

PRINCIPES

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Rhopaloblaste ceramica outlined against the sky at Singapore Botanic Gardens. Photo G. Addison.

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JOURNAL OF THE PALM SOCIETY

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The Genus Rhopaloblaste (Palmae)

HAROLD E. MOORE, JR.*

Three species of attractive palms are cultivated in botanical gardens and collections under the respective names *Ptychoraphis augusta* (S. Kurz) Beccari, *P. singaporensis* (Beccari) Beccari, and *Rhopaloblaste ceramica* (Miquel) Burret (*R. hexandra* Scheffer). A relationship between the genera has been apparent since 1885 when Beccari established the genus *Ptychoraphis*, including the two species mentioned above and a third which was later referred to *Heterospathe* by Beccari himself. *Ptychoraphis* was first distinguished from *Ptychosperma* and *Rhopaloblaste* only by the deep sulcation of the seed along the hilum, but in 1886 (*Malesia* 3: 109) the genus was further separated from *Rhopaloblaste* by "the stamen-filaments connate at the base and not free, by the form of the pistillode in the staminate flowers, by the different mode of vascular branching in the seed-coat, by the form of the embryo, after all by the seed sulcate along the raphe [transl.]." Since that time, there has been no detailed study of the two genera. The most recent separation (Beccari & Pichi-Sermolli, *Webbia* 11: 18, 66–68, 1955) relies on symmetry of fruit, presence or absence of a sulcate hilum, and number of stamens.

When one examines the species now included in *Ptychoraphis* and *Rhopaloblaste* in the light of new collections from New Guinea and the Solomon Islands, and in the light of a better understanding of the importance of the structure of the inflorescence and histology of the fruit-coat in classification, two groups of taxa emerge. Several species referred at some time to one or both genera are found to belong to the genus *Heterospathe* and are so assigned in the list of excluded species on page 90. The remaining species form a homogeneous unit including the type-species of both *Ptychoraphis* and *Rhopaloblaste*. For this genus, the earlist name of *Rhopaloblaste* is used.

The following characteristics unite the species and, in combination, set them off from other genera of the subfamily Arecoideae tribe Clinostigmateae. The leaf-sheaths form a distinct, tubular crown-shaft, the pinnae have only the midnerve elevated and prominent above, and the indument of upper and lower surfaces of the petiole and rachis is distinctive—peltate, lacerate-fimbriate-margined interlocking scales below, basifixed, twisted, membranous scales above, at least when young. The short-pedunculate, infrafoliar inflorescence has 2 caducous bracts of which the upper is enclosed within the lower (prophyll) and the usually twice-branched basal branches are characteristically abruptly divaricate from the rachis immediately above the insertion of the upper bract, *Rhopaloblaste singaporensis* excepted. The outer sepal in both staminate and pistillate flowers develops much before and enfolds a large part of the remaining perianth in bud in a fashion unusual for palms. Staminate flowers at anthesis are symmetric or subsymmetric. The fruit is often rostrate, lacks fiber-sclereids and tannin cells in the mesocarp, dries smooth, and has an apical stigmatic residue; both endocarp and seed are impressed or sulcate along the linear hilum. Seedlings have two bladeless sheaths followed by a pinnate eophyll or first leaf.

*From work relating to National Science Foundation grants GB-1354, GB-3528, GB-7758.

Those species referred to *Heterospathe* differ in lacking a well-defined crownshaft, in having pinnae with usually three nerves prominent above, at least basally, in having a long-pedunculate inflorescence with branches not abruptly divaricate and with bracts markedly unequal, the upper much exceeding the lower, and in having fiber-sclereids in the outer layer of the mesocarp. A fuller characterization of *Heterospathe* is to be found in *Principes* 13: 99–100, 1969.

Rhopaloblaste Scheffer, Annales du Jardin Botanique de Buitenzorg 1: 137. 1876.

Type-species: *R. hexandra* Scheffer (= *R. ceramica* (Miquel) Burret)

Ptychoraphis Beccari, Annales du Jardin Botanique de Buitenzorg 2: 90. 1885.

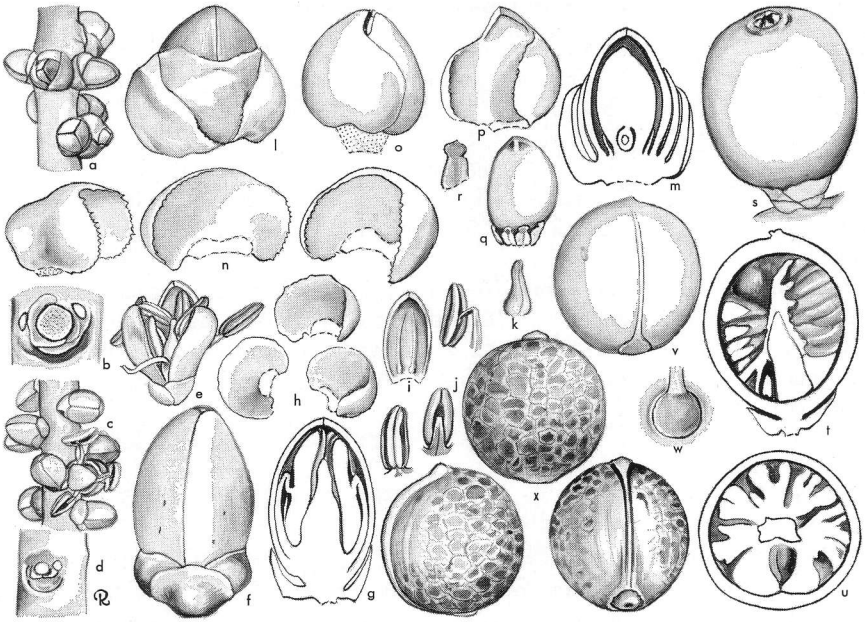
Type-species: *P. singaporensis* (Beccari) Beccari

Solitary or cespitose, unarmed, monoecious, low to tall palms with stems often enlarged at the base but uniform and relatively slender above.

Leaves reduplicately pinnate; sheaths tubular, forming a crownshaft; petioles short to elongate, rounded below, channelled above, rachis rounded below, angled above toward the apex, the sheath, lower surface of petiole and rachis usually densely lepidote with peltate scales having lacerate-fimbriate interlocking margins, the upper surface of petiole and rachis usually densely clothed with basifixed, twisted, entire or lacerate, membranous scales which persist about the bases of pinnae and where protected elsewhere; pinnae spreading or pendulous, with a distal pulvinus at the base, linear, acutely to acuminately and obliquely bifid-praemorse, with only the midnerve elevated, prominent, and often lepidote near the base above, the midnerve and one or more secondary nerves on each side prominent below, minutely brown-puncticulate and at least the midnerve with prominent dull-brown, basifixed or medifixed, twisted, membranous scales basally or throughout.

Inflorescences borne below the leaves; peduncle short; bracts 2, caducous, the lower ancipitous and enclosing the upper, both usually more or less lepidote-tomentose at least when young; rachis short to prominent but as long as or longer than the peduncle; basal branches usually abruptly divaricate-spreading at an angle of about 90° to the rachis (in *R. singaporensis* often at an acute angle); bracts subtending the branches often prominent; bracts subtending the triads prominent or not; bracteoles surrounding the pistillate flower subequal or unequal, prominent and sepal-like.

Flowers borne in triads of two staminate and a pistillate in the lower portion of or nearly throughout the rachillae; staminate flowers symmetric or subsymmetric at anthesis but in bud the outer sepal prominent and largely enfolding the remainder of the perianth; sepals 3, broadly imbricate at anthesis, rounded, more or less gibbous and keeled dorsally; petals 3, valvate; stamens 6–9, the filaments very briefly connate basally or essentially distinct, strap-shaped, narrowed and prominently inflexed at the apex in bud, the anthers narrowly elliptic in outline, medifixed, only emarginate apically and basally, the connective prominent the entire length of the anther, dehiscence by longitudinal lateral slits; pistillode conic to columnar and more or less angled, the apex briefly three-lobed and sometimes somewhat expanded; pistillate flowers broader than high in bud and with the outer sepal usually enfolding the remainder of the perianth as in the staminate; sepals 3, broadly imbricate, rounded; petals 3, broadly imbricate basally, the short valvate apices



1. *Rhopaloblaste elegans.* a, portion of rachilla with triads × 1; b, triad with flowers removed × 2; c, portion of rachilla with paired and solitary staminate flowers × 1; d, scars and bracteoles of paired staminate flowers × 2; e, staminate flowers at anthesis × 2; f, staminate bud × 4; g, staminate bud in vertical section × 4; h, staminate sepals × 4; i, staminate petal × 2; j, stamens in 3 views × 2; k, pistillode × 2; l, pistillate bud × 4; m, pistillate bud in vertical section × 4; n, pistillate sepals × 4; o, pistillate bud with sepals removed × 4; p, pistillate petal × 4; q, pistil and staminodes × 4; r, staminode × 8; s, fruit × 1; t, fruit in vertical section × 1; u, fruit in cross-section × 1; v, endocarp × 1; w, operculum × 2; x, seed in lateral, abaxial and adaxial views × 1. From material of *Moore & Whitmore 9310* preserved in liquid.

erect and scarcely exceeding the sepals at anthesis but the petals in fruit generally nearly twice as long as the sepals; staminodes mostly 6, these obtuse, more or less deltoid, membranous, often united in pairs or irregularly united or united in a membranous, lobed ring; pistil unilocular, uniovulate, the ovule (in *R. ceramica*) hemianatropous, attached adaxially (in the ventral angle) and pendulous from the top of the locule, broadest in its lateral axis; stigmas erect to recurved between valvate apices of petals at anthesis.

Fruit orange-yellow to red, ovoid or ellipsoid to subglobose, with apical stigmatic residue; exocarp smooth; mesocarp lacking fiber sclereids or tannin cells, with flattened longitudinal fibers in one or usually more than one layer against the yellowish, fragile endocarp, this impressed over the hilum and with a round basal operculum; seed brown, with lightly to deeply impressed hilum the length of the adaxial side, vasculature anastamosed, endosperm deeply ruminate, embryo basal, large.

Seedling with 2 bladeless sheaths, then a pinnate eophyll and successive leaves (in *R. augusta, R. Brassii, R. singaporensis*).

Chromosome complement: not known

Distribution: rain forest in Nicobar Islands, southern Malay Peninsula and Singapore, Molucca Islands, New Guinea, Solomon Islands.

