

## Novelties in the Genus *Pelea* (Rutaceae). Hawaiian Plant Studies 50<sup>1</sup>

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THE GENUS *Pelea* occurs on the five largest islands of the Hawaiian group, and like several other genera has undergone extreme diversification. Stone (1969) in his monograph recognized in Hawaii 66 species and 42 infraspecific taxa. His concept was revised by the writer (St. John 1973), who accepted 79 species and 43 infraspecific taxa.

These shrubs or trees are fairly common in all the wooded zones of the islands, and many of the taxa are narrow endemics. Stone stated (1969:22): "There may even be some undiscovered species, but this seems fairly doubtful. . . ." On the contrary, it is very probable that further exploration of more remote localities will continue to bring new kinds of *Pelea* to light. Between 1969 and 1974 four new species of this genus have been discovered and published. The present paper adds three more new species, and reduces one of Stone's and one of the writer's.

### *Pelea cauliflora* sp. nov. (sect. *Megacarpa*)

Figures 1a-d

DIAGNOSIS HOLOTYPE: Arbor 7 m alta est, trunco 10 cm diametro, novellis crebre fulvipilosulis pilis per 2-3 internodos persistentibus, nodis incrassatis, internodis 10-35 mm longis, cicatricibus foliorum 6-7 mm longis scutelliformatis elevatis stramineis, cicatricibus fascicularum numerosis parvis in ordini obovato, foliis juvenalibus cum petiolis dense albi-hirsutulis et puberulis et laminis ciliatis supra glabris infra in midnervo dense pilosis et in nervis secundariis et tertialibus sparse pilosis, foliis maturis cum petiolis 26-33 mm longis crassis supra canaliculatis pilis longioribus deciduis sed pilis puberulis persistentibus, laminis 8.2-13.6 cm

longis 5-9.4 cm latis ellipticis obtusis coriaceis viridibus nitidis supra glabris cum nervis reticulatis nervis secundariis 10-14 in dimidio quoque subascentibus et a nerva inframarginali 2-4 (-5) mm ex bordini interconnectis infra pallide viridibus nervis reticulatis elevatis prominentibus, midnervo salebrose piloso nervis lateralibus paullo salebrose pilosis, (inflorescentia incognita), infructescentia cauliflora remota in caulibus nudis 1-fructifera, pedunculo 11 mm longo, pedicello 12 mm longo ambis glabris, capsula 3 cm lata 9 mm alta, folliculis 1/3 adnatis, exocarpio glabro glandulose punctato lateribus 0.4 mm crassis, endocarpio subtili cartilagineo luteo glabro, seminibus solitariis 6.3 mm longis 5.3 mm latis 4.5 mm crassis, testa nigra lucida fragili.

DIAGNOSIS OF HOLOTYPE: Tree 7 m tall; trunk 10 cm in diameter; innovations densely tawny pilosulous, the hairs persistent on 2-3 internodes; nodes enlarged; internodes 10-35 mm long; leaf scars 6-7 mm long, shield-shaped, elevated, stramineous; bundle scars numerous, small, in an obovate pattern; young leaves with petioles densely white hirsutulous and puberulous, the blades ciliate, glabrous above, but below densely pilose on the midrib and sparsely so on the secondary and tertiary veins; mature leaves with petioles 26-33 mm long, stout, channeled above, the longer hairs deciduous but the puberulence persistent; blades 8.2-13.6 cm long, 5-9.4 cm wide, elliptic, obtuse, coriaceous, above glabrous, green, shiny, and reticulately veined, the secondary veins 10-14 in each half, slightly ascending, connected by an intramarginal vein 2-4 (-5) mm from the margin, below pale green, the reticulate venation raised and prominent, the midrib shaggy pilose, the lateral veins sparsely so; inflorescence not seen; infructescence cauliflorous far down on the naked stems, 1-fruited; peduncle 11 mm long; pedicel 12

