

grouped grapnel spines to 5 mm long, scattered, caducous, brown indumentum on rachis surface; leaflets up to 12 on each side, irregularly arranged in distant groups, lanceolate, suddenly mucronate, dark green, distinctly plicate, lowermost leaflets 170×6 mm, mid-lamina leaflets $260(-310) \times 24$ mm, uppermost to 150×18 mm; leaflets unarmed except for scattered bristles to 1 mm along the margin, near the tip a few black bristles to 4 mm long. *Infructescence* to 90 cm, up to 5 partial inflorescences, each subtended by a tubular, tightly sheathing, peduncular bract armed with scattered, flattened, triangular spines, densely covered in dark brown tomentum, and fringed with long light-brown ciliate hairs, the prophyll to 100×9 mm; partial inflorescences lax to 40 cm long, bracts tightly sheathing, covered with dark-brown tomentum and fringed with light-brown ciliate hairs; female rachillae slender, not zigzag, to 60 mm, bracteoles covered in papillose hairs. *Fruits* (immature) \pm globose, 12×10 mm, with short apical beak to 1 mm tipped with three small divergent stigmas to 1 mm long, and covered with c. 18 vertical rows of green scales with darker margins. *Seed* \pm globular, 7×6 mm.

Derivation — The specific epithet refers to the conspicuous fimbriate margins of bracts in the infructescence.

Distribution — Borneo: Kalimantan Timur (Wanariset, Dilang Puti).

Habitat — Found on slopes in both primary and logged-over forest.

Note — *Calamus fimbriatus* differs from *C. laevigatus* Mart. var. *laevigatus* in length of the petiole, the non-reflexed first pairs of leaflets, and in the rather distant, irregularly grouped, distinctly plicate leaflets. *Calamus fimbriatus* differs from *C. kiahii* Furtado in the lax infructescence, and in the bracts on the inflorescence axis that are more tightly sheathing. Bracts of the partial inflorescences are not scabrid. The rachillae are slender, not zigzag-like.

Other specimens examined — BORNEO. Kalimantan Timur, vicinity Wanariset research station near Samboja, 38 km N of Balikpapan, 1° S 117° E, alt. 50 m, *van Valkenburg JVV 1418* (Wanariset, BO, L); vicinity Dilang Puti, kecamatan Bentian Besar, kabupaten Kutai, *van Valkenburg JVV 1313* (Wanariset, BO, L).

Calamus nigricans Valkenburg, *spec. nov.* — Fig. 2

Species nova ad sectionem *Calamum* (*Coleospathum* Furtadonis, nomen illegitimum) pertinens, *C. muricato* affinis sed vagina folii armata differt; *C. pilosello* Becc. et *C. sarawakensis* Becc. accedens, sed vagina folii spinis pluribus numeris dissimilibusque, indumento abundante nigroque. — *Typus*: *Ambri & Arifin AA 475* (holo L; iso BO, K, Wanariset), Borneo, Kalimantan Timur, Wanariset research station near Samboja 38 km N of Balikpapan, 1° S 117° E, alt. 50 m.

Clustering, slender, pleoanthic, dioecious, spiny, climbing palm. *Stems* ultimately reaching 20 m or more in length; stem without sheaths to 8 mm diameter, with sheaths to 12 mm diameter; internodes to 150 mm or more. *Leaf sheath* bright green but covered with dense, blackish brown coloured, scaly indumentum and armed with small, triangular, flattened, upwards pointed spines up to 2×2 mm, densely bearded with blackish brown hairs along the edges, the spines scattered or partially whorled; knee conspicuous, armed as the rest of the sheath; flagellum to 150 cm in length, armed with reflexed grapnel spines, covered with blackish brown indumentum; ocrea