A Key to the Species of Rhopaloblaste

1. Stems cespitose, slender, to 4 m. high; leaves with elongate petiole 60 cm. or more long and spreading pinnae; inflorescence decurved, short, less than 30 cm. long, simply branched or with the basal branches only furcate and borne at an acute angle with the rachis, the approximately 5 branches or rachillae transversely rugose, glabrescent or covered with simple to stellate, brown or pale trichomes; fruit ovoid, orange-yellow to red, 13–14 mm. long including the prominent rostrum 1.5–2 mm. long, 9–10 mm. in diam. Malay Peninsula, Singapore. ---------- *R. singaporensis*
1. Stems solitary, mostly more than 10 m. high, 10 cm. in diam.; leaves with short petioles less than 50 cm. long; inflorescences spreading, the lower branches divaricate from the rachis at about a 90° angle and once- or twice-branched into glabrous or lepidote rachillae that are not transversely rugose when dry; fruit red or orange-red.
   2. Fruit small, 10 mm. long, 8 mm. in diam.; perianth 4 mm. long in fruit. New Guinea. ---------- *R. Ledermanniana*
   2. Fruit larger, 2.0–3.5 cm. long, 1.0–1.8 cm. in diam.; perianth 6–10 mm. long in fruit.
      3. Fruit subglobose when fresh, 2.6 cm. high, 2.3 cm. in diam.; staminate flowers subsymmetric, the petals slightly angled, 6–7 mm. long, about three times as long as sepals; lower branches of inflorescence mostly once-branched. Solomon Islands. ---------- *R. elegans*
      3. Fruit ellipsoid or ovoid-ellipsoid to obovoid-ellipsoid, distinctly longer than broad; staminate flowers (where known in the mature state) symmetric; lower branches of the inflorescence mostly twice-branched.
         4. Triads subtended by a prominent, more or less reflexed, liplike bract and with a prominent, elevated, and thickened upper margin; pinnae pendulous; rachillae ca. 3 mm. thick at base; fruit ellipsoid, 2.2–2.6 cm. long including a prominent rostrum 2 mm. high, 1.0–1.4 cm. in diam.; petals 6–7 mm. high in fruit; staminodes united in a membranous 6-lobed ring. Nicobar Islands. ---------- *R. augusta*
         4. Triads subtended by a low bract and without a prominent elevated and thickened upper margin; pinnae and fruit various.
            5. Pinnae pendulous; staminate flowers 6–7 mm. high; fruit 3.0–3.5 cm. long, 1.8 cm. in diam., with perianth 1 cm. long; rachillae 5–7 mm. thick at base, glabrous; staminate petals not appearing puncticulate; pistillate buds ca. 4 mm. high, 6 mm. wide, with petals scarcely or not evident at staminate anthesis; staminodes more or less united in a lobed membranous ring. Molucca Islands. ---------- *R. ceramica*
            5. Pinnae spreading; staminate flowers 4–4.5 mm. high.
               6. Fruit 2.0 cm. long, 1.0–1.3 cm. in diam., with perianth 6–7 mm. high; rachillae 2–3 mm. in diam., densely lepidote with pale to red-brown, thickened and often branched trichomes; staminate flowers 4–4.5 mm. long, the petals appearing minutely puncticulate; pistillate buds ca. 3.5 mm. high and wide with valvate apices of petals evident at staminate anthesis; staminodes more or less distinct. New Guinea. ---------- *R. Brassii*

6. Fruit 3.5 cm. long, 1.8 cm. in diam., with perianth 1 cm. high; rachillae 5 mm. in diam. at middle. New Guinea. ..... *R. dyscrita*

Rhopaloblaste augusta (S. Kurz) H. E. Moore, *tr. nov.*

Areca augusta S. Kurz, Journal of Botany 13: 331, pl. 170. 1875.

Ptychoraphis augusta (S. Kurz) Beccari, Annales du Jardin Botanique de Buitenzorg 2: 90. 1885.

Solitary, to 30 m. high or more, 30 cm. in diam. at base, trunk brown or becoming gray in age, clearly ringed.

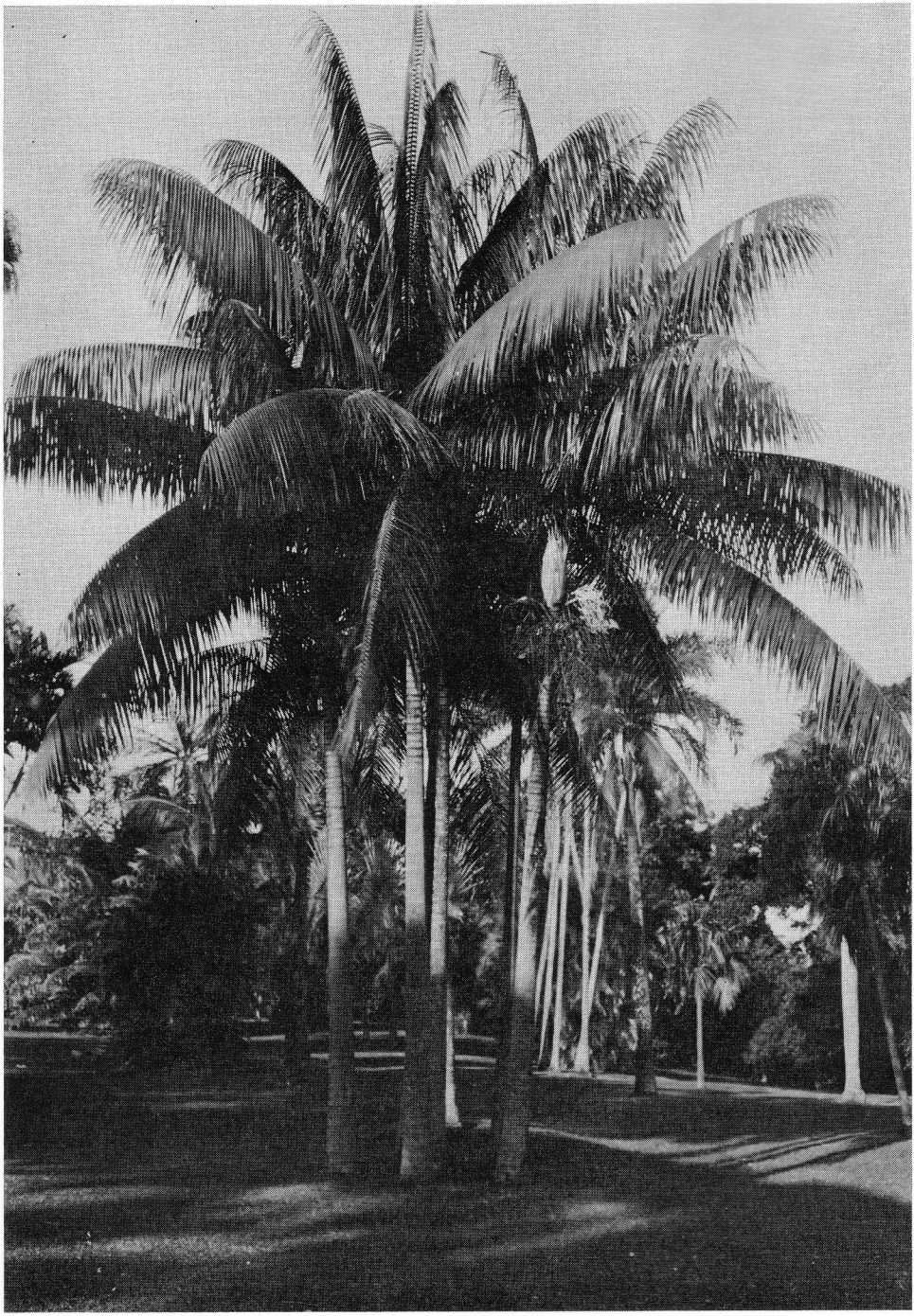
Leaves about 10, to 4 m. long; sheath about 60 cm. long, gray-brown lepidote-tomentose; petiole very short, 10–11 cm. long; rachis densely pale-lepidote below when young with interlocking lacerate-fimbriate, brown-centered scales but becoming merely brown-puncticulate in age, glabrescent above in age but with rusty or dark-brown to pale, twisted and often lacerate, membranous scales persisting in the angles at the base of pinnae or elsewhere when protected; pinnae 90–100 on each side, pendulous, to 70 cm. long, 3 cm. wide, glabrous, dark-green, and shining above, very minutely brown-puncticulate along all the nerves and the midnerve with dark brown or dull-brown, twisted, basifixed, membranous scales to 3 mm. long below.

Inflorescences usually 3–5, ringing the trunk below the crown; lower bract gray-brown; peduncle ca. 5 cm. long; rachis densely brown floccose-lepidote, ca. 37 cm. long with ca. 15 branches, the lower two branches divaricate at about 90° from the rachis immediately above the insertion of the upper bract, the third similarly divaricate abaxially between the first two, remaining branches mostly decussately arranged laterally except the uppermost few, each branch subtended by a bract ranging from very prominent, acute, and 6–7 cm. long at the lowermost to ca. 1 mm. long and liplike at the uppermost; lowermost branches twice-branched into rachillae to 36 cm. long, 3 mm. in diam. at base (when dry), these drying lined but not transversely rugose, glabrous except for floccose scales at margins of triads; bracts subtending the triads very prominent and concealing the buds in young stages, to ca. 2 mm. long on inner side, prominent, rounded, and decurved, the upper margin of the triad elevated and liplike (when dry) at maturity; bracteoles surrounding the pistillate flowers subequal, imbricate, to 2.5 mm. high, bracteoles of the staminate pairs prominent.

Staminate flowers symmetric, greenish outside, whitish inside, 6–7 mm. long at anthesis; sepals ca. 3 mm. long, minutely ciliolate; petals spreading at anthesis, ca. 5 mm. long, attached to a floral receptacle 1 mm. long; stamens 6, filaments and anthers yellow; pistillode conic, about half as long as the stamens, yellowish: pistillate flowers green, 4.5–5 mm. long when dry, to 6 mm. long when fresh; sepals 3–4 mm. long, very strongly imbricate, the outer almost shell-like and somewhat ridged, all with ciliolate margins; petals 4–4.5 mm. long, with only the short, erect, valvate apices exserted above the sepals at anthesis, but becoming 7 mm. long in fruit; staminodes united in a membranous, more or less 3-lobed ring; stigmas white, recurved between the apices of petals.

Fruit ellipsoid, orange-red, 2.2–2.6 cm. long including prominent beak 2 mm. high, 1.0–1.4 cm. in diameter; mesocarp thin, with flat fibers longitudinally appressed against the fragile endocarp, this and the seed impressed over the hilum; seed ellipsoid, rounded at apex, 15–16 mm. long, 9–10 mm. in diameter, vasculature much anastamosed.

Seedling with 2 bladeless leaves, the



2. *Rhopaloblaste augusta* growing in the Botanic Gardens at Roseau, Domincia (*Bailey 711*). Photo by L. H. Bailey.

eophyll with ca. 7 pinnae on each side, rachis with shining castaneous membranous scales.

Distribution: Nicobar Islands.

Specimens examined: NICOBAR ISLANDS. KAMORTA: Feb. 1875, *S. Kurz s. n.* (K, isotype; photo BH, neg. 4913–14); locality and date not stated, *E. H. Man s. n.* (FI, Hb. Becc., Rec. Oct. 1886; photo BH, neg. 3878–80). CULTIVATED. INDONESIA: Java, Botanic Gardens, Buitenzorg [Bogor] XII. E. 89, sub no. *407* (FI, Hb. Becc.; photo BH, neg. 3881–83), same, April-May, 1936, *C. X. Furtado, S. F. N. 30946* (BH). CUBA: Atkins Garden, Harvard University, Soledad, Cienfuegos, 22 Feb. 1952, *H. E. Moore 6088* (BH). DOMINICA: Botanic Gardens, Roseau, Feb.-Apr. 1922, *L. H. Bailey 711* (BH). PANAMÁ: Canal Zone Experiment Gardens, Summit, Feb. 15, 1936, *W. R. Lindsay s. n.* (BH). TRINIDAD: Royal Botanic Gardens, Port-of-Spain, Mar. 1922, *L. H. Bailey 687* (BH); St. Clair Experiment Station, April, 1923, *W. E. Broadway 7030* (BH).