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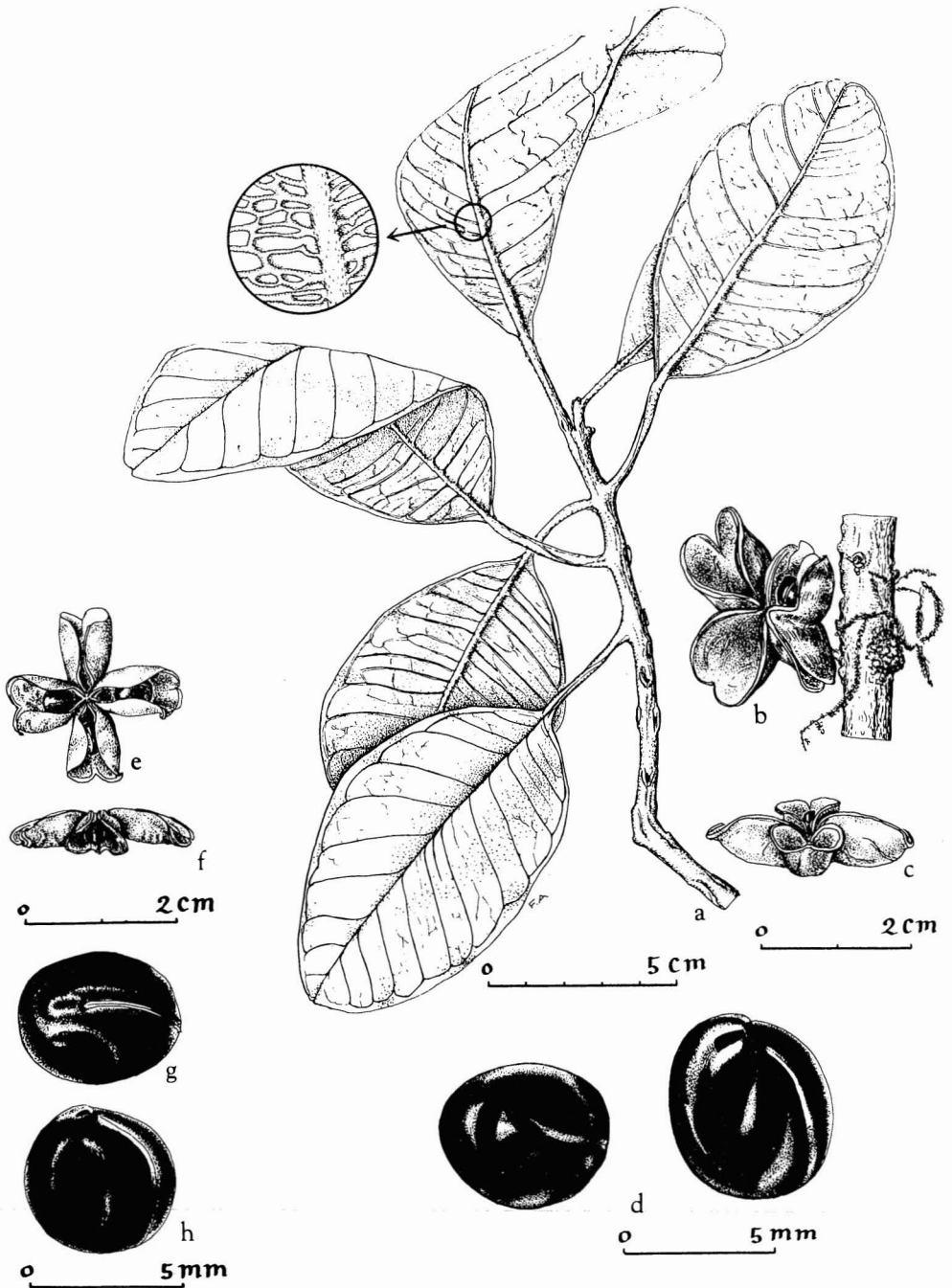


FIGURE 1. *Pelea cauliflora* St. John, from holotype. *a*, habit,  $\times 1/2$ ; *b*, stem and capsule,  $\times 1$ ; *c*, capsule,  $\times 1$ ; *d*, seeds,  $\times 4$ . *Pelea Lydgatei* Hbd., from Rock 12,777. *e*, *f*, capsule,  $\times 1$ ; *g*, *h*, seeds,  $\times 4$ .

mm long, both glabrous; capsule 3 cm broad, 9 mm deep, the follicles united 1/3 way; exocarp glabrous, glandular punctate, the wall 0.4 mm thick; endocarp thin, yellow, cartilaginous, glabrous; seeds 1 per locule, 6.3 mm long, 5.3 mm wide, 4.5 mm thick, the testa black, shining, fragile.

**HOLOTYPE:** Hawaiian Islands, east Maui Island, Nahiku, Kuhiwa trail, Koolau Forest Reserve, wet woods, 6,000 ft alt., 2 Jan 1937, *H. St. John & R. J. Catto 17,954* (BISH).

