

upper montane forest on summit ridge, 1700 m, *Dransfield* JD 5361, (holotype K; isotype SAR).

BRUNEL. G. Pagon Priok, 1600 m, *Ashton* A 281 (K); A 257 (K).

**9. *Pinanga chaiana*** *Dransfield* sp. nov. species *Pinangae* compta vaginis foliorum lateritio-tomentosis, foliis furcatis non pinnatifidis, inflorescentiae rachillis 5–7 pendulis, triadibus florum distichis distinctissima. Structura inflorescentiae *P. patulae* similis, sed characteres vegetativi omnino diversi. Typus: Borneo, Sarawak, *Paul Chai* S 39601 (holotypus K; isotypi BH, L, KEP, SAN, SAR).

Solitary, unarmed, pleoanthic, monoecious undergrowth palm. Stem erect, unbranched, up to 5.5 m tall, about 2.5 cm diam., with internodes to 5 cm; nodes only slightly prominent; stem surface dull greenish-brown, densely covered with pale brown flocculent indumentum. Crownshaft elongate, about 40 cm long, only slightly wider than the stem, about 3.5 cm diam., dull green but densely covered with abundant flocculent pale buff to bright reddish-brown indumentum; ligule poorly developed; about 7 leaves in crown. Whole leaf including leaf sheath to 1.8 m long; leaf sheath to 30 cm long; petiole to 18 cm × 7 mm, triangular in cross-section; lamina entire except for a deep apical split, to 130 cm long, 38 cm wide at the widest point near the leaf tip, coarsely and shortly toothed at the apex, the toothed edge about 17 cm long, the lamina shallowly folded with about 32 main adaxial ribs, with a few less prominent parallel ribs between these; lamina when fresh pale dull green, slightly paler on lower surface than on upper, on drying becoming dull green on upper surface and russet brown on lower surface; brown indumentum very sparse, scattered along main veins on abaxial surface. Inflorescence infrafoliar, pendulous, to about 18 cm long; prophyll not known; all other parts turning black on drying; peduncle erect at base, then sharply reflexed, about 2 cm × 7 mm, with 5–7 crowded parallel branches; rachillae to 20 cm × 2 mm, glabrous; triads borne strictly distichously, about 4 mm apart; staminate flowers not known; pistillate flower globular, ± partly sunken into the rachilla; calyx of 3 free or basally shortly joined, rounded, cucullate, imbricate petals 1.2 mm diam.; ovary rounded, c. 1 mm diam., tipped with an irregular umbonate stigma. Mature fruit not known; almost mature fruit greenish-yellow, spindle-shaped, 10 × 6 mm, terminating in a moderately sharp point. Seed 8 × 4 mm; endosperm deeply ruminant. (Fig. 2).

SARAWAK. 4th Division, G. Mulu National Park, Ulu Sg. Berar, on ridge top in mixed Dipterocarp forest with heavy yellow clay soil, on Setap shale, c. 170 m, *Paul Chai* S 39601 (holotype K; isotypes BH, L, KEP, SAN, SAR).

BRUNEL. Andalau Forest Reserve, damp clay soil in valley, periodically inundated, *Ashton* A 501 (K).

This handsome 'pinang' is named after Paul Chai, the Forest Botanist, Kuching, who collected the type, and whose enthusiasm for palms has done much to enrich our knowledge of Bornean palms. I observed it sterile in a habitat similar to that of the type, at the foot of G. Buda, in the proposed extension of the G. Mulu National Park in October 1977.

This pinang is very distinctive in its russet brown crownshaft, undivided



FIG. 2. *Pinanga chaiana*. **A** habit  $\times \frac{1}{3}$ ; **B** leaf with sheath and petiole  $\times \frac{1}{3}$ ; **C** stem with one inflorescence  $\times \frac{2}{3}$ ; **D** detail of rachilla with pistillate flowers  $\times 5$ ; **E** pistillate flower  $\times 10$ ; **F** sepal from pistillate flower  $\times 10$ ; **G** petal from pistillate flower  $\times 10$ ; **H** ovary  $\times 10$ ; **J** fruit  $\times 2$ ; **K** vertical section of fruit  $\times 4$ . All from Paul Chai S 39601. Drawn by Miss H. Wood.

leaves, and branched inflorescence. In inflorescence structure it appears to approach *P. patula* Blume, but is vegetatively quite distinct.

