sheath on the lateral faces. Ocrea membranous, inconspicuous, to c. 1 mm. Vestigial flagellum present to 20 cm armed with horizontal triangular spines to 4 mm. Leaf cirrate to 2·2 m including the petiole to 20 × 0·7 cm, and the cirrus to c. 1 m; petiole semi-circular in cross-section armed with short spines to 4 mm on all faces; cirrus armed rather densely with scattered reflexed spines, very rarely aggregated into grapnels; leaflets linear, to c. 32 on each side of the rachis arranged in 4–6 rather distant groups, but regularly arranged within the groups, ± uniform in size throughout the leaf, to 32 × 1·3 cm somewhat plicate, armed with sparse black bristles to 1·5 mm on 4 main veins but not the median vein on the adaxial surface, and very densely and conspicuously armed with brown bristles to 1 mm all over the abaxial surface. Staminate inflorescence to 65 cm, curving, known only in a dead state, borne just below the level of the knee; prophyll to 20 cm, closely tubular below but tattering above, densely armed with hairy-margined spines to 5 mm; other bracts on the axis similar, but smaller, all conspicuously lacerate, each including the prophyll subtending a first order branch to 25 cm, bearing deeply lacerate ± unarmed bracts to 6 cm, each subtending a 2nd order branch; 2nd order branches to 7 cm bearing short lacerate triangular bracts to 4 mm, each subtending a rachilla; rachilla strongly curved and reflexed, to 13 × 2 mm, bearing distichously arranged bracts, to 1·5 mm, c. 12 on each side, each subtending a low bracteole to 1 mm; areole of staminate flower to 1·2 mm diam. Other parts unknown. Fig. 4.

SABAH. Labuk & Sugut; slopes of Bt. Masasau, 50 m, *Dransfield et al.* JD5745 (holotype K; isotype SAN); Sapa-Payau F. R., Mile 75, Sandakan–Telupid, 100 m, *Dransfield et al.* JD5815 (K, SAN, SAR).

This species, named for Mr A. J. Hepburn whose arrangements for the rattan survey proved so efficient, is still incompletely known. It belongs to the group of species including *C. pogonacanthus* Becc. ex H. Winkler, *C. eriocanthus* Becc., *C. ulur* Becc., *C. mesilauensis* (described below), and *C. endauensis* J. Dransf. which bear a vestigial flagellum as well as a cirrus. *C. hepburnii* may be distinguished by its linear grouped leaflets, densely bristly on the abaxial surface, and the sheaths with scattered leaf sheath spines, and without scabrid ridges.

8. **Calamus mesilauensis** *J. Dransf.* sp. nov. cirrifera flagello vestigiali praedita, fructibus grandibus *C. pseudoulur* affinis sed gracilicaulis, foliolis parvis, vaginis foliorum spinis parvis triangularibus saepe aggregatis dense armatis differt. Typus: Borneo, Sabah, *Dransfield* JD5556 (holotypus K; isotypi L, SAN, SAR).

Slender clustering rattan with stems climbing to c. 10 m; stem without leaf sheaths c. 8 mm diam.; exceptionally to 10 mm, with sheaths c. 12–15 mm; internodes 12–20 cm long. Sheaths pale green, drying pale brown, armed with scattered large triangular dark brown spines to 10 × 5 mm with swollen somewhat oblique yellowish bases and black hairy margins, interspersed with much smaller spines to 3 × 7 mm, scattered or arranged in short horizontal or oblique groups; leaf sheath mouth membranous, fringed with stiff caducous blackish hairs to 3 mm; vestigial flagellum present, to 5 cm; knee conspicuous armed as the sheath; sparse caducous brown scaly indumentum present between spines. Leaf to 1·25 m including the cirrus to 70 cm; petiole very short, to 2–5 cm, sometimes larger in juvenile specimens,

