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A New Species of Balaka from Fiji

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Balaka, a genus in the subtribe Ptychospermatinae, has nine species distributed in Fiji and Samoa. The genus is most closely related to *Veitchia*, *Ptychosperma*, and *Drymophloeus*, but is distinguished by a combination of a leafsheath that is not fully tubular but split opposite the petiole and with margins near the apex lacerate-fibrous, an elongate peduncle, triads distichously arranged on the rachilla, irregularly shaped endocarp, and seed variously ridged and furrowed. Otherwise, the genus is similar with pinnae that are obliquely truncate and praemorse at the apex, staminate flowers symmetrical and bullet-shaped in bud, numerous stamens, anthers versatile, a prominent pistillode, fruit with apical stigmatic remains, homogeneous endosperm, and basal embryo.

Renewed study of the palm flora of Fiji has been ongoing since the early 1990s, with one of us (DF) recently completing a MSc thesis on the family in Fiji. The Arecaceae in Fiji is represented by 12 genera, only one of which is endemic, and 27 species, all of which are endemic. A close affinity with the palm flora of Vanuatu has been demonstrated by the recent description of two new species, *Neoveitchia brunnea* Dowe and *Heterospathe uniformis* Dowe, that are closely related to Fiji taxa (Dowe and Cabalion 1996). *Neoveitchia* was previously considered endemic to Fiji, while the Vanuatu and Fiji *Heterospathe* species appear more closely related to each other than to other species in the Solomon Islands or elsewhere. The most recent description of a new species of Fiji palm was that of *Heterospathe phillipsii* Fuller and Dowe (Fuller et al. 1997), and now there is an additional species of *Balaka*, as herein presented. There also appear to be new species of *Gulubia* and *Cyphosperma* yet to be described for Fiji.

Balaka streptostachys Fuller and Dowe **sp. nov.**

Palma, *Balakae microcarpae* et *B. macrocarpae* affinis, sed truncus robustior usque ad 10 cm diametro. Inflorescentia usque ad 1.5 m longa. Rachilla trigona asymmetrica, tortilis, tortis 40°–60° intermittentibus, tortis 3–5 in quoque rachilla. Flores in 3–8 triadibus distichis inter tortos in foveis vadosis. Flos staminatus albastro tubernatus, 20–35 stamina. Fructus 18–25 mm longus, 8–14 mm latus. Apex endocarpi aliquantum rostrata, pagina endocarpi canalibus vadosis irregularibus. Typus: FIJI. VANUA LEVU: above Nakorutari Village, below ridge above Matani Creek along Raciba Road, *Fuller 338, with E. Jones and T. Bulitavu*, 23 Feb. 1996 (holotypus BRI; isotypi K, SUVA).

Solitary palm, *trunk* erect, 4–7 m tall, dbh 7–10 cm, base not expanded, internodes congested, dark green to grey with age, nodes conspicuous, light green-brown. *Leaves* eight to ten in the crown, held erect, slightly arcuate, regularly pinnate, to 3 m long including petiole and leafsheath, adaxially mid green, abaxially olive green; petiole 35–45 × 2.5–3.5 cm wide, adaxially concave, abaxially rounded, densely tomentose with scattered long dark scales; leafsheath tubular, split longitudinally opposite the petiole in the upper quarter, 30–50 cm long, abaxially green–light brown, densely tomentose with scattered dark scales, adaxially white, glabrous,

