
Pritchardia flynnii (Arecaceae), a New Endemic Species from Kaua'i, Hawaiian Islands

David H. Lorence

National Tropical Botanical Garden, 3530 Papalina Road, Kalaheo, Hawai'i 96741, U.S.A.
lorence@ntbg.org

Chrissen E. C. Gemmill

Pacific Biosystematics Research Centre, Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton, New Zealand 2001. gemmill@waikato.ac.nz

ABSTRACT. *Pritchardia flynnii* Lorence & Gemmill is described and illustrated from Kaua'i, Hawai'i, U.S.A. This new species most closely resembles the Kaua'i endemic species *Pritchardia hardyi*, from which it differs by its shorter, more slender trunk 0.7–7(11) m tall and 10–20(30) cm DBH, erect to arcuate inflorescences equaling or slightly exceeding the petioles with lanate-tomentose, eventually glabrescent rachillae, and smaller fruits 25–35 × 18–23 mm when dry.

Key words: Arecaceae, Hawaiian Islands, Kaua'i, *Pritchardia*.

Pritchardia Seemann & Wendland (Arecaceae: Coryphoideae) comprises 28 currently recognized species restricted to the Hawaiian Islands, Tuamotu Archipelago, Cook Islands, Tonga, and Fiji (Gemmill, 1998). All but 5 of these species are restricted to the Hawaiian Islands (Uhl & Dransfield, 1987, 1999). All Hawaiian species are single-island endemics, many with highly restricted distributions, and many are listed as federally endangered or threatened. The genus was monographed by Beccari and Rock (1921), who recognized 32 species, 25 of these Hawaiian. Subsequently, Read and Hodel (1990) recognized 19 *Pritchardia* species in their treatment for the Hawaiian Islands, although they overlooked at least 2 additional validly published Hawaiian species: *P. lanaiensis* Beccari & Rock (Beccari & Rock, 1921) and *P. limahuliensis* H. St. John (St. John, 1988). An additional species, *P. perlmannii* Gemmill, was described from Kaua'i based on morphological (Gemmill, 1998) and molecular (Gemmill, unpublished) evidence. Recent collections and field studies have revealed the presence of yet another new species from the mountains of central Kaua'i, bringing the total of Hawaiian endemic *Pritchardia* species to 23.

Pritchardia flynnii Lorence & Gemmill, sp. nov.

TYPE: Hawaiian Islands (U.S.A.). Kaua'i: Koloa District, Lihue–Koloa forest reserve, along ridge leading S from Mt. Kahili to La'auhiha'iai Peak, on E slope below summit, 2100–2200 ft. (640–671 m), 21°57.99'N, 159°29.70'W, 19 Oct. 1999, D. Lorence, T. Flynn, M. H. Chapin, S. Perlman, J. Dransfield & S. Dransfield 8451 (holotype, PTBG; isotypes, MO, US). Figure 1.

Arbor usque ad 7(11) m; foliis 10–26, petiolis (31)35–61 cm longis lepidotis tomentos basin versus, laminis 57–107 cm longis planis vel leviter undulatis (32)42–46(50)-segmentis, pagina abaxiali cum lepidibus densis ellipticis vel subcircularibus 0.4–0.8 mm longis; inflorescentia 58–88 cm longa; drupis ellipsoideis vel ovoideo-ellipsoideis, 22–25 × 15–16 mm in sicco.

