–3.5 mm. long. Capsule unknown.

Specimens examined: *Otto Degener & Emilio Ordoñez* 12,617, six feet tall, on open, rainy ridge, Kaluaalea, Koloa, Isl. Kauai, Dec. 31, 1939 (type, Field); *Degener & Ordoñez* 12,618, bush, on sunny ridge, alt. 1,200 feet, Kawaiumakua, Anahola, Isl. Kauai, Dec. 26, 1939 (Berl.; Deg.; Field; flowers and fruits lacking); *Abbé Urbain Faurie* 13, Kilauea, Isl. Kauai, January, 1910 (Del., 2 sheets; leaf-blades up to 1.5 dm. long and 5.8 cm. wide, petioles long and slender as in var. *magnifolium*, inflorescences sessile and terminal, perhaps though bud injuries).

While capsules are unknown, the various characters of leaf and inflorescence relate this form unmistakably to *P. acuminatum*, from which it may be distinguished by the widely ovate, not subulate sepals of its sterile flowers. The numerous and conspicuous bracts (much reduced interverticillate leaves) occurring on the last portion of the branches seem likewise distinctive, most of them being much more elongate than in the species proper or in var. *magnifolium*. The variety is named for Mr. Otto Degener, the well known authority on the Hawaiian flora, in appreciation of his invaluable aid in supplying numerous specimens of *Pittosporum* for the present revisional study.

Pittosporum acuminatum magnifolium var. nov.—Bracteae ramorum novellorum brunneo-tomentosorum acriter subulatae plerumque sub 1 cm. longae. Petioli graciles 1–3.2 cm. longi; laminis plerumque 1.5–2 dm. longis et 4–6 cm. latis, perspicue acuminatis, novellis secundum venas adpresse brunneo-hispidis. Capsula vero magis rugosa, valvis longitudinaliter jugo mediano rugoso indutis.

Bracts of youngest branches (which are brown-tomentose) sharply subulate, commonly under 1 cm. long. Petioles slender, 1–3.2 cm. long; blades commonly 1.5–2 dm. long and 4–6 cm. wide, conspicuously acuminate, when nascent appressedly brown-hispid along the veins. Capsule really more rugose; valves with a rough, lengthwise, median ridge.

Specimens examined (all from Isl. Kauai): *Charles N. Forbes* 616-K, Hii Mts., Oct. 20, 1916 (Bish.; Field; Mo.); *Forbes* 653-K, same locality, Oct. 22, 1916 (Bish.; Field); *Forbes* 676-K, same locality and date (Bish.; Mo.); *Rev. John M. Lydgate*, Kalihiwai, 1915 (type, Bish.); *Lydgate*, Waialua (Wailua) Mts., Pole Line Trail (Bish.); *Harold St. John et al.* 10,951, alt. 600–1,500 feet, Power-Line Trail, Hanalei-Kalihikai Ridge, Jan. 2, 1931 (Bish.; Field); *idem* 10,991, Napali Coast, Hanakapiai, Jan. 2, 1931 (Bish.; Field; 2 terminal inflorescences observed, at least one of them—on the Bishop Museum specimen—probably so through bud injury).

Pittosporum cauliflorum pedicellatum var. nov.—Arbor ± 5.5 mm. alta, stirpe circ. 1 dm. crassa, foliis *Pittosporo cladantho* similis. Pedunculus nunc 1–1.5 cm. longus (pro floribus fertilibus) et tomentosus nunc (probabiliter pro floribus sterilibus) 4–7 cm. longus et densissime adpresso-setosus vel superne tomentosus. Pedicelli graciles, tomentosi, numerosi (interdum 8–15), nunc (pro floribus fertilibus) 5–11 mm. longi nunc (probabiliter pro floribus sterilibus) 1–2 cm. longi. Flores albi, ad apicem ochroleuci. Capsulae transverse quadratae, circa 3 cm. longae; valvis extus laevibus (non rugosis sed minute tomentosus), demum planis, circumambitu quadratis, circa 3 cm. latis, rostro circ. 2.5 mm. longo. Semina 6.5–8 mm. longa.

Tree ± 5.5 meters tall, trunk about 1 dm. thick, leaves similar to those of *Pittosporum cladanthum*. Peduncle now 1–1.5 cm. long (for fertile flowers) and tomentose, now (probably for sterile flowers) 4–7 cm. long and very densely appressed-setose or supernally tomentose. Pedicels slender, tomentose, numerous (sometimes 8–15), now (for fertile flowers) 5–11 mm. long, now (probably for sterile flowers) 1–2 cm. long. Flowers white, cream-colored at top. Capsules transversely quadrate, about 3 cm. long; valves outwardly smooth (not wrinkled but minutely tomentose), finally flat, in outline quadrate, about 3 cm. wide; beak about 2.5 mm. long. Seeds 6.5–8 mm. long.

Specimens examined: *Harold St. John* 10,378, one tree, 18 feet tall, trunk 4 inches thick, flowers white and at tip cream-colored, pods square in cross-section, on open hillside, alt. 1,400 feet, on north fork of valley east of Palikea, Waianae Mts., Oahu,

Feb. 23, 1930 (type, Bish.: cotypes, Berl.; Field, 2 sheets).

The type herbarium of *Pittosporum cauliflorum* Mann was not cited (Enum. Haw. Pl. no. 18; Proc. Amer. Acad. 7: 151. 1867), but the two specimens of the type number (Mann & Brigham 601) at Cornell University, one of them unnamed by Mann, and the named one at Gray Herbarium have as good claims as any to being regarded as the type. The capsules on the named specimens are fewer, larger, less mature, and less rough, offering a striking resemblance to those of *P. glabrum* var. *spathulatum*. They are grouped subsessilely in clusters of 8–12 on tomentose peduncles 4–8 mm. long.

The material collected by St. John differs sharply in having well developed pedicels. A remarkable feature, too, is the six elongate peduncles (4–7 cm. long) found on one specimen (Herb. Field Mus.). These have the pubescence more appressed and lengthwise disposed, rather than tomentose. Their pedicels are especially long (1–2 cm.). As all the flowers are missing or insect-eaten, it can only be surmised that they bore staminate or sterile flowers. Future collections of this variety and of the species proper are of course desirable to determine whether this surmise is correct, also what kind of peduncles and pedicels the sterile inflorescence of the species proper has, and to what extent therefore the characters of the sterile inflorescence may be used for separating the var. *pedicellatum* from the species proper.

The leaves have blades up to 2.3 dm. or more long and to ± 7.5 cm. wide, and slender petioles 1–3 cm. long. The tomentum of their lower surface is brownish as in *P. cladanthum* and the veins are moderately conspicuous beneath as in that species (not strongly incrassate as in *P. cladanthum* var. *reticulatum*). From *P. cladanthum*, however, the smoothish, not strongly rugose or lumpy, exterior of the capsules should separate var. *pedicellatum* sufficiently well. From *P. cauliflorum* var. *cladanthoides*, var. *pedicellatum* differs in uniformly lacking (so far as known) a strong reddish tinge to its brown leaf-tomentum, and in having larger, more permanently tomentose capsules, the valves of these being square not obcordate-obovate in outline (when flattened out), and about 3 cm. not 2.2–2.5 cm. long and wide.

Pittosporum cauliflorum cladanthoides var. nov. —Verisimiliter arbor. Folia anguste oblongo-obovata, subtus dense tomento rubro-brunneo vestita et moderate venosa, lamina ± 7 cm. petiolo ± 1.5 cm. longa, apice rotundato-obtusa. Inflorescentia fertilis (unica visa) breviter (circ. 6–8 mm.) pedunculata, ± 5 -pedicellata, pedicellis ± 5 –6 mm. longis. Capsulae 2.2–2.5 cm. longae, demum subplanae; valvis obcordato-obovatis, extus non vel tantum minutissime rugosis et mox plus minusve glabrescentibus, 2.2–2.5 cm. latis, rostro circ. 2 mm. longo. Semina 6–7 mm. longa.

Probably a tree. Leaves narrowly oblong-obovate, densely clothed with red-brown tomentum beneath, where moderately veiny; apically rounded-obtuse blade ± 7 cm. petiole ± 1.5 cm. long. Fertile in-

florescence (a single one seen) shortly (about 6–8 mm.) pedunculate, ± 5 -pedicellate, pedicels ± 5 –6 mm. long. Capsules 2.2–2.5 cm. long, finally flattish; valves obcordate-obovate, outwardly not or but very minutely rugose and presently more or less glabrescent, 2.2–2.5 cm. wide, beak about 2 mm. long. Seeds 6–7 mm. long.

Specimens examined: *Christophersen, Wilder, & Hume* 1,577, in wet forest, alt. 500–600 meters, Puu Kapu, Isl. Oahu, Feb. 12, 1931 (type, Bish.).

The type is a single branchlet about 2 dm. long, with a lone terminal whorl of five leaves and one cauline, pedunculate cluster of capsules borne about 6.5 cm. beneath these. The leaves happen to be small (blade ± 7 cm. long), but undoubtedly grow much larger at times, as in var. *pedicellatum* and in *P. cladanthum*. *P. cladanthum* seems to be a close ally, but differs in having rugose or lumpy fruits, these permanently tomentose. Coulter (J. W., Gazetteer Terr. Haw. 189. 1935) lists two Puu Kapu's for the Island of Oahu, but I assume that the one at $21^{\circ} 36' N.$ Lat. and $158^{\circ} 1' W.$ Long., in the Kaipapau Quadrangle of northern Oahu, was the type locality.

Pittosporum cladanthum sp. nov.—Arbor 3–6 vel interdum etiam 9 m. alta. Folia anguste vel sublate obovata, saepe maxima, lamina usque ad 2.5 dm. longa et 9 cm. lata, petiolo usque ad 5.5 cm. longo, facie inferiore elevato-venosa et plus minusve rubido-vel saepius fulvo-tomentosa; surculis juvenibus omnino conspicue denseque subfulvo-vel subrubro-tomentosis. Flores ut videtur *P. cauliflori* floribus similes sed pedunculi demum saepe 1–4 cm. longi et interdum 7 mm. crassi. Capsulae rugosae vel rugoso-tuberculatae, valvis maturis demum planatis obovatis vel parce ovatis oblongisve, pedicellis plerumque 2–8 mm. longis; seminibus sublaevibus, 7–9 mm. longis.