Rhopaloblaste augusta is a palm that deserves to be more widely grown for its attractive foliage and bright fruits. The general habit of the species is well exemplified by the individuals in Fig. 2, though in its native islands trunks may attain a much greater height.

Rhopaloblaste Brassii H. E. Moore, *sp. nov.*

Ab speciebus omnibus aliis *Rhopaloblastis* differt fructibus 2 cm. longis, 1–1.3 cm. in diam., rachillis non rugosis dense lepidotis, floribus masculis 4–4.5 mm. longis.

Stem solitary, dark brown or black, concentrically ringed, sometimes with residual leaf-sheaths below the crownshaft, 8.5–10 cm. in diam. at base and 5–6 cm. in diam. below the purplish-green crownshaft.

Leaves 7–11, "rather flat spreading;" sheath 62–70 cm. long, densely lepidote-tomentose; petiole 15–20 cm. long, densely appressed lepidote-tomentose below, densely lepidote with basifixed membranous scales above; rachis 2.9–3.8 m. long, densely lepidote or dark-puncticulate below, densely lepidote above with basifixed, twisted, castaneous, membranous, entire to lacerate scales or densely puncticulate in age; pinnae about 90 on each side, to 63 cm. long, 2.5 cm. wide, the midnerve prominent and elevated on the upper surface, more or less densely membranous-lepidote, at least near the base, with scales like those of the upper surface of the rachis, the midnerve and other nerves on lower surface brown-puncticulate, the midnerve and sometimes the secondary nerves also with basifixed or medifixed, dull-brown, twisted, membranous scales near the base.

Inflorescence to 95 cm. long, 164 cm. wide across lower branches, lower bract ca. 37.5 cm. long, lowest branches to 80 cm. long, twice branched, ultimate rachillae to 55 cm. long, drying angled but not rugose, 2.5–4 mm. in diameter at base, rather densely beset with small, thick, often branched, pale or red-brown to black trichomes, these often expanded apically and irregular in shape; bracts subtending triads low, rounded, ca. 1 mm. high; bracteoles surrounding the pistillate flowers subequal, imbricate, 1–1.5 mm. high.

Staminate flowers (*Brass 7135*) 4–4.5 mm. high, symmetric; sepals ca. 1.6 mm. high; petals with very minute depressions giving the appearance of being puncticulate; stamens 6; pistillode conic, about as long as filaments.

Pistillate buds at staminate anthesis (*Brass 7135*) ca. 3.5 mm. high with valvate apices of petals evident; sepals 2–3 mm. high in fruit; petals 5–7 mm. high in fruit; staminodes ca. 4, distinct.

Fruit red, ovoid- to obovoid-ellipsoid, ca. 2 cm. long including short excentric beak, 13–14 mm. in diam.; seed 13 mm. long, 10 mm. in diam., the hilum shallowly impressed.

Seedling with pinnate eophylls.

Vernacular name: *Kuwehleh* (Orne language, Wantipi, fide Darbyshire & Hoogland)

Uses: used for arrow points (bird arrows) but part not specified.

Distribution: New Guinea

Specimens examined: NEW GUINEA. WEST IRIAN: frequent in *Agathis* forest, 4 km. southwest of Bernhard Camp, Idenburg River, 900 m. alt., March, 1939. *L. J. Brass 13305* (A, holotype; L, isotype, photo BH neg 4471); common in rain-forest of moist alluvial flats, Bernhard Camp, Idenburg River, April, 1939, *L. J. Brass 13809* (A); in *Agathis* forest, Dalman, 45 km. inward from Nabire, 500 m. alt., Mar. 2, 1940, *R. Kanehira & S. Hatusima 12131* (A). TERRITORY NEW GUINEA: Sepik District; Aitape Subdistrict, near Wantipi village (on Bliri River) in tall forest on foothills, alt. ca. 800 ft., 3 Aug. 1961, *P. J. Darbyshire & R. D. Hoogland 8373* (BH). PAPUA. Palmer River, 2 mi. below junction with Black River, sporadic in ridge forest substage, alt. ca. 100 m., June 1936, *L. J. Brass 7135* (A); *7135A* (A).

None of the collections cited is complete and most are not truly comparable, being in various stages of flower and fruit, yet correspondence is sufficient so that I consider them to represent the same species. The type has mature fruit, *Brass 13809* has immature fruit, *Kanehira & Hatusima 12131* has pistillate buds, *Darbyshire & Hoogland 8373* has a portion of inflorescence in very young bud, *Brass 7135* and *7135A* have staminate flowers, pistillate buds, and unripe fruit which measures less than that in the type but more than that described for *R. Ledermanniana* with which Burret had earlier identified the last two numbers.



3. *Rhopaloblaste Brassii* (*Brass 7145*). Note the slender stem, spreading pinnae, and twice-branched, sharply divaricate lower branches of the inflorescence. Photo by L. J. Brass.

Lacking the type of *R. Ledermanniana*, which is presumed to have been destroyed, or material from the type-locality, I am unwilling to equate the materials cited here with that species since the fruit is twice as long. There is, moreover, no way of assuring from the description of *R. Ledermanniana* alone that it is truly a *Rhopaloblaste* and not a species of *Heterospathe*, while there is the suggestion that it may be *Heterospathe* in the nature of the pistillode of staminate flowers, the size of fruit, and the stature of trees. I have therefore described the above as new, drawing upon all materials but specifying as holotype fruiting material from West Irian.

Such contrasts as can be made with other species appear in the key to species.

Rhopaloblaste ceramica (F. A. W. Miquel) Burret, Repertorium Specierum Novarum 24: 288. 1928.

Bentinckia ceramica F. A. W. Miquel, De palmis Archipelagi Indici 8. 1868.

Rhopaloblaste hexandra Scheffer, Annales du Jardin Botanique de Buitenzorg 1: 156. 1876.

Solitary, to 15 m. high or more, trunk brown or becoming grayish.

Leaves to 3 m. long or more; sheath densely lepidote-tomentose; petiole short; rachis with 80–90 pinnae on each side, densely lepidote-tomentose below, becoming brown-puncticulate in age, clothed with rusty or dark-brown, twisted and often lacerate scales about the bases of the pinnae and along the central ridge above; pinnae pendulous, to 1.1 m. long, 2.5 cm. wide, glabrous above, densely and minutely brown-puncticulate below but membranous scales on midnerve apparently lacking.

Inflorescences several; peduncle ca. 8 cm. long; rachis ca. 55 cm. long, densely tawny-tomentose to glabrescent when young, with ca. 16 branches, the lowest ca. 45 cm. long, twice-branched into stout, glabrous rachillae to ca. 45 cm. long, 5–7 mm. in diameter at base; bracts subtending the triads low, not prominent, the upper margin of the triad not elevated nor liplike; bracteoles surrounding the pistillate flowers markedly unequal, the larger to 2.5 mm. high, bracteoles of the staminate pairs small.

Staminate flowers symmetric, green, to ca. 7.0 mm. long at anthesis; sepals 3 mm. high and wide; petals ca. 6.5 mm. long, adnate to floral receptacle for about 2 mm.; stamens 6 or 7, yellowish; pistillode orange, more than half as long as stamens.

Pistillate flowers green, ca. 4 mm. high, 6–7 mm. wide; sepals 4 mm. high in fruit; petals ca. 10 mm. high in fruit; staminodes united in an irregularly 6-lobed membranous ring.

Fruit scarlet, 3.0–3.5 cm. long, 16–18 mm. in diam., ellipsoid-ovoid; seed ca. 2.1 cm. long, 1.3 cm. in diameter, acutish, impressed over the hilum.

Seedling not described.

Distribution: Bachan (Batjan), Ceram in the Molucca Islands.

Specimens examined. CULTIVATED. SINGAPORE. Botanic Gardens, 11 Dec. 1963, *H. E. Moore, Jr. 9039, 9077* (BH); 23 Aug. 1925, *M. Nur s. n.* (BH); 4 Oct. 1929, *M. Nur s. n.* (BH); INDONESIA: Java; Giardino Botanico di Buitenzorg, Maggio 1878, *O. Beccari* (FI, Hb. Becc.; photo BH, neg. 3854–61).

Rhopaloblaste ceramica, often cultivated under the name *R. hexandra*, has been studied by me only from cultivated specimens. The type of *R. hexandra* was supposedly from the island of Bachan (Batjan) in the Moluccas while that of *R. ceramica* was from Ceram. Burret considered the two species identical and took up the earlier epithet. I have accepted his work and the similar conclusions of Beccari (ex Martelli, *Nuovo Giornale Botanico Italiano*, series 2, 42: 32. 1935) in the absence of authentic material. Complete collections from the wild state are much to be desired.

Rhopaloblaste dyscrita H. E. Moore, *nom. nov.*

Rhopaloblaste micrantha Burret, Notizblatt Berlin 15: 10. 1940; not *R. micrantha* (Beccari) Bentham & J. D. Hooker ex B. D. Jackson, Index Kewensis 2: 713. 1895.

Stems to 20 m. high, 30 cm. D. B. H. Leaves with rachis softly white-floccose-tomentose below, soon glabrescent above; pinnae numerous, spreading, rigid, linear, to 95 cm. long, 3.3 cm. wide,

slightly curved below above the base, the apex acuminate, bifid, obscurely bilobed, the upper lobe produced, nerves minutely dark-puncticulate below and the midnerve with large membranous scales.

Inflorescence large, broadly and divaricately twice- (or ?thrice-) branched; rachis 45 cm. long or more, broadly angled-rounded, 4 cm. wide at base or more; primary branches subtended basally by a short, broadly triangular-rounded bract, fruiting rachillae numerous, robust, to 85 cm. long, 5 mm. in diam. at the middle, bearing loosely spiralled triads in the lower two-thirds, paired staminate flowers in the upper third; bracts subtending the triads lightly produced and broadly rounded; bracteoles broadly rounded.

Staminate flowers (fallen) about 4 mm. high, broadly and shortly ovoid, more or less oblique, apex broadly rounded; sepals broadly ovate, rounded, imbricate, dorsally carinate; petals robust, smooth, ovate, obtuse; stamens and pistillode unknown.

Pistillate flowers (based on fruiting perianth) with broadly imbricate and rounded sepals 3 mm. high; petals ca. 1 cm. high, broadly rounded with short, broadly triangular apex; staminodial ring at length divided into a few dentiform staminodes.

Fruit, including perianth, 3.5 cm. long, oblong in outline, broad, the part slightly above the middle 1.8 cm. in diam., with a thick rostrum and oblique apex above, slightly acute and narrowed to the calyx below; seed ovate-oblong in outline, terete, acute, 3 cm. long, 1.4 cm. in diam.

Distribution: New Guinea. Territory of New Guinea: Morobe District.

Specimens examined: none.

In an earlier paper (*Principes* 10: 98. 1966), I suggested that spreading pinnae and a staminodial ring were not associated with *Rhopaloblaste* as I then understood the genus. It has since become obvious that the pendulous pinnae associated with the type-species and *R. augusta* are perhaps exceptional and that spreading pinnae may be more the rule. It has also become obvious that the staminodes in *Rhopaloblaste* are variously united in irregularly lobed rings or in pairs, or distinct. I have not been able to locate authentic material of the specimens cited by Burret when he described *R. micrantha* (*Clemens 7987*, type; *Clemens 8297*), but from the description (translated and adapted above) it seems likely that the taxon represents a true *Rhopaloblaste*. Since I cannot equate the description with that of any other species, since no material is available, and since Burret's epithet is a later homonym, I propose the new name *Rhopaloblaste dyscrita* from the Greek *dyskritos* (hard to determine, doubtful). The closest relationship would appear to be with *R. ceramica* from which *R. dyscrita* seems to differ chiefly in spreading pinnae and smaller staminate flowers. New and complete collections from the type locality are much desired to provide a basis for understanding *R. dyscrita*.