Solitary palms, often with exposed roots at cylindrical base; trunk 0.7–7(11) m tall, 10–20(30) cm DBH, gray-brown, ringed with low leaf scars, longitudinally fissured. Crown symmetrical, with 10 to 26 leaves, leaf bases fibrous; petioles (31)35–61 cm long, about ½–¾ as long as leaf blade, 2.4–3 cm wide distally, 3.5–5 cm wide and densely woolly basally, the indument pale brown or tan in color, densely lepidote throughout length and eventually glabrate, or scales persisting along margins and extending abaxially onto leaf ribs, adaxial hastula short, 3–4 cm wide, broadly rounded to truncate, often oblique, margin entire or shortly apiculate; blade costapalmate, with (32)42 to 46(50) segments, central portion of blade plane or slightly concave, rigid, nearly plane to somewhat undulate, 57–107 cm long from tip of hastula to apex of median segment, the segments 2–2.9 cm wide, the sinuses ¼–½ length of the blade, the tips stiff or lax with age, deeply bifid, the adaxial blade surface glabrous, the abaxial surface uniformly densely appressed tomentose-lepidote, the scales subcircular to elliptic, 0.4–0.8 mm long, usually matted and

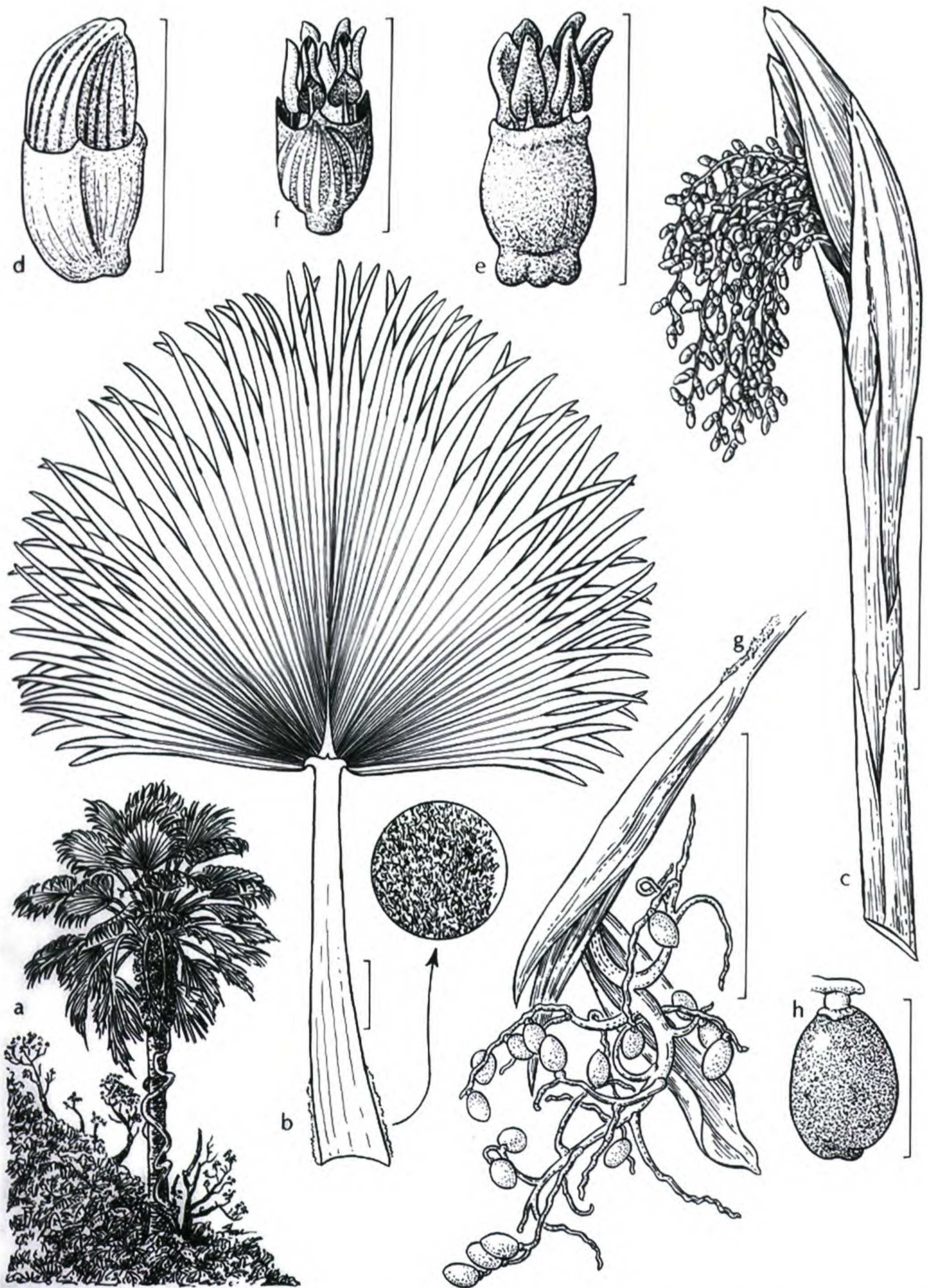


Figure 1. *Pritchardia flynnii* Lorence & Gemmill. —a. Habit. —b. Leaf, adaxial surface, with inset showing dense woolly indument at base of petiole. —c. Inflorescence in bud showing prophyll and peduncular bracts. —d. Dried flower in bud with connate petals. —e. Fresh flower. —f. Dried flower. Both e and f with petals fallen. —g. Infructescence. —h. Mature fruit. a, drawn from unvouchered individual growing along Wahiawa Stream; b, g, h from Lorence & Stone 8380; c–f, from Lorence & Stone 8385. Scale bar 10 cm in b, c; 7 mm in d, e; 6 mm in f; 7.5 cm in g; 2.5 cm in h.

