

Revision of the Genus *Pandanus* Stickman. Part 39 *Pandanus* of Rotuma Island, Pacific Ocean¹

HAROLD ST. JOHN²

ROTUMA is a small volcanic island, situated in the tropical central Pacific Ocean, at 12°30' S latitude, 177°05' E longitude. On it are numerous peaks, some more than 800 feet in height. It is an isolated island, not definitely assigned to any group or archipelago, but politically it is now a part of the British Crown Colony, Fiji, and is nearest to Vanua Levu of the Fiji Archipelago, about 300 miles to the southeast. To the north lie the Ellice Islands; to the east, Wallis Islands and Samoa; and to the west, the Santa Cruz Islands and the New Hebrides. Rotuma, which is situated at the point where Melanesia, Micronesia, and Polynesia meet, deserves close study. Nevertheless, to the present, its flora is unknown.

Rotuma was explored botanically in 1938 by the writer, assisted by a grant from the Carnegie Corporation. Its flora contains 10 species of *Pandanus*, 5 of which are new endemics, 2 are indigenous but of wide distribution westward across the Pacific, 1 is a cultivar with edible fruit, introduced from the Gilbert Islands, 1 is a local sterile cultivar providing leaves for plaiting, and 1 is a recently introduced cultivar grown for its ornamental, white-striped leaves. This is an impressive total of species for a small island only 860 feet high and 9 miles long, but all of the endemics belong in the section *Pandanus*, which contains so many littoral species of the Indian and the Pacific oceans.

KEY TO SPECIES

- A. Plants not flowering, sterile, found only in cultivation,
 - B. Leaves wholly green *P. Hata* cv 'Sa'anga'.
 - B. Leaves with several lengthwise white stripes *P. variegatus*.
- A. Plants flowering and fruiting,
 - C. Stigmas 1-5, arranged in one line §*Hombromia*.
 - D. Phalanges (or sections of the fruit) 7.3-9 cm long, obovoid.....*P. compressus*.
 - D. Phalanges 9.5-13.5 cm long, oblanceoloid *P. dubius*.
 - C. Stigmas clustered and all facing the center axis, usually more numerous than 5...§*Pandanus*.
 - E. Phalanges 9-9.7 cm long, the lower half fleshy and edible, with 10-17 stigmas; cultivated fruit tree *P. tectorius* var. *novi-caledonicus* cv 'Farkoi'.
 - E. Phalanges 3.2-6.5 cm long, with 4-9 stigmas; wild species,
 - F. Phalanges 5.8-6.5 cm long,
 - G. Seeds supramedian; apices of marginal carpels rounded *P. Hata*.
 - G. Seeds inframedian; apices of marginal carpels broadly pyramidal-ovoid *P. rotumaensis*.
 - F. Phalanges 3.2-4.9 cm long,
 - H. Phalanges 3.2-3.5 cm long; leaves 6.8 cm wide near the base ... *P. brachus*.
 - H. Phalanges 4.2-4.9 cm long; leaves 7.2-8.6 cm wide near the base,
 - I. Lower 2/5 of phalanges bright red; central apical sinuses 3-5 mm deep *P. rubricinctus*.
 - I. Lower 2/3 of phalanges bright orange; central spical sinuses 5-7 mm deep *P. basalticola*.

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² Bernice P. Bishop Museum, P.O. Box 6037, Honolulu, Hawaii 96818, U.S.A.

SECTION *Hombronia*

Pandanus compressus Martelli, Webbia 1: 363, 1905; 4(1): 10, 46, 94, 1913; 4(2): t. 8, fig. 14-15, 1914 (sect. *Hombronia*).

P. tetradon (Gaud.) Balf. f. ex Kanehira (non Ridl., 1915), Bot. Mag. Tokyo 52: 236, 238-239, fig. 70, 1938; Merrill & Perry, Jour. Arn. Arb. 20: 166-167, 1939, a later homonym and also a transfer of an epithet which cannot be transferred.

Barrotia tetradon Gaud., Bot. Voy. La Bonite t. 13, fig. 1-8, 1843, an invalid name.

P. Yamagutii Kanehira, Jour. Jpn. Bot. 12: 547-548, fig. 14, Aug. 1936; Bot. Mag. Tokyo 50: 544-545, fig. 54, Oct. 20, 1936.

Figures 347, 348, 349A, 349B, 350

NOM. VERN.: "vaum" (Bismarck Archipelago); "hosoa" (Rotuma).

EXPANDED DESCRIPTION: Tree 10-15 m tall, to 20 cm in diameter, with short spreading branches mostly in whorls of three; prop roots few, short, stout, with scattered, stout, broad-based prickles; leaves 1.5-3.30 (+0.03-0.10) m long, 14-14.7 cm wide at the middle, 13-13.4 cm wide near the base, broad ligulate, thick, soft, subcoriaceous, shining above, dark green, below green, at midsection with 78-87 parallel secondary veins in each half, the tertiary cross veins seen more or less throughout, forming short oblong meshes, blade broad ligulate, towards the tip in the space of 20 cm, contracting from 10.5 to 1 cm (then the extreme apex lost, perhaps 3-10 cm long and stout subulate), the base unarmed, pale, drying brownish, beginning at 10-21 cm up, the margins with prickles 1.8-2.5 mm long, 5-10 mm apart, subarcuate subulate, ascending from a geniculate base, stramineous; the midrib beginning at 41 cm up with prickles 2-2.5 mm long, 18-46 mm apart, subarcuate slender subulate from a geniculate base, strongly reflexed, stramineous; at midsection the margins with prickles 2.5-2.8 mm long, 12-63 mm apart, subarcuate subulate, appressed ascending, wholly stramineous or with slight brown tips; the nearby midrib below with prickles 3-3.2 mm long, 78-100 mm apart, subarcuate subulate, compressed, appressed ascending, stramineous; near the apex

the margins with prickles 1.5-2.2 mm long, 2-5 mm apart, arcuate stout subulate, more or less alternately large and small, strongly ascending, stramineous with reddish brown tips; the midrib with prickles 2-2.3 mm long, 3-10 mm apart, arcuate subulate, broad based, strongly ascending, alternately large and small, stramineous, but the free part reddish brown; infructescence terminal with a solitary, pendent, glaucous syncarp; peduncle 50-60 cm long, pendent, 3-angled; syncarp 26 cm long, ellipsoid-subglobose, bearing about 50 phalanges in nearly vertical, slightly spiraling rows; phalanges 7.3-9 cm long, 5.3-7 cm wide, 3.5-4.3 cm thick, broadly obovoid in profile, 4-6-angled, the lower sides plane, upper 2/5 free, the sides curving, smooth, shining, without lateral sinuses, the apex rounded and at the very tip with the 1-5 (-7) stigmas lined up in 1 (-2) lines in an area 9-20 mm long, and behind the stigmas is a concavity 1-2 mm deep; carpels 1-5 (-7), commonly 2-3; stigmas 2-4 mm wide, auriculate or cordate, erect or vertical, brown, papillose; endocarp in lower 2/5 and 17-35 mm long, bony, stramineous, almost top-shaped, lateral walls 1-2 mm thick, within smooth, shining; seeds 10-14 mm in diameter, ellipsoid to broadly obovoid; apical mesocarp 4-5 cm long, transversely ellipsoid, of solid tissue of parenchyma traversed by longitudinal fibers; basal mesocarp 22-26 mm long, fibrous and fleshy.

STAMINATE TREE (*Stone 1,940*): Tree 12 m tall; habit and foliage said to resemble that of the pistillate; staminate inflorescence about 60 cm long; main axis 3-5 mm in diameter, fleshy and soon disintegrating; lower bracts foliaceous but with yellow tips, the lowest one 75 cm long, 14 cm wide near the base, 11 cm wide at the middle, the midrib and margins, except the basal, weak prickly; bracts in the inflorescence fleshy, clear yellow, boat-shaped, the median ones 20 cm long, 4 cm wide; flowering spikes about 12, and the lower ones 17-20 cm long, 2 cm in diameter, dense, but the apical one 9.5 x 2.5 cm; stamens borne in dendritic fascicles 8-10 mm long; column 4-5 mm long, bearing 8-13 subumbellate stamens; free filament tips 1.5-3 mm long, ascending; anthers 2.5-3.5 mm long, narrowly oblong, the base

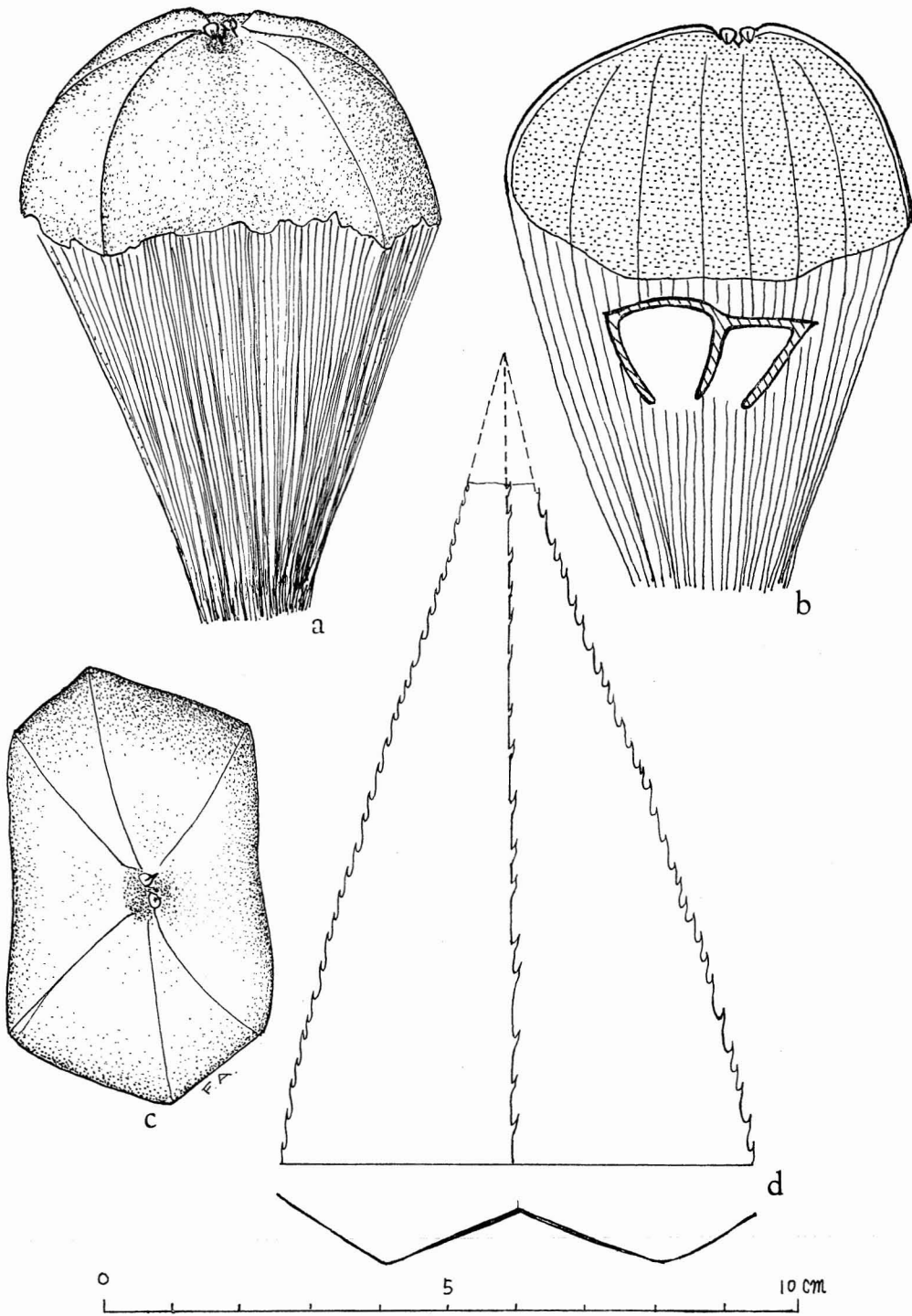


FIGURE 347. *Pandanus compressus* Martelli, from *St. John 19,595*. *a*, phalange, lateral view, $\times 1$; *b*, phalange, longitudinal median section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d*, leaf apex, lower side, $\times 1$.

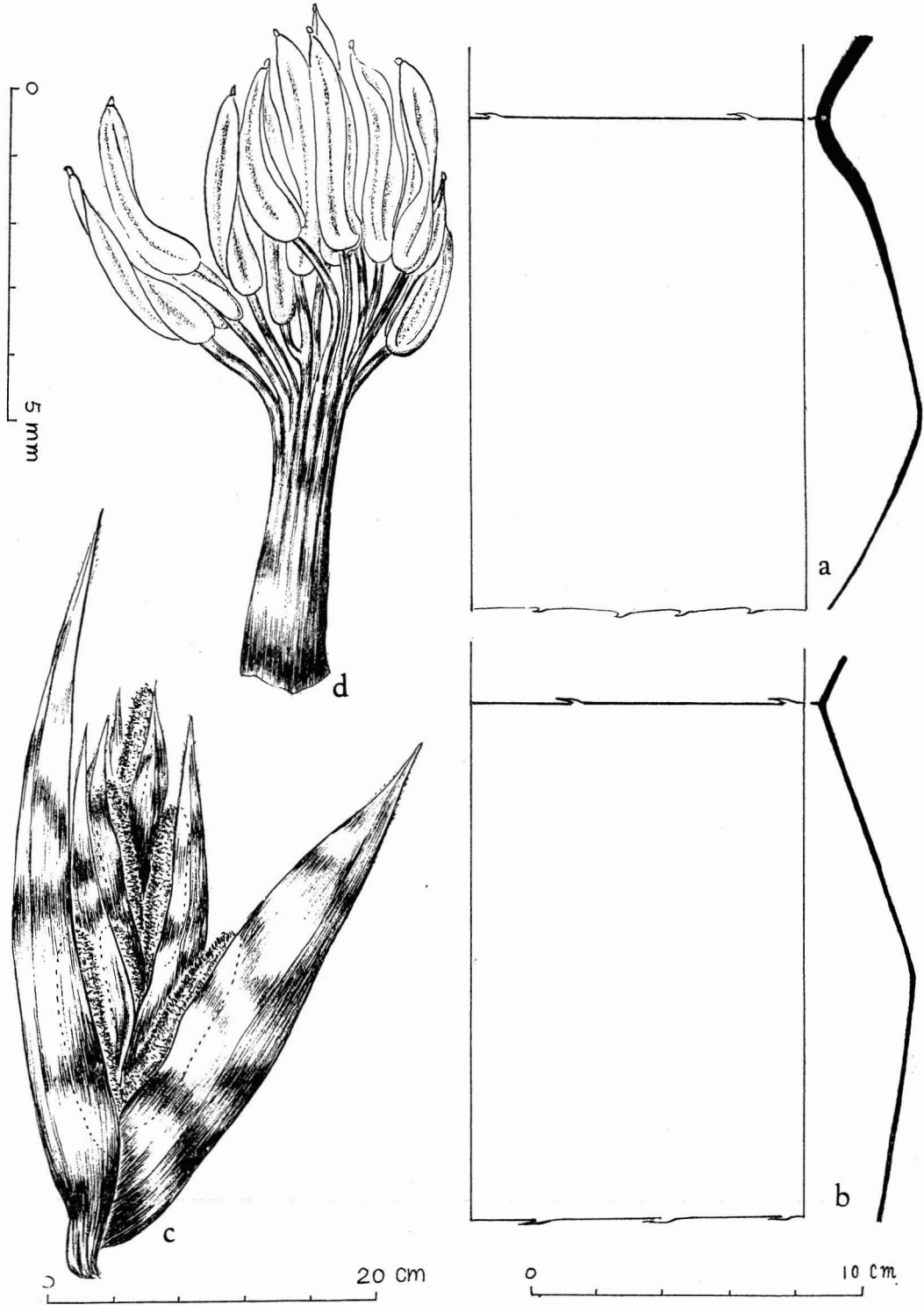


FIGURE 348. *Pandanus compressus* Martelli, from *St. John 19,595*. *a*, half of leaf base, lower side, $\times 1$; *b*, half of leaf middle, lower side, $\times 1$; *c*, staminate inflorescence, $\times \frac{1}{4}$; *d*, fascicle of stamens, $\times 10$.