**DISCUSSION:** *Pelea cauliflora* is a member of the section *Megacarpa*, as is its closest relative, *P. pseudoanisata* Rock, var. *pseudoanisata* of Kohala, Hawaii, a species with the inflorescence 1-3-flowered, borne among the leaves, 3-4 cm long; capsule 3.3-5 cm broad, the axis 11-13 mm high, the follicles lobed 1/2 way and somewhat reflexed; seeds usually 2 per locule, and 7-9 mm long; petioles 1-2 (-3) cm long, sparsely puberulent, soon glabrate; blades 4-12 cm long, 2-6 cm wide, chartaceous to subcoriaceous, the midrib below with a few persistent hairs, otherwise glabrous. *Pelea cauliflora* has the infructescence cauliflorous, 1-fruited; capsule 3 cm broad, the axis 9 mm high, the follicles lobed 2/3 way, divergent; seeds 1 per locule, 6.3 mm long; petioles 2.6-3.3 cm long, puberulent; blades 8.2-13.6 cm long, 5-9.4 cm wide, coriaceous, below the midrib shaggy pilose, and the lateral veins sparsely so.

The new epithet is formed from the Latin *caulis*, stem; and *flos*, flower, in reference to the flowering of the species on the main, naked stems.

*Pelea clusiaefolia* Gray, var. *minor* St. John, Pac. Sci. 25:46-47, fig. 50f, 1971 (sect. *Pelea*)

*P. haleakalae* Stone, Bernice P. Bishop Museum, Occas. Papers 23(10):158, 1966; Phanerogamarum Monogr. 3:157, fig. 67, map 19, 1969

*Pelea haleakalae* was separated from *P. clusiaefolia* on the basis of its having the sepals persistent on the mature capsules. On examination of the holotype and the other cited collections of *P. haleakalae*, it is noted

that rarely on the fruits a few of the sepals are partially persistent. This character is judged to be inconstant and of no taxonomic value. Consequently, the species is here reduced to synonymy.

*Pelea Lydgatei* Hbd., Fl. Haw. Is. 65, 1888; Stone, Phanerogamarum Monogr. 3: 74, map 9, 1969 (sect. *Megacarpa*)

Figures 1e-h

**SUPPLEMENTARY DESCRIPTION:** Capsules 18-22 mm in diameter, 6-7 mm high, lobed 3/4 way, glabrous, the lobes rotate; endocarp glabrous; seeds 1-2 per carpel, 5 mm long, subglobose.

**ISOTYPE:** Oahu, Palolo, *J. M. Lydgate* (BISH).

Stone (1969:74) gave an expanded description of the vegetative parts of the plant, and of the flowers, but stated: "Capsules unknown." However, the Wailupe collection, *Rock 12,777*, which Stone cited, has one good, mature capsule in a pocket on the sheet; and also there is fruit on the *Russ* collection from Maakua-Papali ridge; and now another fruiting collection, *St. John 18,408*, also from Maakua-Papali, is being inserted in the Bishop Museum. An illustration of the fruit of the *Rock* collection (Figure 1e, f) is here furnished.

*Pelea semiternata* St. John, Lloydia 7:271, 1944 (sect. *Megacarpa*)

*P. descendens* St. John, Lloydia 7:266, 1944

The holotypic collection of *P. descendens*, *Hosaka 820*, from Kipapa Gulch, Oahu, consisted of four small, lateral branchlets, one with a single flower, and two had old capsules. The leaves were small, elliptic, and all opposite. Being unique, it was described as a distinct species.

In 1933 an ample collection, *St. John 13,105*, was found at 1500 ft alt., on the wooded Kalauao-Waimalo ridge. This is on the same leeward side of the Koolau range, and is only 4 miles southeast of the type locality. This had similar small, lateral branchlets with opposite leaves, but the