Tree 3–6 or at times even 9 meters tall. Leaves narrowly or subbroadly obovate, often very large, blade up to 2.5 dm. long and 9 cm. wide, petiole up to 5.5 cm. long, lower surface salient-veiny and more or less reddish- or more often brown-tomentose; young shoots conspicuously and densely brownish- or reddish-tomentose. Flowers apparently similar to those of *P. cauliflorum* but the peduncles finally often 1–4 cm. long and sometimes 7 mm. thick. Capsules rugose or rugose-tuberculate, the mature valves finally flattened and obovate or barely ovate or oblong, pedicels commonly 2–8 mm. long; seeds smoothish, 7–9 mm. long.

Specimens examined (all from Isl. Oahu): *Edwin H. Bryan, Jr.*, Aiea, June 5, 1920 (Field); *Bryan*, alt. 1,200 feet, lower west ridge, Kaipapau Valley, July 11, 1920 (Bish.; Field); *Bryan*, trees, 3–4 meters tall, at lower edge of lower forest at transition with guava-lantana vegetation, Hauula Forest Reserve, Punaiki Trail, behind Hauula, May, 1933 (Field); *Erling Christophersen* 1,384, tree, 5–6 meters tall, in forest, alt. ± 200 meters, Pupukea-Kahuku Trail, Koolau Range, Aug. 12, 1930 (Bish.; Field); *Otto Degener* 13,002, in forest, Oio-Paumalu Trail, June 16, 1940 (Deg.; Field); *Degener* 13,003, in forest, Waipilopilo, Hauula, June 11,

1940 (Berl.; Deg.; Field, 2 sheets); *Degener & Emilio Ordoñez* 12,204, in open forest, Waimea Valley, July 24, 1938 (Deg.; Field, 2 sheets); *Degener & Ordoñez* 12,576, flower-buds observed several nodes below ripe fruit, in lower forest, Pupukea-Kahuku, Dec. 14, 1939 (Field); *Degener, Ordoñez, & John Foster* 12,297, in lower rain-forest, north rim of Kaluanui Valley, Mar. 18, 1939 (Berl.; Field, 2 sheets; also a score or more additional, unmounted sprays, as yet undistributed; some typical, some approaching *P. sulcatum* as to smaller leaves, these finally glabrate); *Degener & Kwan Kee Park* 10,985, in forest, east ridge of Kaipapau Valley, July 7, 1935 (Berl.; Deg.; Field); *Degener & Park* 10,997, in forest, Aiea Ridge, Sept. 4, 1932 (Field, 2 sheets); *Degener & Park* 11,000, on dry, exposed slope, southeast side of Makua Valley near its head, Jan. 3, 1935 (Berl.; Deg.; Field); *Degener, Park, & Manuel Kwon* 11,002, in forest, Pupukea-Kahuku region, Jan. 24, 1932 (Deg.; Field); *Degener, Park, Potter, Bush, & Topping* 10,806, in forest, Malaeakahana Trail, Laie, July 29, 1935 (Deg.); *idem* 10,986 (type, Field, 2 sheets: cotype, Deg.); *Degener, Park, Potter, & Gordon Shigeura* 10,809, in forest, Waimalu Gulch, Nov. 3, 1935 (Deg.; N. Y.); *Degener, Topping, Martinez, & Saluop* 11,137, Puulupe Trail, Kawailoa, Feb. 25, 1937 (Berl.; Field, 3 sheets; Gray; Kew); *Charles N. Forbes*, Makaha Valley, Koolau Range, Feb. 12-19, 1909 (Mo.); *Forbes (with Dean Lake)* 1,993-O, Waimano Valley, Oct. 27-30, 1914 (Bish.; Mo.); *Forbes* 2,053-O, on ridge north of Waimea Valley, Feb. 10-13, 1915 (Bish.); *F. R. Fosberg* 9,349, bush, 3 meters tall, in moist forest, alt. 400 meters, Laie-Malaeakahana Ridge, Koolau Mts., Apr. 15, 1933 (Berl.; Bish.; Field, 2 sheets); *Fosberg* 10,357, bush, 3 meters tall, in dry forest, alt. 350 meters, on ridge southeast part of Makua Gulch, Koolau, Mts., Hauula, Oct. 15, 1933 (Bish.; Field, 2 sheets); *Fosberg* 12,360, tree, 5 meters tall, alt. 500 meters, on dry, wooded ridge, south side of Makua Valley, Waianae Mts., Nov. 17, 1935 (Field); *Edward Y. Hosaka* 113, in woods, alt. 1,800 feet, Pupukea, Paumalu Forest Reserve, Koolau Mts., Jan. 12, 1930 (Bish.); *Hosaka* 770, tree, 20 feet tall, in moderately dry place, alt. 700 feet, 2nd north fork, Kipapa Gulch, Koolau Range, Sept. 25, 1932 (Field); *Hosaka* 979, tree, 30 feet tall, in lower wooded forest, alt. 1,000 feet, Kipapa Gulch, Apr. 30, 1933 (Field); *Edward P. Hume* 82, alt. 425 meters, Kipapa, Feb. 15, 1931 (Bish.); *Hume* 451, tree, on sparsely wooded slope, alt. 1,000 feet, Kalauao Gulch, Aiea, Koolau Range, Jan. 3, 1932 (Field); *Charles S. Judd* 19, erect tree, 3 meters tall, alt. 225 meters, dry gulch side, Pupukea, Sept. 28, 1925 (Bish.; *pro var. nova a F. Brownio acceptum*); *Noel Krauss*, alt. 400-600 feet, Waipilopilo Gulch, Hauula, Dec. 2, 1933 (Field); *Alfred Meebold*, alt. 3,000 feet, Makaleha Ridge, Kaala, Waianae Mts., June, 1932 (Bish.); *Meebold*, Waihole ditch trail, June, 1932 (Bish.); *Meebold (Degener distrib. no.)* 10,800, Paumalu, November, 1935 (Deg.); *R. Onuye*, small tree, about 18 feet tall, in rain-

forest, alt. 1,800 feet, on Maakua-Papali Ridge, Kaipapau Forest Reserve, Hauula, Oct. 15, 1933 (Bish.); *Harold St. John* 10,140, flowers white, sweetly fragrant, on wooded ridge, alt. 1,100 feet, Pupukea-Paumalu Forest Reserve, Jan. 12, 1930 (Field); *Carl Skottsberg* 1,792, in Pupukea Forest Reserve, Pupukea-Malaeakahana Trail, Koolau, Sept. 15, 1926 (type, Bish., and cotype, Goth., of *P. cauliflorum* var. *macrophyllum* Skotts.); *Otto H. Swezey*, Ewa, January, 1913 (Gray); *Swezey* 12,712, Waihole, September, 1916 (Bish.); *David L. Topping* 2,925, along Pupukea-Kahuku Trail, Nov. 23, 1924 (Deg.); *E. K. Yoshinaga*, Pupukea, Jan. 12, 1930 (Bish.); *T. G. Yuncker* 3,018, on ridge trail back of Aiea, Sept. 4, 1932 (in herb. Yuncker).

As will be seen below, *Pittosporum cauliflorum* var. *fulvum* Hillebr. (Fl. Haw. Isls. 25. 1888) and *P. cauliflorum* var. *macrophyllum* Skotts. (Meddel. Göteborg. Bot. Trädgård 10: 109. 1936) are synonymous with this species.

Hillebrand (*loc. cit.*) described three varieties of *P. cauliflorum*, namely, var. β *fulvum*, var. γ (without name), and var. δ *flocculosum*, in the order here given. Var. *fulvum*, described as extending in range from Ewa to Waialua, Oahu, is represented by Hillebrand 302, from Waiawa Valley, Oahu, a specimen at Kew.⁴ This lacks flowers and fruits. The leaf-blades are broadly oblanceolate and range to about 10.5 cm. long and 4 cm. wide. The petioles are 1.5-2.5 cm. long. The under surfaces of the leaves are densely covered with a reddish-brown tomentum except in a few small areas where this has sloughed off. The principal lateral veins are moderately visible beneath through the tomentum. An examination of a wide range of specimens from Oahu shows that *P. cauliflorum* var. *macrophyllum* Skotts. is not to be distinguished from this variety. The var. *macrophyllum* had large leaves, excessively dense, brown or reddish-brown tomentum that covered the young leaves and their subtending branchlets, also tomentose, rough, subpedicellate capsules clustered mostly in threes on a peduncle about 1 cm. long. It evidently had been segregated by Skottsberg as a variety because of its large leaves, but the leaf-size varies too much to permit separation from var. *fulvum*.⁵

The various fruiting specimens of var. *fulvum* that are available possess rugose or tuberculate-roughened capsules, these being very different from the smooth capsules on the named type specimens of *P. cauliflorum* Mann. They justify specific rank for var. *fulvum*. Because of the existence already of a *P. fulvum* Rudge (Trans. Linn. Soc. 10: 298, tab. 20. 1811), I have used the new name *cladanthum*.

⁴ The type material of Hillebrand's private herbarium at Berlin is at present inaccessible to me.

⁵ Var. *fulvum* was described by Hillebrand without special mention of leaf-size, and thus assumedly similar in this respect to *P. cauliflorum* proper, the leaves of which were described by Hillebrand as "6-8 inches \times 2-3 inches." It is significant that for Hillebrand's var. γ , a form with usually smaller leaves, he did not omit the leaf-size, describing it as "4-6 inches \times 2-2½ inches."

Furthermore, since Hillebrand had seen no fruiting specimens of var. *fulvum* and, in the broad distributional range cited for it may have included in very small part some material that would prove to be the vegetatively similar *smooth-fruited P. cauliflorum* var. *cladanthoides*, I have chosen to treat *P. cladanthum* as a new species and found it upon its own independent type basis (Degener *et alii* 10,986).