Rhopaloblaste elegans H. E. Moore, Principes 10: 94. 1966.

Solitary, tall palms tapered from a somewhat enlarged base with a mass of short, stout adventitous roots, ca. 12 m. high or more, 15 cm. in diam. near base, 7.5 cm. in diam. below crown, the bole gray-brown to rather light gray upward with chocolate-brown scales on new internodes.

Leaves rather numerous in a handsome spreading crown; sheaths ca. 8.5 dm. long, light green with a dense indument of brown scales and appearing brown, pinkish inside, tightly appressed and sticky inside; petiole short, 5–7.5 cm. long, green; rachis straight, covered with dense indument of shining, brown, fimbriate, peltate scales interspersed with

deciduous white tomentum below, densely covered with shining fimbriate scales above when young, ca. 3.4 m. long; pinnae ca. 76 on each side, bent downward at an acute angle up to 45° with the rachis, light green, stiff, papery, with prominent pale nerves and appearing sub-plicate above, green below, the midnerve elevated and clothed with dark-brown or grayish, dull, twisted, basifixed scales above as are also the margins, below clothed with short and moderate, shining, brown, twisted, basifixed scales, the secondary nerves ca. 3 on each side, prominent below and scaly or brown-puncticulate, lower pinnae ca. 30 cm. long, 1.1 cm. wide, pinnae at mid-leaf 64–68 cm. long, 2.7–3.4 cm. wide, upper pinnae 41–26 cm. long, 19–8 cm. wide, the apex acuminately and obliquely praemorse.

Inflorescences 1–3 below the leaves, enclosed in bud in subterete green bracts with brown lepidote-tomentose indument, the lower bract ca. 36 cm. long, laterally keeled, the keels extending into a flat rostrum ca. 2 cm. long, the upper bract enclosed within the lower, slightly keeled and rostrate, more densely lepidote-tomentose; expanded inflorescence with a short peduncle 6–8 cm. long, orange-green at base, then green; rachis ca. 30 cm. long; branches 15–16, the first two divaricate at about a 90° angle with the rachis and with a main axis ca. 23 cm. long, again branched into simple or furcate, pendulous, glabrous, non-rugose rachillae to ca. 40 cm. long, tipped with a brief sterile spinose apex, middle branches once-branched, the apical unbranched and to ca. 25 cm. long; triads borne on lower half of rachillae, paired or solitary staminate flowers above, subtended by a prominent rounded bract.

Staminate flowers glabrous, subsymmetric, 6–7 mm. long, greenish, leaving an orange scar on the green axis when fresh, acutish at apex; sepals 2 mm. long, 3 mm. wide, slightly keeled basally; petals 5–6 mm. long, 3 mm. wide; stamens 6, the flat white filaments ca. 2.5 mm. long, anthers yellow, 3 mm. long; pistillode dull yellowish, about as high as filaments, narrowed from an ovate base to a trigonous 3-lobed apex: pistillate flowers glabrous, surrounded by 2 low imbricate bracteoles ca. 1 mm. high, rounded in bud, 4 mm. high; sepals 3 mm. high, 5 mm. wide; petals 4 mm. high, 3 mm. wide; staminodes 4, more or less united basally; pistil ovoid with 3 short erect stigmas; pistillate perianth 6–7 mm. high in fruit.

Fruit maturing crimson with a copious glaucescence, green, yellow, to orange when immature, globose-obovate, 2.6 cm. high, 2.3 cm. in diam. when fresh, drying to 2.5 cm. high, 1.9–2.1 cm. in diam.; seed globose or depressed-globose, 1.7 cm. high, 1.8 cm. in diam., hilum deeply impressed, vascular bundles numerous and reticulate dorsally.

Vernacular names: *dai'e* (Kwara'ae language Kwai dialect); *angiriri* (Akui dialect).

Specimens examined: BRITISH SOLOMON ISLANDS PROTECTORATE. GUADALCANAL: north coast, vicinity of Honiara; gully forest 1 mile from coast and 1 mile east of White River headwaters, alt. ca. 500 ft., 27 March 1964, *H. E. Moore, Jr., G. F. C. Dennis & T. C. Whitmore 9310* (*BSIP 4085*) (BH, holotype; BSIP, isotype).

Rhopaloblaste elegans probably occurs on Choiseul Island also. It is distinctive in its fruit and once-branched basal inflorescence branches.

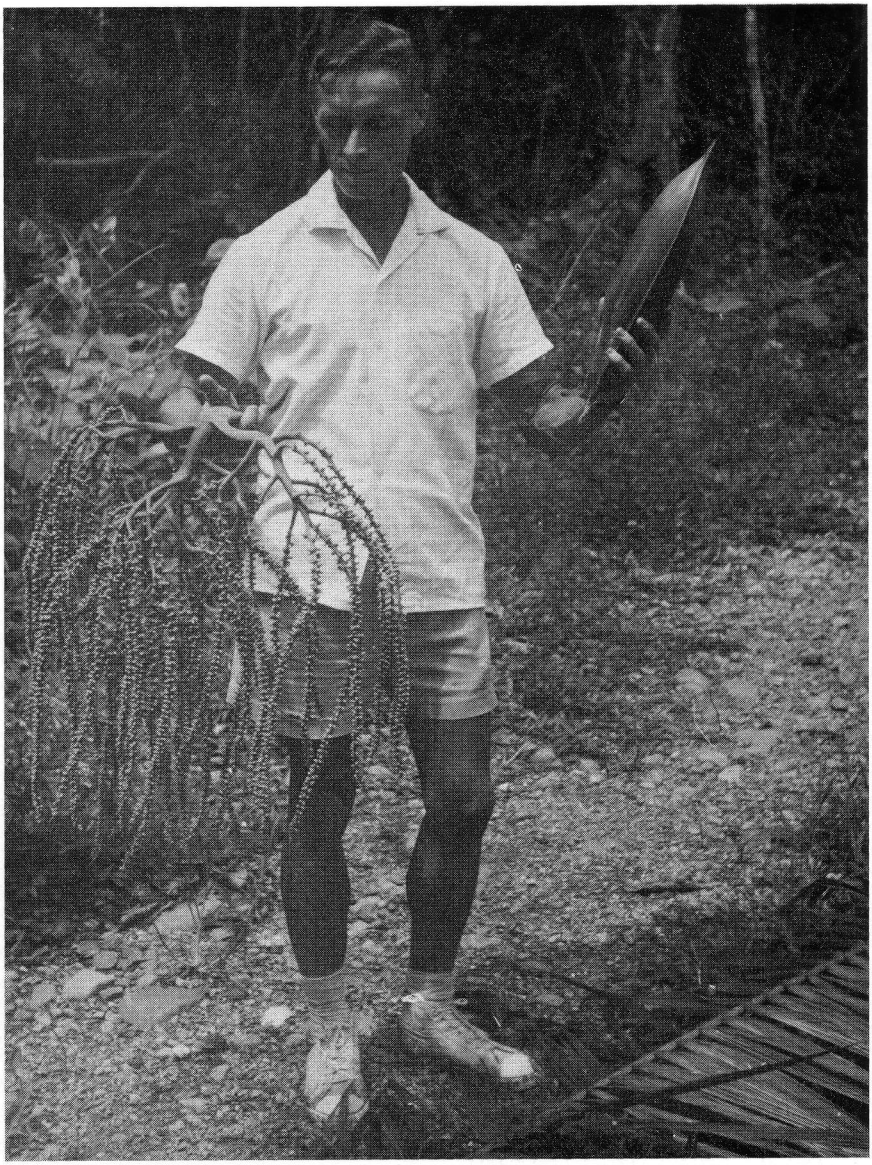
Rhopaloblaste Ledermanniana Beccari, Botanische Jahrbücher für Systematik 58: 45. 1923.

Moderate tree 3–8 m. high and thick as an arm or a leg.

Leaf 2.5 m. long, with very many equidistant pinnae, the intermediate ca. 45



4. *Rhopaloblaste elegans* at the headwaters of the Matinikau River near Honiara on Guadalcanal. Photo by H. E. Moore.



5. Mr. G. F. C. Dennis holds the expanded inflorescence of *Rhopaloblaste elegans* in one hand, an inflorescence still enclosed by the bracts in the other. Photo by T. C. Whitmore.

cm. long, 15–18 mm. wide, ensiform, straight, the apex acuminate and not or scarcely falcate, with minute scales on midnerve below, secondary nerves 3–5 on each side below, prominent, margins and secondary nerves puncticulate.

Inflorescences ample, 3–4 times branched, lightly reddish furfuraceous; rachillae 25–30 cm. long, 2–2.5 mm. thick.

Staminate flowers yellow, regular, ovate in outline; stamens 6, filaments

conspicuously inflexed at apex; pistillode conspicuous, trigonous, apically 3-lobed.

Fruit ovate, symmetric, acute, 10 mm. long, 8 mm. in diam.; seed ovate, acute, endosperm ruminate; fruiting perianth sheathing the fruit one-third, cupular, 4 mm. long, 5 mm. wide, subtended at base by reniform conspicuous bracts approximate to the calyx.

Distribution: New Guinea. Territory of New Guinea, along the April River.

Specimens examined: none.

Beccari cited two Ledermann collections from the April River (Aprilflusse) —*9718*, *8648*—and in text mentioned another, *Ledermann 8708*, from which measurements of pinnae have been taken. The above is a free translation of the original description published in Latin and German. Neither authentic material nor photographs of specimens have been seen, hence it is not possible to determine whether the species is truly a *Rhopaloblaste* or perhaps a species of *Heterospathe*. The type presumably having been destroyed at Berlin, it is to be hoped that ultimately new collections will be made from the type region to resolve the problem of identity.

Rhopaloblaste singaporensis (Beccari) J. D. Hooker in Bentham & J. D. Hooker, Genera Plantarum 3: 892. 1883.

Ptychosperma singaporense Beccari, Malesia 1: 61. 1877 ('*singaporensis*').

Ptychoraphis singaporensis (Beccari) Beccari, Annales du Jardin Botanique de Buitenzorg 2: 90. 1885.

Ptychoraphis longiflora H. N. Ridley, Journal of the Royal Asiatic Society, Straits Branch 41: 38. 1904.

Stems cespitose, to about 4 m. high, gray-brown, prominently ringed.

Leaves to 1.7 m. long; sheath about 26 cm. long, densely lepidote with interlocking, peltate, brown-centered, pale and often lacerate-fimbriate-margined scales or becoming merely brown-puncticulate; petiole elongate, 60–70 cm. long, with lacerate, castaneous, membranous scales; rachis ca. 1.1 m. long, rounded and castaneous-lepidote below, angled above and densely lepidote with basifixed, twisted, membranous scales or brown-puncticulate; pinnae 40–50 on each side, spreading, slender, to ca. 30 cm. long, 13–14 mm. wide, the midnerve and usually a prominent secondary nerve on each side on lower surface with basifixed or medifixed, twisted, brown, membranous scales at least near the base, all nerves minutely brown-puncticulate, median pinnae dark green, to 31 cm. long, 12 mm. wide.