felt-like, pale brown or gray. Inflorescences 1 or occasionally 2 per leaf axil, in flower erect or arcuate, 58–88 cm long, equaling or generally exceeding petiole and reaching $\frac{1}{2}$ (rarely $\frac{3}{4}$) length of blade, in fruit 80–100 cm long, erect to arcuate and slightly shorter to slightly longer than the blade; prophyll externally brown or tan lepidote, tomentose basally, disintegrating; peduncular bracts 4, overlapping, eventually disintegrating, externally uniformly brown or tan tomentose, denser basally; peduncle 48–60 cm long, 8–11 mm diam., terete or compressed, brown lanate-tomentose; panicle branched to second degree, the floriferous portion 11–20 cm long, the basal branches 10–13 cm long with 3 or 4 rachillae, the middle branches with a single bifurcate branch of 2 rachillae or less commonly unbranched, apical portion of rachis with 9 to 11 unbranched rachillae, these sinuous in flower, 6–11 cm long, at first sparsely to densely lanate-tomentose, in fruit 10–14 cm long, tomentose or glabrescent; floral bracts subulate-filiform, 1.5–3 mm, brown. Flowers spirally arranged, 8–10 mm long in bud, glabrous, calyx plus pedicel 3–5 mm long, calyx cupular, 1.5–2.5 mm wide at base, 3–4 mm wide at rim of cup, green when fresh, when dry with prominent nerves converging in abruptly acuminate teeth 0.3–0.8 mm long; petals 5.7–7 × 2.8–3.5 mm, acute to acuminate at apex, yellow when fresh, veins prominent when dry; staminal cup 3.5–6 mm long, exerted beyond calyx rim, deep orange-yellow when fresh; filaments 1–2 mm long, anthers 3–5 mm long; pistil 5–6.5 mm long, including style 3–4 mm long; style present in fruit, ca. 2 mm long. Fruit ellipsoid or ovoid-ellipsoid, 25–35 × 18–23 mm when fresh, 22–25 × 15–16 mm when dry, often slightly asymmetrical or acentric, with persistent calyx and corolla at base and accrescent style at apex, smooth, glabrous, shiny dark green, ripening purplish black; seed ovoid-ellipsoid, 14–18 × 9–12 mm.

Distribution. Known from south-central to north-central Kaua'i. Populations are known from the Wahiawa Drainage (Wahiawa Stream and Mountains and Mt. Kahili) in the south, the north fork of the Wailua River ("Blue Hole"), Makaleha Mountains, Power Line Trail, and Wainiha Valley in the north. Intervening areas likely harbor additional plants, in effect linking these known populations.