Var. γ was cited first from Mt. Kaala, Oahu. The leaves were said by Hillebrand to be "brownish-tomentose as in var. β , but strongly nerved underneath." Hillebrand had seen no capsules for his var. *fulvum* and it seems that neither had he seen any for his var. γ . For each he gave a few supplementary characters but these appear to have been drawn from inflorescences of different sexes and perhaps different stages of maturity. However, Skottsberg (Meddel. Göteborg. Bot. Trädg. 10: 109. 1936) has accepted Hillebrand's var. γ and named it *reticulatum*. This var. *reticulatum* simulates strongly *Pittosporum confertiflorum* var. *Mannii*, from which it differs in lacking a terminal inflorescence. Like *P. cladanthum*, it has the young leaves and their subtending branchlets densely brownish- or reddish-brown-tomentose, these thus presenting a strong contrast to the lower, older, and larger leaves, which are green and glabrous or glabrate on their upper surfaces. *It resembles P. cladanthum, too, in having rugose capsules.* It must therefore be transferred to that species and will stand as:

Pittosporum cladanthum var. **reticulatum** (Skottsberg.) comb. nov.; *P. cauliflorum* var. *reticulatum* Skottsberg. *loc. cit.*

Var. δ *flocculosum* was based on material from Kaala, Isl. Oahu, and is easily recognized by the "pale strigose pubescence in flakes or patches" on the lower surfaces of the leaves. A comparison of the strigose pubescence on the leaves of var. *flocculosum* with the tomentum on those of *P. cauliflorum* proper indicates that the two forms are specifically distinct and the former is accordingly here treated as:

Pittosporum flocculosum (Hillebr.) comb. nov.; *P. cauliflorum* var. *flocculosum* Hillebr. *loc. cit.*

Specimens examined (all from Isl. Oahu): *Degener, Krauss, & Martinez* 11,019, in forest, Puu Kaupakuhale, Oct. 22, 1936 (Berl.; Deg.; Field, 3 sheets); *Degener, Martinez, & Salucop* 11,125, in lower rain-forest, on ridge directly north of Kaala, Mar. 26, 1937 (Berl.; Deg.; Field); *Degener & Ordoñez* 12,203, slender tree, 35 feet tall, with few horizontal branches, in dark forest, Kaaawa Gulch (north of Kaala), August 2, 1938 (Berl.; Deg.; Field); *Degener, Ordoñez, & Foster* 12,338, in forest, mauka of Kawaiiki ditch intake, Apr. 30, 1939 (Field, 2 sheets); *Degener, Ordoñez, & Northwood* 12,296, in decadent forest, between Puu Pane and Maili, Mar. 25, 1939 (Field); *Degener, Park, Topping, Bush, & Northwood* 10,999, in forest, gulch north of middle of ridge between Puu Kamao-hanui and Puu Pane, Jan. 10, 1932 (Deg.; Field, 2 sheets); *Charles N. Forbes*, Makaha Valley, Koolau Range, Feb. 12-19, 1909 (Bish.; Field); *Forbes*

1,825-0, on slopes of Kaala, Mokuleia, Apr. 26-May 16, 1912 (Berl.; Bish.; Field; Mo., 2 sheets); *Fosberg & Duker* 9,043, bush, 3 meters tall, in dry forest, alt. 500 meters, head of Makua Valley, Makua, Waianae Mts., Nov. 25, 1932 (Field, 2 sheets); *F. Kitamura*, tree on dry ridge, alt. 2,600 feet, Puu Hapapa, Waianae Mts., Jan. 7, 1934 (Field); *Joseph F. Rock* 17,003, Makaleha Valley, May 2, 1918 (Arn.; Bish.); *Harold St. John* 14,003, diffuse tree, 20 feet tall, flowers white, near edge of woods, alt. 2,600 feet, main divide northwest of Puu Kanehoa, Waianae Mts., Honouliuli, Jan. 7, 1934 (Bish.; Field).

The range of variation in this species is almost incredible. Without a liberal representation of specimens, one might well mistake two or three extremes of foliage and fruit as connoting distinct varieties or even species. Thus, for example, some specimens have all fruits small, smoothish, and perhaps slender-pedicelled, while some have all fruits large, very rugose or lumpy and ridged, and subsessile. Yet in some cases both types of fruit may occur in the same cluster. In Degener, Krauss, & Martinez 11,019, of which I have been permitted through Mr. Degener's generosity to study his entire collection of perhaps thirty specimens, several of the extremes in diagnostic characters are present.

Pittosporum Helleri sp. nov.—Habitum foliorum *Pittosporo acuminato* H. M. valde similis. Folia saepius 10-12 cm. longa et 2-3 cm. lata, plerumque laeviores. Pedunculus inflorescentiae femineae (saltem demum) glaber, 3-8-florus, interdum vere terminalis; saepius axillaris, elongatus, ramiformis et foliosus foliis 4-10 cm. longis et 1-2 cm. latis; pedicellis gracilibus, ad anthesin brevissime patentem hispidulis et ± 1 cm. longis, demum glabris et forsitan paulo longioribus. Flores ignoti. Capsula ovoidea, quadrata, basi rotundata vel truncata, primum dense brunneo-tomentosa demum plus minusve glabrescens; valvis tuberculato-rugosis, basi cordatis, sulco mediano longitudinaliter sulcatis, 1.5-2.4 cm. longis (stylo gracili ± 5 mm. longo excluso) et subaequaliter latis.

In habit of foliage very similar to *Pittosporum acuminatum* H. Mann. Leaves more often 10-12 cm. long and 2-3 cm. wide, commonly smoother. Peduncle of female inflorescence (at least finally) glabrous, 3-8-flowered, at times truly terminal; more often axillary, elongate, branch-like and foliose with leaves 4-10 cm. long and 1-2 cm. wide; pedicels slender, at anthesis very shortly spreading-hispidulous and ± 1 cm. long, finally glabrous and perhaps a little longer. Flowers unknown. Capsule ovoid, quadrate, at base rounded or truncate, at first densely brown-tomentose but finally more or less glabrescent; valves tuberculate-rugose, cordate at base, marked lengthwise with a median groove, 1.5-2.4 cm. long (excluding the slender, ± 5 mm. long style) and subequally wide.

Specimens examined: *Amos Arthur Heller* 2,783, on Kaholuamanu, above Waimea, Kauai, Aug. 30, 1895 (Field); *Heller* (similarly) 2,783, same locality, September 2-9, 1895 (type, Gray: cotypes,

Arn.; Berl.; Field; Kew; Minn.; Mo.; N. Y.; Par.; U. S.); *Joseph F. Rock* 5,817, woods above Makaweli, Kauai, Sept., 1909 (Gray).

An interesting character is the leafiness of what I construe to be the peduncles, at least of those bearing the fertile flowers. At times these peduncles are definitely terminal, but in most cases they are axillary. In these latter cases, however, the leaves along the lower part may give the remaining terminal portion of the peduncle the deceptive appearance of being terminally placed on a leafy branch.

Heller misconstrued this species as representing *Pittosporum acuminatum* H. Mann. From that species it may be separated at once by its leafy, not minutely subulate-bracted, peduncles, by the very minutely spreading-hispidulous, not tomentulose, pedicels of the fertile flowers, and by the finally glabrate, not tomentose, capsules; also doubtless by several other characters yet to be ascertained when flowering specimens of both sexes are collected.

Pittosporum confertiflorum Mannii var. primum nomin.; *Pittosporum confertiflorum* var. β Hillebr. Fl. Haw. Isls. 26. 1888.—Forms with more veiny and more red-tomentose lower leaf-surfaces may offer a resemblance to *P. cauliflorum* var. *reticulatum* Skottsberg. but usually can be recognized by their narrower sepals and their terminal inflorescence. The type or at least first cited material of Hillebrand's unnamed *P. confertiflorum* var. β came from "Hawaii! Kau and Kona." His second citation was of the Lanai material collected by Mann & Brigham, no. 337. The Hillebrand type in Berlin has been inaccessible to me because of recent war conditions. I have therefore, in the interests of absolute certainty, selected Mann & Brigham 337 for the type collection, of which no fewer than ten sheets are now before me. From these, supplemented by other specimens among those cited below, the following fresh description is drawn:

Folia plerumque minima, tomento saepius subrubro-brunneo. Inflorescentia duorum sexus primum terminalis, sed fructifera saepe demum (surculo terminali producto) axillaris. Sepala lanceolata vel moderate ovata. Capsulae saepe angustius ovoideae et valdius rugosae (interdum Persici nucleo rugosisimo similes).

Leaves usually smaller, their tomentum usually reddish-brown. Inflorescence of both sexes at first terminal, but the fruiting one often finally axillary by the development of a terminal shoot. Sepals lanceolate or moderately ovate. Capsules often more narrowly ovoid and more extremely roughened (at times suggesting a very rough peach-pit).

Specimens examined: OAHU—*Edwin H. Bryan, Jr.*, alt. above 3,000 feet, by trail, east side, Puu Kaala, Waianae Mts., Jul. 22, 1928; *Bryan* 457, alt. about 3,000 feet, east side trail, Mt. Kaala, Waialua District, Jul. 22, 1928 (Corn.); *Bryan*, alt. 1,000 feet, Pupukea, Jan. 23, 1929 (Field; a strange form, placed here because of terminal inflorescence, but has longer leaves up to 2 dm. long including petioles and thus resembles *P. cladanthum* given above, (p. 21); *Otto Degener et alii*, Kaala, May 1, 1938

(Deg.; Field); *Degener, Ordoñez, & Selling* 12,243, in forest, alt. 3,500 feet, southeast slope of Kaala, Sept. 25, 1938 (Field); *Degener, Salucop, & Arlantico* 12,075, in forest, southeast slope of Kaala, Dec. 19, 1937 (Berl.; Deg.; Field); *idem* 12,076, same locality and date (Deg.; Field; sterile; leaves all entirely glabrate; otherwise closely matching *Degener et al.* 12,075 and *Degener, Ordoñez, & Selling* 12,243 from same locality); *Hosaka* 1,263, branching tree 20 feet tall, in wet woods, alt. 3,700 feet, Puu Kaala, Waianae Mts., Oct. 4, 1934 (Field); *Joseph F. Rock*, Punaluu (Arn.); *Harold St. John* 11,041, on wooded ridge, alt. 2,600 feet, Puu Kanehoa, Waianae Mts., Mar. 22, 1931 (Bish.; Field); *Olof H. Selling* 3,582, entrance to Kaala, east side of Waianae Mts., Sept. 25, 1938 (Goth.); *Carl Skottsberg* (with *A. Judd*) 364, north slope of Kaala, Aug. 30, 1922 (Goth.; labelled by Skottsberg as *Pittosporum cauliflorum* H. Mann, and so treated by him in *Meddel. Göteborg. Bot. Trädg.* 10: 109. 1936, but has terminal inflorescence).