Inflorescences decurved, to ca. 20 cm. long, densely covered with simple to branched or even stellate, brown to pale hairs or glabrescent, simply branched, or the lower branches forked; lower bract to 14 cm. long, densely brown-lepidote-tomentose, upper bract densely whitish-lepidote-tomentose; peduncle 1.5–3 cm. long; rachis 2–6 cm. long; rachillae green-brown, transversely rugose, to 34 cm. long, subtended by low, acute bracts; triads subtended by rounded bracts to ca. 1.5 mm. high; bracteoles surrounding pistillate flowers subequal, to about 1.4 mm. high.

Staminate flowers yellowish, 3–4(–5) mm. long at anthesis; sepals 1.5–2 mm. high, margins ciliolate; petals ca. 3 mm. high, adnate to a receptacle ca. 1 mm. high; stamens 6–9 but frequently 8; pistillode conic, about as high as the stamens in bud.

Pistillate flowers at anthesis about 5 mm. high; sepals 2 mm. high; petals 4.5 mm. high; staminodes 3–6, membranous, broad, obtuse, discrete or variously partially connate in an irregularly lobed ring.



6. *Rhopaloblaste singaporensis* forms clumps in the Singapore Botanic Garden. Photo by G. Addison.

Fruit orange-yellow to red, 13–14 mm. high including prominent beak 2 mm. high, 9–10 mm. in diam.; endocarp about 11 mm. long, 8 mm. in diam., prominently impressed over the hilum, operculum round, hilum impressed in the seed the length of one side.

Seedling with pinnate eophyll.

Distribution: Malay Peninsula and Singapore.

Specimens examined: SINGAPORE: a Woodlands, Marzo 1866, *O. Beccari Hb. No. 11180* (FI, holotype; photos BH, neg. 3870–72); nella parte selvatica del orto botanico, Gennaio 1878, *O. Beccari Hb. No. 11181* (FI, photo BH, neg. 3873–77; wooded slopes of nature reserve, Bukit Timah, 14 Dec. 1963, *H. E. Moore, Jr. & T. D. Pennington 9047* (BH); Krangi, 5 Aug. 1889, *H. N. Ridley 2136*

(FI); Chan Chu Rang, 1892, *H. N. Ridley 2124* (FI); Loos, 1891, *H. N. Ridley 3137* (FI) MALAYSIA. MALAYA: Johore; north of Labis, 5 miles, *M. R. Henderson 38203* (BH).

Rhopaloblaste singaporensis is here taken to include *Ptychoraphis longiflora* which seems not to differ in significant detail. The little-branched inflorescence with transversely rugose, mostly hairy rachillae, the cespitose habit, and orange-yellow fruit set the species apart.

Dr. T. C. Whitmore has independently concluded that *Ptychoraphis longiflora* could not stand as a distinct species. With his permission, I include here two paragraphs which were to have appeared in a forthcoming article of his own.

"*Ptychoraphis longiflora* was based on *Ridley 1121* collected in Johore on the top of Gunong Banang at Batu Pahat. I could not find the collection at Kew or Singapore. There is now a road to the top of G. Banang and a telecommunications tower on the top. The original forest has been destroyed all along the summit ridge and the slopes have been culled for timber. Now there is secondary forest and degraded, climber-tangled, primary forest patches. I very much doubt if *Ptychoraphis*, a delicate palm of primary forest undergrowth shade, has survived all this; I myself could not find it nor any other of the palms of primary forest undergrowth.

"Ridley's observations and descriptions on Malayan plants are sometimes uncritical. The diagnostic difference he stated from *Ptychoraphis singaporensis*—longer male petals, which he later amended to 'slender branched inflorescences with distant flowers and lanceolate petals' (*Flora of the Malay Peninsula* 5: 19, 1925)—are not fully substantiated by the full descriptions. I very much doubt if there are two species of this genus in Malay, and it seems that *Ptychoraphis longiflora*, a very weak species if one at all, is now probably extinct."

The description above was drawn largely from my own notes taken from a plant at Bukit Timah where the leaf sheaths were tubular and the apparently mature fruit was orange-yellow. Dr. Whitmore, however, has noted in other localities that "In *R. singaporensis*, the crownshaft is obscured by old persistent leaf sheaths which slowly rot away rather than abscissing neatly at the bottom and falling in one piece. The inflorescences develop in the axils of these moribund leaves, sometimes burst through their basis and sometimes persist after their sloughing. The fruit eventually ripen red. There are several records from the Dindings in lower Perak including my own *FRI 0991*. I have also extended its range into E. Pahang, Aur Forest Reserve (*FRI 3685*)."

EXCLUDED AND UNCERTAIN SPECIES AND SOME TRANSFERS TO HETEROSPATHE

The following do not belong to or are uncertainly placed in *Ptychoraphis* and *Rhopaloblaste*. They are referred chiefly to *Heterospathe* with complete synonymy provided under the listing for that genus below. Two epithets have not been transferred owing to the need for a detailed study of *Heterospathe* in the Philippine Islands.

Ptychoraphis

P. cagayensis = **Heterospathe cagayensis**

P. Elmeri = **Heterospathe Elmeri**

P. intermedia = **Heterospathe** sp.

P. microcarpa = **Heterospathe** sp.

P. philippinensis = **Heterospathe philippinensis**

P. Siebertiana Hort. Sander, Gardeners' Chronicle, series 3, 43: 257 and Supplementary Illustration, Apr. 25, 1908 = ?

The description accompanying this name is of a juvenile plant and is so general that not even the genus can be properly ascertained. The name should be rejected from future consideration since there appears to be no further description with detail requisite for generic assignment.

Rhopaloblaste

R. arfakiana = **Heterospathe arfakiana**

R. Elmeri = **Heterospathe Elmeri**

R. intermedia = **Heterospathe** sp.

R. Macgregorii = **Heterospathe Macgregorii**

R. micrantha = **Heterospathe micrantha** but see also *Rhopaloblaste dyscrita*

R. microcarpa = **Heterospathe** sp.

R. princeps Hort. Bull, Gardeners' Chronicle, series 2, 13: 759. 1880 = ?

The description, if such it can be called, cannot be applied even at the generic level. The name should be rejected from future consideration.

Heterospathe

Heterospathe arfakiana (Beccari) H. E. Moore, *tr. nov.*

Ptychosperma arfakianum Beccari, Malesia 1: 57, 101. 1877 (*'arfakiana'*).

Rhopaloblaste ? arfakiana (Beccari) Beccari ex Martelli, Nuovo Giornale Botanico Italiano, series 2, 42: 76. 81. 1935.

Mature fruit of certain origin is not part of the type (*Beccari Hb. No. 11187*) but the nature of the inflorescence, the nervature and acute apices of the pinnae, together with the morphology of the staminate flowers in combination are congruent neither with *Ptychosperma* nor with *Rhopaloblaste*. They are congruent with *Heterospathe* as are fruits from a separate packet in the Beccari Herbarium (*No. 11163*) which were associated with the type by Beccari though not described. These fruits are 13 mm. long, 8 mm. in diameter, with a perianth 3 mm. high. They are within the range of expected size for mature fruit of *Heterospathe pilosa* (Burret) Burret from the Cyclops Mountains of West Irian. Should these taxa ultimately prove identical, the name *Heterospathe arfakiana* will have priority.

Heterospathe cagayensis Beccari, Philippine Journal of Science, Botany 4: 611. 1909.

Ptychoraphis cagayensis (Beccari) Beccari, Philippine Journal of Science 14: 328. 1919.

Heterospathe Elmeri Beccari in Elmer, Leaflets of Philippine Botany 2: 646. 1909.

Ptychoraphis Elmeri (Beccari) Beccari, in Philippine Journal of Science 14: 328, 1919.

Rhopaloblaste Elmeri (Beccari) Beccari in Martelli, Atti della Società Toscana di Scienze Naturali residente in Pisa, Memorie 44: 138 [reprint 27]. 1934.

Heterospathe Macgregorii (Beccari) H. E. Moore, *tr. nov.*

Rhopaloblaste Macgregorii Beccari in Martelli, Atti della Società Toscana di Scienze Naturali residente in Pisa, Memorie 44: 134 [reprint 23]. 1934.

The type of this species, collected by Sir W. MacGregor on the Fly River,

Papua, is fragmentary with some sections of leaf, two branches of an inflorescence in very young bud, and loose fruits. It conforms well with a more recent collection from limestone banks of the Kikori River, Gulf Division, Papua (*K. J. White N. G. F. 10714*, BH), which has a long-pedunculate inflorescence in its entirety and three-nerved pinnae characteristic of *Heterospathe*. The fruit has an essentially apical stigmatic residue as in *Rhopaloblaste* but unlike that genus there are diagonal fiber-sclereids in the outer mesocarp and anastamosing red tannin bodies between the longitudinal fibers and the endocarp. Transferred to *Heterospathe*, the species approaches *H. pilosa* (Burret) Burret from West Irian but differs in having much larger though ellipsoid fruit.

Heterospathe micrantha (Beccari) H. E. Moore, *tr. nov.*

Ptychosperma micranthum Beccari, Malesia 1: 52. 1877 ('*micrantha*').

Rhopaloblaste micrantha (Beccari) Bentham & J. D. Hooker ex B. D. Jackson, Index Kewensis 2: 713. 1895; Nuovo Giornale Botanico Italiano, series 2, 42: 78, 81. 1935.

Examination of the type material of this species makes clear that it belongs in *Heterospathe* rather than *Ptychosperma* or *Rhopaloblaste*. It falls among those species previously referred to *Ptychandra* but recently incorporated in *Heterospathe* (*Principes* 13: 99–105, 1969) and in a provisional key to species runs to the vicinity of *Heterospathe Clemensiae* because of the ellipsoid fruit. There do appear to be adequate specific differences between the two taxa however.

Heterospathe philippinensis (Beccari) Beccari, Philippine Journal of Science, Botany 4: 610. 1909.

Ptychoraphis philippinensis Beccari, Annales du Jardin Botanique de Buitenzorg 2: 90. 1885; Malesia 3: 109. 1886.

Heterospathe sp.

Ptychoraphis intermedia Beccari, Philippine Journal of Science 14: 328. Mar. 1919; Leaflets of Philippine Botany 8: 3011. Aug. 1919.

Rhopaloblaste intermedia (Beccari) Beccari ex Martelli, Nuovo Giornale Botanico Italiano, series 2, 42: 75, 81. 1935.

The relationship of this and the next to other species of *Heterospathe* in the Philippines is not clear hence the epithets are not transferred.

Heterospathe sp.

Ptychoraphis microcarpa Beccari, Philippine Journal of Science 14: 327. 1919.

Rhopaloblaste microcarpa (Beccari) Beccari ex Martelli, Nuovo Giornale Botanico Italiano, series 2, 42: 75, 81. 1935.

Some Notes on Palms Growing in the Jacksonville Area of Florida

CHARLES RAULERSON AND WILLIAM THEODORE WAAS II

The winters in Florida's northernmost large city—Jacksonville—are frequently startling severe in comparison with central Florida, southern Florida and coastal southern California. A series of articles on the palms growing in this area may therefore be of interest to the readers of *Principes*, particularly now that we have just gotten through one of the greatest freezes of the century—a freeze second only to the 1962 freeze in low temperature, but of first rank in duration (number of hours below freezing). The recent freeze began on the night of Tuesday, January 6, 1970, and continued until Sunday morning, January 11, 1970. During this period, 48 hours or more were below 32° F.; many of these hours were in the low twenties, with 18° F. being the lowest temperature generally reported. Only in the middle of the afternoons during a four-day stretch did the mercury rise above 32° F., and then only briefly.