FIGURE 349A. *Pandanus compressus* Martelli, on eastern shore of Solkope Island, shown to upper right of the central rock ledge.



FIGURE 349B. *Pandanus compressus* Martelli, showing fruiting syncarp of the tree shown in Figure 349A.

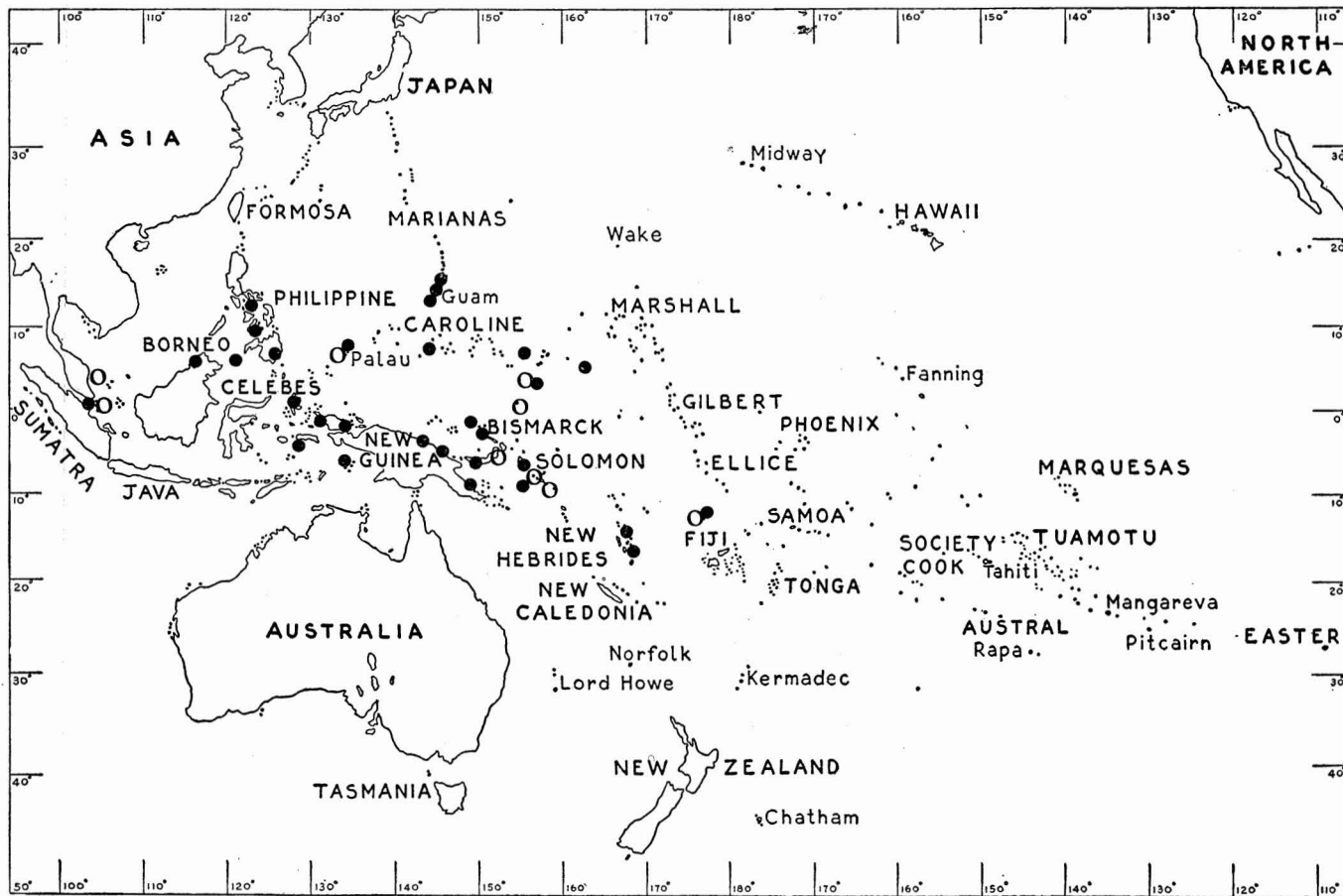


FIGURE 350. Map of distribution, showing: circles, *Pandanus compressus* Martelli; solid disks, *Pandanus dubius* Spreng.

subcordate, the apex bearing a mucro 0.1–0.15 mm long, formed of a projection of the connective.

HOLOTYPE: "Isole Salamone (Guppy in Herb. Kew.)." This was not found there in 1963. Isotype (FI)!

SPECIMENS EXAMINED: Solomon Is., San Cristoval I., Waimamura, common, raised coral foreshore, nom. vern. "bana," 1 Sept. 1932, L. J. Brass 2,786 (A, BISH, L); Santa Isabel, Bagi R., 1 mile s. of Allardyce Hbr., sand beach, 15.10.63. T. C. Whitmore BSIP 2,196 (L); New Georgia, damp land and swamp, 26, viii, 1929, J. H. L. Waterhouse 308 (K).

Rotuma Island: Solnahu I., moist woods, steep slope above cliffs, common, nom. vern. "hosoa," Aug. 18, 1938, H. St. John 19,595 (BISH). Also observed and photographed on Solkope Island.

Bismarck Archipelago: Raul (Ralum, New Britain), riva al mare, 1905–1906, nom. vern. "vaum," Parkinson 1 (FI); New Ireland, 4 Jan. 1958, B. C. Stone 2,623 (BISH); Keraivara (=Keravia), Cocoshain, Warburg 21,008 (B).

Caroline Islands: Kapingamarangi, central area in limestone soil, 20 May 1957, B. C. Stone 1,940; 1,941 (BISH); Nukuoro, Stone 1,952 (BISH); Truk, R. Kanehira 3,494 (A); Palau Islands: Kayangel Atoll, July 1, 1956, St. John 25,890 (BISH); and Stone 1,354 (BISH); Korror I., Kanehira 2,135 (NY).

Malaysia, Malaya: Pulau Tiunan, Jarua Bay, June 1915, I. W. Burkill (SING); ditto, 17.8. 1935, E. J. H. Corner (SING); Pulau Tulai, on rocks 27 May 1927, M. R. Henderson 18,520 (BM, BO, K); Johore, Sungai Sedili Kechil, low alt., 20 June, 1934, Corner 28,463 (BO, FHO, CGE, K).

DISCUSSION: *P. compressus* is a member of the section *Hombroonia*, and there it, when called *P. tetradon*, was long treated as a synonym of *P. dubius* Spreng. The species was reestablished by the careful comparisons of R. Kanehira, though he failed to realize that the epithet he used was invalid. The two species are closely related and particularly *P. dubius* shows a considerable range of variability and it is widespread in native cultivation. Nearly all collections of it are from planted trees at the edge of the villages. *P.*

compressus does seem distinct, particularly by its shorter phalanges with broad, compressed semiorbicular apices.

The species was first published as *Barrotia tetradon* Gaudichaud (1843) with an illustration but no description, in a newly announced but unpublished genus of three species. By article 43 (International Code of Botanical Nomenclature, 1972) such epithets are invalid, and cannot be transferred. The combination *P. tetradon* was made by Balfour in 1878, but he did not accept it himself. Kanehira in 1938 adopted the binomial *P. tetradon* (Gaud.) Balf. f. ex Kanehira. This cannot be accepted as a new taxon starting with Kanehira, as he failed to provide a diagnosis. In any case, there was a previously published *P. tetradon* Ridl. (1915), a valid name for a different Malayan species. Of the synonyms cited by Kanehira, *P. Hombroonia* F. Muell. (1891) is a synonym of *P. dubius* Spreng. *P. Yamagutii* Kaneh. (1936), from Truk, may well be a synonym of *P. compressus*, but it was described from flowering pistillate material with the ovaries only 26 mm long. It is so immature that it is useless to attempt a positive identification. Kanehira himself in 1938 retracted the species and reduced it to *P. tetradon*. *P. Sjozoi* Kanehira, based on Kanehira 3,727 from Babeldaob, Palau, would seem to be a similar and equally immature specimen, but it has 11 syncarps in a loose panicle and in this inflorescence character is quite distinct. At present it can only be placed as a *species dubia*.

Martelli in the original description of *P. compressus* gave details only of the phalange. He based it on a collection from the Solomon Islands by Guppy (KEW).

In 1963 the writer studied all the specimens of *Pandanus* at Kew in the organized herbarium, in the recent and unsorted collections, and in the exhibition museum. The holotype of *P. compressus* was not located. However, in Martelli's collection in the herbarium at Firenze there is an isotype, of a single phalange, 8.5 × 6.8 × 3.2 cm. It is immature and its lower part is much shrunken, but the free upper 1/3 is hemispheric, compressed, and with 3 good stigmas. It agrees well with the illustration published by Martelli. Since there was but a single phalange, no longitudinal section was made. Nevertheless, it appears to be nearly

full-sized, and to evidence its diagnostic characters. It is a meager but sufficient basis for the recognition of *P. compressus* Martelli.

It will be noted that *P. compressus* has the same kind of dendritic fascicles of stamens as does *P. dubius*, the type species of the section *Hombroonia*.

The epithet is the Latin participle, *compressus*, compressed, and was given with reference to the flattening of the two sides of the phalange.

Pandanus dubius Spreng., in Syst. Veg. of Linnaeus, ed. 16 by Spreng. 3: 897, 1826 (sect. *Hombroonia*). See also S. Kurz, Jour. Bot. Brit. & For. 5: 127–128, t. 64, 1867; Solms-Laubach, Linnaea 42: 48–49, 1878; Balfour, Linn. Soc. Bot., Jour. 17: 45–46, 1878; Martelli, Webbia 4(1): 12, 48, 94, 1913; Warburg, Pflanzenreich IV, 9: 50, 52, fig. 1, 14 A–D, 1900; Merrill, Enum. Philipp. Pl. 1: 17, 1925; Miquel, Fl. Ind. Bat. 3: 159, 1855; Koorders, Exkursfl. Java 1: 79–80, 1911; Merrill, Interp. Rumphius's Herb. Amb. 81–82, 1917; Kanehira, Fl. Micronesica 61–62, fig. 2, 1933; Kyushu Imp. Univ., Dept. Agric., Jour. 4(6): 260, 1935.

Folium Baggea maritimum Rumph., Herb. Amb. 4: 151, 1750.

P. latifolius Rumph., Herb. Amb. 4: 146–147, pl. 78, 1750.

P. latifolius Rumph. ex Miq., Fl. Ind. Bat. 3: 164, 1855, non Perrotet (1825).

P. edulis De Vriese, in Hook. Kew Jour. 6: 264, 1854, non Thouars (1808).

P. latissimus Blume, Rumphia 1: t. 53, 1835; Miq., Pl. Jungh. 1: 166, 1851–53, description. *P. Bagea* Miq., Fl. Ind. Bat. 3: 159, 1860, based on *Folium Baggea verum* Rumph., Herb. Amb. 4: 150, 1750.

Figures 350, 351, 352, 353, 354A, 354B, 355A, 355B, 355C

NOM. VERN.: “haun wassi” (Ambon); “ima,” “imae” (Ceram); “wacun ranu” (Banda); “haun pantei” (Malay); “haun laymoeloen” (Ambon); “haoen lainoeloen” (Ambon); “haoen pantai” (Ambon); “poeng” (Weda); “bokoe” (Gal., Halmahera; Ternate); “booe” (Tidore); “bidur” (Java); “pandan bañang”

(Visayan); “paoun” (Mariana Is.); “pafung” (Saipan); “pahong” (Guam); “pohk” (Truk); “buuh,” “poko” (Palau); “meu-yok” (Kusaie); “kalá” (Pulau Kasiem, W. New Guinea); “buku” (Angaur I.); “fach” (Yap); “hosoa” (Rotuma I.); “samoos” (Manikiong); “simoes” (Mejach); “ekebram” (Biak); “dimboh” (Kurudu); “na vaku” (Nguna, New Hebrides); “moil” (Forok lang., Wewak, New Guinea).

DESCRIPTION OF ALL SPECIMENS EXAMINED: Tree 10–20 m tall, with a long bole 15–30 cm in diameter, smooth, and a narrow, few branched, compact crown; bark pale brown, smoothish, but with distant conic spinelike rootlets; prop roots 2–5 m long, about 7–10 cm in diameter, prickly in vertical lines; leaves 2–5 m long, 11–16 cm wide at the middle and near the base, the outer 1/3 folded down and pendent, the tissue firm but thick and fleshy, above dark green and shiny, below green and somewhat shiny, at midsection with 70–82 parallel secondary veins in each half, the tertiary cross veins conspicuous below and evident above in the outer 2/3, forming short oblong meshes, the blade broad ligulate, then in the last 20–30 cm contracting to a trigonous subulate apex about 5–8 mm long, this at a point about 10 cm down 18 mm wide, the base unarmed, pale, drying cream-colored or brownish, beginning at 8–11 cm from the base the margins with prickles 1–1.5 mm long, 2–4 mm apart, strongly arcuate stout subulate, strongly ascending, the base stramineous, the tip reddish, distinctly of two sizes, large and small alternating; the midrib below unarmed for the lower third; at midsection one margin with prickles 1.7–2 mm long, 11–55 mm apart, subarcuate or almost straight subulate, appressed ascending, the free part red, the other margin unarmed or nearly so; the nearby midrib with prickles 2.2–2.5 mm long, 35–60 mm apart, subarcuate subulate, compressed, appressed ascending, the base stramineous, the middle and tip red; near the apex the margins and midrib below with prickles 0.3–0.7 mm long, 2–7 mm apart, arcuate subulate, appressed ascending, red-tipped; infructescence bearing a solitary, pendent syncarp; peduncle 60–85 cm long, 2–2.5 cm in diameter, 3-sided, the lower 1/3 naked, the outer 2/3 with caducous bracts; syncarp globose, 20–35 cm in diameter, bearing