LANAI—*Charles N. Forbes* 72-L, mountains near Koele, June, 1913 (Field); *Forbes* 73-L, same locality and date (Bish.); *Forbes* 86-L, same locality and date (Berl.; Field; Kew); *Forbes* 106-L, same locality and date (Bish.); *Forbes* 125-L, same locality and date (Berl.; Field); *Forbes* 136-L, same locality and date (Field; Kew); *Forbes* 140-L, mountains behind Koele, June, 1913 (Berl.; Del.; Field; Gray); *Forbes* 304-L and 305-L, without locality, Sept., 1917 (Bish.); *F. R. Fosberg* 12,589, shrub 4 meters tall, flowers white and fragrant, alt. 800 meters, in wet gulch bottom, Kaiholena Gulch, Dec. 3, 1935 (Bish.; Field); *Fosberg* 12,593, spreading tree 5 meters tall, flowers white, not very fragrant, alt. 800 meters, at wet bottom of gulch, near head of Kaiholena Gulch, Dec. 3, 1935 (Field, 2 sheets); *Horace Mann & William T. Brigham* 337, without locality, 1864–1865 (type, Corn.: cotypes, Bish.; Del.; Field, 2 sheets; Gray; Kew; Mo.; N. Y.; U. S.); *George C. Munro*, without locality (Field); *Munro*, Kaiholena, June 20, 1914 (Bish.); *Munro*, foot of cliff, Lanaihale, Apr. 8, 1915 (Berl.; Field; Kew); *Munro* 46, outer forest, Kaiholena, Aug., 1913 (Bish.); *Munro* 131, ridge at head of Kaiholena, Sept. 28, 1913 (Bish.); *Munro* 139, Kaiholena, Sept. 28, 1913 (Bish.); *Munro* 252, Waiopaa, Mar. 24, 1915 (Bish.); *Munro* 334, Kaiholena, June 20, 1914 (Bish.); *Munro* 376, Kaiholena, Jan. 3, 1915 (Bish.); *Munro* 433, Waiopaa, Mar. 26, 1915 (Bish.); *Emilio Ordoñez* (*Otto Degener distrib. no.*) 12,848, Puu Alii, July 14, 1940 (Berl.; Deg.; Field); *Ordoñez* (*Degener distrib. no.*) 12,849, same locality and date (Berl.; Deg.; Field); *Jules Remy* 573, without locality, 1851–1855 (Par.); *Joseph F. Rock* 8,066, Lanaihale, July, 1910 (N. Y.); *Rock* (similarly) 8,066, Lanaihale, July 22, 1910 (Berl.; Del.; Field; Gray; Kew; Par.); *Rock* (similarly) 8,066, Haalelepaakai, July 22, 1910 (Gray); *Rock* 8,104, Mahana, Aug. 2, 1910 (Arn.; Berl.; Bish.; Field; Gray; Kew); *Rock* 8,110, Mahana, July 28, 1910 (Berl.; Del.; Field; Kew; Par.); *Rock* 8,111, Kaiholena, Aug. 5, 1910

(Berl.; Bish.; Field); *Rock* (similarly) 8,111, tree 15 feet tall, leaves greenish underneath, fruits dark purple inside, first valley, dry foothills of Mahana, Aug. 5, 1910 (Arn.); *Rock & Hammond* 8,066, on top of ridge leading to the main one, July 22, 1910 (Arn., 2 sheets); *Rock & Hammond* 8,110, in shady places under guayava bushes, valley facing main ridge, July 28, 1910 (Arn.); *Rock & Moki* 8,087, small tree or shrub, at the head of Mahana Valley, July 24, 1910 (Arn.); *Rock & Moki* (similarly) 8,087, Kaiholena Valley, July 24, 1910 (Berl.; Field); *Rock & Moki* 8,108, top of the ridge leading to Haalelepaakai, July 23, 1910 (Arn., 2 sheets; Berl.; Field; Kew; form with capsules especially deep-grooved and wrinkled).

HAWAII—*Charles N. Forbes* 386-H, Kau Desert, Aug. 2, 1911 (Berl.; Del.; Field); *Mrs. Francis Sinclair, Jr.*, Kaolaunui, *communic.* January, 1885 (Kew).

Occasionally the capsules become exceedingly rough, the several dozen glabrescent surface-elevations on each valve resembling darkened, malformed, fungoid, at times coalesced tongues 4–9 mm. long (e.g., *Forbes* 304-L, Bish.). The valves may finally appear more or less cordate when flattened out and measure 3 cm. long and wide.

It seems improbable that *Pittosporum cladanthum* (described above) occurs on Lanai. Therefore several larger-leaved sprays of sterile or cauline-flowering or -fruiting material from Lanai that might pass on Oahu for that species are assumed to belong here (*Munro* 334 and 376; *Rock* 8,104 and 8,111). *Rock* 8,111 is noteworthy in this respect. The Berlin and Bishop Museum specimens of that plant have all the peduncles cauline, but the Field Museum specimen has, in addition to 3 cauline peduncles, one that is about 2.5 cm. long and is *terminal on a tiny lateral branchlet* of about 8 mm. in length and bearing, at its (i.e., the branchlet's) tip, a leaf about 9 cm. long.

Pittosporum confertiflorum microphyllum var. nov.—Folia minora, lamina tantum 3–6.5 (raro –8) cm. longa et 1.3–3.5 cm. lata. Inflorescentia semper terminalis, subsessilis. Capsulae (1–3 pro inflorescentia) minores, moderate rugosae, primum dense brunneo-tomentosae, demum irregulariter nunc tomentosae nunc glabrescentes, compressae; valvis horizontaliter oblongo-orbiculatis, circ. 1.5 cm. altis et fere 2 cm. latis, seminibus 5.5–6.5 mm. longis.

Leaves smaller, blade only 3–6.5 (rarely –8) cm. long and 1.3–3.5 cm. wide. Inflorescence always terminal, subsessile. Capsules (1–3 for an inflorescence) smaller, moderately roughened, at first densely brown-tomentose, at last irregularly now tomentose, now glabrescent, compressed; valves horizontally oblong-orbiculate, about 1.5 cm. tall and almost 2 cm. wide, seeds 5.5–6.5 mm. long.

Specimens examined: *Charles N. Forbes* 14-L, Kaiholena, Lanai, June, 1913 (type, Bish.: cotypes, Berl.; Field; Gray).

A single opened flower on the type has oblong-lanceolate sepals, these about 2.5 mm. long; corolla-

tube about 5 mm. long and petal-tips about 2.5 mm. long.

Pittosporum glabrum var. **spathulatum** (H. Mann) comb. nov.; *Pittosporum Terminalioides* var. γ Gray, Bot. U. S. Explor. Exped. 231. 1854 (as to Oahu material); *Pittosporum spathulatum* H. Mann Enum. Haw. Pl. no. 20 (Proc. Amer. Acad. 7: 151). 1867; *Pittosporum Terminalioides* var. *spathulatum* Gray ex Wawra, Flora 56: 169. 1873; *Pittosporum glabrum* var. β Hillebr. Fl. Haw. Isls. 23. 1888.—Among the species of *Pittosporum* native to the Island of Oahu are the two more or less sister species numbered 2 and 4 in Hillebrand's treatment of *Pittosporum*, Fl. Haw. Isls. 21–24. 1888. Each of these has the typical form with a glabrous or only faintly pubescent ovary, and at least one variety with a tomentose ovary, the tomentum persisting more or less fully upon the ripened capsule (although getting more or less irregularly scattered as the ovary expands to form the capsule). The first (i.e., no. 2), with its variety, differs as to capsule, however, in being much less deeply furrowed and never runcinate. It was correctly treated by Hillebrand as *P. glabrum* Hook. & Arn. and its variety was designated merely as var. β . The second (i.e., no. 4) was erroneously treated by Hillebrand as *P. spathulatum* H. Mann (with no mention of a tomentose-capsuled variety, with which Hillebrand apparently was unacquainted; he did, however, describe the ovary of the species proper as "faintly pubescent"). Hillebrand referred Remy 572 to this second species and of this species wrote: "Differs from var. β of *P. glabrum* in the capsule and the size of the tree. Mann's description applies to fertile flowers of the former, but as he included Remy's number his name may stand." Now it so happens that Remy included under his number 572 two distinct forms. One of these was that represented in Gray Herbarium, where it had been labelled by Asa Gray as *Pittosporum Terminalioides* "var. γ foliis glabris" (although Gray's first cited or type specimen of var. γ was one from the District of Waimea, Island of Hawaii; cf. Gray, Bot. U. S. Explor. Exped. 1: 231. 1854). This plant was later labelled by Horace Mann as his *P. spathulatum*. It is a flowering specimen and matches perfectly various plants distributed by Mann & Brigham under their no. 602 for *P. spathulatum* Mann. Moreover, in specimens of Mann & Brigham 602 possessing well developed ovaries (e.g., Herb. Corn. Univ.), these are seen to be as in *P. glabrum* except tomentose (cf. "ovario tomentoso," Mann, *loc. cit.*). Both Mann & Brigham 602 and Remy 572 of *Gray Herbarium* must therefore stand as a variety, namely, Hillebrand's var. β of *P. glabrum* Hook. & Arn. Furthermore, since the name *spathulatum* is seen to have been the first one applied to this entity in its here accepted varietal status,⁶ it must be adopted as above done by me for

⁶ Just what warrant Wawra had (*loc. cit.*) for citing Gray as the author for the combination *P. terminalioides* var. *spathulatum* I do not know. *Rock* (Indig. Trees Haw. Isls. 157. 1913) attributes the combination to "Gray Bot. U. S. E. E. (1854) 231," an utter impossibility of

the tomentose-fruited form of *P. glabrum* Hook. & Arn.