We begin our series of articles with a few photos of, and comments on, one of the handsomest palms that can be grown in this area, which is subjected to occasional prolonged hard freezes. This particular palm, we feel, is as handsome as any growing in any area, tropical or subtropical. It is reported to be a natural cross between *Butia capitata* and *Arecastrum Romanzoffianum*.

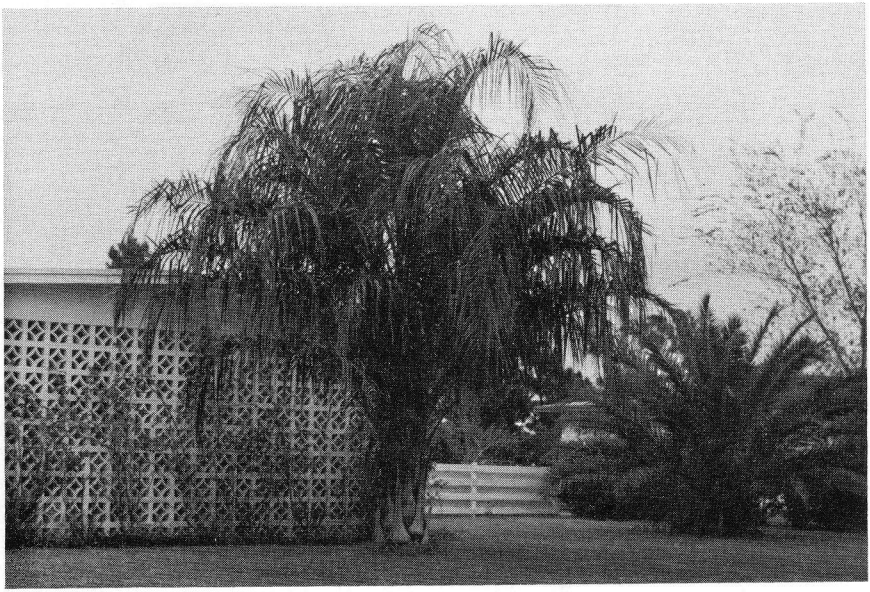
A number of these presumed hybrids (perhaps twenty or more) exist in the Jacksonville area, but an even larger number exist in the Leesburg–Orlando areas in central Florida. The palm has the hardiness of the *Butia* and the feathery fronds and tropical look of the *Arecastrum*. The 12° F. minimum of the freeze of 1962, however, damaged slightly some of the tips of the fronds on several of the smaller hybrids in this area. No damage has been noted to any of these hybrids in the recent freeze of January 7–12, 1970 (see Dent Smith's splendid article on cold damage in *Principes* 8: 26–39, 1964, in which he re-



1. An 18-year-old hybrid growing in the yard of Charles Raulerson, 14521 Plumosa Drive, Isle of Palms, Jacksonville Beach, Florida 32250. It has never bloomed. The smaller palm in the foreground is *Erythea armata* which also was undamaged in the recent prolonged hard freeze.



2. A hybrid about eight years old recently planted in the yard of William Theodore Waas, 5941 Caribbean Drive, Jacksonville, Florida 32211. The hybrid was undamaged in the recent freeze, but the *Arecastrum* on the left was severely injured. The small *Trachycarpus Fortunei* on the right, of course, is perhaps the hardiest of all palms.



3. This hybrid is located in the yard of Mr. Maurice Tipple on the corner of Starwan St. and Mathonia Ave. in Jacksonville. It is the most attractive hybrid the authors have seen. Note the large fruits shown in Fig. 4. At least one seed from these large fruits is reported by Mr. Tipple to have sprouted recently. The magnificent crown is exceptionally green, feathery, and dense.



ports on the cold tolerance of his hybrids).

On the more attractive of these hybrids, the fronds typically are 12–13 feet in length from trunk base to tip; the fronds are deep dark green in color, more so than either of its alleged parents. The shape of the fronds varies, apparently, according to its *Butia* parentage. Some of the hybrids may have had *Butia capitata* var. *strictor* parentage and hence have fronds that tend to sweep upward in a very graceful manner. We feel that the quality and color of the frond of this hybrid rivals that of the coconut palm, *Cocos nucifera.*

The trunk tends toward the stoutness of *Butia*, but in older hybrids the boots gradually drop off, revealing a smooth, grey-white trunk, but not as smooth as

←

4. Fruits on the palm in Fig. 3.



5. These two hybrids are located on the strip between the sidewalk and street on the corner of Avondale Ave. and Oak St. in Jacksonville. Note the strict habit of the plant on the right. Each is about 20 years old and both produce large fruits but nothing is known of their viability. The plants have to be seen to appreciate their rich, dark green color and to note how strikingly different they are from *Butia capitata.*

that of its *Arecastrum* parent. Plants typically have 20 to 28 fronds in the crown, giving a much fuller appearance than the crowns of the *Arecastrum* and the *Butia*.

Some of these hybrids observed in the central Florida area look more like their *Butia* parent; but even when they are barely distinguishable from the *Butia*, they are unarmed—which is a dead giveaway as to its hybrid status; the petioles of true *Butia* are heavily armed.

The fruits vary from tiny pea size to the plump marble size of *Butia* and *Arecastrum*. No less an authority than Dent Smith attests to the sterility of the seeds, although the sprouting of at least one seed from a recent crop from one particularly attractive specimen in this area has been reported recently. Seeds from the specimen mentioned are large and characteristically cocoid.

At least one or more of these hybrids has produced a few possibly viable seeds from time to time, but the seeds have not germinated because they were not planted under conditions favorable to germination. We would like to learn if readers have had any success in germinating seeds from these hybrids.

PALM BRIEFS

Interesting Exhibition Planned for Honolulu

From a brochure recently received we quote the following:

"Come September, Honolulu will be the site of a spectacular horticultural display showing the history of man's relationship to the plantlife of his environment. It's called Flora Pacifica 1970. It's a $250,000 "ethno-botanic" exposition. And it will run 10 days, from September 11 to 20, at the giant Honolulu International Center Arena.

"Flora Pacifica deals specifically with the histories and cultures of all Pacific Basin people, past and present, by showing man's ingenuity using plant life for food, to build homes, make clothes and implements. . . even to satisfying his gods.

"There will be 10 major life-size, walk-through pavilions, each a microcosm or perfect example of a specific culture or civilization which borders on the Pacific Ocean."

Palms should have a prominent place in such an exhibition. If the detailed description is accurate, a visit to Flora Pacifica should be of interest. Anyone wanting further information may write to Communications-Pacific, Inc., Suite 825–1600 Kapiolani Blvd., Honolulu, Hawaii 96814.

L. H. WAIT

CLASSIFIED SECTION

FOR SALE—Good copy of Blatter: Palms of British India. First check for $67.00 takes it. Edwin A. Menninger, Box 217, Cashiers, North Carolina 28717.

Liberbaileya gracilis

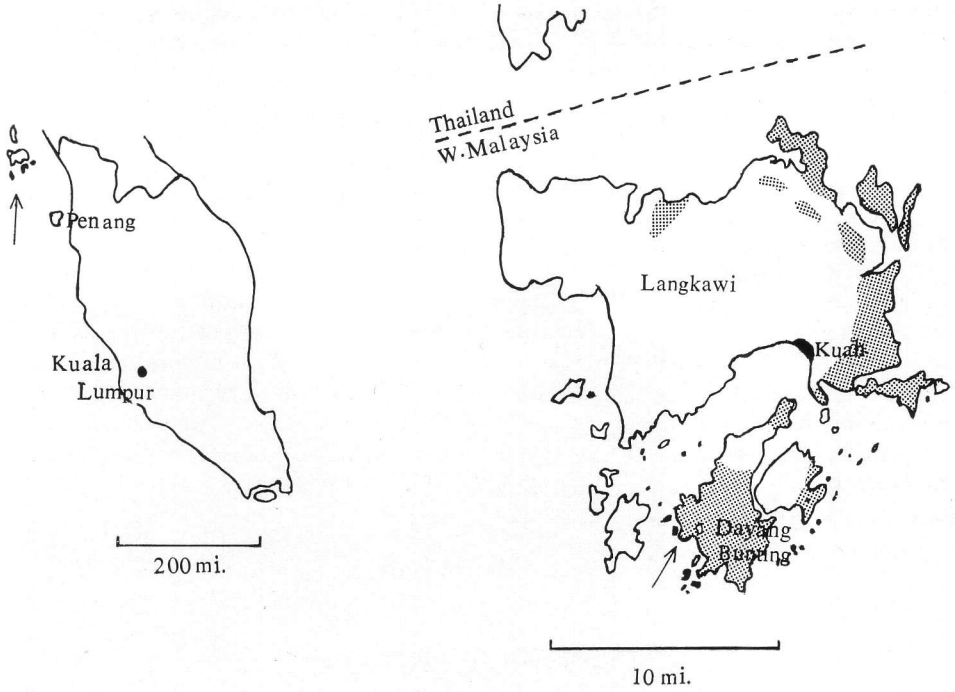
T. C. WHITMORE

Forest Research Institute, Kepong, West Malaysia

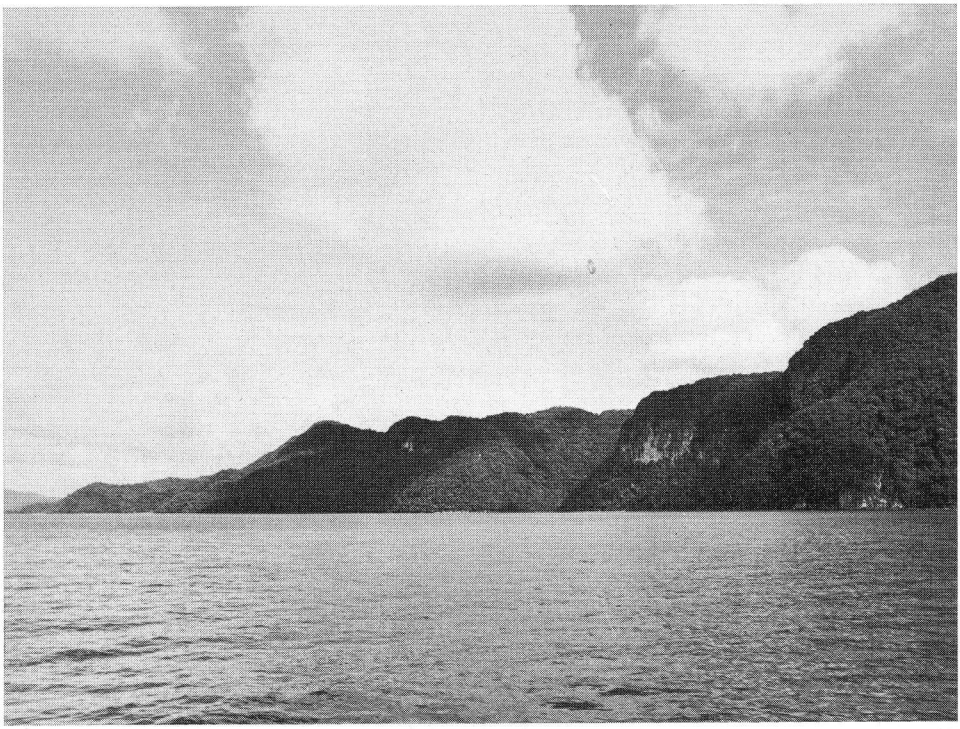
Far from the international tourist track, and remote for most residents too, the Langkawi Islands lie twenty miles off the west coast of the Malay peninsula athwart the Thai–West Malaysia border. The islands are connected to the mainland by a ferry which crosses daily from Kuala Perlis, two and one-half hours drive north of Penang.