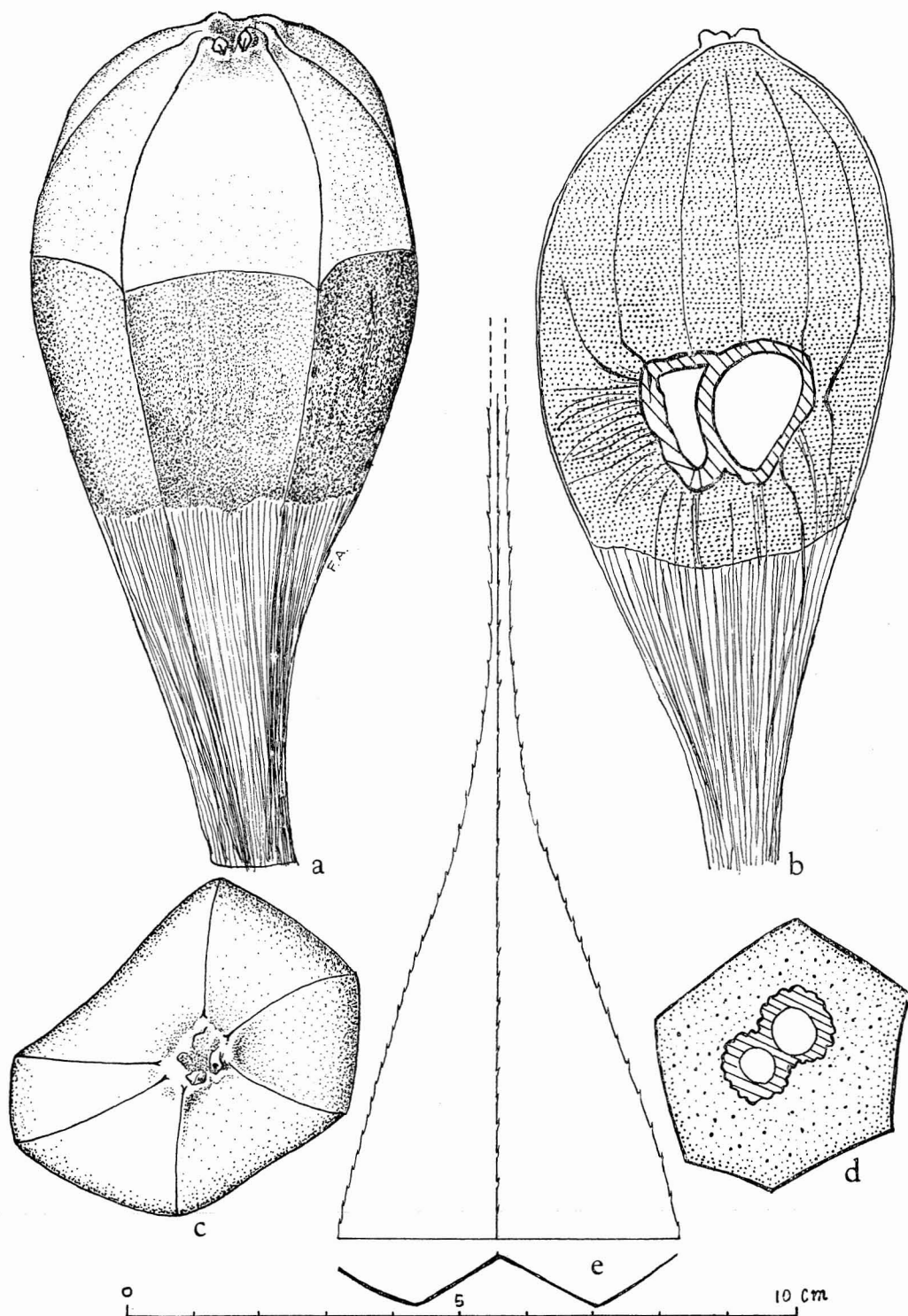


FIGURE 351. *Pandanus dubius* Spreng., from *St. John 18,998*, showing the abundant 2-carpelate phalanges. *a*, phalange, lateral view, $\times 1$; *b*, phalange, longitudinal median section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d*, phalange, median cross section, $\times 1$; *e*, leaf apex, lower side, $\times 1$.

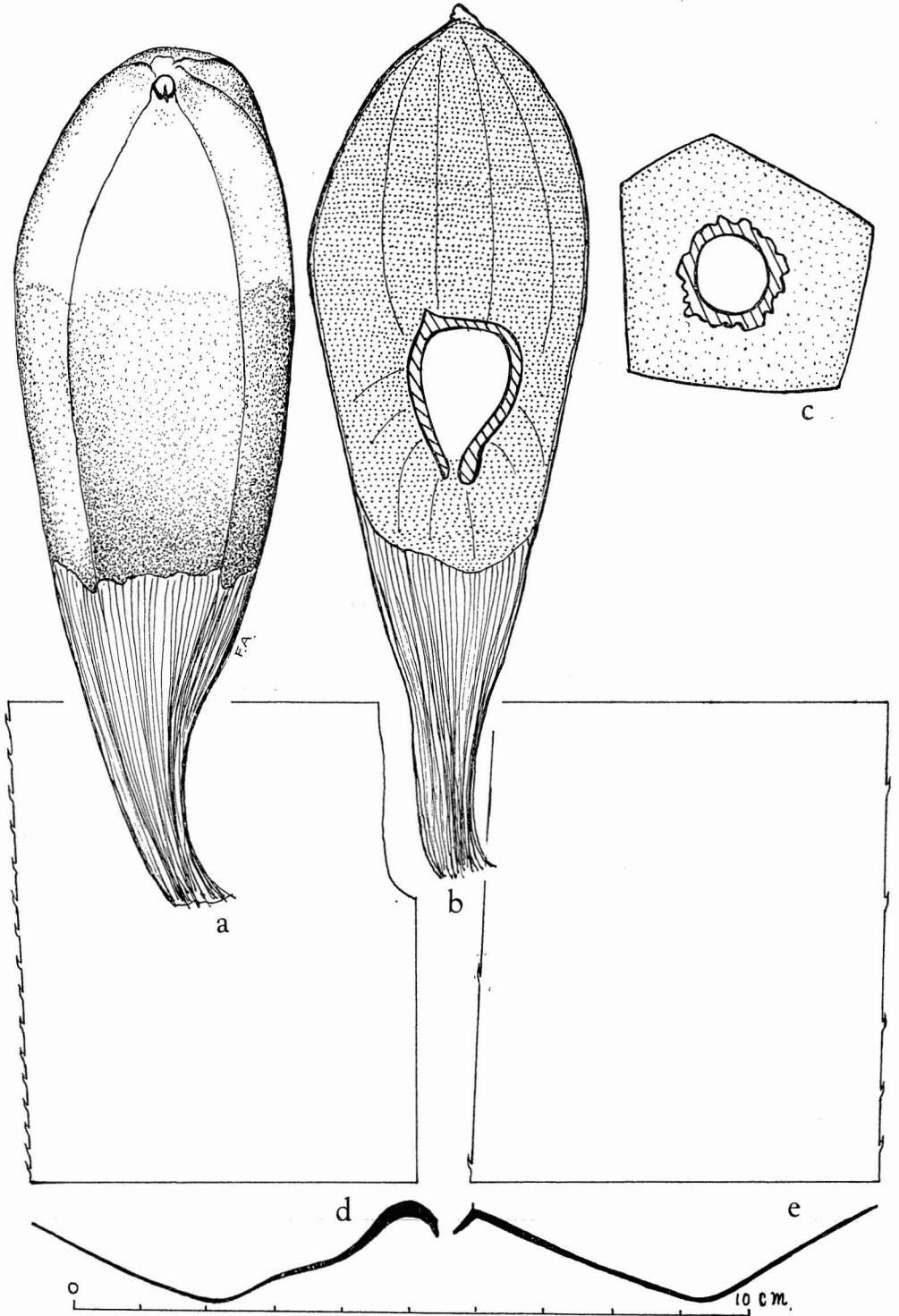


FIGURE 352. *Pandanus dubius* Spreng., from *St. John 18,998*, showing the infrequent 1-carpelate drupe. *a*, drupe, lateral view, $\times 1$; *b*, drupe, longitudinal median section, $\times 1$; *c*, drupe, median cross section, $\times 1$; *d*, half of leaf base, lower side, $\times 1$; *e*, half of leaf middle, lower side, $\times 1$.

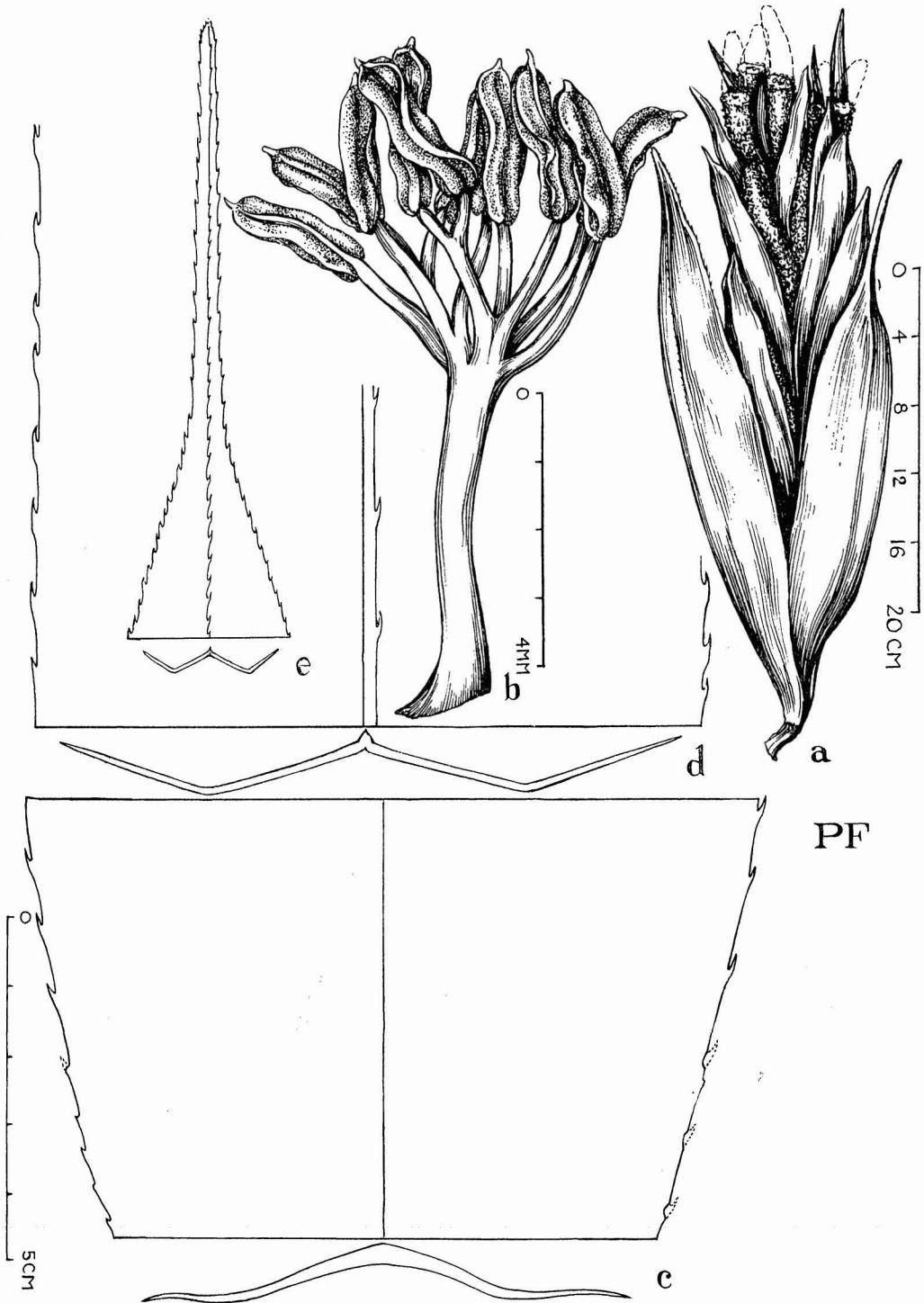


FIGURE 353. *Pandanus dubius* Spreng., from *Beguïn 764*. *a*, staminate inflorescence, $\times 1/4$; *b*, fascicle of stamens, $\times 10$; *c*, leaf base, lower side, $\times 1$; *d*, leaf middle, lower side, $\times 1$; *e*, leaf apex, lower side, $\times 1$.



FIGURE 354.A. *Pandanus dubius* Spreng., from *St. John 18,998*. Fruiting tree, habit.

52–86 phalanges, these 9.5–13.5 cm long, 4–6.5 cm wide, 3.6–5 cm thick, oblanceoloid (5-) 6-angled, compressed, the apex concave or mostly short rostrate and its tip 7–18 mm wide, concave, the lower part with plane sides, fleshy, white, the upper $1/4$ – $1/3$ free, the surface

glaucous blue-green, smooth, shining, the second quarter from the apex purple-brown, the apex ovoid or broadly so, sharply (5-) or 6-angled, the sides convex; carpels 1–4, commonly 2–3, in 1 (or 2) parallel lines and the stigmas directed to one side, 1.5–3.5 mm long,

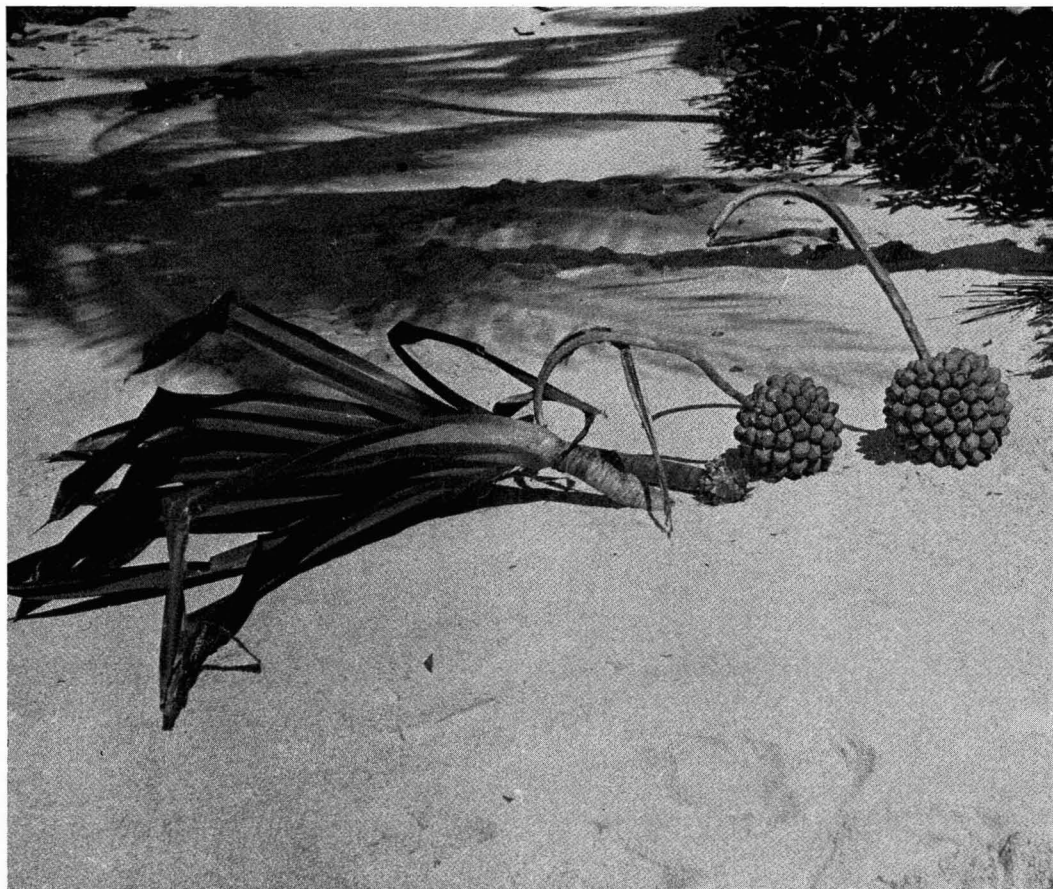


FIGURE 354B. *Pandanus dubius* Spreng., from *St. John* 18,998. Fruiting branch, and a detached syncarp.

elliptic to ovate, sulcate, vertical, brown, papillose, either approximate and equally attached on the rim or separated by a 0.5–2 mm valley, and behind them on the actual apex is a concavity 1–2 mm deep; endocarp from slightly supramedian to in the lower 2/5, and 20–35 mm long, and when several-celled cuneate to top-shaped, bony, dark brown, the apex truncate or with a conic projection, the lateral walls 2–5 mm thick, within smooth, shining; seeds 10–16 mm long, broad ellipsoid; when 1-carpellate the endocarp 16–24 mm long, subglobose, and the seed subglobose; apical mesocarp 4–7 cm long, a solid tissue of dense parenchyma, traversed by longitudinal fibers; basal mesocarp 3–5 cm long, fibrous and fleshy.