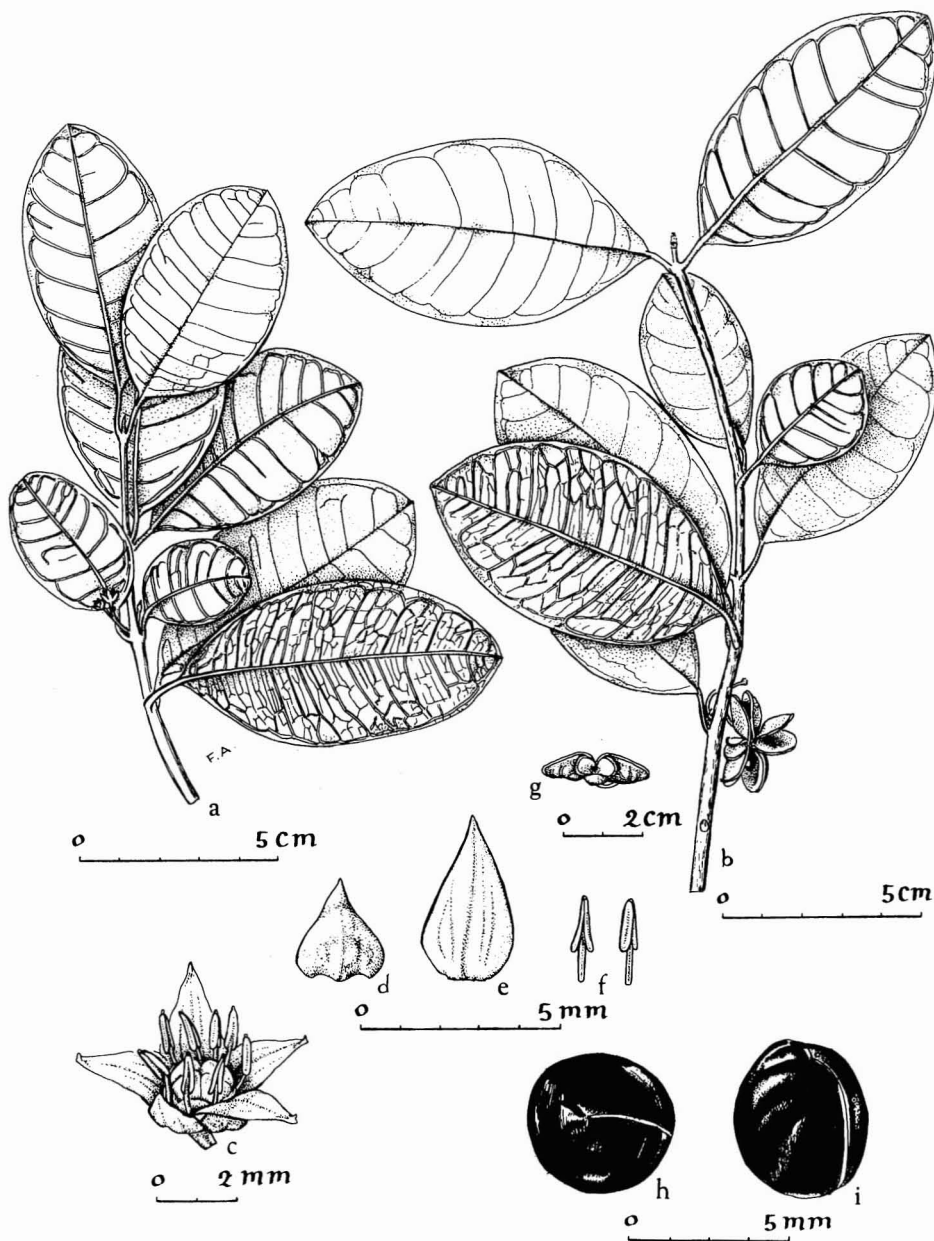


FIGURE 2. *Pelea paludosa* St. John, from holotype. *a*, *b*, habit,  $\times 1/2$ ; *c*, perfect(?) flower,  $\times 5$ ; *d*, sepal,  $\times 5$ ; *e*, petal,  $\times 5$ ; *f*, stamens,  $\times 5$ ; *g*, capsule,  $\times 1/2$ ; *h*, *i*, seeds,  $\times 4$ .

stronger and the main branches all had the leaves whorled, 3 (–4) at a node, and up to 11.3 cm in length and to 4.7 cm in width.

In 1932 another collection, *St. John 11,686*, was made at 1650 ft alt., on the same south ridge of Kipapa Gulch, about a mile from

the type locality. This had the leaves 3 (–4) in a whorl, a single old capsule, and it matches nicely the holotype.

From examination of this more ample material, it is now clear that *Pelea descendens* should be reduced to the synonymy of *P.*

*semiternata*, a species of the same date, but one based upon more adequate material.

