

almost as strong, all veins raised adaxially, only minor veins dominant abaxially; marginal veins thicker than secondary veins; two terminal pinnae basally united. *Inflorescence* 70–115 cm long, 2-spiked, filiform, rigid, moderately arched; peduncle 40–75 cm by c. 3 mm, dorsi-ventrally compressed; rachilla 30–35 cm by c. 3 mm; floral pits congested. *Flowers* c. 1.5 mm apart, cream. *Staminate flower* broadly ovoid in bud, c. 2 mm high, widely opening at maturity; sepals c. 0.5 mm long, triangular, obtuse, apex acute, strongly carinate, margins hyaline; petals c. 2 mm long, triangular, broadly ovate, apex moderately acute, inward curving, longitudinally striate; stamens 6, 2.5–3 mm long; filaments c. 0.1 mm diam., not noticeably tapered, c. 2.5 mm long, extended outward between the petals; anthers ovoid, c. 1.2 mm long, with  $\pm$  parallel sides, versatile; pistillode elongate, c. 2.5 mm long, slightly tapered toward the apex, apex flat; pollen mostly circular, monosulcate, exine finely reticulate. *Pistillate flower* not seen. *Fruit* ellipsoid, 9–13 mm long, 6–10 mm diam., crimson; epicarp smooth, minutely granular when dry; mesocarp sparsely fibrous; endocarp crustaceous. *Seed* ellipsoid, 7–10 mm long, 4–6 mm diam.; endosperm homogeneous.

Distribution — Papua New Guinea: W Sepik Province; Freida River area.

Habitat & Ecology — In rain forest at 120–140 m.

Etymology — From *amoena* – delightful, in reference to the general appearance of the palm.

Vernacular name — Yurrimak.

Notes — 1. *Calyptrocalyx amoenus* is distinguished by caudate pinnae that decrease in size towards the leaf tip, a 2-spiked inflorescence, staminate flower with 6 elongate stamens, ellipsoid fruit 9–13 mm long, 6–10 mm diam. that are crimson at maturity, and homogeneous endosperm.

2. The stem of this palm is used to make spears, spear heads, or practice bows. Stems are also used for cross-beams in houses. Staminate flowers have a soapy smell.

### 3. *Calyptrocalyx arfakianus* (Becc.) Dowe & M.D. Ferrero, *comb. nov.*

*Linospadix arfakianus* Becc., Malesia 1 (1877) 62. — *Bacularia arfakiana* (Becc.) F. Muell., Fragm. 11 (1878) 58. — *Paralinospadix arfakianus* (Becc.) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 12 (1935) 333, syn. nov. — Type: *Beccaria s.n.* (holo FI; iso FI, K), Indonesia, Papua, Mt Arfak, Hatam, 1500–2000 m, July 1875.

*Linospadix pachystachys* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 11 (1933) 711. — *Paralinospadix pachystachys* (Burret) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 12 (1935) 335, syn. nov. — Type: *Stein 128* (holo B<sup>+</sup>), Indonesia, Papua, Waigeo, 250 m, 20 May 1931.

Solitary, small palms. *Stem* erect, 1–2 m tall, 10–14 mm diam.; internodes to 3 cm long, dark green; crown with 6–10 leaves. *Leaves* irregularly segmented, 75–100 cm long; leafbase 15–18 cm long, green, minutely nerved, margin moderately lacerate-fibrous; petiole 15–25 cm by 2–3 mm, adaxially channelled; lamina to 50 cm long, to 16 cm wide, dark glossy green adaxially, much lighter abaxially; segments unequal on either side, irregularly arranged, 2 per side or 1–4 on one side and up to 10–12 on the other, with some major divisions; basal segments narrow c. 12 mm wide; terminal segments united to form a deeply bifid apex, margins truncate, toothed; primary ribs adaxially prominent, 15 mm apart, not raised abaxially; secondary veins raised slightly on both surfaces. *Inflorescence* to 75 cm long, 2–4-spiked, pendulous; prophyll to 12 cm long; peduncular bract to 20 cm long; peduncle 45–55 cm long, to 2 mm wide,