Habitat. This new species occurs from approximately 488 to 890 m elevation, usually on moderate to steep slopes in low-stature lowland wet forest, shrubland, or herbland usually dominated by *Metrosideros polymorpha* Gaudichaud, *M. waialealae* (Rock) Rock var. *waialealae*, and *Dicranop-*

teris linearis (Burm.) Underwood. Other associates include *Antidesma platyphyllum* H. Mann var. *hillebrandii* Pax & K. Hoffmann, *Bobea elatior* Gaudichaud, *Diospyros sandwicensis* (A. DC.) Fosberg, *Freycinetia arborea* Gaudichaud, *Ilex anomala* Hooker & Arnott, *Machaerina angustifolia* (Gaudichaud) T. Koyama, *Melicope*, *Syzygium sandwicensis* (A. Gray) Niedenzu, and species of *Cibotium*, *Cyanea*, *Cyrtandra*, *Myrsine*, *Psychotria*, *Scaevola*, and *Tetraplasandra*. Weedy alien species invading this habitat include *Psidium cattleianum* Sabine var. *cattleianum* and *Melastoma candidum* D. Don, both of which pose a significant threat to native plant communities in the vicinity (Lorence & Flynn, unpublished), and a variety of alien grasses including *Paspalum conjugatum* Bergius, *Setaria gracilis* Kunth, and *Schizachyrium condensatum* (Kunth) Nees.

Population size and conservation status. This species occurs as scattered individuals and small groves throughout the Wahiawa Drainage area, where the population size is estimated at 250 to 300 individuals. Additional populations are known from: the ridge between Mt. La'auhiha'ihai and Mt. Kahili (6 individuals), the Blue Hole (exact number unknown), Power Line Trail (8), the Makaleha Mts. (84), and Wainiha Valley (exact number unknown), bringing the total to perhaps 350 to 400 plants.

Plants of different size classes including occasional juveniles are represented in some localities, suggesting at least limited regeneration is taking place. However, invasive weedy alien plant species, notably *Psidium cattleianum* Sabine and *Melastoma candidum* D. Don and aggressive grasses, threaten this species (Lorence & Flynn, unpublished). Additional threats are posed by feral animals including feral pigs (*Sus scrofa*) and the Polynesian rat (*Rattus exulans*), a known seed predator that adversely impacts regeneration of the Hawaiian *Pritchardia* species (Cuddihy & Stone, 1990). Feral pigs are present in many areas inhabited by this species and may destroy seedlings and increase opportunities for alien plants to invade through degradation of the habitat. Based on its relatively low population status, presence of threats, and low regeneration, we suggest this new species should be considered for threatened status.

Etymology. We are pleased to name this new species for one of its initial collectors, Timothy W. Flynn, in recognition of his extensive botanical collections and contributions to our knowledge of the Hawaiian flora.

Affinities. Among the Kaua'i species, *Pritchardia flynnii* resembles *P. hardyi* Rock, which is also characterized by abaxially densely gray tomentose-

lepidote leaves. This latter species differs by its stouter trunk 4–8 m tall and 30–45 cm diam., inflorescences equal to or often exceeding the leaves with minutely villous rachillae, and long-drooping infructescences with larger fruits 20–35(40) × 16–25 mm when dry.

Pritchardia flynnii is distinguished from its Kaua'i congeners by the following combination of features: short stature with trunk 0.7–7(11) m tall; relatively small crown with only 10 to 26 leaves; leaf blades relatively small, 57–107 cm long, nearly plane to slightly undulate and abaxially densely appressed tomentose-lepidote; relatively small inflorescences branched to the second degree, reaching $\frac{1}{2}$ (rarely $\frac{3}{4}$) length of blade in flower and often reaching the blade apex in fruit; fruits smooth, ellipsoid or ovoid-ellipsoid.