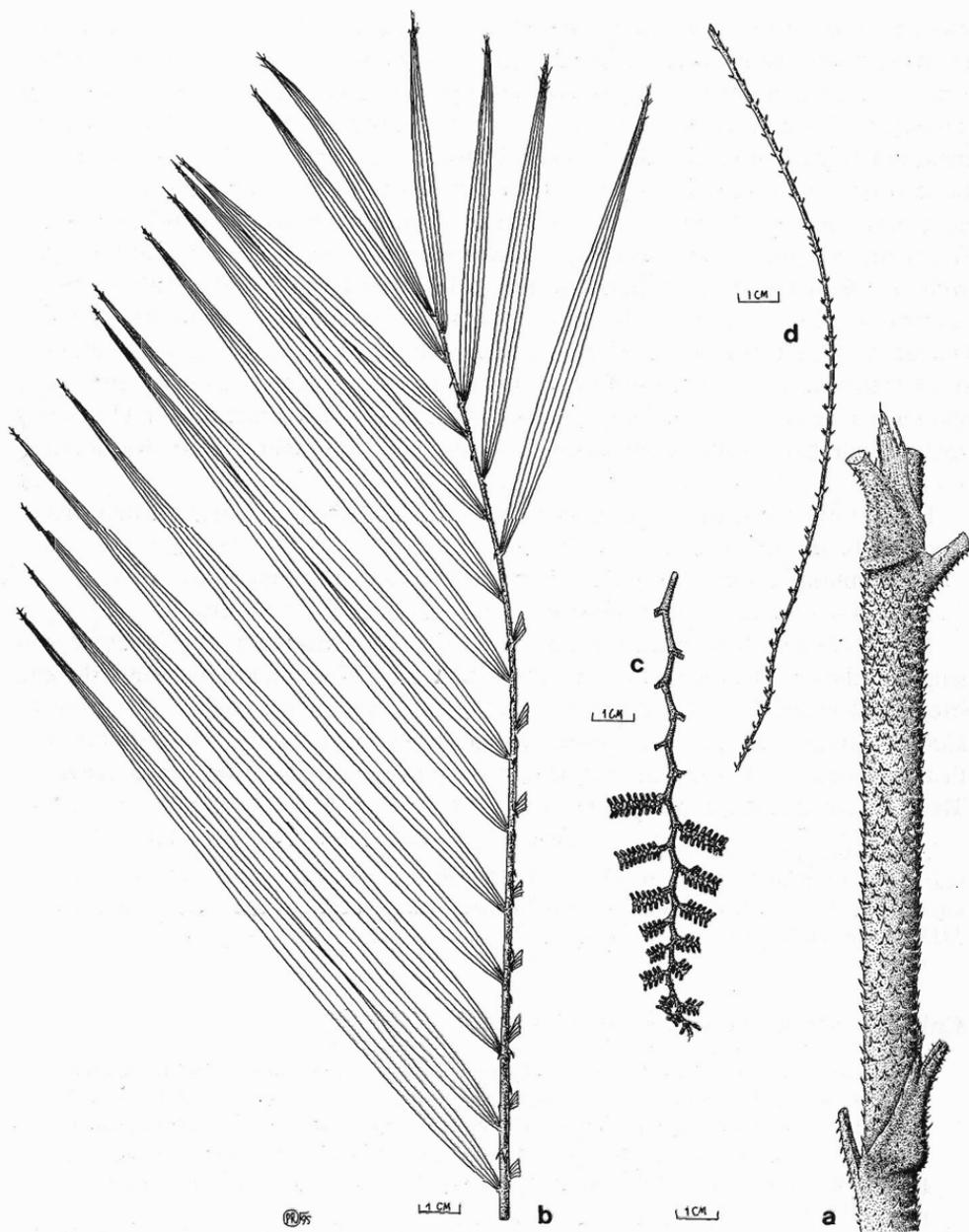


Fig. 2. *Calamus nigricans* Valkenburg. a. Part of sheathed stem; b. leaf tip; c. part of inflorescence; d. part of flagellum (all Ambri & Arifin AA 475).