glabrous; rachilla 18–20 cm long, to 3 mm diam., fusiform. *Flowers* bright yellow. *Staminate flower* pointed in bud, widely opening at maturity; sepals c. 1 mm long, scarcely carinate, moderately striate; petals to 5 mm long, broadly ovate, triangular, pointed, rigid, longitudinally striately-nerved; stamens 8 or 9, c. 6 mm long, unequal in length; anthers 1–1.5 mm long, versatile, yellow; pistillode elongate. *Pistillate flower* c. 3 mm high, obtusely pyramidal; sepals c. 1.5 mm long, obtuse, with ciliate margins, gibbose-carinate; petals c. 3 mm long, striately-nerved; stigma papillose. *Fruit* globose to subglobose, 11–12 mm long, 7–8 mm diam., black; epicarp smooth, crustaceous when dry; mesocarp mealy, fibrous, bright yellow, with fibres tightly fused, reticulate to anastomose; endocarp adherent to the seed. *Seed* globose to ovoid, c. 8 mm long, c. 6 mm diam.; raphe longitudinal; endosperm ruminant.

*Distribution* — Indonesia: Papua: Sorong, Manokwari, and Fakfak Divisions.

*Habitat & Ecology* — In rain forest at 250–2000 m.

*Etymology* — The species was named for the type locality, Arfak Mts.

*Vernacular name* — Mbep (Anggi language – Arfak Mts).

*Note* — *Calyptrocalyx arfakianus* is distinguished by the combination of a solitary habit, small stature, multi-spiked inflorescence, globose to subglobose black fruit, and ruminant endosperm. The original description of *Paralinospadix pachystachys* from Waigeo Island matches *C. arfakianus* very closely, and despite the loss of the type specimen, *Stein 128* (B†), the name is placed as a synonym of *C. arfakianus*.

#### 4. *Calyptrocalyx awa* Dowe & M.D. Ferrero, *spec. nov.* — Fig. 2

Palma caespitosa, statura parva, foliis segmentis foliorum irregulariter dispositis, vaginis foliorum marginibus laevibus, inflorescentia bi-spicata, spicis filiformibus flexuosis, petalis apicaliter rubro-vittatis, filamentis elongatis, staminibus 6–7, pistillodio columnari, fructu globoso, mesocarpio fibroso, fibris aggregatis prope endocarpium, endospermio homoganeo. — *Typus*: Dowe & Ferrero 507 (holo BRI; iso K, LAE), Papua New Guinea, W Sepik Province, Vanimo District, Pual River area, Wasimei, 10 Feb. 1998.

Clustering, small palms. *Stems* 2–5, 2–3 m tall, 20–30 mm diam.; internodes to 5 cm long, green; crown with 8–11 leaves. *Leaves* bifid, or irregularly segmented or regularly pinnate, 90–129 by 30–58 cm, new leaf emerges peach-bronze; leafbase 16–30 cm long, margin ± smooth; petiole 5–18 cm long, shallowly channelled adaxially; rachis 50–69 cm long, ridged adaxially, rounded abaxially; segments 2–6, with 1–8 ribs per side, irregularly arranged; ribs adaxially prominent; lamina semi-glossy green adaxially, lighter dull green abaxially; ribs and veins not raised abaxially. *Inflorescence* 40–70 cm long, 2-spiked; prophyll 17 cm long; peduncular bract to 26 cm long; peduncle 10–20 cm by 3–4 mm; rachilla 30–50 cm long, 3.5–4.5 mm diam. *Flowers* cream to green. *Staminate flower* c. 2 mm high; sepals c. 0.5 mm long; petals c. 2 mm long, triangular, rigid, red-tinged, densest toward the apex; stamens 6 or 7, c. 1 mm long; filaments c. 1 mm long; anthers linear, 0.5 mm long, shallowly sagittate, versatile; pollen mostly circular in polar view, long axis 21.7–25.3  $\mu\text{m}$ , short axis 16.3–21.7  $\mu\text{m}$ , monosulcate, exine finely reticulate; pistillode columnar, c. 1.5 mm long. *Pistillate flower* not seen. *Fruit* globose, 10–12 mm diam., orange; epicarp smooth, thin; mesocarp moderately fibrous; fibres thick, aggregated toward the endocarp. *Seed* globose, 7–10 mm diam.; endosperm homogeneous.

*Distribution* — Papua New Guinea: W Sepik Province, Vanimo District.