***Pelea paludosa* sp. nov. (sect. *Apocarpa*)**

Figure 2

DIAGNOSIS HOLOTYPE: Frutex repens est, caulibus glabris viridibus ad obscure rubriadiis laevibus, ramulis foliosis 2–5 mm diametro, internodis 7–40 mm longis cicatricibus foliorum 2–4 mm diametro suborbiculari prostratis stramineis, cicatricibus fascicularum 5 grandibus congregatis, foliis oppositis glabris, petiolis 4–16 mm longis subcarnosis, laminis 2.4–9.3 cm longis 1.6–5.5 cm latis ellipticis apice obtuso vel subacuto basi rotundata ad late cuneata coriacea supra obscure viridibus rugulosis infra pallide viridibus et saliente rugosis, cymis axillaribus 1–2 cm longis 3-floriferis glabris, pedunculo 2–3 mm longo, pedicellis 7–12 mm longis et cum pari bracteis 1 mm longis lanceolatis, floribus hermaphroditis (?) cum 4 sepalis 2.5 mm longis 2.2 mm latis deltoideis in paribus imbricatis subviridibus glabris 1-costatis angulis binis inferioribus rotundatis, 4 petalis 4 mm longis 1.6 mm latis lancei-ovatis subtiliter carnosius 1-costatis pallidis, ovario composito 1 mm alto 1.5 mm diametro oblate globoso parte 1/3 supera loculorum libera rotundata glabra, stylo nullo, stigmatibus non evidentibus, 8 staminibus; filamentis 0.5–0.8 mm longis ligulatis in basi dilatatis, antheris 0.5–0.8 mm longis anguste ellipticoblongis ad sagittati-ovatis, capsulis 23–26 mm diametro cum 4 carpellis 11 mm longis 6–7 mm altis separtis rotatis glabris ellipsoideis compressis late obtusis 1-ovulatis in superficie viridibus et rubri-maculatis, endocarpio glabro, seminibus 6 mm longis 5.3–5.7 mm latis 4 mm crassis subglobosis, testa subtili nigra lucida, hilo 5 mm longo lineari pallido.

DIAGNOSIS OF HOLOTYPE: Prostrate creeping shrub; stems glabrous, green to dark reddish brown, smooth, the leafy part 2–5 mm in diameter; internodes 7–40 mm long; leaf scars 2–4 mm in diameter, suborbicular, flush, stramineous; bundle scars 5, large, congregated; leaves opposite, glabrous; peti-

oles 4–16 mm long, somewhat fleshy; blades 2.4–9.3 cm long, 1.6–5.5 cm wide, elliptic, the apex obtuse or subacute, the base rounded to very widely cuneate, coriaceous, above dark green and rugulose, below pale green and prominently salient rugose; cymes axillary, 1–2 cm long, 3-flowered, glabrous; peduncle 2–3 mm long; pedicels 7–12 mm long, bearing a pair of lanceolate bracts 1 mm long; perfect(?) flowers with 4 sepals 2.5 mm long, 2.2 mm wide, deltoid, but the two lower angles rounded, imbricate in pairs, greenish, glabrous, 1-ribbed; petals 4 and 4 mm long, 1.6 mm wide, lance-ovate, thinly fleshy, 1-ribbed, pale; combined ovary 1 mm high, 1.5 mm in diameter, oblate globose, the upper third of each ovary free, rounded, glabrous; style none; stigmas invisible; 8 stamens; filaments 0.5–0.8 mm long, ligulate, dilated at base; anthers 0.5–0.8 mm long, narrowly elliptic oblong to sagittate-ovate; capsule 23–26 mm in diameter, of 4 distinct, rotate, glabrous follicles, these 11 mm long, 6–7 mm high, ellipsoid, compressed, broadly obtuse, 1-ovuled, the surface green, mottled with dull red, reticulate; endocarp glabrous; seeds 6 mm long, 5.3–5.7 mm wide, 4 mm thick, subglobose, the thin testa shiny black; hilum 5 mm long, linear, pale.

HOLOTYPE: Hawaiian Islands, Kauai Island, Kahili bog, Wahiawa, wet bog, prostrate and creeping under other shrubs, 2100 ft alt., 24 Dec 1933, *H. St. John & F. R. Fosberg 13,565* (BISH).