Several collections from the Makaleha Mountains (Lorence & Flynn 7424, PTBG; Perlman & Wood 16260) differ in having leaf blades that are abaxially sparsely scattered lepidote, but these specimens are otherwise referable to *P. flynnii*. The comparatively sparse foliar pubescence may be due to leaf age or weathering, or it may be genetically controlled. This variant will key out under 8b in the key below.

Seven endemic *Pritchardia* species including *P. flynnii* occur on Kaua'i, and two Pacific species are commonly cultivated there (*P. pacifica* Seemann & H. Wendland and *P. thurstonii* F. Mueller & Drude). In order to successfully key out these palms complete material is required including flowers, fruits, and leaves. In addition, the number of leaves per crown, relative lengths and positions of leaves, inflorescences, and infructescences should be noted and photographed when making herbarium specimens. With adequate herbarium material available, the native Kaua'i species generally can be separated by the following key, which was adapted in part from Gemmill (1998) and Read and Hodel (1990). Measurements are based on dried herbarium specimens.

KEY TO THE ENDEMIC SPECIES OF *PRITCHARDIA* IN KAUA'I, HAWAII

- 1a. Inflorescences nearly equal to or exceeding leaf blades in flower; infructescences usually extending well beyond the blade apex and generally pendulous *P. hardyi*
- 1b. Inflorescences shorter than petioles or reaching $\frac{1}{2}$ (rarely $\frac{3}{4}$) length of leaf blade; infructescences shorter than or equaling but not exceeding the blade apex, erect, arcuate, or pendulous.
 - 2a. Leaf blades abaxially densely silvery to pale brown or golden, appressed lepidote-tomentose, the scales and hairs matted and obscuring the blade surface.
 - 3a. Inflorescence rachillae densely floccose-lanate at least when young, becoming glabrate with age *P. minor*
 - 3b. Inflorescence rachillae glabrous or sparsely to densely velutinous-tomentose when young and soon glabrescent.
 - 4a. Inflorescence rachillae glabrous, viscous with varnish-like resinous coating; flowers and buds shiny, viscous-resinous; fruit 33–35 mm long *P. viscosa*
 - 4b. Inflorescence rachillae velutinous-tomentose or glabrescent, not viscous or resinous; flowers and buds dull, not shiny and viscous; fruit 22–25 mm long *P. flynnii*
 - 2b. Leaf blades abaxially with scattered to closely arranged scales and hairs, but these not obscuring the blade surface.
 - 5a. Large palms, up to 20 m tall; trunk large and stout, 50 cm or more DBH; crown with more than 40 leaves; leaf blades waxy or glaucous pale green *P. waialealeana*
 - 5b. Moderate- to small-sized palms, less than 10 m tall; trunk moderate to slender, much less than 50 cm DBH; crown with less than 30 leaves; leaf blades plain green.
 - 6a. Leaves with petioles 96–170 cm long; fruit 30–38 × 18–21 mm *P. perlmanii*
 - 6b. Leaves with petioles (31)35–90 cm long; fruit 18–28 × 12–21 mm.
 - 7a. Abaxial surface of blade with lepidia 0.2–0.3 mm long; flowers with calyx + pedicel 1.8–3 mm; petals 3–3.5 mm *P. napaliensis*
 - 7b. Abaxial surface of blade with lepidia 0.4–1.5 mm long; flowers with calyx + pedicel 2.5–5 mm; petals 4.5–7 mm.
 - 8a. Rachillae glabrous; floral bracts scarious, ovate-triangular, 0.5–1.5 mm; calyx + pedicel 2.5–3 mm; petals 4.5–5 mm *P. limahuliensis*
 - 8b. Rachillae sparsely to densely velutinous-tomentose when young, often glabrescent; floral bracts stiff, subulate-filiform, 1.5–3 mm; calyx + pedicel 3–5 mm; petals 5.7–7 mm *P. flynnii* (Makaleha Mountains collections)