DESCRIPTION OF STAMINATE PLANT (*Bequin* 764): Leaves 3.26 m long, 11.5 cm wide near

the base, 9.8 cm wide at the middle, thick, subcoriaceous, above green, shiny, below pale green, shiny, broadly U-sulcate, 2-pleated, at midsection with 65 parallel secondary veins in each half, the tertiary cross veins more or less visible throughout, forming short oblong meshes, blade broad ligulate, in outer 1/8 shortly contracting into the 6 cm stout trigonous subulate apex, this at the point 10 cm down 22 mm wide, the base unarmed, pale, beginning at 10–16 cm with prickles 2–2.5 mm long, 4–15 mm apart, arcuate subulate, compressed, strongly ascending, stramineous; the midrib below beginning at 25 cm with prickles 1.5 mm long, 30–80 mm apart, arcuate slender subulate, ascending, stramineous; at midsection the margins with prickles 1.5–2.5 mm long, 5–13 mm apart, subarcuate, stout subulate, strongly ascending, stramineous; the midrib below with

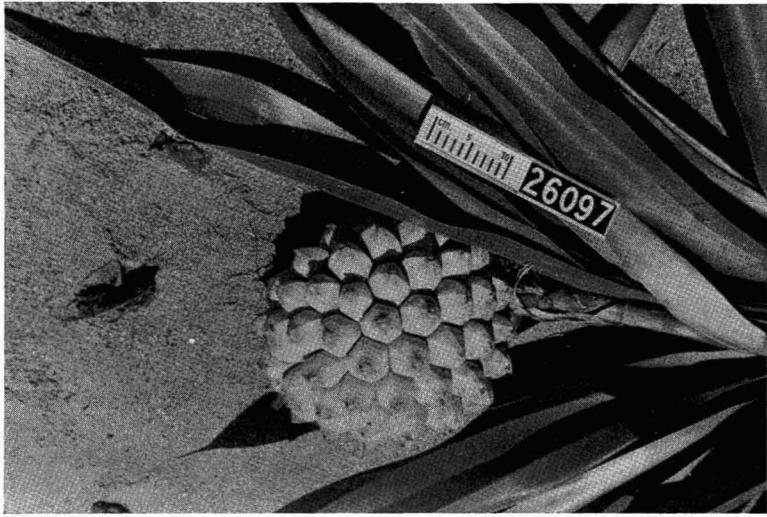


FIGURE 355A. *Pandanus dubius* Spreng. Fructing branch from *St. John 26,097*, Pulau Kasiem, West Nieuw Guinea.



FIGURE 355B. *Pandanus dubius* Spreng. Branches and leaves of staminate tree, from *B. C. Stone 2,495*, Santa Isabel I., Solomon Islands.

prickles 1.6–2 mm long, 10–18 mm apart, arcuate subulate, compressed, ascending, stramineous; on the subulate apex the margins and midrib below with prickles 0.3–0.5 mm long, 3–5 mm apart, arcuate stout subulate, ascending, brownish; staminate inflorescence 40 cm long, 14 cm wide; each node bearing a thick, fleshy, coriaceous, creamy yellow bract, the

lowest one 36 cm long, 7 cm wide, lanceolate, near the tip the margins and midrib below with arcuate subulate prickles; median bract 17 cm long, 3 cm wide, lanceolate; spikes numerous, about 15 in number, and 5–12 cm long, 13–15 mm in diameter, cylindric, dense; staminal fascicles 7–10 mm long, of 6–10 stamens; column 4–6 mm long, slender; at apex branching



FIGURE 355C. *Pandanus dubius* Spreng. Staminate inflorescence, from B. C. Stone 2,495, Santa Isabel I., Solomon Islands.

umbellately, and some branches forking again; free filament tips 1.5–3 mm long; anthers 2.3–2.7 mm long, oblong, bearing at apex a 0.1–0.2 mm subulate prolongation of the connective.

The staminate trees are definitely rare. The pistillate are common, mostly in semicultivation at the edges of villages. The writer has observed or collected the pistillate on many islands, but has never seen the staminate. The male plants are now known from: Indonesia, Ternate, Soelmadaha, *Beguin 764* (L); Aru Is., Vokan, VI, 1873, *O. Beccari* (FI).

Philippine Is.: Sibuyan I., *Elmer 12,458* (A, G, K, MO, US, Z).

Mariana Is.: Guam, *Stone 4,025* (BISH).

Solomon Is.: Santa Isabel, *Stone 2,495* (BISH).

Using the collections by Beccari from the Aru Islands, Solms gave the first and only brief description of the staminate flowers (*Jard. Bot. Buitenzorg*, Ann. 3: 95, 1883).

The specimen collected by Beguin on Ternate is from Moluccas like the type island, Amboina, and equally close is the locality on the Aru Islands. Both have similar massive staminate inflorescences. They have numerous stamens in dendritic fascicles, and they are not peltate. Warburg (1900: 44) based the section

Hombronia (Gaud.) Warb. on two characters, one being the peltate staminal cluster. He did not know it for the type species, *P. dubius*, but observed it on two New Caledonian species, *P. macrocarpus* (Brongn.) Vieill. and *P. altissimus* (Brongn.) Solms. Now, with the known dendritic staminal fascicles of *P. dubius*, the other species with peltate staminal fascicles and a different fruit structure, must be given a different sectional placement.

TYPE: "Folium baggeae maritimum Rumph. 4. t. 80. 75? (*P. erigens* Thouars.?)."

LECTOTYPE: *Folium baggeae maritimum* Rumph., *Herb. Amb.* 4: 151, t. 80, 1743. Amboina. (Excluding Rumph. t. 75 which is *P. spurius* Miq. of the section *Pandanus*, and *P. erigens* Thouars, of Réunion I., a synonym of *P. montanus* Bory, of the section *Microstigma*.)

STANDARD SPECIMEN: Amboina, July–Nov. 1913, C. B. Robinson, *Plantae Rumphianae Amboinense* 55 (US). Also seen in (FI, K, NY, P).

SPECIMENS EXAMINED: Indonesia: Amboina I., C. Smith (BM); Aru Is., Challenger Exped. (K); ditto, March 1873, Beccari (FI); ditto,

Governator (FI); Halmahera I., Galela, 24/10/21, *Beguín* 1,842 (L); Lingga Archipel., P. Sebangka, 16/8/19, *Bunnemeijer* 7,506 (P); Ternate I., Soelamadaha, 6/6/21, *Beguín* 1,651, and 728, 764, 814, 815, 1,652, and 1,770 (L); Ceram, Lohi, Feb. 1904, *Krayer* (or *Kayer*?) (FI); ditto, *Warburg* (FI); Aru Is., Vokan, VII 1873, *Beccari* (FI); Batjan, Moluccas, *Warburg* (FI).

Sabah (British North Borneo): Usakan Bay, seashore, March 1910, *L. S. Gibbs* 4,334 (BM).

Philippines: Sibuyan I., Magallanes, Mt. Giting-Giting, May 1910, *A. D. E. Elmer* 12,458 (A, BISH, FI, K, MO, US, Z); Leyte I., Gigantangan, Jan.-Feb. 1957, *Y. Kondo* & *G. Edaño* 36,506 (BISH, US); Mindanao, Davao Dist., March 1904, *E. B. Copeland* 613 (FI, US); Sulu I., Mt. Bayao, Jan.-Feb. 1957, *Kondo* & *Edaño* 36,507 (BISH).

Mariana Is.: Saipan, July-Aug. 1930, *R. Kanehira* 900 (NY); ditto, *B. C. Stone* 1,366, 1,367, and 1,371 (BISH). Rota, July 1932, *Kanehira* (FI, FU); Sinapal, VII.10.1934, *T. Hosokawa* 7,588 (TAI); Tetachô, Feb. 1941, *T. Tiyama* (TI). Guam, Tantapalao Pt., on limestone, 30 m. alt., April 20, 1936, *E. H. Bryan, Jr.* 1,222 (BISH, NY, UC); Voy. Bonite, *C. Gaudichaud* 210, "paoun" (G, P); ditto, "acoun," *Gaudichaud* (G); ditto, Oct. 1911, *R. C. McGregor* 581 (BISH, US), and 583 (BISH, E, FI, K, M, NY); Talofoto, 130 m. alt., June 15, 1956, *St. John* 25,804 (BISH); Chalonguay, flat forested area, March 15, 1957, *Stone* 1,689 (BISH); Barrigada, 21 March 1962, *Stone* 4,025 (BISH).

Caroline Is.: Mortlock Group, Lukunor Atoll, Kurum Islet, June 10, 1950, *D. Anderson* 2,214 (BISH); Truk, *R. Kanehira* 3,494 (A), and Aug. 1935, *Kanehira* 3,722 (A, FU); Woleai, 1956, *C. Wong* 45 (BISH). Yap, Tabenfiy, June 27, 1956, *St. John* 25,881 (BISH). Palau Is., Angaur, July 1929, *Kanehira* 877 (FI, NY); ditto, July 10, 1956, *St. John* 25,912 (BISH); Ngeregong I., 7 Feb. 1945, *L. F. Koch* 1,239b (UC); Korrol I., March 1933, [*Kanehira*] 2,135 (FI, FU); Urukthapel I., forest on steep coral slope, 18 m. alt., July 4, 1956, *St. John* & *R. P. Owen* 25,898 (BISH). Kusaie, Men Yok, 1934, [*Kanehira*] 3,507 (FU); Nukuoro I., *Stone* 1,952 (BISH).

Irian Barat (Netherlands New Guinea): Pulo Manim, Presso Mafor (Soron), 1875, *O. Beccari* (FI); Cape Soeadja, coastal swamp, Dec. 20, 1957, *St. John* 26,163A (BISH); Wakde I., 1918,

L. Gibbs 6,248 (BM, K); and 5,749 (BM); Manokwari, Nov. 29, 1957, *St. John* 26,115 (BISH); Pulau Kasiem, Sele Straits, thicket at top of beach, Nov. 23, 1957, *St. John* 26,097 (BISH); isola presso Windesi, riva al mare, terreno roccioso, Luglio 1905, *J. A. van Balen* 1 (FI).

Australian New Guinea: Wewak, *St. John* 26,184 (BISH); Hatzfeldhafen, *Warburg* 21,007 (B).

Papua: Robinson Bay, *R. D. Hoogland* 3,430 (A); Cape Caution, Holnicote Bay, *W. M'Gregor* (BM).

New Hebrides: Nguna I., Taloa, 4 Sept. 1957, *Stone* 2,207 (BISH).

Bismarck Archipelago: New Ireland, *Stone* 2,638 (BISH); ditto, 31.8.75, *Naumann* 5 (B); Nodup, Gazelle Penin., April 1935, *Waterhouse* 397, and 29,596 (NY); New Hanover, 21.7.75, *Naumann* 5, and 482 (B); Boiku, 20/10/55, *J. S. Womersley* 7,964 (A); New Ireland, s. coast, Kulube Plantation, 1/4/58, *Stone* 2,623 (BISH).

Solomon Is.: New Georgia, Roviana, *Waterhouse* (BISH, K, NY, P); Ganongga I., 22 Nov. 1957, *Stone* 2,554 (BISH); Santa Isabel I., Vulavu-Thathaje trail, 17 Oct. 1957, *Stone* 2,495 (BISH) and 2,499 (BISH). Malaita, Auki, Oct. 2, 1957, *Stone* 2,457 (BISH); Buka I., Dec. 1957, *Stone* 2,568, and 2,571 (BISH); Guadalcanal, 1957, *Russell* no. C (BISH); Santa Cruz Is., Anuta I., 24.11.71, *D. E. Yen* (BISH).

Rotuma I.: sandy sea shore, June 30, 1938, *St. John* 18,998, 19,208, 19,271, 19,409, and 19,636 (BISH).

DISCUSSION: The first account of this species, an extensive and good treatment, was by Rumphius (1750), as *Folium Baggea maritimum*. He printed the name this way seven times in text and legend, and other species included the name *Baggea*, but in his chapter heading it was written *F. bagea maritimum*. The first post-Linnaean and valid name was published in 1826 by Sprengel, *Pandanus dubius*. Why he called it *dubius*, or doubtful, is not now obvious. It was clearly distinct then from the few other known species. Sprengel based his taxon upon *Folium baggeae maritimum* Rumph. from Amboina, and gave reference to his plate 80. He gave a diagnosis of 11 words, all extracted from Rumphius's lengthy description. To this he added with a query, Mascarene Islands, *P. erigens* Thouars. ?

This latter is now known to be a member of the different section *Microstigma*, and to be a later synonym of *P. montanus* Bory. Hence, it is seen that *P. dubius* Spreng. rests upon a single positive base, the *Folium Baggea maritimum* Rumph.

Another species published at the same time by Rumphius was *Pandanus latifolius* (Herb. Amb. 4: 146–147, t. 78, 1750). The plate shows only an unopened massive inflorescence with overlapping, unopened bracts. This was republished as *P. latifolius* Rumph. ex Hassk. (1842), and has a reference to Rumphius and a diagnosis derived therefrom. Its basis is *P. latifolius* Rumph. (4: 146–147, pl. 78, 1750). His figure shows only a massive, but young, staminate inflorescence, with the upper peduncular, gladiate bracts and the unopened, broadly ovate, whitish, floral bracts, 14 inches long and more than one palm broad, and prickly on the upper margins and midrib. This has been thought to be a staminate inflorescence of *P. dubius*, but the male flowers of that species have never been figured or described, and are very rarely found. *P. latifolius* Rumph. was described as with a trunk 9 ft tall, the leaves 6 ft long and more than one palm wide, thick, firm, glabrous but with spiny margins. The plant produces slender basal suckers which are used for propagation. The fruit was unknown. In its broad leaves and massive inflorescence it approaches *P. dubius*, but the leaves of *P. latifolius* are thick and fragrant. When cut or grated they give off an odor of fresh hay or rice, called in Malayan “wangi.” Leaves of pistillate *P. dubius* lack any such odor, and though thick, they are soft. Warburg himself collected *P. latifolius* on Java, and in the Moluccas, but his specimens have been destroyed. No such specimens are in the Bogor or any other herbarium seen.

Merrill published a valid name for the plant, *P. Hasskarlii* Merr., Interp. Herb. Rumph. 80, 1917, basing it upon *P. latifolius* Rumph. (1750) non Perrotet, but he had no specimens of it. C. B. Robinson, whom he sent to Amboina to collect a representative set of plants for the Rumphian Amboina species, failed to find this *Pandanus*. It may have been a cultivar, developed from *P. dubius*, but in lack of specimens and good information, it seems best to leave *P. Hasskarlii* Merr. (*P. latifolius* Rumph.) as a species *dubia*.

S. Kurz in 1867 published the first genuine revision of the genus. He accepted (pp. 127–128) *P. dubius* Spreng and recorded it from the Moluccas, Java, Banca, and the Riouw Archipelago. His plate 54 showed a habit view of the tree; fig. 1, two live sized drupes; and fig. 2, a side view of the stigma. He called it a full-grown tree, but it had a slender, almost simple stem, with only one lateral branch a few decimeters long, and the syncarp was shown as subsessile on this small branch, not on cernuous, long dangling peduncles, as is characteristic in this species. On the contrary, it showed a young tree with its first fruit, and no crown developed. The two mature phalanges shown in fig. 1 are of normal length, but the free upper part is narrowly oblanceoloid, much narrower than is usual, and the stigmas are 2–3-times broader than normal. The originals of these drawings by Kurz are preserved in the Calcutta herbarium. Despite the real and apparent discrepancies in these illustrations by Kurz, they seem to represent genuine *P. dubius*. There is no record to tell whether he made the drawings of a tree in the garden at Bogor or on some one of the northern Indonesian islands.