armed, as is the rachis, on the abaxial surface only, with scattered spines to 5 mm, distally becoming more abundant and more reflexed; cirrus spines claw-like mostly scattered and not organized into grapnel groups; leaflets about 10 on each side of the rachis irregularly arranged in four groups of 2's or 3's; most proximal leaflets somewhat shorter and narrower than the rest, 30 × 0·8 cm; mid-leaf leaflets to 40 × 3·5 cm; most distal leaflets slightly smaller; leaflet surfaces somewhat plicate with five major ribs, unarmed except along margins at tip, where armed with sparse black bristles; transverse veinlets conspicuous. Inflorescences borne halfway up the exposed portion of the leaf sheath. Staminate inflorescence to 50 cm, in one exceptional specimen to 80 cm; peduncle to 11 × 0·4 cm, narrower at the insertion, rather heavily armed with horizontal spines to 5 mm; primary bracts to 15 cm, dull dirty brown, covered wtih brown scaly indument, and with scattered spines near the base, the whole deeply lacerate giving a tattered and dead appearance to the whole inflorescence, each subtending a first order branch (partial inflorescence); partial inflorescence to 40 cm, usually only 20 cm bearing lacerate bracts to 10 cm, each subtending a rachilla; rachilla somewhat reflexed, to 4 cm, thus considerably exceeded by the subtending bract; rachilla bracts tomentose somewhat congested, strictly distichous, with triangular, ciliate-margined limb to 3 mm; involucre to 2 mm, ciliate-margined. Staminate flower c. 5 × 3 mm; calyx 3-lobed, to 4 mm, tubular in the basal 2 mm, the lobes c. 2 × 2·5 mm, covered except at the tip and very base with lustrous chocolate-coloured scales and looser pale brown tomentum; corolla to 5 mm, split almost to the base forming three petals to 4·5 × 2 mm; filaments borne at mouth of corolla tube, tapering c. 1·5 × 0·5 mm at the base; anthers introrse, c. 2 × 0·75 mm; pollen yellow; pistillode c. 1 × 0·2 mm. Pistillate inflorescence as the staminate; rachillae to 3 cm; rachilla bract as in staminate; involucrophore to 3 mm; involucre to 2·5 mm fringed and tomentose. Sterile staminate flowers all fallen in available material. Pistillate flower to 5 × 3 mm; calyx tubular in basal 3 mm, with three short lobes to 1 × 2 mm, bearing indumentum as in staminate; corolla to 4 × 2 mm, the lobes triangular 2·5 × 1·5; staminodal ring c. 1mm high, bearing six triangular teeth to 0·75 × 0·5 mm; ovary to 4 × 2 mm ± cylindrical, scaly in the basal half, the upper half forming a massive cylindrical beak tipped with three recurved stigmas. Ripe fruit somewhat oblate, disproportionately large (? always) to 17 × 23 mm, tipped with a cylindrical beak to 1·5 × 1·5 mm, and covered in 24–26 vertical rows of deep reddish-brown scales with darker margins; sarcotesta described as rather sweet and edible; seed ± oblate, to 12 × 17 mm; endosperm deeply ruminate; embryo basal. Fig. 5.

SABAH. Kinabalu, Pinosok Plateau near Mesilau River, 1500 m, *Dransfield et al.* JD5556 (holotype K; isotypes L, SAN, SAR), JD5557 (K, KEP, L, SAN, SAR), *Chew & Corner* RSNB4125 (in part—infructescence only—as to other part, *Daemonorops longistipes* Burret (K), RSNB7069 (K), *Chew, Corner & Stainton* 1817 (K); Ulu Liwagu and Ulu Mesilau, *Chew, Corner & Stainton* 1957 (K); Liwagu Trail, 1700 m, *Dransfield et al.* JD5696 (K, SAN, SAR), JD5698 (K, SAN).

