cm, smooth, almost succulent when fresh, striate on drying, bearing scales and hairs as the internodes, distally with 2 short rapidly disintegrating auricles 6 × 3 mm; petiole very short, c. 20 × 2·5 mm, bearing scales and hairs as the sheath; blade when fresh, dark shiny green adaxially, grey hairy abaxially, deeply bifid, the costa c. 5 cm only, the two lobes conspicuously cucullate, to 25 × 3 cm, with about 5 ribs, the tips entire rather than lobed, adaxial surface glabrous, abaxial surface densely grey-scurfy, particularly along the folds. Inflorescence unbranched or bifid, pendulous or porrect, to 8 cm; prophyll not preserved; peduncle very short, not exceeding 8 mm, c. 4 mm diam. near the base; rachilla c. 2 × 1 mm diam., pale cream, thickening and becoming red at fruit maturity, rather densely covered in caducous branched scale-like trichomes, and bearing strictly distichous triads of flowers. Staminate flowers (based on one very imperfectly preserved flower) c. 4 × 3 mm; calyx c. 0·5 mm high, irregularly 3-lobed; petals c. 4 × 2 mm, unequal; stamens at least 4 (exact number not known), filaments 0·5 mm, anthers elongate, 1·3 mm; pollen not known. Pistillate flower globular, c. 2 mm diam.; calyx gamosepalous, striate, c. 1·5 mm high, shallowly 3-lobed; petals imbricate, ovate, c. 1·5 × 1·5 mm, the margins minutely ciliate; staminodes absent; ovary ellipsoid, c. 2 × 1 mm, tipped with an irregularly lobed stigma. Mature fruit black, ellipsoid, c. 13 × 5 mm. Seedling not known. (Fig. 1).

BORNEO. Sarawak: 1st Division, Serian District, Sabal Tapang Forest Reserve, *Dransfield et al.* JD6072 (holotype K; isotypes BH, BO, L, PNH, SAR), *Dransfield et al.* JD4656 (BH, K, KEP, L, SAR), *Ilias Paie* S.5397 (K, SAR).

This is a pretty species, very distinctive in its cucullate bifid leaves of a curious almost succulent texture, adaxially shiny green and abaxially grey-hairy. It seems always to be found in 'kerangas' (Bornean heath forest) and, although all collections are from the same locality, I have observed it elsewhere in the 1st Division at Semengoh Forest Reserve near Kuching and in Sempadi Forest Reserve on the Bau-Lundu Road. Although abundant where it occurs, it is, like many kerangas palms, a shy flowerer. It seems most closely related both in vegetative and floral details to *P. tomentella* Becc.; the latter, however, is immediately distinguishable by its entire, lanceolate, scarcely bifid leaf.

Pinanga rupestris *J. Dransf.* sp. nov. habitatione egregia verosimiliter affinis *P. rivulari* Becc. inflorescentia spiciformi sepalis floris pistillati connatis et ramificatione internodiali sed lamina angusta integra breve bifida statim distinguibilis. Typus: Borneo, Sarawak, *Dransfield et al.* JD5917 (holotypus K; isotypi BH, L, SAR).

Diminutive clustering palmlet, erect or more usually pendulous from crevices in sandstone rock faces. Stems rarely exceeding 60 cm long, usually much less, c. 4–6 mm diam., conspicuously marked with nodal scars, internodes 1–3 cm, surface with scattered brown scales, stem base producing aerial roots and dense clusters of sucker shoots, the stem also frequently producing bulbil-like shoots from the middle of the distal internodes. Crown of about 6 leaves, the sheaths forming an elongate crownshaft; leaf sheaths c. 80 × 7 mm, striate on drying, covered in scattered dull brown scales, distally with a rapidly disintegrating laciniate ocrea to 16 mm; petiole of leaves of