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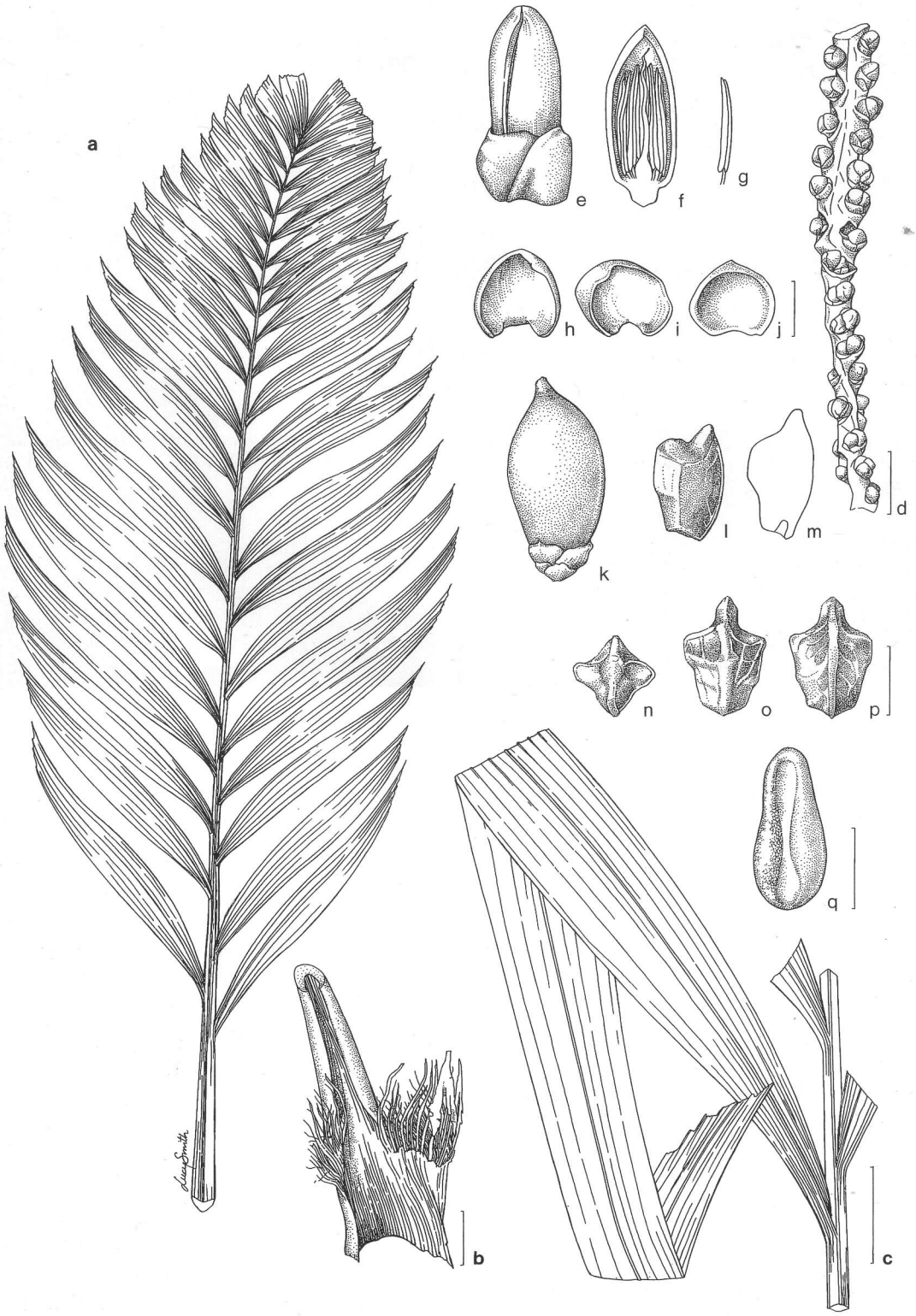
1. *Balaka streptostachys*. a. leaf. b. petiole base and leafsheath apex with lacerate-fibrous margins. c. pinna. d. section of rachilla. e. staminate flower in bud. f. staminate flower in cross-section. g. stamen. h.–j. sepals. k. fruit. l. seed, equatorial side view. m. seed in same view, cross-section with embryo exposed. n. seed, apical view. o. seed, equatorial back view. p. seed, equatorial front view. q. pollen grain. Scale bars: b. 3.5 cm; c. 6 cm; d. 2 cm; e.–j. 2 mm; k.–p. 5 mm; q. 15 µm. Illustration by Lucy T. Smith, a.–d. from *Fuller 338*, e.–q. from *McClatchey and Fuller 1095*.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2. a. *Balaka streptostachys* in habitat, Vanua Levu, Fiji. b. Inflorescence with staminate flowers in bud.

margins at the apex lacerate-fibrous, fibers coarse and thick; rachis densely tomentose with scattered dark scales, proximally channelled, becoming ridged distally adaxially, abaxially rounded proximally, flattened distally, diamond-shaped in cross-section at mid rachis. *Pinnae* in one plane, regularly arranged, sub-opposite, 18–22 per side, obliquely truncate at the apex, apically dentate; mid-leaf pinnae elongately falcate, 83–95 × 6–8 cm wide, tapered from the middle toward the apex and the base; basal pinnae 90–110 × 6–7 cm wide; distal pinnae increasingly elongate to compactly cuneate toward the leaf apex, apical pair basally joined for one-sixth to one-fourth their length; mid rib prominent on both sides in all pinnae, secondary ribs almost as prominent abaxially only, two to six each side of pinna, marginal veins thick, lower marginal vein tomentose. *Inflorescence* interfoliar becoming infrafoliar in age, 1–1.5 m long, branched to three orders; axes densely silver tomentose when young, densely red-brown tomentose at maturity; prophyll boat-shaped, 35–40 cm long, fully encircling the peduncle at attachment, persistent; peduncular bract one, 70–78 cm long, attached 27–30 cm above attachment of the prophyll, narrowly tubular, persistent and withering to a fibrous papyraceous state; peduncle elongate, 60–65 × 2.0–3.5 cm wide, laterally compressed, elliptical in cross section; rachilla 16–30 × 0.4–0.5 cm wide, irregularly angled in cross-section, densely tomentose, triads in shallow pits, three to eight triads ranked linear-distichous, rachilla with 40°–60° twists at intermittent intervals, with three to five twists per rachilla. *Flowers* in triads for entire length of the rachilla; staminate flowers bullet-shaped in bud, 6–7 mm long, symmetrical, white; sepals triangular, 3 mm long, margins smooth; petals elongate, 6 mm long, 2–3 mm wide, apically pointed, thick, apically valvate; stamens 20–35; filaments thin, 3–4 mm long; anthers linear, 4 mm long, dorsifixed, versatile; pistillode elongate, 4–5 mm long, flask-shaped. *Pollen* elliptical in