The record of the species from Java is here discounted, as the plant concerned is the type of the distinct *P. Bidoer* Jungh.

SECTION *Pandanus*

Pandanus basalticola sp. nov. (sect. *Pandanus*)

Figure 356

NOM. VERN.: “hata.”

DIAGNOSIS HOLOTYPE: Arbor 7 m alta 2 cm diametro, ramulis 5 cm diametro gilvis laevibus lucidis cum radicibus adventivis conicis 1–2 mm altis, foliis 1 m longis proxima basem 7.2–7.8 cm latis in medio 5–5.8 cm latis coriaceis supra viridibus lucidis infra palliditer viridibus et licet glaucis latiter sulcatis 2-plicatis in medio cum 62 nervis parallelis secundariis in dimidio quoque nervis tertiis transversis in dimidio basali evidentis et reticula breve oblonga formantibus, laminis gladiatis ex basi in apice gracili trigono deminuentibus (apex deest), basi inermis pallida, ex 6–7 cm marginibus cum aculeis 1–1.5 mm

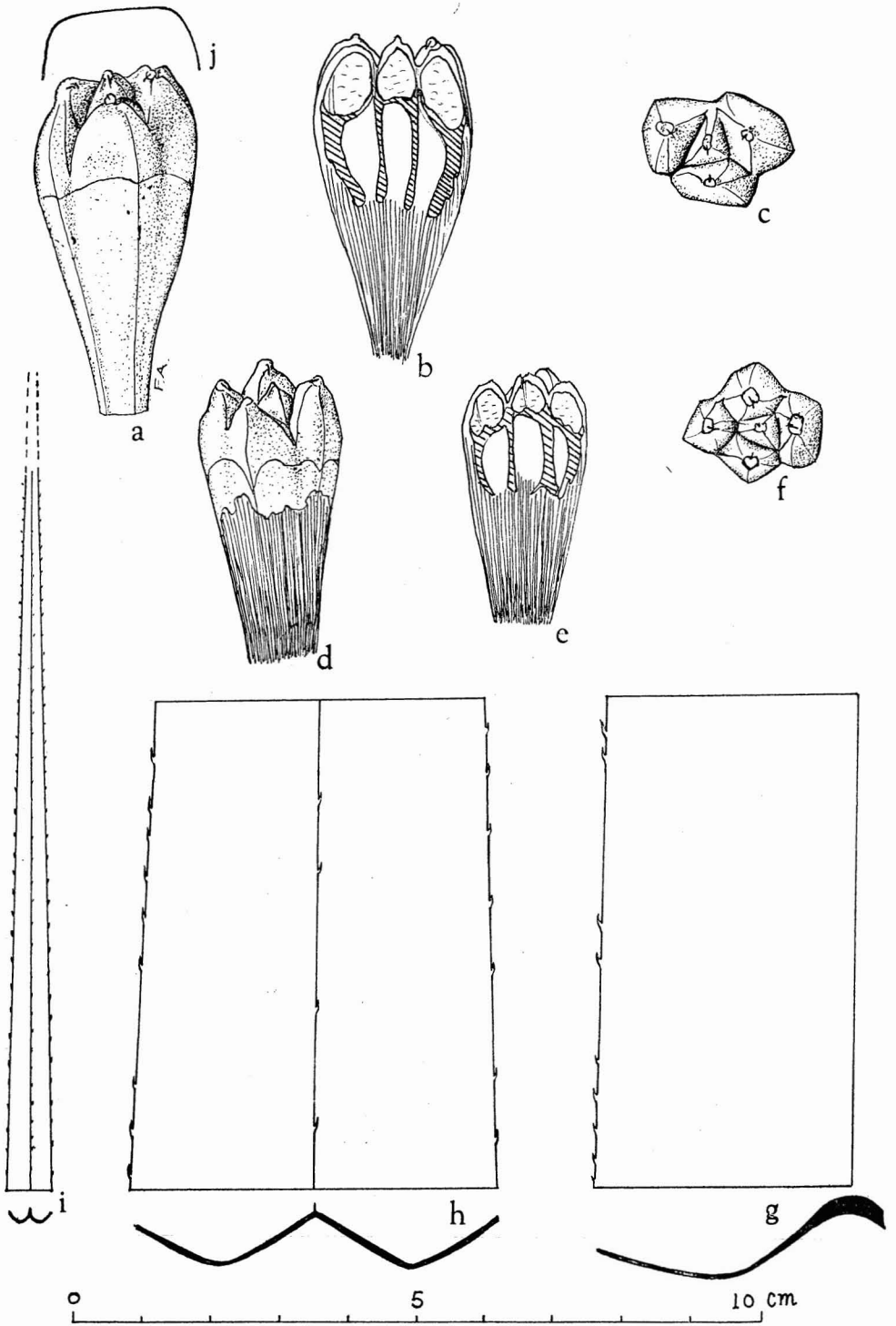


FIGURE 356. *Pandanus basalticola* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, longitudinal median section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d-f*, phalange of smaller depauperate head; *g*, half of leaf base, lower side, $\times 1$; *h*, leaf middle, lower side, $\times 1$; *i*, leaf apex, lower side, $\times 1$; *j*, profile of phalange, $\times 1$.

longis 3–11 mm separatis subrectis subulatis adscendentibus stramineis, midnervo infra ad medium inermi, in sectione mediali marginibus cum aculeis 1–1.3 mm longis 4–11 mm separatis arcuatis subulatis compressis adpresse adscendentibus stramineis sed cum apicibus rubris, midnervo proximo infra cum aculeis 1–1.5 mm longis 7–17 mm separatis simulantibus, in sectione apicali marginibus et midnervo infra cum aculeis 0.3–0.5 mm longis 2–6 mm separatis valde arcuatis subulatis valde adscendentibus pallidis cum apicibus rubris, infructescentia cum syncarpio solitario, pedunculo ultra 17 cm longo 13 mm diametro trilaterato foliosibracteato, syncarpio 16 cm longo 13 cm diametro latiter ellipsoideo, nucleo in sicco 8 × 4.5 cm in superficie fibroso et cum cicatricibus, phalangibus 4.2–4.8 cm longis 1.4–2.4 cm latis (–3.3 cm latis in gemino cum 6 carpelis) 1.2–1.8 cm crassis oblanceoloideis vel anguste oblanceoloideis 3–5-angulosis apice truncato lateribus inferioribus planis intense aurantiacis carnosus parte 1/3 supera libera lateribus subcurvatis laevibus lucidis viridibus tum aurantiacis et brunneis maculatis denique brunneis, sinibus lateralibus nullis, carpelis 3–4 (–5) adscendentibus sed subradialibus marginalibus cum apicibus latiter ovoideis plerumque distaliter planatis et cum vel sine concavitate distali plerumque cum 1–2 angulis secundariis parvis, apicibus interioribus raris anguste ovoideis 1/2–2/3 tam grandibus quam exterioribus, sinibus apicalibus centralibus 5–7 mm profundis anguste V-formatis, stigmatibus 1–1.5 mm latis reniformibus horizontalibus vel inflexis brunneis papillois, sinibus proximalibus foraminibus vel rimis 1/3 ad fundam extentis, endocarpio in parte 1/3 supera et 17 mm longo osseoso rubri-nigro subgloboso in basi concavo apice cum projectionibus conicis parvis lateribus lateralibus 1.5 mm crassis intra obscure rubris lucidis sed cum striis spiralibus, seminibus 11–12 mm longis ellipsoideis, mesocarpio in apice carpellae cuiusque cavernam 5–10 mm longam formanti cum fibris longitudinalibus paucis et membranis albis multis, mesocarpio basali 22–23 mm longo fibroso et carnosio.

DIAGNOSIS OF HOLOTYPE: Tree 7 m tall, 2 cm in diameter; branchlets 5 cm in diameter, buff-colored, shining, smoothish, but with a few

adventitious conic rootlets 1–2 mm high; leaves about 1 m long, 7.2–7.8 cm wide near the base, 5–5.8 cm wide at the middle, coriaceous, above shining green, below pale green and apparently glaucous, broadly U-sulcate, 2-pleated, at mid-section with 62 parallel secondary veins in each half, tertiary cross veins evident in basal half, forming short oblong meshes, blade sword-shaped, tapering from the base to the slender subulate tip (apex lost), the base unarmed, pale; beginning 6–7 cm up, the margins with prickles 1–1.5 mm long, 3–11 mm apart, nearly straight subulate, ascending, stramineous; the midrib below unarmed almost to the middle; at mid-section the margins with prickles 1–1.3 mm long, 4–11 mm apart, arcuate subulate, compressed, appressed ascending, stramineous below with red tips; the nearby midrib below with prickles 1–1.5 mm long, 7–17 mm apart, similar; on the subulate apex the margins and midrib below with prickles 0.3–0.5 mm long, 2–6 mm apart, strongly arcuate subulate, strongly ascending, pale with red tips; infructescence bearing a solitary syncarp; peduncle more than 17 cm long, 13 mm in diameter, 3-sided, leafy bracted; syncarp 16 cm long, 13 cm in diameter, broadly ellipsoid; dried core 8 × 4.5 cm, the surface fibrous and with superficial fruit scars; phalanges 4.2–4.8 cm long, 1.4–2.4 cm wide (–3.3 cm wide in a twin with 6 carpels), 1.2–1.8 cm thick, oblanceoloid or narrowly so, 3–5-angled, the apex truncate, lower sides flat, not distended, bright orange, fleshy, upper 1/3 free, its sides gently curved, smooth, shining, green, becoming mottled orange and brown, finally brown; lateral sinuses none; carpels 3–4 (–5), ascending, but more radial than parallel, the apices of the marginal ones broadly ovoid, mostly flattened distally and with or without a slight concave distal platform, mostly with 1–2 weak secondary angles, the rare inner carpel apices more narrowly ovoid, 1/2–2/3 as large as the outer ones; central apical sinuses 5–7 mm deep, narrow V-shaped; stigmas 1–1.5 mm wide, reniform, horizontal or inflexed, brown, papillose; proximal sinuses from a mere hole to a slit running as much as 1/3 way to the valley bottom; endocarp in upper 1/3 and 17 mm long, bony, reddish black, roughly subglobose, the base concave, the apex with tiny conic projections over the seeds, lateral walls 1.5 mm thick,

within dark red, shining, but spirally grooved; seeds 11–12 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 5–10 mm long, with aerenchyma of a few longitudinal fibers and many white membranes; basal mesocarp 22–23 mm long, fibrous and fleshy.

HOLOTYPE: Rotuma Island, Huo, Oinafa Dist., on basalt headland, 10 ft. alt., July 26, 1938, *H. St. John 19,285* (BISH).

SPECIMENS EXAMINED: Rotuma Island, same data, no. *19,285a* (BISH).

DISCUSSION: *P. basalticola* is a member of the section *Pandanus*, as is its closest relative, *P. upoluensis* Martelli var. *minor* Martelli, a plant of Samoa, known only from some phalanges strung as a necklace, a plant with the phalanges 2.9–3.5 cm long, 0.9–1.6 cm wide; carpels 2–5, usually 4–5; central apical sinuses 1–3 mm deep, the apices with a concave distal platform; and the endocarp median. *P. basalticola* has the phalanges 4.2–4.8 cm long, 1.4–2.4 cm wide; carpels 3–5, usually 3–4; central apical sinuses 5–7 mm deep, the apices with or without a slight distal platform; and the endocarp in the upper 1/3.

The new epithet is from the Latin, *basaltes*, a dark African rock, now basalt; *cola*, a dweller in, and is given with reference to the basaltic habitat.

At the present time of writing it is 27 years since I collected this plant, and I remember the occasion, but I do not remember finding two kinds of fruit on the single tree, yet from the specimens and their data it seems to have been the case. There is one packet of collection *19,285* with a large head and very numerous phalanges, and these are made the holotype of the new species. A smaller packet with the same number has the peduncle, bract remnants, core 6.5 × 4 cm, and the phalanges similar in shape and cleaving, but only 3.7–3.9 cm long, 1.5–2.1 cm wide, 1.2–1.6 cm thick, and the central apical sinuses 3–5 mm deep. It is like the species but is a dwarf. This was probably taken from the same tree, which bore it on a lower, shaded, weak, and depauperate branch. It could be described as in a minor category, but it seems best to discuss it and leave it in the same species; it is now renumbered as *19,285a*.

Pandanus brachus sp. nov. (sect. *Pandanus*)

Figures 357, 358A, 358B

NOM. VERN.: "hata."

DIAGNOSIS HOLOTYPE: Arbor 8 m alta 2 dm diametro ramis paucis et corona distenta, foliis 1.05 (+0.05–0.1?) m longis proxima basem 6.5–6.8 cm latis in medio 5–5.5 cm latis coriaceis U-sulcatis 2-plicatis supra viridibus lucidis infra palliditer viridibus et glaucis in sectione mediali cum 51–56 nervis parallelis secundariis in dimidio quoque nervis tertiis transversis infra evidentis supra vix evidentis et reticula breviter oblonga formantibus laminis gladiatis ex basi in apice trigono gracili subulato deminutentibus (apice perditio) basi inermi pallida, ex 4.5–5.5 cm marginibus cum aculeis rectis subulatis adscendentibus stramineis cum apicibus minime rubri-brunneis biformatis eis grandibus 1.3–1.7 mm longis plerumque cum alteris parvis 0.7–1.2 mm longis alternantibus, midnervo infra ex 9–11 cm cum aculeis 0.7–1 mm longis 6–16 mm separatis arcuatis subulatis adpresse reflexis stramineis vel brunneis, in sectione mediali marginibus cum aculeis 1.5–2 mm longis 2–9 mm separatis arcuatis subulatis compressis valde adscendentibus in basi stramineis supra rubri-brunneis, midnervo infra proximo cum aculeis 1–1.3 mm longis 4–11 mm separatis simulantibus sed adpresse adscendentibus, in apice subulato marginibus et midnervo infra cum aculeis 0.4–0.7 mm longis 1–4 mm separatis subarcuatis crassiter subulatis valde adscendentibus rubri-brunneis, infructescentia cum syncarpio solitario, pedunculo 16 cm et plus longo 15 mm diametro trigono folioso bracteato, syncarpio ovoideo nucleo carnosio et fibroso 137 phalangibus ferrentibus, phalangibus 3.2–3.5 cm longis 1.8–2.7 cm latis 1.2–1.9 cm crassis late cuneatis 4–6-angulosis apice convexo (vel in illis minoribus carpelarum paucarum truncatis) lateribus lateralibus plerumque planatis sinibus lateralibus plerumque nullis rare paucis 1/2 distancia extensis parte 2/5 supera lateribus subconvexis laevibus lucidis, carpelis lateralibus cum 1–3 angulis indistinctis, carpelis 4–7 (vel 2–3 in phalangibus angustis paucis), eis marginalibus cum apicibus latiter pyramidalibus ovoideis vel hemisphericis et plerumque cum area concava subhorizontali distali 1–2.5 mm latis, apicibus