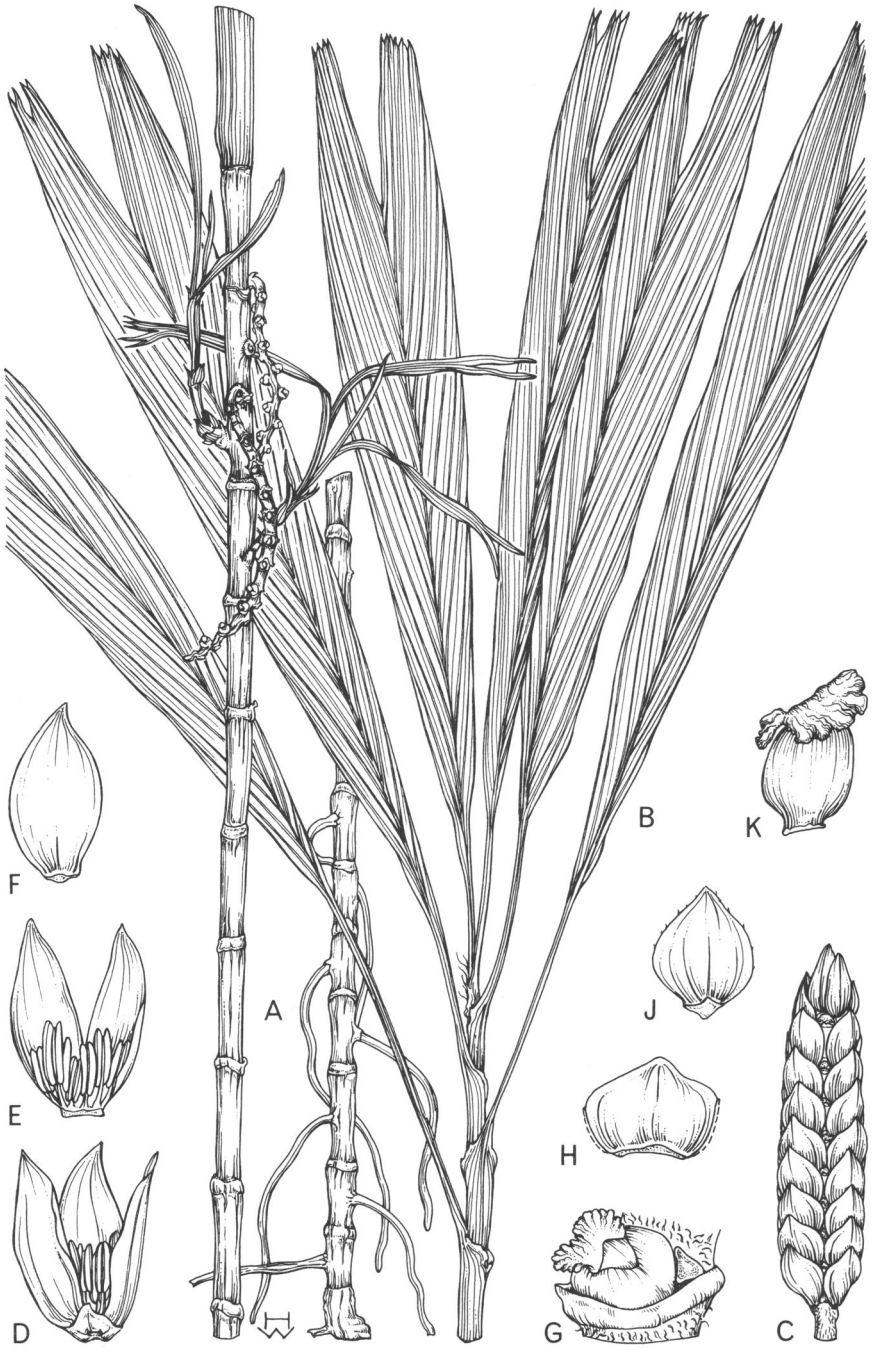

FIG. 2. *Pinanga rupestris*. **A** stem showing base, inflorescences and internodal branches × 2/3; **B** crown of bifid leaves × 1/3; **C** inflorescence × 1 1/3; **D** staminate flower × 3½; **E** staminate flower, one petal removed × 3½; **F** petal of staminate flower × 3½; **G** detail of rachilla and pistillate flower × 7½; **H** calyx lobe of pistillate flower × 12; **J** petal of pistillate flower × 12; **K** gynoecium × 12. **A, B** from S.17961, **C–K** from *Dransfield* JD5917. Drawn by Heather Wood.