The *Pittosporum* species no. 4 of Hillebrand's treatment is in large part the species named below as *P. sulcatum*, which see for further notes regarding the present var. *spathulatum*.

Pittosporum sulcatum sp. nov.; *Pittosporum spathulatum sensu* Hillebr. Fl. Haw. Isls. 24. 1888 *pro parte*; non Mann, Enum. Haw. Pl. no. 20 (Proc. Amer. Acad. 7: 151). 1867; *Pittosporum spathulatum sensu* Rock, Indig. Trees Haw. Isls. 157, pl. 56. 1913 *pro parte* (non Mann).—Frutex vel arbor, 2–5 m. alta; ramis rigidis, numerose foliosis. Folia alterna ac subsparva vel conferte subverticillatis, subatroviridia, glabra vel juvenissima interdum pilosa, subcoriacea, cuneato- vel obovato-spathulata, de apice rotundato vel obtuso vel aegre acuminato usque in petiolum alatum vel subalatum 0.5–2.5 cm. longum plus minusve sensim angustata; lamina nunc plerumque 3.5–6.5 nunc plerumque 5.5–9 (rarius usque ad 15) cm. longa et 1.5–3.5 (rarius usque ad 6) cm. lata. Inflorescentia plerumque axillaris (sed interdum terminalis) et pro duobus sexibus subsimilis, flavo- vel fulvo-pubescent pilis plus minusve multiloculatis ac glanduloso-capitulatis, saepius 5–8-flora; pedunculo plerumque 4–12 rarius usque ad 33 mm. longo; pedicellis saepius 3–7 mm. longis, bracteis subulatis sparsim pilosis 2–3 mm. longis. Sepala pro floribus masculinis oblonge vel late ovata apice subobtusata acutave tergo ± 7 -striata et minute pubescentia vel grabata marginibus inferne subscariosis ciliata 4–5 mm. longa, pro femineis angustiora apice magis attenuata tergo estriata longius pilosa tantum circ. 2 mm. longa. Corolla alba vel lactea pro floribus masculinis tubo circ. 8–10 mm. longo et stamina parce superante, lobis oblongo-ovatis apice obtusis rotundatisve circ. 4–5 mm. longis, pistillo abortivo lineari inferne adpresse antrosomque fulvo-hispido; pro femineis tubo tantum circ. 6 mm. longo lobis similibus sed sub 3 mm. longis, staminibus minutis ± 1.5 mm. longis, ovario primum conspicue adpresso-hispido setis fulvis plerumque antrorsis, stylo glabro circ. 4–5 mm. longo apice 2-lobato. Capsula subquadrangularis, cuspidata, profunde sulcata, glabra vel obsolete pubescens, styli rostro ± 3 mm. longo non incluso demum 1.5–3 cm. longa et aequaliter vel subaequaliter crassa. Semina nigra vel rubro-nigra (subnitida), compressa, angulata, tergo irregulariter subcostulata vel subrugulosa, circ. 7–9.5 mm. longa et circ. 6–7 mm. lata.

Shrub or tree, 2–5 meters tall; branches rigid, numerous leaved. Leaves alternate and subremote, or close together and subverticillate, darkish-green, glabrous or the youngest ones sometimes pilose, subcoriaceous, cuneately or obovately spatulate, more or less gradually narrowed all the way from the rounded or obtuse or weakly acuminate apex into an course, since the name *spathulatum* was not employed until Mann used it in 1867. Probably Rock merely assumed Gray's authorship of the combination in the reference cited because of Wawra's having attributed (*loc. cit.*) the combination to Gray.

alate or subalate petiole, this 0.5–2.5 cm. long; blade now commonly 3.5–6.5 now commonly 5.5–9 (more rarely up to 15) cm. long and 1.5–3.5 (more rarely up to 6) cm. wide. Inflorescence commonly axillary (but sometimes terminal) and nearly similar for the two sexes, yellow- or brown-pubescent with more or less multiloculate and glandular-capitulate hairs, more often 5–8-flowered; peduncle commonly 4–12 (more rarely 25) mm. long; pedicels more often 3–7 mm. long, their subulate bracts sparsely pilose and 2–3 mm. long. Sepals for staminate flowers oblongly or widely ovate, at apex subobtusata or acute, dorsally ± 7 -striate and minutely pubescent or glabrate, ciliate toward base along the subscarios margins, 4–5 mm. long; for pistillate flowers narrower, at apex more attenuate, dorsally longer-pilose and not striate, only about 2 mm. long. Corolla white or milk-colored, for staminate flowers the tube about 8–10 mm. long and scarcely surpassing the stamens, lobes oblong-ovate, apically obtuse or rounded, about 4–5 mm. long, the abortive pistil linear and toward base appressedly and antrorsely brown-hispid; for pistillate flowers having a tube only about 6 mm. long, lobes as before but less than 3 mm. long, the minute stamens ± 1.5 mm. long, ovary at first conspicuously appressed-hispid with yellow and commonly antrorse setae, the glabrous style about 4–5 mm. long and apically 2-lobed. Capsule subquadrangular, cuspidate, deeply sulcate, glabrous or very obsoletely pubescent, finally 1.5–3 cm. long exclusive of stylar beak (this ± 3 mm. long) and equally or subequally thick. Seeds somewhat shining, black or reddish-black, compressed, angulate, irregularly and minutely somewhat ridged or roughened, about 7–9.5 mm. long and about 6–7 mm. wide.

Type specimen: Collected by *Nobue Tsuji*, in windy and rainy area at top of ridge, on side of Waikane-Schofield Trail, Waianaeuka, Koolau Mts., Oahu, Oct. 16, 1932 (Bish.; a single sheet bearing one spray, this having, still attached, a lone mature or nearly mature, strongly rugose capsule; the sheet bears the determination *Pittosporum spathulatum* Mann by Dr. Harold St. John).

Specimens examined (unless otherwise noted, all from the Island of Oahu, Hawaiian Islands): *Captain Beechey*, see *Lay & Collie*; *E. Christophersen & E. Hume* 1,419, alt. 500–750 meters, Kahuauli Ridge, Dec. 17, 1930 (Berl.; Bish.; Field); *Hattie Davis*, alt. 2,325 feet, Waikane-Schofield Trail, Koolau Mts., Oct. 16, 1932 (Bish.); *Otto Degener & Emilio Ordoñez* 12,053, small forest tree, C.C.C. Trail, Kawailoa, July 3, 1938 (Berl.; Field); *Degener, Ordoñez, & J. Kepaa* 12,774, in woods, Peahinaia Trail, Apr. 28, 1940 (Berl.; Deg.; Field); *Degener, Park, et alii* 10,810, in forest, on southeast slope of Kaala, Feb. 2, 1936 (Deg.; N. Y.); *Degener, Park, & D. L. Topping* 11,020, in forest, C.C.C. Trail, Aiea, Feb. 16, 1936 (Deg.; Field); *Degener, Salucop, & Arlantino* 11,535, in lower forest, C.C.C. Trail, Aiea, Dec. 6, 1937 (Deg.; Field; Mo.); *idem* 11,569, coarsely branched tree, 11 feet tall, in forest, alt. 2,400 feet, southeast slope of Kaala, Dec. 19, 1937 (Field; *forma foliis supra sub-*

nitidis lamina usque ad 15 cm. longa et ad 6 cm. lata); *idem* 11,570, in forest, alt. about 3,000 feet, same locality and date (Berl.; Deg.; Field); *Degener, Takamoto, & Martinez* 10,799, in forest, C.C.C. Trail, Aiea, Mar. 15, 1936 (N. Y.); *K. Duker*, in wet forest, Manoa Cliff Trail, Manoa Valley, July 13, 1933 (Bish.; Field); *G. R. Ewart, III*, half-way on Pupukea-Laie Trail, Nov. 9, 1928 (Field); *Abbé Urbain Faurie* 2, alt. 600 meters, Kalihi, May, 1910 (Del.; Par.); *Charles N. Forbes*, Waiolani Ridge, Dec. 10, 1908 (Bish.; Field; capsular valves slightly pubescent near edges); *Forbes*, Makaha Valley, Feb. 12–19, 1909 (Bish.); *Forbes*, Palolo Valley ridges, Apr. 20, 1909 (Field); *Forbes*, ridge between Waialae Nui and Palolo, Apr. 20, 1909 (Bish.); *Forbes* 1,896–O, west edge of Palolo Crater, Jan. 27, 1914 (Bish.); *Forbes (with Dean Lake)* 1,972–O, Waimano Ridge, Oct. 27–30, 1914 (Bish.; Mo.); *Forbes (with Dean Lake)* 1,987–O, same locality and date (Bish.); *Forbes* 2,220–O, Wahiawa Headgate Trail, Aug. 17–20, 1915 (Bish.); *F. R. Fosberg* 9,453, in wet forest, alt. 500 meters, Kalauao-Waimalu Ridge, Koolau Mts., Apr. 30, 1933 (Bish.; Field, 2 sheets); *Fosberg* 9,472, bush 2–3 meters tall, flowers white, in moist forest, alt. 550 meters, Kalauao Ridge, Koolau Mts., Apr. 30, 1933 (Field); *Fosberg* 9,783, bush 2 meters tall, in wet forest, alt. 600 meters, Kipapa Gulch, Waipio, Aug. 7, 1933 (Bish.; Field); *Fosberg & E. Christophersen* 8,682, flowers cream-colored, in rain-forest, alt. 650 meters, ridge south of Kipapa Gulch, Waipio, Sept. 18, 1932 (Field); *Fosberg & K. Duker* 8,790, shrub 3 meters tall, alt. 500 meters, in wet forest, on steep ridge, Waikane-Schofield Trail, Kahana, Oct. 16, 1932 (Bish.; Field); *Charles Gaudichaud*, Hawaiian Isls., 1819 (Del.); *J. Arthur Harris* C 242,243, Oahu, Sept. 10, 1924 (Minn.); *Constance Hartt*, in rain-forest, Kawailoa Trail, Oct. 31, 1937 (Bish.); *A. A. Heller* 1,985 *pro parte*, in Nuuanu, Mar. 23, 1895 (Berl.; Field; Gray; Kew; Minn.; Mo.); *William Hillebrand & John Lydgate*, Oahu (Bish.); *sola capsula, cum P. glabro commixt.*; *E. Y. Hosaka* 1,179, tree 16 feet tall, on wooded ridge, occasional, alt. 2,000 feet, Kipapa Gulch, Waipio, Koolau Range, Aug. 7, 1933 (Bish.; Field); *Lay & Collie (Captain Beechey's Expedition)*, Oahu (Del.; important as showing an immature capsule with very definite grooves; had been labeled in pencil, "*glabrum*," but differs in its fruit from the Lay & Collie type of *P. glabrum* at Kew); *V. McCaughey*, Mt. Waiolani, Oct., 1914 (Bish.; Field); *Alfred Meebold (Otto Degener distrib. no.)* 10,801, Waikane-Kahana Trail, Dec., 1935 (Deg.); *Rock & Ballou*, Palolo Valley, Nov. 30, 1912 (Gray); *Rock & Holm*, Palolo, Sept., 1917 (Field); *Rock & Shaw*, Konahuanui, Sept., 1912 (Bish.); *Harold St. John* 10,026, on wooded slope, alt. 1,300 feet, ridge south of Kipapa Gulch, Waipio, Koolau Mts., Nov. 10, 1929 (Field); *St. John* 11,196, shrub 15 feet tall, on wooded ridge, alt. 1,900 feet, main ridge running southwest from Puu Lanihuli, Kalihi-Nuuanu, Nov. 29, 1931 (Berl.; Bish.; Field); *St. John* 11,556,