3. *Balaka streptostachys*, leaf portions overlaid with section of infructescence with maturing fruit. Photo credits: 2a. and b. J. Marcus; 3. R. H. Phillips.

polar view, long axis ca. 36 μm, short axis ca. 15 μm, monosulcate, exine tectate, finely reticulate. *Fruit* irregularly ovoid, tapered toward the apex, 18–25 × 8–14 mm wide, orange-red at maturity, stigmatic remains apical on a beaked cone; epicarp smooth, drying moderately granular; mesocarp 2–3 mm thick, fibrous; endocarp longitudinally ridged, four-angled in cross section, apex with a moderate beaked extension, surface with numerous irregular shallow channels; seed similarly shaped as endocarp; hilum longitudinal; endosperm homogeneous; embryo basal. *Eophyll* bifid. (Fig. 1).

Distribution. Fiji. Vanua Levu, known from a single location S of Labasa on the logging road toward Mt. Sorolevu, at 300 m elevation; grows as an understory palm in lower montane rainforest in a boggy area.

Additional Specimens Examined. FIJI. Vanua Levu, above Nakorutari Village, below ridge above Matani Creek along Raciba Road, *McClatchey and Fuller 1095/185, 1099/189*, 13 May 1995 (FTG, SUVA).

Etymology. From the Greek *strepto* (twisted) and *stachys* (spike) in reference to intermittent 40°–60° twists in the rachilla, with the sections between the twists otherwise straight. This character has not been observed in other species of *Balaka*.

Ethnobotany. No native Fijian name or uses for this palm have been recorded.

Conservation Status. Proposed for IUCN Red List threatened category — Critically Endangered. There are 50–60 adult trees in the single known population of this unusual palm. This area has been selectively logged, and future logging is imminent. Dick Phillips (*personal communication*) has two seedlings of this taxon in cultivation in Fiji.

Notes. Balaka streptostachys (Fig. 2a) is distinguished by its comparatively greater trunk diameter, to ca. 10 cm, than that of similar species such as *B. microcarpa* and *B. macrocarpa*. The inflorescence is distinctive in that the rachillae are densely tomentose, have 40°–60° twists at intermittent intervals, and are angular in cross-section (Figs. 2b,3). Triads are ranked distichously, three to eight per section between the twists in the rachilla. The endocarp and seed are ridged and angular as with other *Balaka* species, though the arrangement with a single prominent longitudinal ridge, extended "wings" and quadrangular in cross-section is distinctive. An informal description of this species was included under the name of *Balaka* "robusta" in Fuller (1997) and again in Doyle and Fuller (1998). The species was first observed by Timoci Bulitavu, while working on construction of a logging road. Subsequently he showed it to palm horticulturist, Dick Phillips of Suva, Fiji, in early 1994, and again to Phillips along with DF and Will McClatchey in 1995.

Balaka streptostachys occurs as an understory palm species in mixed evergreen-lower montane rainforest. The single known population is growing on very wet, spongy ground in a flat section of the Mt. Sorolevu foothills. This area receives well over 3000 mm of rain per year. The associated vegetation includes the palms *Alsmithia longipes* H.E. Moore (new island record [*McClatchey and Fuller 1101/191*, 13 May 1995, and FTG, SUVA]), *Balaka macrocarpa* Burret and *Physokentia thurstonii* (Becc.) Becc. Higher up the slopes starting at c. 500 m large numbers

of *Gulubia microcarpa* Essig (new island record [*McClatchey and Fuller 1117/210*, 17 May 1995, FTG, SUVA]) can be found and *Clinostigma exorrhizum* (H. Wendl.) Becc. occurs above 900 m on the slopes and the top of Mt Sorolevu.

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