mature stems c. 8–17 cm, c. 3 mm diam., ± triangular in cross section, bearing scattered scales when fresh; blade dull brown or greenish brown when dry, narrow, entire, bifid, to 50 cm long, gradually widening from the base to 6 cm near the tip, usually shorter and narrower, split to 7·5 cm, the two halves with c. 6 shallow lobes to 7 mm deep; adaxial surface minutely punctate, abaxial surface bearing inconspicuous thin grey indumentum. Inflorescence unbranched, pendulous, 6 cm long; prophyll c. 6 × 1·4 cm; peduncle very short, not exceeding c. 7 mm; rachilla surface hairy; triads strictly distichous, borne in a plane radial to the stem, each subtended by a low rachilla bract to 1 mm high. Staminate flowers ± triangular ovate in outline, laterally flattened or curved by close packing; calyx irregularly 3-lobed, the lobes 1–2 mm high; petals cream-coloured, fleshy, irregular, two c. 6·5 × 3 mm, the third c. 6·5 × 4·5 mm; stamens 7–8, filaments c. 1 × 0·2 mm, anthers c. 2 × 0·6 mm, with broad connectives. Pollen grains monosulcate, ellipsoid in apertural view; long axis (31–)33·3(–36) μm, short axis (24–)26·2(–30) μm, wall thickness c. 2 μm; sulcus membrane not observed, sulcus somewhat longer than long axis; exine intectate, clavate, the larger clavae interspersed with smaller diameter, shorter clavae, clavae not modified at sulcus margin. Pistillate flower very low; calyx tubular, ± striate, c. 0·8 mm high, very shallowly 3-lobed; petals imbricate, ovate, c. 0·8 mm long, the margins sparsely ciliate; staminodes lacking; ovary c. 0·8 mm diam., tipped with an irregularly lobed stigma. Fruit not known. (Fig. 2).

BORNEO. Sarawak: 1st Division, Bako National Park, *Dransfield et al.* JD5917 (holotype K; isotypes BH, L, SAR), *Dransfield* JD746 (K), *Ashton* S.17961 (K, SAR), *Jugah ak Kudi* S.36627 (BH, K, KEP, L, SAN, SAR).

This remarkable little 'pinang' is found only on the great sandstone cliffs and boulders of Bako National Park. It is by no means abundant, but is very distinctive. No fruits have been found although dead inflorescences can be seen on herbarium specimens and in the field. How the palm is dispersed to crevices in vertical cliffs is a mystery.

P. rupestris, although superficially very different, seems to me to be related to the rheophyte, *P. rivularis* Becc., from neighbouring Brunei and the 4th and 5th Divisions of Sarawak. Both species are diminutive, and have internodal branching and simple, hairy inflorescence axes bearing gamosepalous pistillate flowers; the leaves of *P. rivularis* are, however, very finely pinnate as befits a rheophyte.

Pinanga pachyphylla *J. Dransf.* sp. nov. solitaria vel caespitosa *P. strictae* Becc., *P. ligulatae* Becc. et *P. patulae* Bl. verosimiliter affinis sed textura laminae folii crassa coriacea vel vix succulenta, foliolis distantibus inflorescentia compta rachillis divaricatis distincta. Typus: Borneo, Sarawak, *Dransfield et al.* JD5912 (holotypus K; isotypi BH, SAR).

Moderate, solitary or clustering undergrowth palm with stems to 3 m tall, c. 2 cm diam., conspicuously marked with nodal scars, internodes c. 5–10 cm, the surface covered with caducous brown scales. Crown of c. 5 pinnate leaves, the sheaths forming a well-defined green crownshaft c. 30 × 2 cm; sheath 15–25 × 2 cm, rather succulent in texture when fresh, drying dull brown, striate, with caducous scattered scales, apparently lacking any ligule-like appendages; petiole c. 30 × 1 cm, bearing caducous scales as the sheath;