shrub 10 feet tall, in woods, alt. 1,400 feet, Laie-Malaekahana Ridge, Koolau Mts., Feb. 4, 1932 (Field); *St. John* 13,038, shrub 15 feet tall, flowers white, fruits yellow, on wooded ridge, alt. 1,400 feet, Ewa Forest Reserve, Kalauao Ridge, Mar. 29, 1933 (Field); *Olof H. Selling* 2,602, upper part of Kipapa Gulch, Koolau Mts., July 3, 1938 (Goth.); *Selling* 3,550, vicinity of Kaala, east side of Waianae Mts., Sept. 25, 1938 (Goth.); *Shaw*, Palolo (Bish.); *Carl Skottsberg* 177, Nuuanu-Kalihi Ridge, Koolau Range, Aug. 13, 1922 (Bish.; Goth.); *Skottsberg* 895, Palolo, Koolau Range, Oct. 23, 1922 (Bish.; Goth.); *Skottsberg* 1,072, Nuuanu-Pauoa, Koolau Range, Nov. 5, 1922 (Goth.); *Skottsberg* 1,793, Malaekahana Trail, Pupukea, in Pupukea Forest Reserve, Koolau Range, Sept. 15, 1926 (Bish.; Goth.); *Amy Suehiro*, alt. 3,500 feet, Mt. Kaala, Jan. 8, 1933 (Bish.); *Otto Swezey*, Koolau Range (Bish.); *Nobue Tsuji*, in windy and rainy area at top of ridge, on side of Waikane-Schofield Trail, Waianaeuka, Oct. 16, 1932 (type, Bish.).

Glabrous- or essentially glabrous-fruited (*i.e.*, typical) forms of this species were referred by Hillebrand to species no. 4 in his treatment of *Pittosporum* (Fl. Haw. Isls. 24. 1888), already discussed under the last preceding variety (*qu. v.*). Continuing the discussion there given, it may be noted that in the Museum of Natural History at Paris there are three more sheets of Remy 572, additional to the sheet at Gray Herbarium, and that one of these likewise bears solely *P. glabrum* var. β Hillebr. (*i.e.*, my var. *spathulatum*). The other two bear exclusively the pubescent-fruited one of the two forms having "the suberiform epicarp deeply furrowed or runcinate" as described by Hillebrand for his *Pittosporum* no. 4, *i.e.*, his erroneously so-called "*P. spathulatum* Mann."⁷ This important *pubescent-fruited* form which, together with my above described *P. sulcatum*, constitutes the species that has commonly passed as *P. spathulatum* among authors and collectors, is seen to have been without a valid name until now.⁸ It is here named:

⁷ On the label for one of these last two sheets Asa Gray had written as a synonym (but erroneously): "*Pittosporum glabrum* Putterl.-non Hook." All three sheets of Remy 572 at Paris had been studied by Gray and he had (incorrectly) determined each as his *Pittosporum Terminalioides* var. γ (for disposition of the true *P. Terminalioides* var. γ Gray, see under *P. glabrum* var. *spathulatum*, p. 25).

⁸ That Mann (*loc. cit.*) could not have had this form in mind when describing his *P. spathulatum* is shown by his words, "capsula glabra fere laevi" and, "capsule nearly smooth." Strictly speaking, however, a fine tomentum can be discerned here and there on his mature capsules if a good lens be used. Mann had indeed collected this very form but had commixed it with specimens of *P. glabrum* (Herb. Kew) and of his *P. spathulatum* (Herb. Corn. Univ.). His description of the fruit of *P. glabrum*, "capsula globosa tuberculato-rugosa," clearly was drawn from his mislabelled fruiting specimens of this form. It is important to note here, however, that the tuberculate-roughened ("tuberculato-rugosa") nature of the mature fruit was not overlooked by Mann. Without question, Mann's designation of the capsule of his *P. spathulatum* as "fere laevi" was intended to contrast it with the capsule of what he mistakenly supposed to be fruiting material of *P. gla-*

Pittosporum sulcatum **Remyi** var. nov.—A species ipsa foliis plerumque paulo multove majoribus infra sparsim vel saltem secundum venam medianam saepe adpresse setosis, ovariis omnino etiam capsulis maturis intra (interdum obsolete inter) sulcos sulculosque pubescentibus differt; praeterea, ramorum 1 vel 2 ultimis principalibus internodiis saepe parumper dense adpresso-hispidis.

Unlike the species proper in its leaves, these commonly a little or much larger and on lower surface sparsely or at least along median vein often appressedly setose, also in its tomentose ovaries and in its mature capsules, these latter pubescent within (and sometimes obsoletely so between) the various furrows, both large and small. Frequently, too, the last one or two principal "internodes" of the branches are for a while appressed-hispid.

Specimens examined: OAHU—*F. B. H. Brown* 1,283, on slopes, rare, alt. \pm 400 meters, Waimalu, Dec. 31, 1925 (Bish.); *E. Christophersen*, *G. P. Wilder*, & *E. Hume* 1,665, in forest, alt. 300–500 meters, middle ridge, Palolo Valley, Mar. 26, 1931 (Bish.); *Degener*, *Park*, *Potter*, *Bush*, & *Topping* 10,811, in forest, Kipapa Trail, June 2, 1935 (Deg.; Field); *Charles N. Forbes* 1,433-O, on ridge, west side of Nuuanu Valley, Jan. 7, 1910 (Mo.); *F. R. Fosberg* 9,772, bush, 3 meters tall, in wet woods, alt. 550 meters, Kipapa Gulch, Waipio, Aug. 8, 1933 (Bish.); *Fosberg* 10,329, bush, 3 meters tall, in wet forest, alt. 620 meters, on ridge southeast part of Makua Gulch, Koolau Mts., Hauula, Oct. 15, 1933 (Field, 2 sheets); *Fosberg* 10,354, bush, 3 meters tall, in moist forest, on ridge, same locality and date (Bish.; Field, 2 sheets); *Fosberg* 10,713½, small tree, 5 meters tall, flowers white, inflorescence very few-flowered, on wet, wooded ridge, alt. 550 meters, Pal'lo-Waialae Nui Ridge, Dec. 27, 1934 (Field); *Fosberg* & *M. Chong* 9,416, bush, 2 meters tall, alt. 650 meters, in wet forest, Laie-Waimea Divide, Koolau Mts., Apr. 15, 1933 (Field); *E. P. Hume* 163, alt. 560 meters, west ridge, Kaaawa, Apr. 12, 1931 (Bish.); *H. Mann* & *Wm. T. Brigham* 203 *pro parte* (Corn.; Kew. cum *P. glabro commixt.*; Mo.); *Alfred Meebold*, Waiahole ditch trail, June, 1932 (Bish.); *Jules Remy* 572 *pro parte*, without locality, 1851–1855 (Par., 2 type sheets); *D. LeRoy Topping* 2,824, Bowen Trail, Fort Shafter, Aug. 31, 1924 (Deg.); *United States Explor. Exped.*, mountains behind Honolulu, 1840 (U. S., 2 sheets).

LANAI—*George C. Munro*, without locality (Bish.).

That Hillebrand did not have this exact (pubescent-fruited) form in mind when drawing the description of his species no. 4 (intended for *P. spathulatum* H. Mann) is shown by his description of the ovary as "faintly pubescent." This would more accurately fit *P. sulcatum* proper (rather than its variety *Remyi*). Doubtless he overlooked the persistent pubescence of the mature capsules on *Remy* 572 when he included that plant after first citing his *brum*, thus confirming my treatment of his *P. spathulatum* as being referable (*variately*) to *P. glabrum*.

own material: "Oahu! in forests between Kalihi and Ewa."

Pittosporum Terminalioides macrocarpum var. nov.⁹—Pedunculi pro unico specimine viso breves (sub 6 mm. longi), pedicellis primum subgracilibus longioribusque (usque ad 11 mm.). Capsula circumambitu ovata vel oblongo-ovata, primum dense tomentulosa demum sparsim vel pro parte subglabrata, major, rostro excluso usque ad 4 cm. longa et 2.9 cm. lata.

Peduncles short (under 3 mm. long) on the single specimen seen, pedicels at the outset longer (up to 11 mm.) and rather slender. Capsule in outline ovate or oblong-ovate, at first densely tomentulose, finally sparsely or in places subglabrate, larger, up to 4 cm. long excluding the beak and 2.9 cm. wide.