membranous to c. 7 mm, without spines densely covered with blackish brown indumentum. Leaf ecirrate, without sheath 150 cm, with petiole 60×4 mm; petiole armed abaxially with short, reflexed grapnel spines, covered with blackish brown indumentum; laterally with sparse, reflexed grapnel spines; adaxially unarmed but covered

with blackish brown indumentum; leaflets up to 30 on each side of the rachis, arranged regularly, close, the rachis abaxially armed with short, reflexed grapnel spines to 2 mm, sparse, blackish brown hairs also present; lowermost leaflets to 190×8 mm; mid-lamina leaflets to 220×10 mm; leaflets gradually decreasing in size distally, the uppermost to 150×5 mm; adaxial surface unarmed except for a few distant bristles on the mid-vein; margins with distant very short bristles, 0.5 mm long, up to 5 mm long near the tip; abaxial surface proximally with blackish brown hairs, densely bristly along mid-vein and 2 lateral veins, the bristles brown, to 1 mm. *Staminate inflorescence* arcuate, flagelliform, to 150 cm; prophyll over 270 mm, closely tubular, densely armed with short, reflexed, brown grapnel spines to 2 mm, covered with blackish brown indumentum, prophyll subtending a partial inflorescence; partial inflorescences 5, very slender, distant to 260 mm, axis of partial inflorescence bearing up to 9 distichous 2nd order branches, each subtended by a tubular peduncular bract, sparsely armed with reflexed brown spines, covered with blackish brown indumentum, the most proximal to 110 mm; rachillae 3–20 mm long, subtended by tubular bracts with fimbriate margins, covered with papillose hairs, rachillae with strictly distichous bracts with fimbriate margins, each subtending one staminate flower. Only *staminate flowers* (still young) known, to 2.5×1 mm; calyx cupular, glabrous, 1.3 mm long with 3 short triangular lobes; corolla glabrous, to 2 mm, split into 3 petals; stamens 6, briefly epipetalous, to 1.5×0.2 mm, pistillode trifid to 1×0.2 mm.

Derivation — The specific epithet refers to the dark-brown scales on leaf sheath, flagellum and petiole.

Distribution — Borneo: Kalimantan Timur (Wanariset).

Note — *Calamus nigricans* superficially resembles *C. pilosellus* and *C. sarawakensis*, but differs in armature of leaf sheath, the blackish brown hairs on the rachis, and staminate flowers that are very different. *Calamus nigricans* is related to *C. muricatus* and allied species but lacks the muricate armature.

Other specimen examined — BORNEO, Kalimantan Timur, Wanariset research station near Samboja 38 km N of Balikpapan, 1° S 117° E, alt. 50 m, *Ambri & Arifin W 908* (Wanariset, BO, L).

Daemonorops pumilus Valkenburg, *spec. nov.* — Fig. 3

Species nova ad sectionem *Piptospatha* pertinens, speciebus palmijuncis quorum vaginae cuniculos formicarum incompletos ferentes (ut in *D. atra* Dransfield et *D. collarifera* Becc.) affinis; sed species nova foliolis aliquantum distantia regulariter dispositis internodiisque brevissimis — Typus: *van Valkenburg JVV 1396* (holo L; iso BO, K, Wanariset), Borneo, Kalimantan Timur, Long Sungai Barang in Apo Kayan region, $1^\circ 40'$ N 115° E, alt. 800 m.

Clustering, pleonanthic, dioecious, spiny, climbing palm. *Stems* short, climbing to 2 m, often scrambling and rooting at the nodes, resulting in reversal to juvenile state; stem without sheaths to c. 8 mm diameter, with sheaths to c. 15 mm diameter; internodes rarely exceeding 50 mm. *Sheath* brownish green when fresh, armed with up to 7, oblique (rarely complete), reflexed collars, to 1 mm, bearing brittle laminar, brown to blackish spines of very irregular size, varying from horsehair-like spicules to 4 mm, to broad spines 20×3 mm; spines around the leaf sheath mouth mostly erect, to 50 mm long; sheaths, collars and spines covered with pale brown indumentum; knee inconspicuous, armed with smaller, very incomplete spine whorls. Ants