A sterile collection (JD5321) from hill Dipterocarp forest in the G. Mulu National Park (referred to as '*Calamus* sp. aff. *C. semoi* Taxon 2' in my account of the palms of the National Park—see Dransfield in press) differs only in the sheaths being more sparsely armed and in drying green rather than brown;

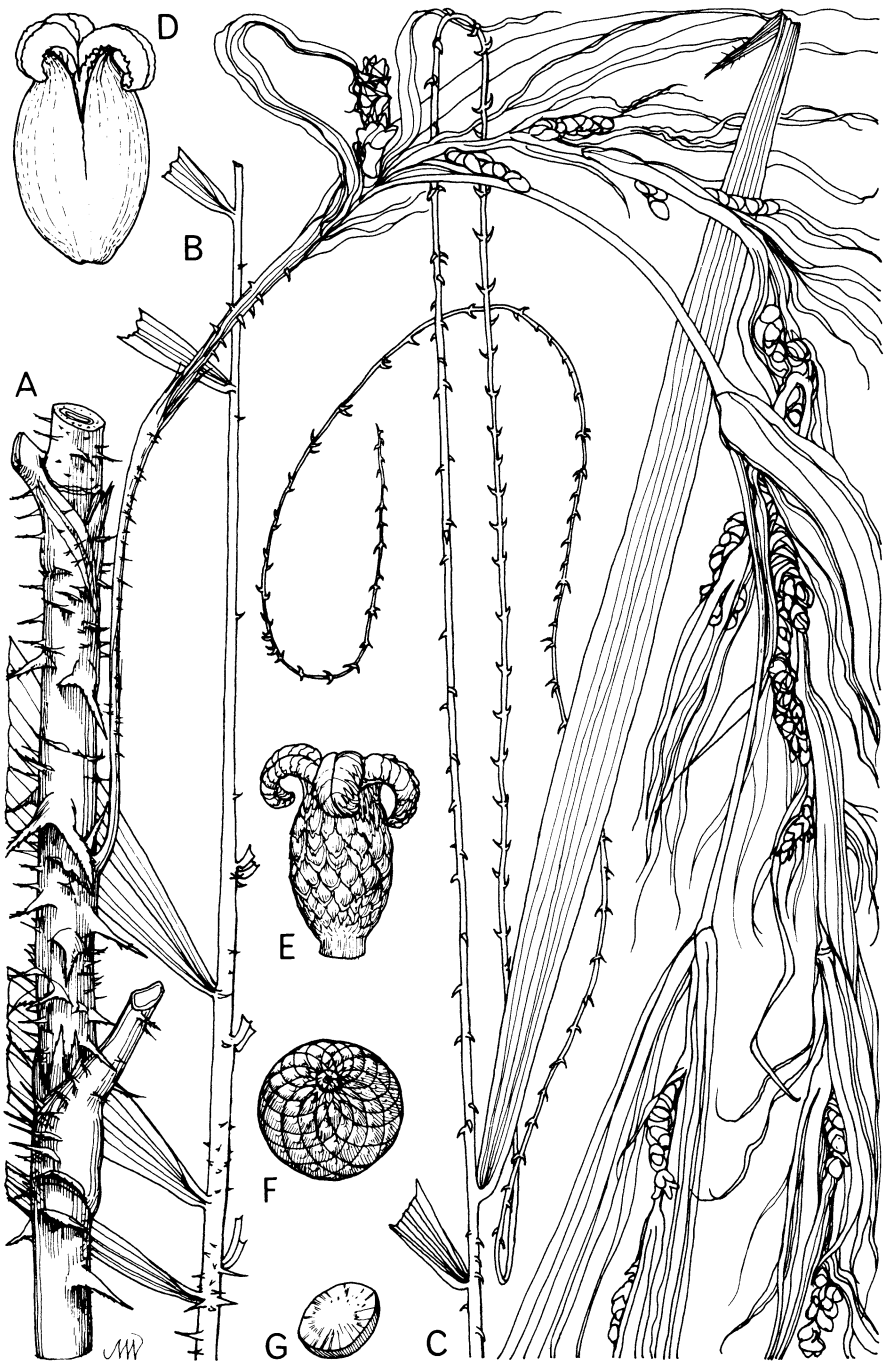

FIG. 5. *Calamus mesilauensis*. **A** part of sheathed stem with pistillate inflorescence × ⅔; **B** mid-portion of leaf × ⅔; **C** apex of leaf with cirrus × ⅔; **D** pistillate flower × 6; **E** ovary × 6; **F** fruit × ⅔; **G** seed in transverse section × ⅔. **A–E** from *Dransfield* JD5556, **F, G** from *Chew & Corner* RSNB 4125. Drawn by Mary Millar Watt.