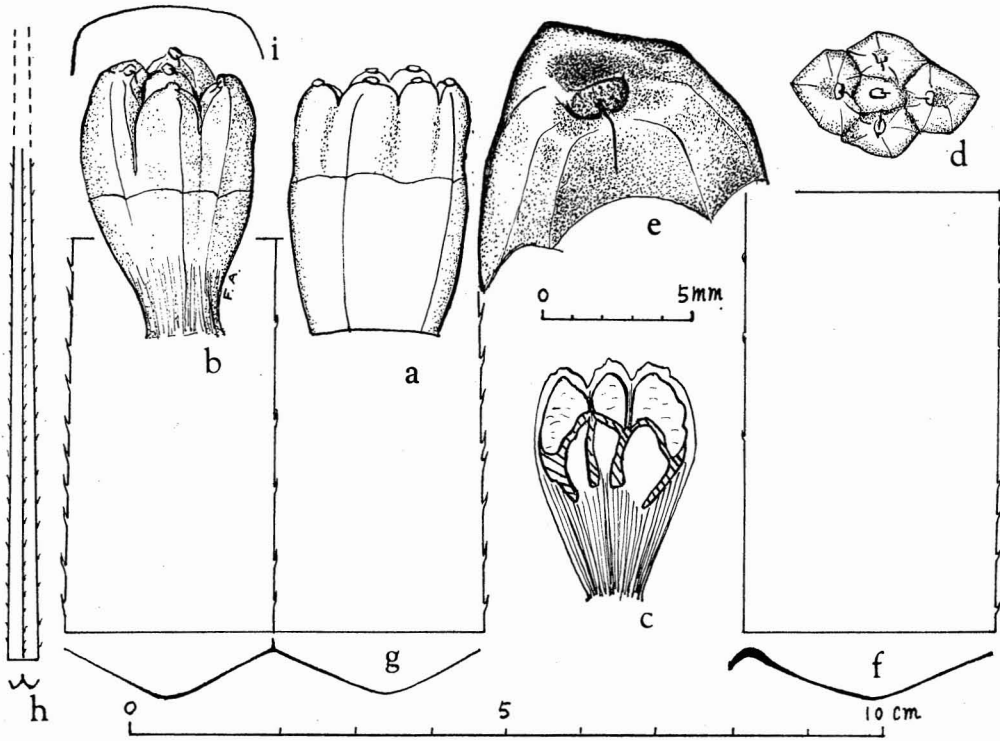


FIGURE 357. *Pandanus brachus* St. John, from holotype. *a*, phalange, when fresh, lateral view, $\times 1$; *b*, phalange when dried, lateral view, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, carpel apex and stigma, oblique view, $\times 4$; *f*, half of leaf base, lower side, $\times 1$; *g*, leaf middle, lower side, $\times 1$; *h*, leaf apex, lower side, $\times 1$; *i*, profile of phalange, $\times 1$.

centralibus ovoideis $1/2$ – $2/3$ tam grandibus quam marginalibus, sinibus apicalibus centralibus 3–4 mm profundis V-formatis rectis vel subcurvatis, stigmatibus 1–1.5 mm longis ellipticis vel obovatis brunneis papillois obliquis, sinibus proximalibus profundis $1/3$ – $1/2$ ad fondam extentis, endocarpio in parte $2/5$ supera 11–13 mm longo osseoso obscure rubri-brunneo transverse ellipsoideo in basi concavo apice cum projectionibus rotundatis lateribus lateralibus 1–1.5 mm crassis intra ludicis sublaevibus spiraliter striatis vel rugosis, seminibus 7–9 mm longis ellipsoideis, mesocarpio in apice carpelae cuiusque cavernam 3–9 mm longam formanti cum fibris et parenchyma, mesocarpio basali 11–14 mm longo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Tree 8 m tall, 2 dm in diameter, few branched into an open crown; eaves 1.05 (+0.05–0.1?) m long, 6.5–6.8 cm

wide near the base, 5–5.5 cm wide at the middle, coriaceous, U-sulcate, 2-pleated, above green, shining, below pale green and glaucous, at mid-section with 51–56 parallel secondary veins in each half, tertiary cross veins evident below, less so above, forming short oblong meshes, blade sword-shaped, tapering from the base into the trigonous slender subulate apex (the tip lost), the base unarmed, pale; beginning 4.5–5.5 cm up the margins with prickles 2–7 mm apart, straight subulate, ascending, stramineous, with slight reddish brown tips, of 2 kinds, large ones 1.3–1.7 mm long, mostly alternating with small ones 0.7–1.2 mm long; beginning at 9–11 cm the midrib below with prickles 0.7–1 mm long, 6–16 mm apart, arcuate subulate, appressed reflexed, stramineous to brown; at mid-section the margins with prickles 1.5–2 mm long, 2–9 mm apart, arcuate subulate, compressed, strongly ascending, the base strami-



FIGURE 358.A. *Pandanus brachus* St. John, from holotype. At center, habit view; on its branches the slender vine *Alyxia* sp.; at lower right corner, *Scaevola Taccada*.

neous, the free part reddish brown; the midrib below with prickles 1–1.3 mm long, 4–11 mm apart, similar but appressed ascending; on the subulate apex the margins and midrib with prickles 0.4–0.7 mm long, 1–4 mm apart, sub-

arcuate stout subulate, strongly ascending, reddish brown; infructescence with a solitary syncarp; peduncle more than 16 cm long, 15 mm in diameter, trigonous, leafy bracted; syncarp ovoid, the core fleshy and fibrous, bearing 137

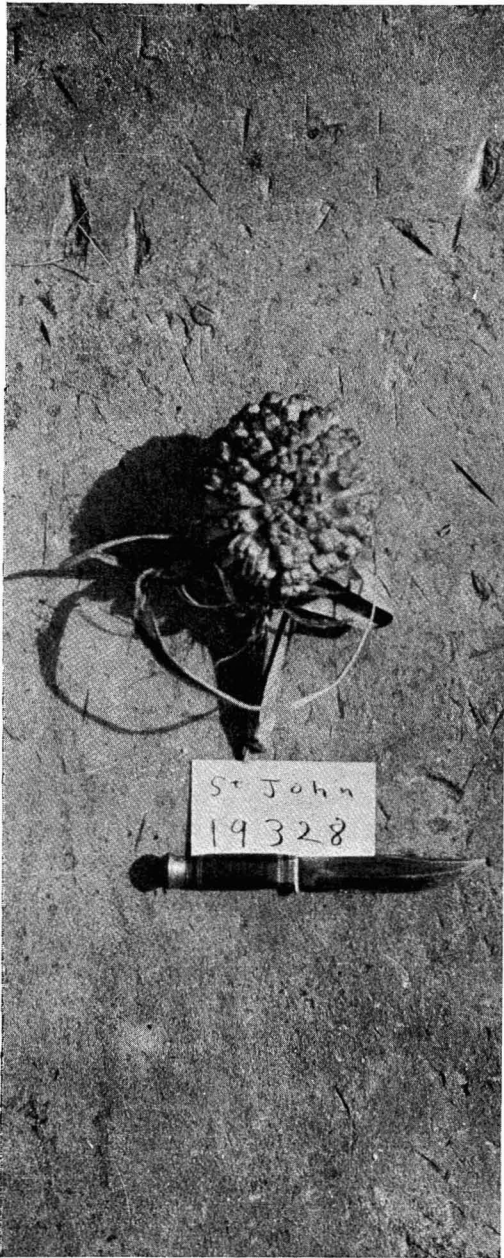


FIGURE 358B. *Pandanus brachus* St. John, from holotype. Ripe syncarp.

phalanges, these 3.2–3.5 cm long, 1.8–2.7 cm wide, 1.2–1.9 cm thick, broad cuneate, 4–6-angled, the apex convex (or in small ones with few carpels truncate), lower sides mostly flat; lateral sinuses mostly none, rarely with a few

running less than halfway down; upper $2/5$ free, the sides gently convex, smoothish, shining, the back of each carpel with 1–3 weak angles; carpels 4–7 (or in a few narrow apical phalanges 2–3), the marginal ones with apices broadly pyramidal ovoid to hemispheric, and mostly with a nearly horizontal concave platform 1–2.5 mm wide, distal of the stigma; central carpel apices ovoid, $1/2$ – $2/3$ as large as the marginal ones; central apical sinuses 3–4 mm deep, V-shaped, straight or gently curving; stigmas 1–1.5 mm long, elliptic to obovate, brown, papillose, oblique; proximal sinuses deep, running $1/3$ – $1/2$ way to valley bottom; endocarp in upper $2/5$ and 11–13 mm long, bony, dark reddish brown, transversely ellipsoid, the base concave, the apex with rounded elevations over the seeds, lateral walls 1–1.5 mm thick, within spirally striate or rugose, smoothish, shining; seeds 7–9 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 3–9 mm long, containing aerenchyma of longitudinal fibers and a loose parenchyma; basal mesocarp 11–14 mm long, fibrous, and fleshy.

HOLOTYPE: Rotuma Island, Pepjei Pt., Pepsei Dist., brink of 30 ft. basalt sea cliff, July 29, 1938, *H. St. John 19,328* (BISH).

DISCUSSION: *P. brachus* is a member of the section *Pandanus*, as is its closest relative, *P. sinicola* A. C. Sm., of Vanua Mbalavu Island, Fiji, a species with the phalanges 2.5–3 cm long, 1–1.7 cm wide, 1.1–1.2 cm thick, narrowly cuneate obovoid; carpels 3 (4–5), their apices almost wholly marginal, hemispheric and mostly oblately so; endocarp median; basal mesocarp 6 mm long; the margins beginning at 8–16 cm from the base with prickles 1.8–2.9 mm long, 4–9 mm apart, stout subulate, strongly ascending, brown tipped. *P. brachus* has the phalanges 3.2–3.5 cm long, 1.8–2.7 cm wide, 1.2–1.9 cm thick, broad cuneate; carpels 4–7 (or in a few apical phalanges 2–3), the apices of the marginal ones pyramidal ovoid to hemispheric; central carpel apices ovoid, $1/2$ – $2/3$ as large as the marginal ones; endocarp in the upper $2/5$; basal mesocarp 11–14 mm long; leaf margins beginning 4.5–5.5 cm from the base with prickles 2–7 mm apart, straight subulate, ascending, stramineous with slight reddish

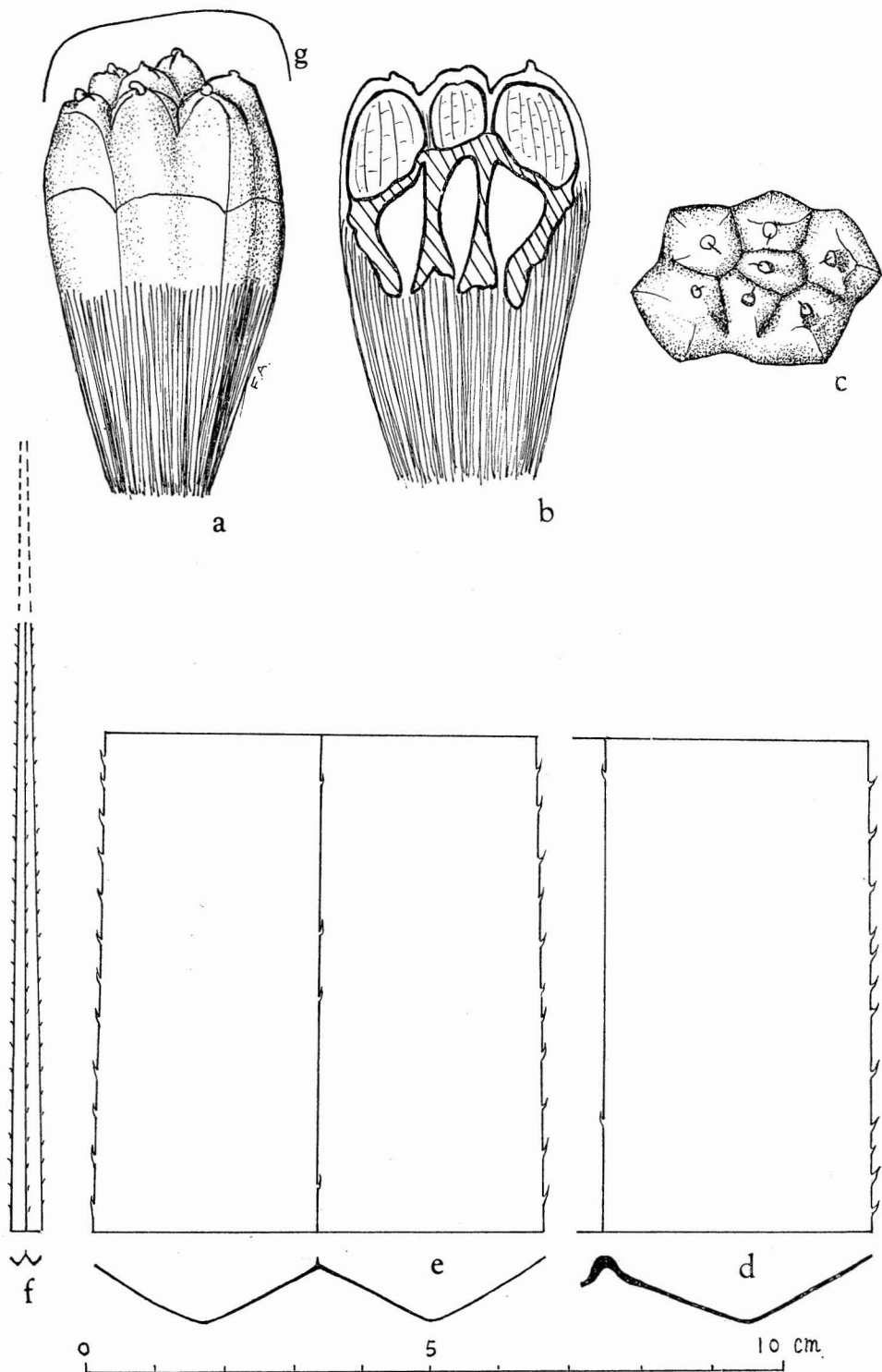


FIGURE 359. *Pandanus Hata* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, longitudinal median section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d*, half of leaf base, lower side, $\times 1$; *e*, leaf middle, lower side, $\times 1$; *f*, leaf apex, lower side, $\times 1$; *g*, profile of phalange, $\times 1$.



FIGURE 360.A. *Pandanus Hata* St. John. At upper part, habit view; at lower left and right, *Scaevola Taccada*, from Lulu Bay.

brown tips, of 2 kinds, large ones 1.3–1.7 mm long, mostly alternating with small ones 0.7–1.2 mm long.

The new epithet is the Greek adjective *brachus*, short, and is given in description of the short phalanges or fruit.

Pandanus Hata sp. nov. (sect. *Pandanus*)

Figures 359, 360.A, 360.B

NOM. VERN.: “hata,” “hat” (Rotuman).