DISCUSSION: *Pelea paludosa* is a member of the section *Apocarpa*, as is its closest relative, *P. glabra* St. John, of Mahanaloa Valley, Waimea, Kauai, a species with the peduncle 2–7 mm long; pedicels 4–7 mm long; follicles 7–8 mm high, 1-2-seeded; seeds 6–7 mm long, 4–5 mm wide and thick, broadly ellipsoid; petioles 1–4 cm long, more slender; blades 6.2–11.5 cm long, 3.8–5.2 cm wide, firm chartaceous. *Pelea paludosa* has peduncles 2–3 mm long; pedicels 7–12 mm long; follicles 6–7 mm high, 1-seeded; seeds 6 mm long, 5.3–5.7 mm wide, 4 mm thick, subglobose; petioles 0.4–1.6 cm long, 1–2 mm thick; blades 2.4–9.3 cm long, 1.6–5.5 cm wide, coriaceous.

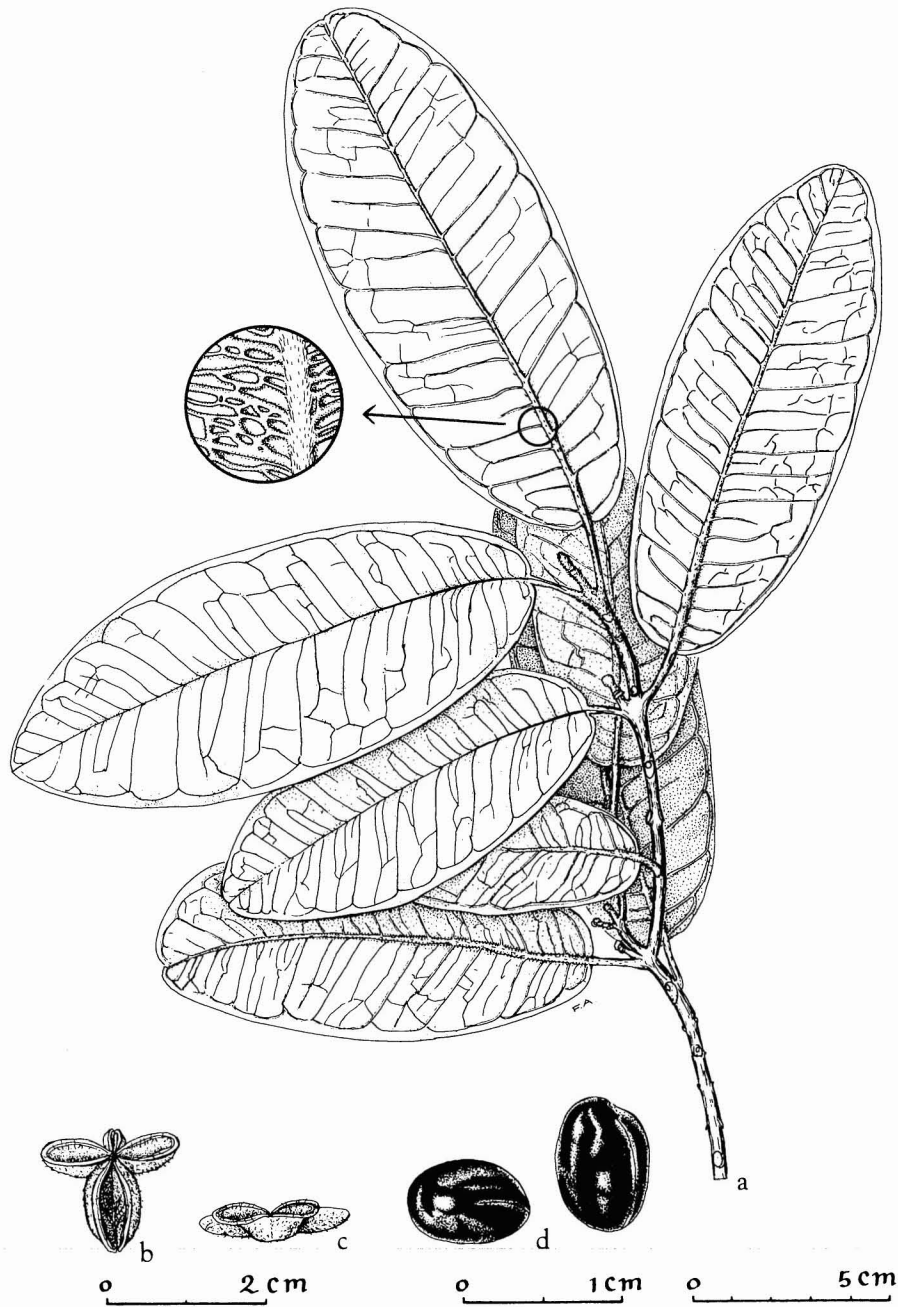


FIGURE 3. *Pelea wailauensis* St. John, from holotype. a, habit,  $\times 1/2$ ; b, c, capsule,  $\times 1$ ; d, seeds,  $\times 2$ .