**10. *Pinanga dumetosa* Dransfield sp. nov.** a ceteris speciebus borneensibus *Pinangae* habitu dumetoso, foliolis miro modo lanceolatis cucullatis a rachide angulo acutissimo divergentibus, et inflorescentia erecta florum triades spiralter vel distiche gerenti, floribus masculis persistentibus calyce paupere evoluto differt, *P. brevipedi* et *P. crassipedi* similis sed caule evoluto et caracteribus folii valde distincta. Typus: Borneo, Sarawak, *Dransfield* JD 5340 (holotypus K; isotypi BH, KEP, L, SAN, SAR).

Clustering, low, thicket-forming, unarmed, pleoanthic, monoecious palm. Stems suckering at the base, rarely more than 1 m long, frequently decumbent with only the terminal portion and the crownshaft erect, to 1.3 cm diam. just above the node, to 1.6 cm diam. just below the node, with nodes prominent and about 6 cm distant; stem surface dull green, bearing abundant dark reddish-brown, pale buff-edged scales. Crownshaft elongate, to 25 cm long, scarcely swollen, up to 2 cm diam., dull greenish-brown, rather densely covered in reddish-brown scales as the stem, becoming striate on drying; about 7–8 leaves in crown. Whole leaf including the sheath c. 1.5 m long; leaf sheath c. 25 cm long terminating in an irregularly tattering very short ligule; petiole up to c. 75 cm long, 6 mm wide, triangular in cross-section when fresh, diverging from the crownshaft at an acute angle, dull green, covered in scattered reddish-brown scales as on the sheath; leaflets 6–8 on each side of the rachis, diverging at an acute angle, subopposite or alternate; lowermost pair of leaflets narrower than the rest, to 37 × 3.5 cm, frequently narrower; mid-leaf leaflets noticeably lanceolate, not sigmoid, ± parallel sided, to 40 × 5 cm, sometimes wider, with up to 5 main ribs; terminal pair diverging only slightly, joined for up to 14 cm, to 35 × 6 cm, lanceolate, cucullate, the apex shortly toothed with teeth corresponding to the main ribs (up to 9 of them); all leaflets somewhat plicate, dull green, same colour on both surfaces, glabrous except for scattered brown scales along the main veins on the lower surface near the leaflet tips; leaflets rarely much narrower and more numerous, but still detectably lanceolate. Inflorescence infrafoliar, erect, remaining so even to fruit maturity, rarely somewhat spreading; prophyll 6.5 × 3 cm, ovate, strongly 2-keeled, cream-coloured when fresh, quickly turning brown; peduncle scarcely exceeding 1 cm, branching to one order to give up to 8 rachillae to 6 cm long, densely grey tomentose when young; triads rather irregularly arranged, spirally below, distichously above, or distichously throughout, or subdistichously throughout. Staminate flowers not caducous, frequently persisting as shrivelled remains at mature fruiting, the whole flower asymmetric, sometimes very shortly pedicellate, usually sessile; calyx very poorly developed, present as a reflexed, bilobed, undulate collar partly fused with the petal bases, the lobes sometimes interlocking round the pistillate flower, the calyx rarely more than 1 mm high; corolla with 3 well-developed triangular lobes 5 × 2 mm, joined shortly below; stamens about 16; filaments 0.5 mm long; anthers 5 × 1.75 mm. Pistillate flower sessile; calyx cup-shaped, 3 mm diam., with 3 low triangular ciliate lobes to 1.25 mm high; corolla with 3 cucullate free ± rounded ciliate petals 2 mm high; ovary rounded, 2 mm diam., tipped with a subtrigonou cristate stigma.