Specimens examined: *Charles N. Forbes* 431-H, Kapapala, Kau, Island of Hawaii, Aug., 1911 (type, Bish.).

The leaves, while at first very tomentose on both surfaces, soon become glabrate or glabrous (and often somewhat glaucous) above.

Pittosporum Terminalioides mauiensis var. nov.; *Pittosporum Terminalioides sensu* Rock, Indig. Trees Haw. Isls. 159. 1913 (as to Maui plants and Rock's accompanying plate 57).—Folia tenuiora, lamina plerumque 7–9 cm. longa et 2–3 cm. lata, paucis nullisque venis elevatis, petiolo 1–2 cm. longo. Pedunculus usque ad 2.8 cm. longus, pedicellis \pm 6 mm. longis, capsulis subnumerosioribus minoribusque, valvis oblongo-orbiculatis plerumque sub 1.8 cm. longis latisque.

Leaves thinner, blade commonly 7–9 cm. long and 2–3 cm. wide, few or no veins salient, petiole 1–2 cm. long. Peduncle up to 2.8 cm. long, pedicels \pm 6 mm. long, capsules smaller and somewhat more numerous, valves oblong-orbiculate and commonly under 1.8 cm. in length and width.

Rock (*loc. cit.*) states that this variety "differs from the Hawaii plants [*i.e.*, the species proper] in the leaves only, which are much thinner texture, being chartaceous and having rather indistinct veins." As noted above, however, the capsules are smaller and somewhat more numerous.

Specimens examined: *Joseph F. Rock* 8,669, Isl. Maui (type, Bish.).

PHYLLOSTEGIA BREVIDENS **Degeneri** var. nov.—Rami patenter vel subretrosum pilosi. Folia ma-

⁹Planchon, the author of the name *Pittosporum Terminalioides*, had spelled the trivial name "terminalioides" on the type sheet at Kew. Asa Gray published the name so spelled. Hillebrand later (Fl. Haw. Isls. 22 and 24. 1888) altered the name by dropping the second *i*, perhaps through oversight or perhaps assuming that Planchon had been concerned merely with a falsely terminal inflorescence, in which latter case Hillebrand's spelling would be correct. However, the Kew type (now before me) shows no terminal inflorescence at all, although two detached capsules are glued to the sheet, just below the leafy spray; these evidently had been cauline in origin, as revealed by two or more remaining cauline pedicels. Moreover, the genus *Terminalia* L. f. (family Combretaceae) has many species that are resembled by *Pittosporum* species, Planchon's species among them, and there seems no doubt that Planchon meant to spell the trivial name exactly as he did, and in allusion to such a resemblance.

jora, petiolo patenter piloso 2–5 cm. longo; lamina ovata, apice vix acuminata, basi rotundata vel truncata vel subcordata, 0.8–1.3 dm. longa et 5–8.5 cm. lata, subnumerose serrata dentibus pro utroque latere ± 25 , infra tomentosa supra plus minusve glabrata. Verticillastra saltem inferiora 8-flora, racemi 1–2 dm. longi axe patenti-piloso, pedicellis gracilibus sed non filiformibus patentibus tomentulosis plerumque 2–3 (etiam –3.5) cm. longis. Calyx pubescens eglandulosus, tubo circ. 5–6 mm. longo, lobis deltoideis vix acutis circ. 1.5–2 mm. longis. Corolla ignota.

Branches spreading- or subretorse-pilose. Leaves larger, the spreading-pilose petiole 2–5 cm. long; blade ovate, at apex scarcely acuminate, at base rounded or truncate or subcordate, 0.8–1.3 dm. long and 5–8.5 cm. wide, somewhat numerously serrate (teeth ± 25 on each side), tomentose beneath but more or less glabrate above. Whorls (at least the lower ones) 8-flowered, raceme 1–2 dm. long, its axis spreading-pilose; pedicels slender but not filiform, spreading, tomentulose, commonly 2–3 (even –3.5) cm. long. Calyx pubescent, without glands, its tube about 5–6 mm. long, the scarcely acute lobes deltoid and about 1.5–2 mm. long. Corolla unknown.

Specimens examined: *Otto Degener, Emilio Ordoñez, & Felix C. Salucop* 12,464, in fog-swept jungle, alt. 6,000 feet, northwest side of Koolau Gap, Haleakala, East Maui, Aug. 20, 1939 (2 type sheets, Field: cotype, Deg.).

In my revisional treatment of the genus *Phyllostegia* (Bish. Mus. Bull. 136: 12–59, figs. 3–19. 1935), this variety would stand under the last letter *b* in the key to *Phyllostegia brevidens* and its varieties (p. 22). It is easily distinguished from the four varieties there given, as follows: From var. *pubescens* by its more densely pilose branches, the broader and more nearly truncate or cordate bases of its leaf-blades, whorls only 8- not 8–14-flowered, pedicels mostly 2–3 or even 3.5 cm., not 7–15 mm. long; from var. *heterodoxa* by the spreading-pilose not appressedly hispidulous upper parts of its branches, by the more densely pubescent lower surfaces and the frequently subcordate bases of its leaves, whorls only 8- not 10–12-flowered, pedicels mostly 2–3 or even 3.5 cm. not 7–13 mm. long; from var. *longipes* by its tomentose not sparsely hispid or even glabrate lower leaf-surfaces, whorls only 8- not 10–12-flowered, pedicels tomentulose and moderately slender not glabrous and filiform, calyx pubescent, not glabrous, etc.; and from var. *ambigua* by its pilose, not glabrous branches, its lower leaf-surfaces tomentose, not sparsely hispid to glabrate, whorls only 8- not 10–12-flowered, pedicels tomentulose, not glabrous or nearly so, calyx pubescent, not glabrous, etc.

STENOGYNE AFFINIS Degeneri var. nov.—Ramulorum pili quam in forma typica majores ac paulo magis retrorsi. Foliorum laminae majores, plerumque 1.5–2.5 cm. longae et 1.1–1.6 cm. latae, multo sparsius adpresso-hispidae; petiolis plus minusve retrorsum hispidis. Calyx paulo major, tantum sparsim adpresso-hispidus, lobis sublongioribus (plerumque 2–2.8 mm. longis) acutisque, nervis manifestis

sed minus elevatis. Corolla sicca subviridi-flava vel pallide rosaceo-flava, 2.2–2.5 cm. longa, extus longius adpresso-pilosa, labro superiore quam tubo fere dimidio brevior, stylo staminibusque vix exsertis. Fructus ignoti.

Hairs of branches larger and a little more retrorse. Foliar blades larger, commonly 1.5–2.5 cm. long and 1.1–1.6 cm. wide, much more sparsely appressed-hispid; petioles more or less retrorsely hispid. Calyx a little larger, only sparsely appressed-hispid, its lobes slightly longer (commonly 2–2.8 mm. long) and acute, the nerves manifest but less elevated. Corolla when dry greenish-yellow or pale rose-yellow, 2.2–2.5 cm. long, outwardly more elongately appressed-pilose, the upper lip almost a half shorter than the tube, style and stamens scarcely exerted. Fruits unknown.

Specimens examined: *Otto Degener, Emilio Ordoñez, & Felix C. Salucop* 12,465, at rim of forest where windy, north of Kuiki beyond National Park boundary, Haleakala, East Maui, Aug. 9, 1939 (type, Field: cotype, Deg.).

In 1915, Charles N. Forbes collected a new species of *Stenogyne* at Puu Huluhulu (“a cinder cone of Mauna Kea which has become isolated by lava flows from the north side of Mauna Loa”), Hawaii. The following year he described and illustrated it (Occas. Papers Bish. Mus. 6: 182 and plate) under the name of *S. affinis*. So far as I know, no other collectors have ever found true *S. affinis*. The species proper is apparently limited to its type locality in central Hawaii. The plant found by Degener and his associates on East Maui, while referable *specifically* to *S. affinis*, differs so remarkably in the characters noted as to warrant its being considered a pronounced geographic variety. Like the last preceding variety, it has been named after Mr. Degener in grateful appreciation of the vast amount of work that he has done in the botanical exploration of the Hawaiian Islands.

RAILLIARDIA LONCHOPHYLLA var. **stipitata** (Sherff) comb. nov.; *Railliardia molokaiensis* var. *stipitata* Sherff, Amer. Jour. Bot. 20: 619. 1933; \times *Railliardia dolosa* Deg. & Sherff ex Sherff, Bot. Gaz. 96: 152. 1934.—The two collections of this variety heretofore known (*C. N. Forbes* 2,603-M, along upper trail, Waikamoi, June 25, 1920; *Otto Degener* 4,229, in rain-forest, along Olinda ditch trail [pipe-line trail], June 17, 1927) came from north and northeast of Haleakala Crater, East Maui. While differing distinctly from the Molokai species, *R. molokaiensis* Hillebr., and its variety *oppositifolia* Sherff (likewise of Molokai) in achenial characters, they were referred as a variety to *R. molokaiensis* largely because of habitat characters. Recently Mr. Degener and his associates have come across several additional plants growing in the same direction from Haleakala Crater but much closer to it (e.g., *Degener, Ordoñez, & Salucop* 12,449, below cliffs at 5,750 feet, in rain-swept jungle, northwest side of Koolau Gap, Aug. 20, 1939. Degener adds on some of his labels: “2–3 feet high, sprawling over bushes; several plants seen, so evidently not hy-

brid"). Some of the branches are typical for *Raillardia molokaiensis* var. *stipitata* as originally described, but most of them display a much fuller development of the inflorescence and a tendency toward larger and somewhat more numerous nerved leaves, revealing a definite affinity with *R. lonchophylla*, to which the variety must be referred. From *R. lonchophylla* proper, which is known only from the northeastern part of Haleakala Crater, the var. *stipitata* differs in its much less crowded leaves, these linear-lanceolate to oblongly linear, 3-7-nerved, mostly 5-10 cm. long and 6-12 mm. wide, antrorsely somewhat ciliate along the slightly revolute edges but glabrous or glabrate upon both surfaces. The paniculate inflorescence (the inflorescence is not well known for the species proper) is at times more than 3 dm. long and almost as wide, with heads often numerous (± 200).