DIAGNOSIS HOLOTYPI: Arbor 8 m alta 2 dm diametro, trunco muricato, ramulis 4 cm diametro palliditer brunneis sublaevibus lucidis, foliis 1.19–1.33 (+0.05–0.15?) m longis proxima basem 7.2–7.5 cm latis in medio 5.8–6.1 cm latis coriaceis supra lucidis obscure viridibus infra viridibus V-sulcatis 2-plicatis in sectione mediali cum 60 nervis parallelis secundariis in dimidio quoque nervis tertiis transversis praesertim infra reticula breviter oblonga vel

rhombica formantibus laminis gladiatis ex basi in apice trigono gracili subulato deminuentibus (apice perduto), basi inermi pallida ex 5–6 cm marginibus cum aculeis 1.5–2 mm longis 2–7 mm separatis geniculatis subulatis vel subarcuati-subulatis adscendentibus stramineis, midnervo infra ex 12 cm cum aculeis 1.5 mm longis 17–58 mm separatis arcuatis crassiter subulatis adscendentibus stramineis, in sectione mediali marginibus cum aculeis 2–5 mm separatis biformatis eis grandibus 1.5–1.8 mm longis arcuatis crasse subulatis compressis adscendentibus stramineis et cum illis minoribus simulantibus 0.7 mm longis commixtis, midnervo infra cum aculeis 1–1.3 mm longis 8–22 mm separatis arcuatis subulatis compressis adpressi-adscendentibus stramineis, in apice subulato marginibus et midnervo infra cum aculeis 0.2–0.4 mm longis 2–4 mm separatis subulatis valde adscendentibus pallidis cum apicibus brunneis, syncarpio 20 cm diametro subgloboso cum 94 phalangibus eis 5.8–6.2 cm longis 2.5–3.7 cm



FIGURE 360B. *Pandanus Hata* St. John. Syncarp of holotype.

latis 2.3–2.9 cm crassis oblongis obovoideis 4–5-angulosis apice vadose convexo parte 1/4 supera libera lateribus subconvexis lucidis lutei-aurantiacis sinibus lateralibus nullis, carpelis 5–8 adscendentibus parallelis eis marginalibus cum apicibus semiorbicularibus vel latiter ovoideis eis majoribus cum areola concava pauca distali illis interioribus ovoideis et 1/2–2/3 tam grandibus quam marginalibus, sinibus apicalibus centralibus 4–6 mm profundis rectis vel subcurvatis V-formatis et lateribus divergentibus, stigmatibus apicalibus 2–3 mm longis vel latis ovatis vel reniformibus horizontalibus vel obliquis brunneis papillois, sinibus proximalibus profundis 1/2–2/3 ad fondam extentis,

endocarpio in parte 1/3 supera et 22–23 mm longo osseoso obscure brunneo transverse ellipsoideo basi concava apice cum projectionibus conicis parvis lateribus lateralibus cum alis validis adscendentibus lateribus 3.5–4 mm crassis intra lucidis sublaevibus sed spiraliter striatis, seminibus 9–13 mm longis ellipsoideis vel asymmetricis, mesocarpio in apice carpelae qujusque cavernam 7–15 mm longam cum fibris longitudinalibus et membranibus albis transversis formanti, mesocarpio basali 28–32 mm longo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Tree 8 m tall, 2 dm in diameter, trunk muricate; branchlets pale

brown, smoothish, shining, 4 cm in diameter; leaves 1.19–1.33 (+0.05–0.15?) m long, 7.2–7.5 cm wide near the base, 5.8–6.1 cm wide at the middle, coriaceous, above dark shiny green, below green, V-sulcate, 2-pleated, at midsection with 60 parallel secondary veins in each half, the tertiary cross veins seen mostly below, forming short oblong or rhombic meshes, blade sword-shaped, tapering outward from the base, the apex slender trigonous subulate (the tip lost), base unarmed, pale; beginning at 5–6 cm the margins with prickles 1.5–2 mm long, 2–7 mm apart, geniculate, subulate or subarcuate subulate, ascending, stramineous; beginning at 12 cm the midrib with prickles 1.5 mm long, 17–58 mm apart, arcuate thick subulate, ascending, stramineous; at midsection the margins with prickles 2–5 mm apart, of 2 sorts, large ones 1.5–1.8 mm long, arcuate stout subulate, compressed, ascending, stramineous, interspersed by fewer small ones, but these similar, 0.7–1 mm long; the midrib below with prickles 1–1.3 mm long, 8–22 mm apart, arcuate subulate, compressed, appressed ascending, stramineous; on the subulate apex the margins and midrib below with prickles 0.2–0.4 mm long, 2–4 mm apart, subulate, strongly ascending, pale with brown tips; syncarp solitary, subglobose, 20 cm in diameter, bearing about 94 phalanges, these 5.8–6.2 cm long, 2.5–3.7 cm wide, 2.3–2.9 cm thick, oblong obovoid, 4–5-angled, the apex low convex, upper 1/4 free, the sides gently convex, smooth, shining, yellowish orange, lateral sinus none; carpels 5–8, ascending, parallel, the marginal ones with free apices semiorbicular to broadly ovoid, the larger ones with a small concave platform distal of the stigma and hence appearing somewhat truncate, the interior ones ovoid and 1/2–2/3 as large as the marginal ones, central apical sinuses 4–6 mm deep, straight or gently curved, V-shaped, then the sides flaring outward; stigmas apical 2–3 mm long or wide, ovate to reniform, horizontal or oblique, brown, papillose; proximal sinuses deep, running 1/2–2/3 way to valley bottom; endocarp in upper 1/3 and 22–23 mm long, bony, dark brown, transversely ellipsoid, the base concave, the apex with slight conic projections over the seeds, the lateral margins with stout ascending wings, lateral walls 3.5–4 mm thick, within shining, smoothish but

spirally striate; seeds 9–13 mm long, ellipsoid or asymmetrically so; mesocarp forming in the apex of each carpel a cavity 7–15 mm long, with longitudinal fibers and white transverse membranes; basal mesocarp 28–32 mm long, fibrous and fleshy.

HOLOTYPE: Rotuma Island, Jarua, Itutiu Dist., swampy lowland, 50 ft. alt., July 22, 1938, *H. St. John 19,246* (BISH).

DISTRIBUTION: KNOWN only on Rotuma I., where it is common and widely distributed. It was observed, but not collected, at Motusa, Kilinga, Pala, Losa, Lulu, Paho, and Vaitoko. It was also observed on the offshore islands Hauatia, Solnahu, Uea, and Solkope.

P. Hata is a member of the section *Pandanus*, as is its closest relative, *P. odoratissimus* L. f. var. *pseudo-linnaei* Martelli, of Tongatabu I., Tonga, a plant with the phalanges 7 cm long, 4.5–5 cm wide, broadly ellipsoid, all lateral sinuses deep, extending below the middle; carpels 7–10; and the endocarp median, 27–38 mm long. *P. Hata* has the phalanges 5.8–6.2 cm long, 2.5–3.7 cm wide, oblong obovoid, the lateral sinuses none; carpels 5–8; and the endocarp in the upper 1/3, and 22–23 mm long.

The new epithet is the vernacular name on Rotuma I. of this species. Actually, it is a group name, applied equally to all other species of the section *Pandanus* found on the island, but not to those of the section *Hombrovia*, which are called "hosoa."

Another photograph showing the swampy habitat, the lower trunks, prop roots, and juvenile plants was printed as fig. 9 in the author's *Ferns of Rotuma* (Occas. Pap. Bernice P. Bishop Mus. 21(9): 161–208, 1954).

Pandanus Hata St. John cv 'Saanga' new cultivar

NOM VERN.: "sa'anga" (Rotuman lang.).

DESCRIPTION: Sterile trees, up to 5 m in height; trunk simple, erect; leaves 2.4 m long, 7 cm wide near the base, 5–5.5 cm wide at the middle, leathery, shining green above, pale green below, U-sulcate, 2-pleated, the blade gladiate, tapering from the base into the trigonous

slender subulate apex, this at the point 10 cm down 1.5 mm wide; beginning at 11–12 cm from the base the margins with prickles 2.5–3 mm long, 4–9 mm apart, subarcuate subulate, ascending, stramineous; the midrib below beginning at 15–17 mm from the base with prickles 1 mm long, 3–13 mm apart, mere conic stramineous umbos; at midsection the margins with prickles 2–2.5 mm long, 3–6 mm apart, subulate, appressed ascending, stramineous with slight brown tips; the nearby midrib below with prickles 1.5–2.2 mm long, 3–8 mm apart, straight or subarcuate subulate, strongly ascending, pale brownish; on the subulate tip the margins entire but the midrib below with subulate serrulations 0.5–1 mm long, 2–5 mm apart, the free part dark reddish brown.

HOLOTYPE: Rotuma Island, Itumutu District, Mafatoa, cult., 50 ft. alt., July 19, 1938, *H. St. John 19,224* (BISH).

SPECIMENS EXAMINED: Rotuma, Solnahu Island, 50 ft. alt., cult. in bush garden, Aug. 18, 1938, *St. John 19,541* (BISH). It was also observed in cultivation, but not collected, at Motusa, Losa, and Pepjei.

DISCUSSION: The natives of Rotuma maintain that these plants are always sterile. It was a favorite source of the dried leaf strips used in the plaiting of mats.

Pandanus rotumaensis sp. nov. (sect. *Pandanus*)

Figures 361A, 361B

NOM. VERN.: "hata" (Rotuman).

DIAGNOSIS HOLOTYPI: Arbor 8 m alta, trunco 1 dm diametro lutei-brunneo sublaevi lucido, foliis 2.45 (+0.2–0.3?) m longis proxima basem 9–9.5 cm latis in medio 7.6–8 cm latis crasse rigide coriaceis supra lucidis viridibus infra pallide viridibus U-sulcatis 2-plicatis in sectione mediali cum 72 nervis parallelis secundariis in dimidio quoque nervis tertiis transversis proxima basem et ad apicem evidentis et reticula breviter oblonga formantibus, laminis

ligulatis sed in parte 1/8 ultima in apice longo gracili deminuentibus (apici perditio) basi inermi pallida, ex 17–18 cm marginibus cum aculeis 2.1–2.7 mm longis 7–11 mm separatis subarcuatis gracilibus subulatis adscendentibus in toto stramineis vel cum apicibus minimis rubris, midnervo infra per partem 1/6–1/4 basalem inermi, in sectione mediali marginibus cum aculeis 1.2–1.6 mm longis 4–10 mm separatis arcuatis crassis subulatis valde adscendentibus stramineis cum apicibus rubris, midnervo infra cum aculeis 1.5–1.8 mm longis 22–37 mm separatis arcuatis gracilibus subulatis valde adscendentibus stramineis cum apicibus rubris, in apice subulato marginibus et midnervo infra cum aculeis 0.4–0.7 mm longis 2–4 mm separatis arcuatis subulatis valde adscendentibus cum apicibus rubris, syncarpio 22.5 cm longo 19.5 cm diametro solitario latiter ellipsoideo cum circa 104 phalangibus eis 6.1–6.5 cm longis 2.4–3.9 cm latis (4.4–5.3 cm latis in geminis cum 12 vel 15 carpelis) 2.1–3.1 cm crassis obovoideis vel oblanceoloideis compressis 4–6-angulosis apice subconvexo sinibus lateralibus nullis lateribus inferis paene planatis lutescentibus parte 1/3 supra libera lateribus laevibus lucidis viridibus subplanatis vel subcurvatis, carpelis 5–8 adscendentibus subparallelis eis marginalibus cum apicibus latiter pyramidali-ovoideis erectis vel paucis subdivergentibus, carpelis interioribus cum apicibus 1/2 tam grandibus vel aequalibus cum illis marginalibus, sinibus centralibus apicalibus 3–5 mm profundis V-formatis subrectis, stigmatibus 2–3 mm longis ellipticis obliquis pallidis brunneis papillois, sinibus proximalibus angustis 1/4–3/4 ad fondam extentis, endocarpio mediali osseoso subrubri-brunneo late cuneato in basi late concavo apice convexo et supra semines cum projectionibus conicis humeris curvatis adscendentibus lateribus lateralibus 2.5 mm crassis intra lucidis sublaevibus sed spiraliter striatis, seminibus 13–14 mm longis ellipsoideis, mesocarpio in apice carpelae cuiusque cavernam 12–22 mm longam cum aerenchyma fibris longitudinalibus paucis et membranis transversis brunneis, mesocarpio basali 17–18 mm longo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Tree 8 m tall, trunk 1 dm in diameter, yellowish brown, smoothish, shining; leaves (2.45 + 0.2–0.3?) m long, 9–9.5

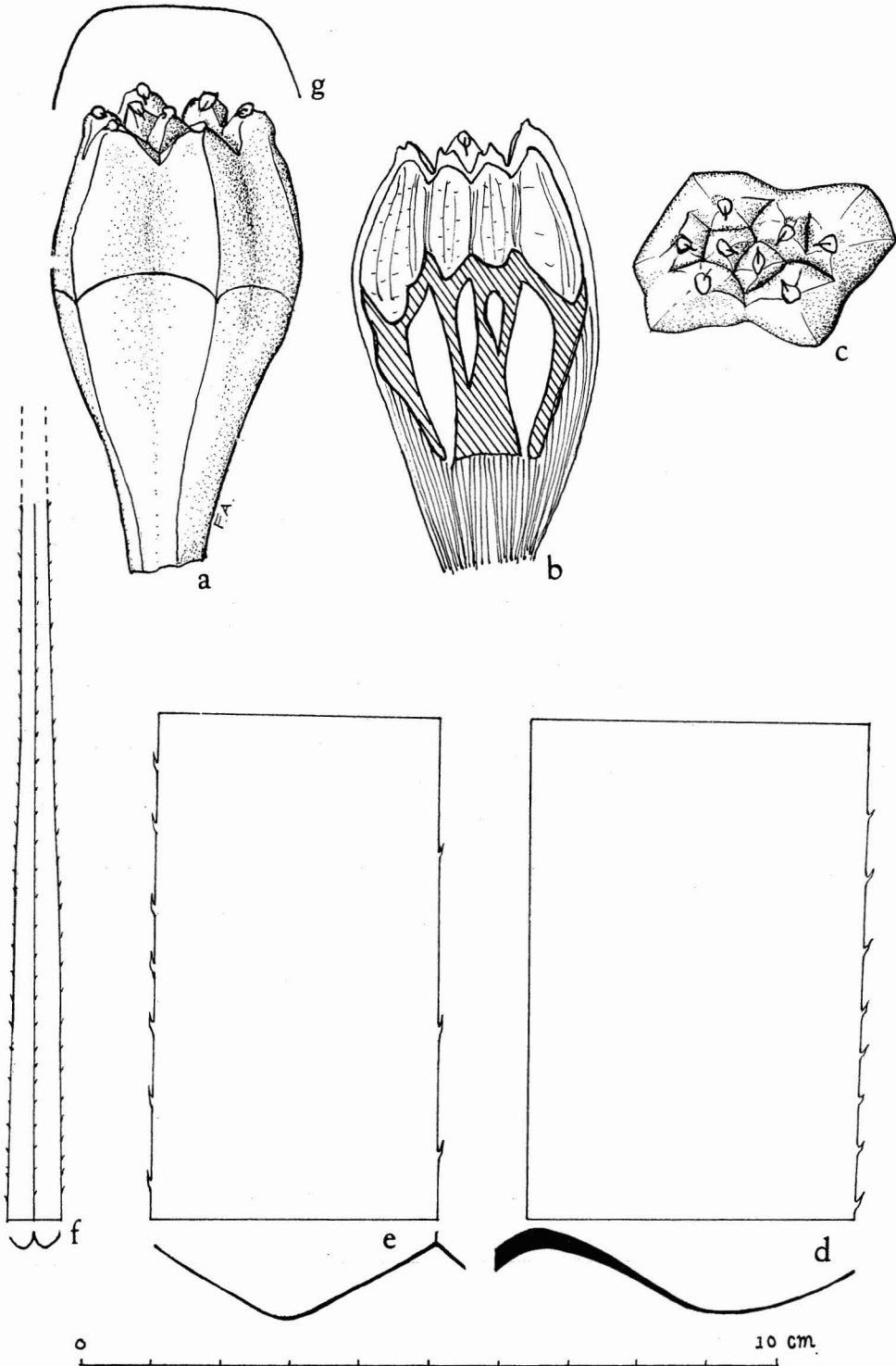


FIGURE 361A. *Pandanus rotumaensis* St. John, from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, longitudinal median section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d*, half of leaf base, lower side, $\times 1$; *e*, half of leaf middle, lower side, $\times 1$; *f*, leaf apex, lower side, $\times 1$; *g*, profile of phalange, $\times 1$.