Paratypes. HAWAIIAN ISLANDS (U.S.A.). **Kaua'i:** Koloa District, Lihue–Koloa forest reserve, Wahiawa Stream & Mtns., along steep N–S-facing ridge from stream towards Kapalaoa Peak, Lorence *et al.* 6655 (PTBG, US); Wahiawa Mtns. S of Kapalaoa, along main Wahiawa Stream, Lorence & Stone 8380 (PTBG, US), 8385 (PTBG); headwaters of Wahiawa Stream, Wood *et al.* 238 (PTBG); first N fork of Wahiawa Stream, NW of Wahiawa Bog,

Flynn et al. 2931 (PTBG); Wahiawa Drainage below Kapalaoa, *Wood* 7466 (PTBG); trail from Kahili Mtn. Park watertank along spine of secondary ridge betwn La'auhaihai & Kahili, *Flynn & Nishek* 6496 (PTBG), *Chapin et al.* 57 (K, PTBG); border of Lihue and Kawaihau Districts, headwaters of N fork of Wailua River, area called "Blue Hole" below Mts. Waialeale and Kawaikini, *Lorence et al.* 5400 (PTBG); Kawaihau District, Kealia forest reserve, Makaleha Mtns., *Lorence et al.* 7413 (PTBG); between Pu'u Eu & Lelewi, 840–890 m, 14 July 1993, *Wood et al.* 2675 (PTBG); betwn. Malamalama & Lelewi, *Wood et al.* 2501 (PTBG); SSE of Mt. Namahana, *Wood & Perlman* 7304 (PTBG); slopes S of Mt. Kekoiki & Mt. Namahana, drainages of Anahola Stream, *Perlman & Wood* 16260 (PTBG); border betwn. Hanalei & Kawaihau Districts, Power Line Trail, *Chapin* 76 (PTBG); Hanalei District, Wainiha Valley, back of valley below Hinalale Falls, *Wood et al.* 2347 (PTBG); W side of Wainiha Valley, 2000 ft. (607 m) N of Pali Eleele, *Christensen & Robinson* 289 (BISH, PTBG).

Acknowledgments. We are grateful to Melany Chapin, Ken Wood, Steve Perlman, and Tim Flynn for constructive discussions and comments on the manuscript. We extend our gratitude to Anna Stone for skillfully preparing the line drawing. Thanks are given to the curator of the Bishop Museum Herbarium (BISH) for access to specimens. This work was supported in part by an NSF Dissertation Im-

provement Grant (DEB-9411848) to Tom A. Ranker and Chrissen E. C. Gemmill, and by the National Tropical Botanical Garden. Mahalo from CECG to Tom Ranker for his immeasurable support.

Literature Cited

- Beccari, O. & J. F. Rock. 1921. A monographic study of the genus *Pritchardia*. Mem. Bernice P. Bishop Mus. 8(1): 1–77.
- Cuddihy, L. W. & C. P. Stone. 1990. Alteration of Native Hawaiian Vegetation. University of Hawaii Cooperative National Park Resources Study Unit, Honolulu.
- Gemmill, C. E. C. 1998. A new narrow endemic species of *Pritchardia* (Arecaceae) from Kaua'i, Hawaiian Islands. *Novon* 8: 18–22.
- Read, R. W. & D. R. Hodel. 1990. Arecaceae. Pp. 1360–1375 in W. L. Wagner, D. R. Herbst & S. H. Sohmer, *Manual of the Flowering Plants of Hawai'i*, Vol. 2. Univ. Hawaii Press and Bishop Museum Press, Honolulu.
- St. John, H. 1988. Diagnoses of some Phanerogamae: Hawaiian Plant Studies 165. *Phytologia* 64: 177–178.
- Uhl, N. W. & J. Dransfield. 1987. *Genera Palmarum*. A Classification of Palms based on the Work of Harold E. Moore, Jr. L. H. Bailey Hortorium and International Palm Society, Ithaca, New York.
- & ———. 1999. *Genera Palmarum* after ten years. Pp. 245–253 in A. Henderson & F. Borschsenius (editors), *Evolution, Variation, and Classification of Palms*. Mem. New York Bot. Gard. 83.