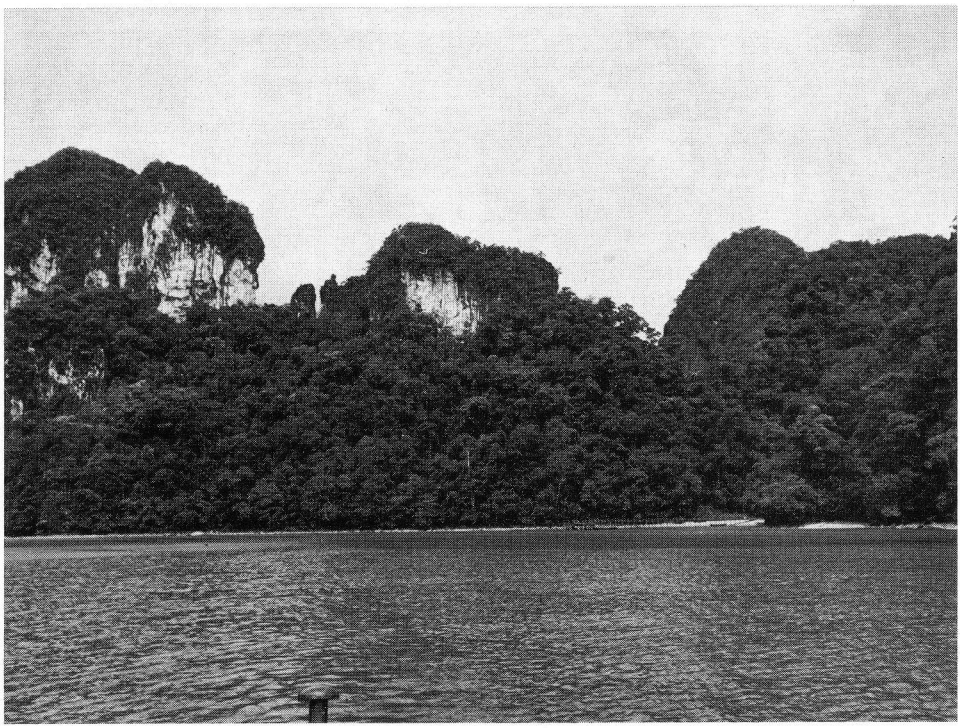
The principal island in Malaysian Langkawi has a small town, Kuah, with a government rest house and two small hotels, facing south on to the precipitous cliffs of the second largest island, Dayang Bunting a few miles away across Bass Harbour. At the farther end of Dayang Bunting from Kuah, about two hours away by chinese sampan (whose hire can be arranged with the rest house keeper), grows *Liberbaileya gracilis*, an elegant, dainty, small fan palm known from nowhere else in the world.

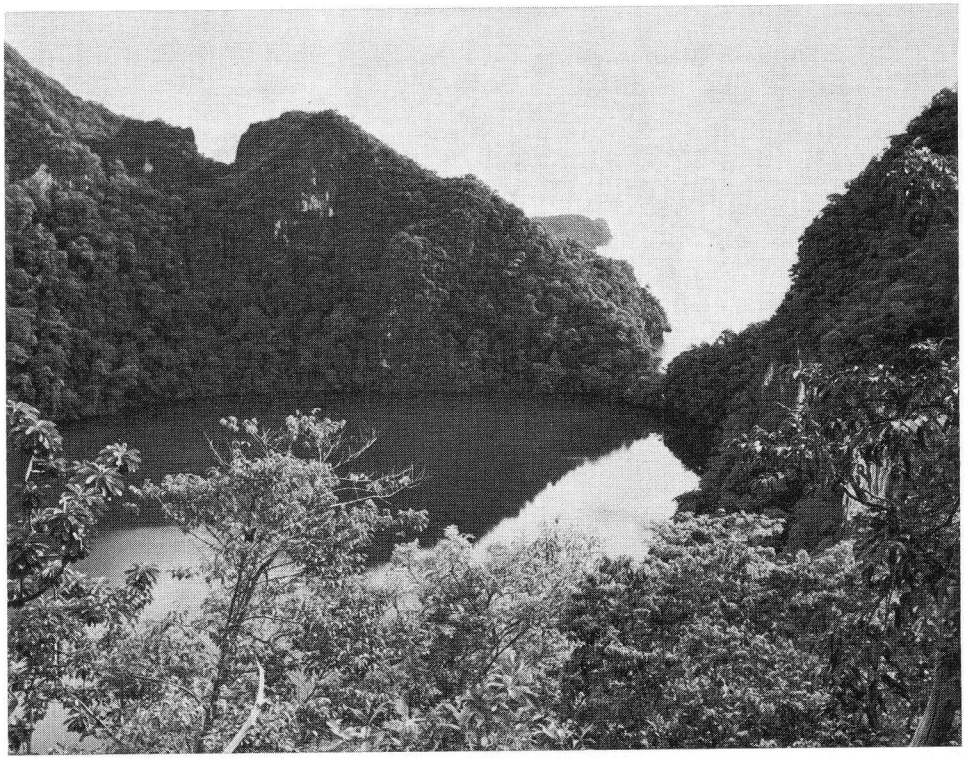
Liberbaileya is a palm with several claims of interest. It was originally described by Ridley in 1904 as a species of *Livistona*, confused with the other Malayan limestone fan palm *Maxburretia*, and only in 1941 were the differences discovered, independently by Furtado in Singapore and Burret in Germany (see



1. Maps of region where *Liberbaileya* grows. Left: W. Malaysia showing location of the Langkawi islands. Right: Malaysian Langkawi; limestone hills stippled, locality of *Liberbaileya* arrowed.







4. The freshwater lake separated from the open sea by an isthmus only 60 ft wide; viewed from the *Liberbaileya* forest.

Moore 1967). Furtado named his two genera after the two pre-eminent palmologists of the day, Prof. Liberty Hyde Bailey of Cornell, and Prof. Dr. Max Burret of Berlin. He pointed out that the relationship of these palms is closer with *Chamaerops* and *Trachycarpus* of the Mediterranean and Himalaya than with *Livistona* or other tropical coryphoid palms. Both genera are restricted to very small areas of limestone. Dayang Bunting has a limestone north cape, a shale centre and a limestone southern end. There are many other limestone hills on the other Langkawi islands. Yet *Liberbaileya* has only been found on a small part of the southern Dayang Bunting limestone. As the visitor approaches by sea he can see scattered plants on the cliffs through binoculars as he enters the strait by Batu Merah island. One of these palms was figured in the note in *Principes* by Moore (1967) already referred to, based on information and photographs supplied by Dr. B. C. Stone. The boat passes Batu Merah then enters a bay to a convenient jetty, landing point for a picturesque freshwater lake, bowled

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2. View northwards along west coast of Dayang Bunting island showing part of the southern limestone and beyond it the shale waist of the island. Langkawi island with Kuah at extreme left.

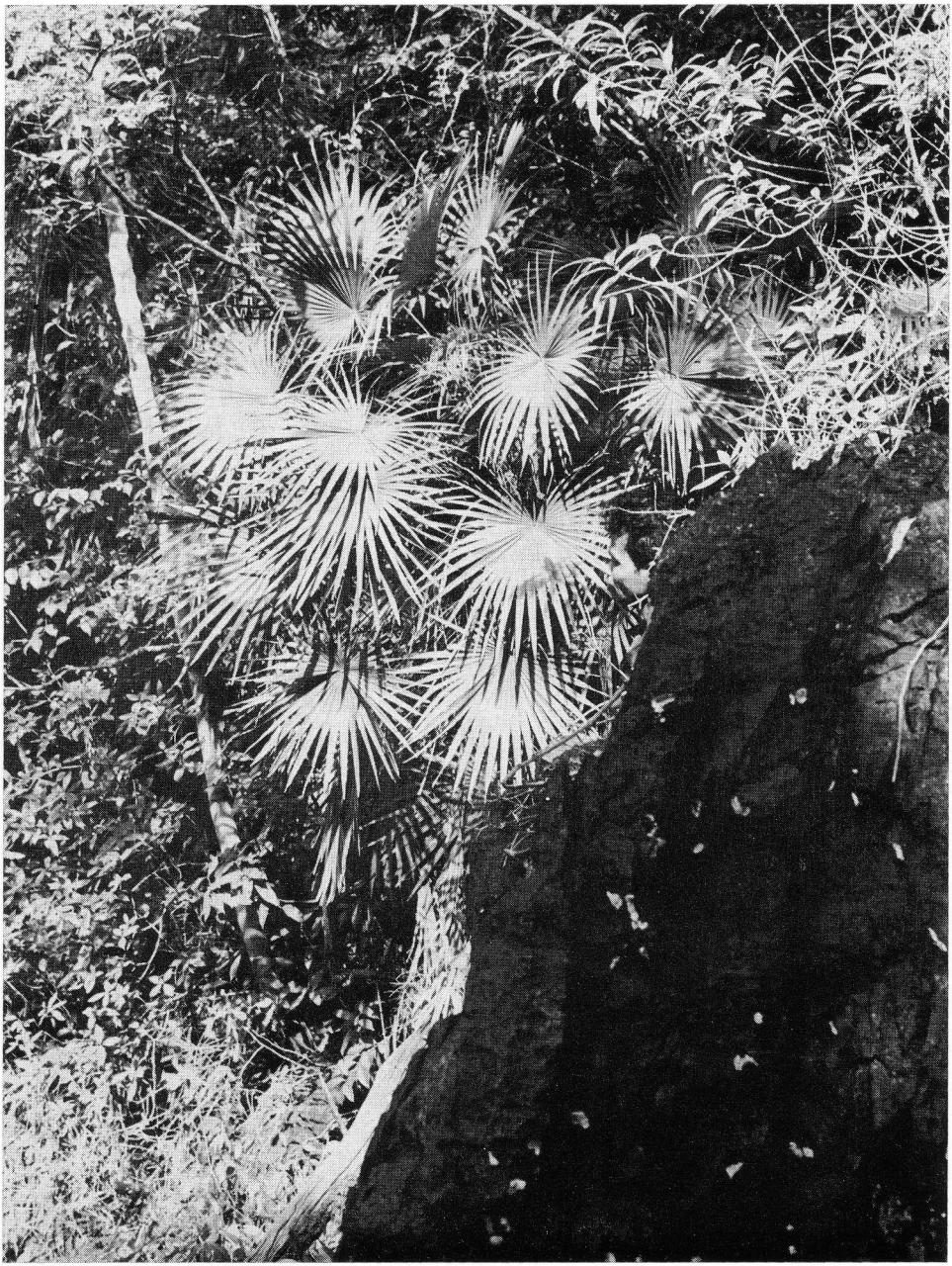
3. The bay and jetty on Dayang Bunting. *Liberbaileya* groves cover the top of the hill on the extreme right.