The new epithet is the Latin adjective *paludosa*, swampy, and it is given with reference to the habitat of the species.

*Pela wailauensis* sp. nov. (sect. *Megacarpa*)

Figure 3

DIAGNOSIS HOLOTYPE: Frutex 3.3 m altus est, novellis dense adpresse hirsutulis pilis per 3 internodos persistentibus, caulibus laevibus badiis nitidis, nodis incrassatis, internodis 8–80 mm longis, cicatricibus foliorum 2.5–4 mm altis suborbicularibus badiis elevatis, cicatricibus fascicularum 5 in semicirculo, foliis maturis cum petiolis 10–16 mm longis supra canaliculatis glaberratis, laminis 6.5–14.8 cm longis 2.9–6.5 cm latis ellipticis obtusis in basi paullo subcordatis subtiliter subcoriaceis supra viridibus lucidis glabris reticulate nervosis nervis secundariis 14–18 in dimidio quoque paullo adscendentibus et a nerva intramarginali 2–3 (–4) mm ex bordini interconnectibus infra pallidiore viridibus midnervo hirsutulo sed in pagina elevate reticulatis et cum punctis resinosis glandulosis multis, (inflorescentia incognita), infructescentia cum fructu solitario, pedunculo et pedicello 5 mm longo, capsula 20 mm lata 8 mm alta, folliculis 1/3 adnatis, exocarpio adpresse minute puberulo lateribus 2 mm crassis, endocarpio subtili luteo cartilagineo intra sparse pilosulo, seminibus 8.5 mm longis 5.5 mm latis 4.5 mm crassis ellipsoideis testa nigra laevi lucida.

DIAGNOSIS OF HOLOTYPE: Shrub 3.3 m tall; innovations densely appressed hirsutulous, the hairs persistent for three internodes; stems smooth, brown, shiny; nodes enlarged; internodes 8–80 mm long; leaf scars 2.5–4 mm high, suborbicular, brown, elevated; bundle scars 5, in a semicircle; mature leaves with petioles 10–16 mm long, channeled above, glabrate; blades 6.5–14.8 cm long, 2.9–6.5 cm wide, elliptic, obtuse, the base slightly subcordate, thin subcoriaceous, above green and shiny, glabrous reticulate veiny, the secondary veins 14–18 in each

half, slightly ascending, connected by an intramarginal vein 2–3 (–4) mm from the margin, below paler green, the midrib persistently hirsutulous, but the surface glabrous, with conspicuous raised reticulate venation and numerous glandular dots with a resinous odor; inflorescence unknown; infructescence 1-fruited; peduncle and pedicel 5 mm long; capsule 20 mm wide, 8 mm deep; follicles united 1/3 way; exocarp appressed minute puberulous, the wall 2 mm thick; endocarp thin, yellow, cartilaginous, sparsely pilosulous within; seeds 8.5 mm long, 5.5 mm wide, 4.5 mm thick, ellipsoid, the testa black, smooth, shining.

HOLOTYPE: Hawaiian Islands, Molokai Island, Wailau Valley, Kukuinui ridge, moist woods, 2400 ft alt., 4 July 1933, *H. St. John, J. Dunn & W. B. Storey* 13,262 (BISH).

DISCUSSION: *Pelea wailauensis* is a member of the section *Megacarpa*, as is its closest relative, *P. Balloui* Rock, of Maui, a species with the inflorescence 5–9-flowered, paniculate; capsule lobed 3/4 way, silky tomentose; endocarp puberulent; petioles 10–26 mm long; blades 5–10 cm long, coriaceous, at first puberulent, but glabrate. *Pelea wailauensis* has the infructescence 1-fruited; capsule lobed 1/3 way, minutely puberulous; endocarp sparsely pilosulous; petioles 10–16 mm long; blades 6.5–14.8 cm long, subcoriaceous, the midrib below persistently hirsutulous.

The new epithet is a Latin geographic adjective.

## LITERATURE CITED

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