The stipitate character of the achenes is not constant and is not maintained in most material examined. Some of the specimens display leaves intermediate between those of *R. Menziesii* A. Gray and those of *R. platyphylla* A. Gray, and are seen to be the precise form once suspected by Mr. Degener and myself as a hybrid between those two species (namely, $\times R. dolosa$ Deg. & Sherff). Whether hybridity is present or absent in these foliage forms cannot be stated positively for the present. True it is, as recorded parenthetically above, Degener labeled some of his specimens, "evidently not hybrid." But on the labels for some others he confessed to a suspicion of hybridity.

Few groups in the entire Hawaiian Island flora appear to need more urgently a painstaking study under controlled cultural conditions, to establish more certainly their respective identities and interrelationships, than do the species and varieties of *Raillardia* growing in the immediate vicinity of the Haleakala Crater, of East Maui.

RAILLIARDIA PLATYPHYLLA var. **Trillioidea** Degener & Sherff, var. nov.—A specie ipsa foliis principalibus plerumque verticillatis (trinis ad singulos nodos) et achaeniis 5-6.5 non 4.5-5 mm. longis difert.

Differs from the species proper in having its principal leaves commonly verticillate (three at each node) and its achenes 5-6.5 not 4.5-5 mm. long.

Specimens examined: *Otto Degener, Emilio Ordoñez, & Felix C. Salucop* 12,425, on dry talus, south of Kaluanui, Haleakala, East Maui, Aug. 7, 1939 (type, Field: cotypes, Berl.; Deg.).

In my revision of the genus *Raillardia* Gaud. (Bull. Bish. Mus. no. 135: 108-136. 1935), a considerable number of specimens of *R. platyphylla* A. Gray and its single then known var. *leptophylla* Sherff were cited (pp. 135 and 136). All of these were indicated in the key, p. 111, as having opposite leaves. Recently Degener *et al.* have collected a large assortment of additional specimens which are typical for the species proper except that the principal leaves on nearly every branch are verticillately disposed in threes, and the achenes are slightly longer. While in numerous species with commonly

opposite leaves an occasional freakish form occurs with the leaves in threes, the verticillate habit is here much too pronounced throughout the several dozen specimens examined (which surely must have come from several individual shrubs) to warrant the assumption that it connotes a mere transitory mutation. Moreover, we have the further consideration that in *Raillardia* a verticillate leaf-habit commonly is of definite diagnostic significance.

The variety is named in allusion to the resemblance of its leaf whorls to those found in the genus *Trillium* L.

Lipochaeta acris Sherff, Bot. Gaz. 95: 83. 1933.—In my monographic treatment of *Lipochaeta* DC. (Bish. Mus. Bull. no. 135. 1935), *L. acris* was noted (p. 28) as having "leaves sessile to shortly petiolate with petioles sometimes margined and 0.5-1 cm. long." This species was placed in the key (p. 26), however, under the caption (1st d): "Blades of leaves narrowed below to a scarcely petioloid base or more or less alate-petiolate." Recently Degener & Ordoñez have collected a series of additional specimens (no. 12,613, grassy slopes and ledges, alt. 250-500 feet, between Makana and Waiahuakua, Kauai, Dec. 24, 1939). These display a remarkable range of variation in petioles, from short and margined to long (± 1.5 cm.) and slender, even completely marginless.

Lipochaeta alata var. *acrior* Sherff, Bot. Gaz. 95: 82. 1933.—Heretofore this variety has been known only from the two specimens of the type collection, obtained on the Island of Kauai (definite locality not cited), by the United States Exploring Expedition a century ago. The following may now be added: *Degener & Ordoñez* 12,611, dry, rocky slope, Kaawaloa Valley, Mana, western Kauai, Jan. 2, 1940 (Field, 2 sheets); *Degener & Ordoñez* 12,614, dry, rocky roadside, alt. 1,500 feet, Puehu Ridge, Kekaha, western Kauai, Dec. 29, 1939 (Field, 3 sheets); *Degener & Ordoñez* 12,615, grassy, rocky valley crest, alt. 500 feet, Hanapepe, southern Kauai, Dec. 29, 1939 (Field, 3 sheets).

It will be noted that the var. *acrior* is thus seen to have a geographic range coextensive with that for *L. alata* proper (*cf.* Bish. Mus. Bull. 135: 31. 1935). It is hoped that numerous additional specimens may be obtained, to learn if their foliar characters reputed to separate the species proper and its variety are reliable.

Lipochaeta exigua Degener & Sherff, sp. nov.—Perennis, suffruticosa, ramis gracillimis adscendentibus erectisve e caule saepe prostrato ± 4 -gonis sulculatis glabratibus vel sparsim adpresseque setulosis principalibus circ. 1-1.5 mm. crassis et verisimiliter usque ad circ. 1 m. longis, multibus ± 0.5 mm. crassis. Folia subremota, opposita, gracillime petiolata petiolo 4-9 mm. longo antrorsum adpresseque hispido; lamina viridi, tenuissima, adpresse antrorsumque albo-hispida, nunc simpliciter diverse elliptico-oblonga vel oblongo-lanceolata saepius 1-2.5 cm. longa apice obtusa subacutave marginibus pauciseriulata vel 1- vel 2-lobulata, nunc pinnatim saepius 3-partita foliolis lateralibus parvulis plus minusve

obovatis vel oblongis terminali plus minusve lanceolato, rarius bipinnata segmentis lanceolato-linearibus vel anguste oblongis. Capitula plerumque solitaria ad ramulorum apices, minima, radiata, pansa ad anthesin sub 5 mm. lata. Involucrum late obconicum, circ. 4 mm. altum; bracteis exterioribus 4–6, lanceolato-oblongis, plus minusve atro-purpureis, antrorsum adpresseque albo-setosis, apice acutis subacutisve. Flores ligulati 2 vel 3, flavi, ligula ovati, involucrum paulo superantes, sparsim antrorsumque adpresso-hispidi, apice 2–3-denticulati. Flores tubulosi pauci (4–6, rarius –9), sub 3 mm. longi. Unicum maturum achaenium (forsitan exteriore?) visum, hoc subtetragonum, exalatum, clavatum, parce 2 mm. longum, circ. 0.7 mm. crassum, brunneo-atrum, apice truncato-rotundato albido-hispidulum atque aristula circ. 0.6 mm. longa armatum.

Perennial, suffruticose; branches very slender, ascending or erect, from an often prostrate stem, ± 4 -angled, minutely grooved, glabrate or sparsely and appressedly setulose, principal ones about 1–1.5 mm. thick and probably up to about 1 meter long, many ± 0.5 mm. thick. Leaves subremote, opposite, very slenderly petiolate; petiole 4–9 mm. long, antrorsely appressed-hispidulous; blade green, very thin, appressedly and antrorsely white-hispid, now simple, variously elliptic-oblong or oblong-lanceolate, more often 1–2.5 cm. long, at apex obtuse or subacute, at margins few-serrulate or 1- or 2-lobulate; now pinnately more often 3-parted (lateral leaflets rather small, more or less obovate or oblong, the terminal one more or less lanceolate); or more rarely bipinnate (with lanceolate-linear or narrowly oblong segments). Heads commonly solitary at tips of branchlets, very small, radiate, expanded at anthesis less than 5 mm. wide. Involucre broadly obconic, about 4 mm. tall; outer bracts 4–6, lanceolate-oblong, more or less black-purple, antrorsely and appressedly white-setose, at apex acute or subacute. Ligulate florets 2 or 3, yellow, sparsely and antrorsely appressed-hispid, apically 2–3-denticulate, slightly surpassing the involucre, the ligule ovate. Tubular florets few (4–6, rarely –9), under 3 mm. long. A lone mature achene (perhaps outer one?) seen, this subquadrangulate, exalate, club-shaped, scarcely 2 mm. long, about 0.7 mm. thick, brownish-

black, at truncate-rounded apex whitish-hispidulous and armed with a tiny awn about 0.6 mm. long.

Specimens examined: *Otto Degener & Emilio Ordoñez* 12,610, on grassy, shrubby summit ridge, 0.75 mile southwest of Hokunui, Nawiliwili, Island of Kauai, Jan. 8, 1940 (3 type sheets, Field: cotypes, Berl.; Deg.; etc.).

Collected in considerable quantity by Degener and Ordoñez. The several dozen folders of material studied reveal a plant habitally somewhat similar to *Lipochaeta dubia* Deg. & Sherff, of the Island of Oahu. The heads of *L. exigua*, however, are much smaller and suggest those of *L. micrantha* (Nutt.) Gray, found on both Oahu and Kauai. They are mostly in the budding or flowering stage and only one definitely mature achene has appeared in the many heads examined. Additional achenes are to be desired, that more certain reference of this species may be made to its proper subgeneric section. Apparently it belongs to the section *Aphanopappus* (Endl.) Benth. & Hook.¹⁰

BIDENS PENTAMERA (Sherff) Degener & Sherff comb. nov.; *Bidens Campylothea* var. *pentamera* Sherff, Bot. Gaz. 85: 4. 1928; *Bidens pentamera* Degener nomen subnudum, Fl. Haw. fam. 344, sub *B. Campylothea* Schz. Bip., May 20, 1940.—*Bidens Campylothea* Schz. Bip. is a rare plant, known only from the islands of Oahu, Lanai, and Hawaii. The plant collected on East Maui and originally described by me as var. *pentamera*, has since been studied somewhat intensively by Mr. Otto Degener. As a result of his findings, we here join in elevating its status formally to that of a distinct species.

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¹⁰ Several heads appear to be somewhat abortive in the subfruiting stage. It seems unlikely that hybridity is thus connoted, since the foliar habit of *L. exigua* could scarcely arise from that of species previously known on Kauai. Moreover, in cultivations of hundreds of plants of several species of the allied genus *Bidens* from islands of the Pacific Ocean, more than twenty years ago, I frequently observed (especially in Marquesas Island plants) heads of good species to become abortive and fail to produce achenes.