5. *Liberbaileya*, a big clump, about 20 ft tall.



6. *Liberbaileya*, with Datah.



7. *Liberbaileya*, with Mahayu.



8. The old dead leaf sheaths split in an attractive symmetrical manner.



9. *Liberbaileya* inflorescence, with Gi.

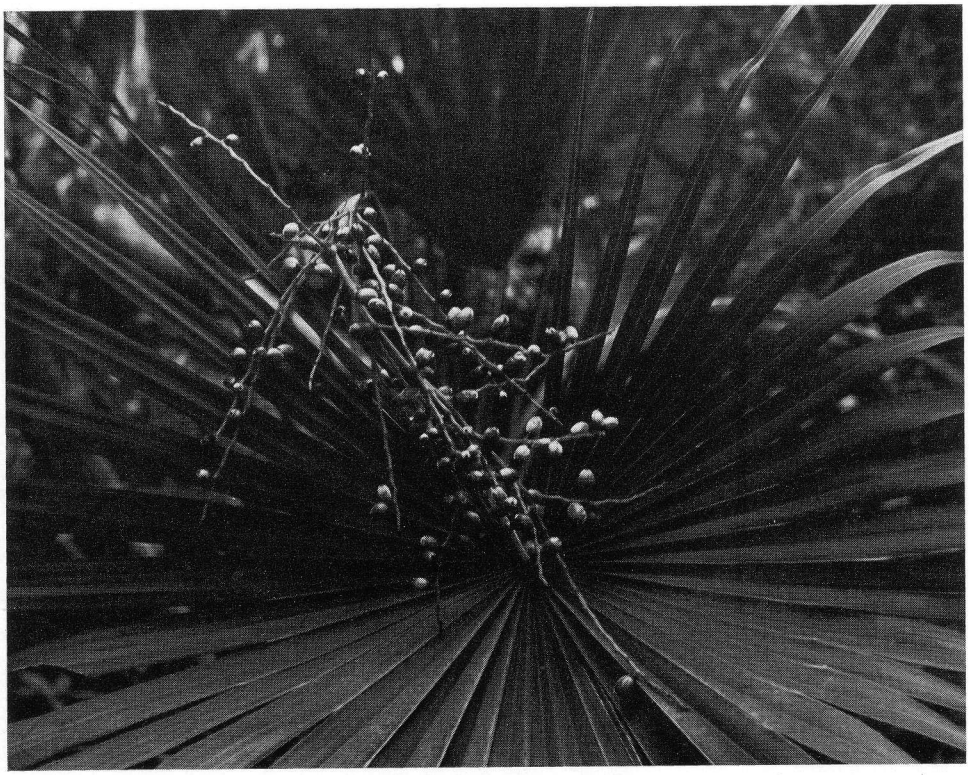
by limestone cliffs. By scrambling up the hill north of the isthmus separating the bay from the lake, extensive groves of *Liberbaileya* can be reached.

Liberbaileya is an undergrowth palm, and under the light shade of the 20–30-foot-high forest on this hilltop it is exceedingly abundant, in places dominating the undergrowth. It is rare on hillsides, and absent from the highest peaks which are more exposed. It is rare in the open. The few plants seen from the boat are atypical. The limestones of Langkawi are amongst the oldest rocks in the country. The outcrop from which *Liberbaileya* is known is thought to be of Permian age. It is hard and much altered by heat and folding. Aeons of weathering have produced a karst landscape, and because it is an impure limestone, the weathering has left the crevices full of a red brown soil.

Liberbaileya forms clumps of one or two rosettes and one to four stems, and is usually 4–10 ft. tall. The stems are often slightly curved; in their upper parts they are clothed with the beautifully regularly split, grey-brown, old leaf sheaths. The roundish crown has numerous flat fan fronds deeply divided into narrow segments, pale green, and below very slightly grey with fine brown dots. Several inflorescences are borne in the crown; these comprise a 2–3-foot slender sinuous stalk with several sheathing spathes and a brushlike cluster of twisted flower-bearing branchlets at its tip. The flowers have gun-metal grey petals and cream anthers at maturity and a slightly sweet fragrance. On my visit



10. *Liberbaileya*, flowers at anthesis.



11. *Liberbaileya* young fruits, matchstick scale just visible in centre.

in mid-December 1969 I found most of the palms in flower and a few with young silvery-grey, hairy fruits. No one has ever found ripe fruits.

Furtado based his description on *Henderson SFN 29134*; it became the type of his new genus and species *Liberbaileya lankawiensis*. He also saw *Curtis 2661*, of which one sheet (Oct. 1900) has very young flowers, and a sterile collection by Fox. He describes the flowers as hermaphrodite or female and notes that both are of similar structure. His discussion and description stress this dioecism.

Burret saw a duplicate of the Henderson collection, and described the flowers as hermaphrodite.

I dissected numerous pickled flowers from my own gatherings and found them all to be in bud or anthesis, and all fully hermaphrodite (reference collection *FRI 15053*).

I have therefore carefully re-examined Furtado's holotype at Singapore. It bears three inflorescences. I boiled up and dissected three flowers from each one. The first (a) has the flowers at anthesis, as in my gatherings, with the anther cells 0.3–0.4 mm long. The second (b) has indeed got empty anther cells, but careful dissection suggests they are old ones, as they are split all down the outer edge, and do in fact contain a few pollen grains; they are 0.2–0.3 mm long. The third inflorescence (c) bears a few young fruits and a few old flowers similar to (b). I think Furtado misinterpreted the flowers on (b) and (c) as being functionally female; I believe them

to be old hermaphrodite ones with empty withered anthers.

Rare plants everywhere in West Malaysia are today under threat of extinction due principally to the fecundity of late twentieth century man, and to his rapacity armed with bulldozer and one man chain saw; the rain forest ecosystem of the country is likely to be largely destroyed within the next decade. Fortunately *Liberbaileya* grows on limestone in a stunted forest of no commercial value and will therefore survive. Moreover it takes a determined visitor to reach Langkawi island and then Dayang Bunting, and an athletic one to reach the exquisite groves of this lovely palm, so it is unlikely to be lost to overkeen gardeners or naturalists. Limestone hill forest is sometimes burned elsewhere in the country, and some measure of protection from fire might be desirable as Langkawi becomes more visited. On the whole, though, one can probably regard *Liberbaileya* as a symbol of the richness and interest of the plants of Malaysia, which is more likely to endure than most.

LITERATURE CITED

FURTADO, C. X. 1941. Palmae Malesicae IX. Two new coryphaceous genera in Malaya. The Gardens' Bulletin, Singapore 11:236–243.

MOORE, H. E. 1967. *Liberbaileya gracilis*. Principes 11:98–99.

RIDLEY, H. N. 1904. New Malayan plants. Journal of the Straits Branch, Royal Asiatic Society 41:38–44.

NEWS OF THE SOCIETY

A Rare Palm From Thailand

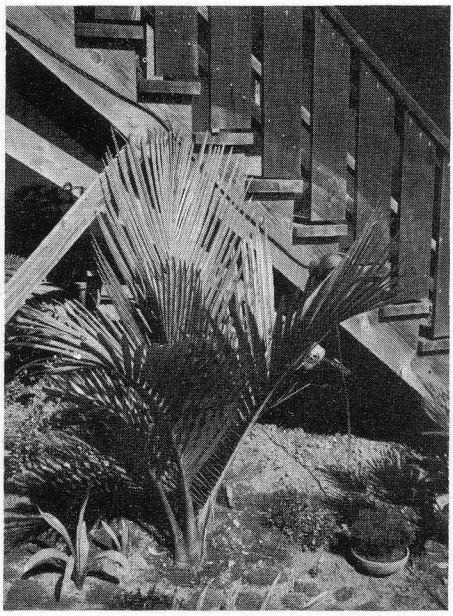
When members of The Palm Society reached Thailand, on their around-the-world trip in 1968, they were shown a *Licuala* species native to the southern part of that country. It took their breath away with its dignified beauty. The entire leaves are six to seven feet across, although the plant itself is not large.

There are very few specimens of this palm in Bangkok as yet, but it can be found occasionally growing wild in its native area in southern Thailand. Dr. U. A. Young, of Tampa, Florida, made a slide of one plant growing in Bangkok, and standing beside it was a former government forester, a gentleman now over eighty, who had brought and planted it in his garden. Mr. Pittha Bunnag, Director of Vocational Training for the Ministry of Education in Thailand, has color slides of this *Licuala* taken in the wild, which he showed to a number of Palm Society members when he visited the United States last year.

Everyone who saw the actual plants or the slides immediately developed a tremendous desire to own this *Licuala*,



1. *Licuala* sp. growing in a garden in Thailand. Photograph courtesy of Commander Watana Sumawong.



2. A young plant of *Rhopalostylis sapida* growing on a hillside in San Francisco. Photograph courtesy Richard Douglas.

which is being temporarily called *L. elegans*, pending a more accurate identification.

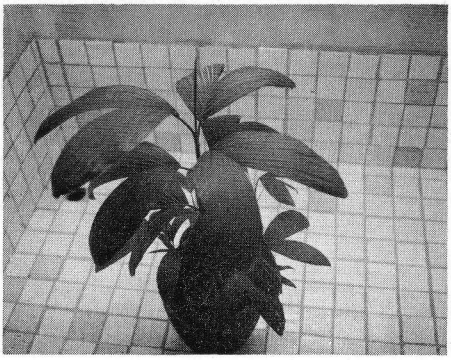
Recently, seeds have become available, and members in Bangkok have donated some of them to the Seed Bank, which has parceled them out to those who have expressed a wish for them.

Commander Watana Sumawong recently sent the Society a photograph of this stunning *Licuala*, so now all can see what a prize they will have if they germinate these seeds. Mr. James Benzie, of California, has had success in germinating those seeds from which he removed the hard shell. He does this to all palm seeds he plants, and reports very good results from this method.

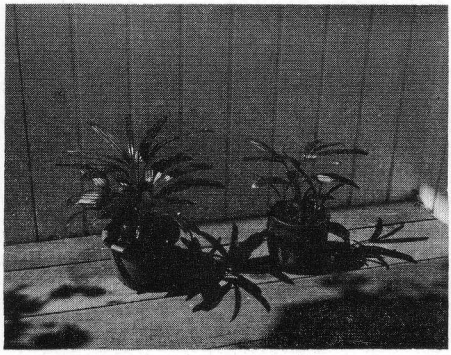
Some Palms Growing Thriftily in San Francisco

Captain Walter Haught and Mr. Richard Douglas, both United Airlines pilots, have a house on a steep hillside in San Francisco. There they grow many ornamental plants, including several species of palms.

Mr. Douglas recently sent us pictures of several thriftily growing palms: *Rhopalostylis sapida*, *Chamaedorea nana* (?) and *Rhapis excelsa*, two pots of the latter showing excellent growth from seeds planted April 12, 1968. He wrote: "This is photographic evidence that Rhapis aren't all *that* slow!"



3. A clustering *Chamaedorea*, possibly *C. brachypoda*, from cultivation in San Francisco. Photograph courtesy Richard Douglas.



4. *Rhapis excelsa* germinated from seed April 12, 1968. This is photographic evidence that *Rhapis* isn't as slow to grow as is often thought. Photograph courtesy Richard Douglas.