its affinity with the present species cannot be fully assessed until fertile material becomes available. A recent collection of *C. pseudoulur* from the Fourth Division of Sarawak (*Chin* 3014) (K), shows that the fruit of this species also is inordinately large. *C. mesilauensis* differs in the more slender stems and the sheaths more densely armed with small spines, often in groups.

9. **Calamus convallium** *J. Dransf.* sp. nov. Species singularis inflorescentia et floribus *C. conirostri & C. lobbiano* affinis sed aspectu omnino divergenti, flagello parvo, folio subcirrato, foliolis binatis divergentibus his apice folii minutis, rachillis staminatis circinatis distinctissima. Typus: Borneo, Sabah, *Dransfield* JD5816 (holotypus K; isotypi KEP, L, SAN, SAR).

Clustering, low to high climbing rattan tending to form rather open thickets in wet valley bottoms. Stem without sheaths 1–1·5 cm diam., with sheaths to 2·5 cm, rarely more; internodes to 25 cm. Sheaths dull green, armed with rather sparse brittle laminar black spines to 25 × 5 mm, usually less, the spine margins conspicuously fringed with brownish-black hairs; pale brown scaly indumentum present as a thin caducous covering between the spines; knee conspicuous, usually unarmed; ocrea scarcely developed. Flagellum usually absent in juveniles, reaching 1·3 m only in mature stems, sometimes present as only a short vestige, weakly armed with rather distant grapnel groups. Leaf arcuate, conspicuously subcirrate, to 1·5 m; petiole to 30 cm long, semi-circular in cross-section, 12 × 6 mm, unarmed on the flattened adaxial surface, armed with distant reflexed black spines along the edges and on the abaxial surface; rachis gradually decreasing in diam. from the petiole, distally becoming more angular in cross-section and more densely armed with grapnel groups of spines; leaflets lanceolate, acute or somewhat acuminate, 12–20 on each side of the rachis, in the proximal portion arranged in very distant pairs (to 25 cm distant), the leaflets in each pair strongly divergent; in the most distal portion (the subcirrus) the leaflets sometimes subregular; mid-leaf leaflets to 40 × 5 cm, decreasing distally, the leaflets of the subcirrus ranging from 16 × 2·5–4·5 × 0·4 cm, a malformed leaflet pair frequently present fused to the tip of the rachis; ab- and ad-axial leaflet surfaces unarmed; leaflet margins armed with black bristles to 4 mm, usually only conspicuous at the leaflet tip; three main veins conspicuous on adaxial surface, transverse veinlets very conspicuous, somewhat sinuous. Staminate inflorescence to 1·5 m, the peduncle c. 6 mm diam. at the insertion on the leaf sheath, and bearing five evenly spaced partial inflorescences c. 25 cm distant; primary axis bracts closely tubular armed with scattered reflexed triangular spines along the surface abaxial to the stem; margins of bracts bearing a fringe of grey hairs to 3 mm; partial inflorescence to 16 cm, arcuate bearing c. 8 conspicuously recurved rachillae on each side of the axis, the proximal few rachillae sometimes bearing a few branches; bracts on the partial inflorescence axis to 15 × 3 mm, with scattered brown scales, fringed as the primary bracts; rachilla bracts with triangular limbs to 4 mm, ciliate-margined and brown scaly; involucre c. 3·5 mm diam., ciliate-margined. Staminate flower rounded in bud; immature calyx c. 3 mm with three short triangular lobes, the whole densely covered in yellowish silicified scale-like papillae; corolla tubular at the base with three broad petals; stamens 6. Pistillate inflorescence known only from mummified material, to 35 cm with one partial inflorescence; peduncular bract armed with scattered spines as the leaf sheath, but