FIGURE 361B. *Pandanus rotumaensis* St. John, from holotype. Ripe syncarp, lateral view.

cm wide near the base, 7.6–8 cm wide at the middle, thick rigid coriaceous, above shining green, below pale green, U-sulcate, 2-pleated, at midsection with 72 parallel secondary veins in each half, the tertiary cross veins evident near the base and the tip, forming short oblong meshes, blade ligulate, but in outer 1/8 tapering into the long slender tip (apex lost in ours), the base unarmed, pale; beginning 17–18 cm up the margins with prickles 2.1–2.7 mm long, 7–11 mm apart, subarcuate slender subulate, ascending, wholly stramineous or with slight red tips; the midrib below unarmed for the lower 1/6–1/4; at midsection the margins with prickles 1.2–1.6 mm long, 4–10 mm apart, arcuate stout subulate, strongly ascending, stramineous with red tips; the midrib with prickles 1.5–1.8 mm long, 22–37 mm apart, arcuate slender subulate,

strongly ascending, stramineous, red-tipped; on the subulate apex the margins and midrib with prickles 0.4–0.7 mm long, 2–4 mm apart, arcuate subulate, strongly ascending, red-tipped; syncarps solitary, 22.5 cm long, 19.5 cm in diameter, broadly ellipsoid, bearing about 104 phalanges, these 6.1–6.5 cm long, 2.4–3.9 cm wide (4.4–5.3 cm in twins with 12 and 15 carpels), 2.1–3.1 cm thick, obovoid to oblanceoloid, compressed, 4–6-angled, apex low convex, lateral sinuses none, lower sides nearly flat, becoming yellow; upper 1/3 free, the sides smooth, shining, green, flattish or gently curving; carpels 5–8, ascending, more or less parallel, the apices of the marginal ones broadly pyramidal ovoid, all erect or a few slightly out-curving, the inner apices from 1/2 as large to quite as large as the marginal ones; central

apical sinuses 3–5 mm deep, V-shaped, nearly straight; stigmas 2–3 mm long, elliptic, oblique, pale brown, papillose; proximal sinuses narrow, running 1/4–3/4 way to valley bottom; endocarp median, bony, pinkish brown, broadly cuneate, the base broad concave, the apex convex with conic projections over the seeds, the upper rim with curved ascending wings, lateral walls 2.5 mm thick, within shining, smoothish but slightly spirally striate; seeds 13–14 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 12–22 mm long, containing aerenchyma of a few longitudinal fibers and brownish transverse membranes; basal mesocarp 17–18 mm long, fibrous and fleshy.

HOLOTYPE: Rotuma Island, Pacific Ocean, Mea, Itutiu Dist., cutover forest on sandy flat, 20 ft. alt., Aug. 17, 1938, *H. St. John 19,521* (BISH).

DISCUSSION: *P. rotumaensis* is a member of the section *Pandanus*, as is its closest relative, *P. odoratissimus* L. f. var. *pyriformis* Martelli, as typified by *Setchell & Parks 15,668* from Fiji, a plant with the syncarps ovoid; phalanges 5.7–6 cm long, pyriform, the upper 1/2 free, lateral sinuses distinct part or all the way down the sides, on the sides each carpel with one or more secondary angles; carpels 8–11, and the inner apices narrowly ovoid to lanceoid; stigmas 1.2–1.5 mm long; endocarp in the upper 1/3; leaves 5.5 cm wide at the middle, the margins beginning at 6 cm from the base with prickles 1.3–2 mm long, 2–8 mm apart, stout subulate, ascending, stramineous below, brown-tipped, the lower ones geniculate near the base, the others arcuate. *P. rotumaensis* has the syncarps suborbicular; phalanges 6.1–6.5 cm long, obovoid to oblanceoloid, the apex low convex, the upper 1/3 free, the lateral sinuses none; the lower sides nearly flat; carpels 5–8, the inner apices broadly pyramidal ovoid; stigmas 2–3 mm long; endocarp median; leaves 7.6–8 cm wide at the middle, the margins beginning at 17–18 cm from the base with prickles 2.1–2.7 mm long, 7–11 mm apart, subarcuate slender subulate, ascending, wholly stramineous or with slight red tips.

The epithet is made from the geographic name, Rotuma, and the Latin adjectival place suffix, *-ensis*.

Pandanus rubricinctus sp. nov. (sect. *Pandanus*)

Figure 362

NOM. VERN.: "hata" (Rotuman).

DIAGNOSIS HOLOTYPE: Arbor 8 m alta 2.5 dm diametro, foliis 1.22 (+0.1–0.3?) m longis proxima basem 8–8.6 cm latis proxima medium 5.6 cm latis coriaceis supra lucidis viridibus infra palliditer viridibus et licet glaucis V-sulcatis 2-plicatis in sectione mediali cum 66 nervis parallelis secundariis nervis tertiis obscuris laminis gladiatis ex basi in apice gracili deminuentibus (apice perditio) basi inermi pallida, ex 7–8 cm marginibus cum aculeis 1–2.3 mm longis 2–7 mm separatis subulatis infimis subrectis alteris arcuatis adscendentibus stramineis et plerumque cum apicibus subrubris, midnervo infra ex 21–26 cm cum aculeis 1–2 mm longis 8–19 mm separatis arcuatis gracilibus subulatis adscendentibus stramineis, in sectione mediali marginibus cum aculeis 1.5–2 mm longis 4–8 mm separatis subarcuatis subulatis valde adscendentibus stramineis cum apicibus rubris, midnervo infra cum aculeis 1.3 mm longis 8–18 mm separatis subulatis valde adscendentibus stramineis, proxima apicem marginibus et midnervo infra cum aculeis 0.4–0.8 mm longis 2–4 mm separatis arcuatis crassiter subulatis adscendentibus cum apicibus rubris, syncarpio solitario cum 144 phalangibus sed non preservatis, phalangibus siccis 4.5–4.9 cm longis 2.1–3 cm latis (3.7 cm latis in gemino cum 9 carpelis), 1.5–2.3 cm crassis, oblanceoloideis 4–5-angulosis parte 2/5 infera ellipsoidea et subcarnosa incrassata intense rubri et 3–4 mm crassiori quam parte supera, supra parte carnosa parte contracta et intense rubri, parte 2/5 supera libera subrubri vel rubri sed in sicco brunnea lateribus subplanatis vel subcurvatis sublaevibus lucidis sinibus lateralibus nullis, carpelis 3–9 adscendentibus subparallelis, carpelis marginalibus cum apicibus pyramidalis-semiorbicularibus (vel latiter pyramidalis-ovoidis), carpelis centralibus cum apicibus aequalibus vel 2/3 tam grandibus quam marginalibus

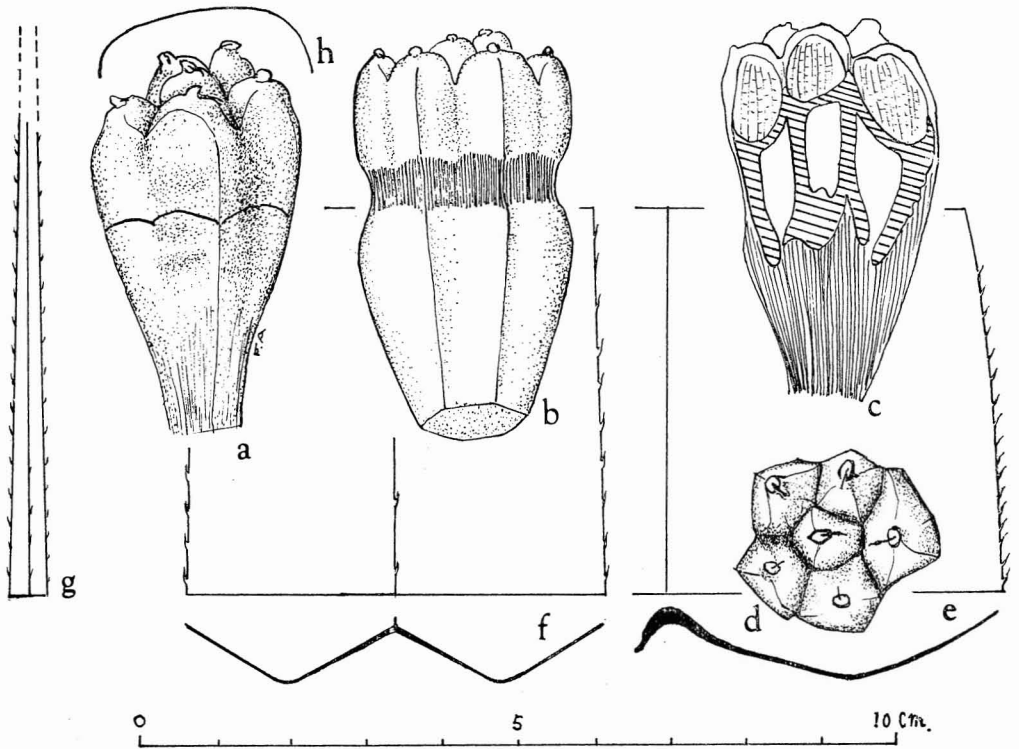


FIGURE 362. *Pandanus rubricinctus* St. John, from holotype. *a*, dried phalange, lateral view, $\times 1$; *b*, fresh phalange, lateral view, $\times 1$; *c*, phalange, longitudinal median section, $\times 1$; *d*, phalange, apical view, $\times 1$; *e*, half of leaf base, lower side, $\times 1$; *f*, leaf middle, lower side, $\times 1$; *g*, leaf apex, lower side, $\times 1$; *h*, profile of phalange, $\times 1$.

latiter pyramidalis-ovoideis sinibus centralibus apicalibus 3–7 mm profundis subrectis latiter V-formatis, stigmatibus apicalibus 1.5–3 mm longis vel latis eis marginalibus reniformibus illis apicalibus ellipticis brunneis papillois plerumque obliquis, sinibus proximalibus angustis et $1/4$ – $1/2$ ad fondam extensis et apice obscuro expanso, endocarpio in parte $2/5$ supra 17–22 mm longo osseoso stramineo transverse elliptico cum projectionibus conicis supra semines humeris adscendentibus basi concava lateribus lateralibus 2–3 mm crassis intra lucidis spiraliter rugosis rubri-brunneis maculatis, seminibus 9–11 mm longis ellipsoideis, mesocarpio in apice carpelae cujusque cavernam 7–13 mm longam cum fibris longitudinalibus et membranis transversis multis albis formanti, mesocarpio basali 19–20 mm longo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Tree 8 m tall, 2.5 dm in diameter; leaves 1.22 (+0.1–0.3?) m

long, 8–8.6 cm wide near the base, 5.6 cm wide near the middle, coriaceous, shiny green above, pale green and apparently glaucous beneath, V-sulcate, 2-pleated, at midsection with 66 parallel secondary veins in each half, the tertiary veins obscure, blade sword-shaped, tapering from the base into the slender apex (tip lost in ours), base unarmed, pale; beginning at 7–8 cm up the margins with prickles 1–2.3 mm long, 2–7 mm apart, subulate, the lowest ones straightish, the succeeding ones arcuate, ascending, stramineous, and mostly with slight red tips; the midrib below beginning at 21–26 cm up with prickles 1–2 mm long, 8–19 mm apart, arcuate slender subulate, ascending, stramineous; at midsection the margins with prickles 1.5–2 mm long, 4–8 mm apart, subarcuate subulate, strongly ascending, stramineous with red tips; the midrib below with prickles 1.3 mm long 8–18 mm apart, arcuate subulate, strongly ascending, stramineous; towards the apex the margins and midrib below with prickles

0.4–0.8 mm long, 2–4 mm apart, arcuate stout subulate, ascending, red-tipped; syncarp not preserved, bearing 144 phalanges, these when dried 4.5–4.9 cm long, 2.1–3 cm wide (3.7 cm wide in a twin with 9 carpels), 1.5–2.3 cm thick, oblanceoloid, 4–5-angled, the lower $2/5$ is ellipsoid, slightly fleshy enlarged, bright red, and 3–4 mm wider than the upper part, just above the fleshy part is a contracted collar 5 mm high, deep red, and the exposed upper $2/5$ free part is pink or red but brown when dried, its sides flattish or gently convex, smoothish, shining, lateral sinuses none; carpels 3–9, ascending, almost parallel, the marginal carpels with apices pyramidal semiorbicular (or broadly pyramidal ovoid), central carpel apices equal to or $2/3$ as large as the outer ones, broad pyramidal ovoid; central apical sinuses 3–7 mm deep, straightish, broad V-shaped; stigmas apical, 1.5–3 mm long or broad, the marginal ones reniform, the apical ones elliptic, brown, papillose, mostly oblique; proximal sinuses narrow, running $1/4$ – $1/2$ way to valley bottom, and with a dark expansion at the end; endocarp in upper $2/5$ and 17–22 mm long, bony, stramineous, transversely elliptic, with short conic projections over the seeds and ascending lateral shoulders, the base concave, the lateral walls 2–3 mm thick, within spirally rugose, shining and only here red brown; seeds 9–11 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 7–13 mm long, with aerenchyma of few longitudinal fibers and many transverse white membranes; basal mesocarp 19–20 mm long, fibrous and fleshy.

EXPANDED DESCRIPTION FROM ALL SPECIMENS EXAMINED: Leaves 5.2–8.4 cm wide near the base, 4.8–5.6 cm wide at the middle, at midsection with 55–66 parallel secondary veins in each half; syncarp ellipsoid, bearing 143 phalanges, peduncle more than 10 cm long, 12 mm in diameter, 3-sided, leafy bracted; core ellipsoid, fibrous and fleshy, but the soft interior evanescent, leaving on a dried specimen only the loose fibrous margin; phalanges 4.3–4.9 cm long, 1.3–3 cm wide, 1.3–2.3 cm thick; central apical sinuses 2–7 mm deep.

HOLOTYPE: Rotuma Island, Kopo, Itutiu Dist., sandy flat near shore, 10 ft. alt., Aug. 6, 1938, *H. St. John 19,437* (BISH).

SPECIMENS EXAMINED: Rotuma I., Pepjei, Pepsei Dist., sandy soil, in village, 15 ft. alt., Aug 15, 1938, *St John 19,488* (BISH); also observed at Vaitoko, Oinafa Dist., on Aug. 26, 1938.

DISCUSSION: *P. rubricinctus* is a member of the section *Pandanus*, as is its closest relative, *P. Vandra* St. John, of Fiji, a species with the phalanges 2.8–3.4 cm wide, the lateral sinuses all deep and evident, the color unknown; marginal carpel apices ovoid or broadly so, with a concave platform distal of the stigma; inner apices $1/3$ – $1/2$ as large as the marginal ones; central apical sinuses narrow V-shaped; basal mesocarp 22–24 mm long; leaf 6 cm wide near the base, the apex with the margins and midrib unarmed. *P. rubricinctus* has the phalanges 2.1–3 cm wide, the lateral sinuses none, the color red; marginal carpel apices pyramidal semiorbicular (or broadly ovoid), lacking a platform; inner apices equal to or $2/3$ as large as the marginal ones; central apical sinuses broad V-shaped; basal mesocarp 19–20 mm long; leaf 8–8.4 cm wide near the base, the apex with the margins and midrib below with prickles 0.4–0.8 mm long, 2–4 mm apart, arcuate stout subulate, ascending, red-tipped.

The new epithet is formed from the Latin, *ruber*, red; *cinctus*, belted, and refers to the deep red belt of color on the base of the free part of the phalanges.

Pandanus tectorius Warb. var. *novi-caledonicus* Martelli cv 'Farkoi' new cultivar (sect. *Pandanus*)

Figure 363

NOM. VERN.: "farkoi" (Gilbertese).

DESCRIPTION OF HOLOTYPE: Tree 10 m by 2 dm; leaves 2.01 (+0.15–0.3?) m long, 7.9–9.6 cm wide near the base, 9 cm wide at the middle, coriaceous, above dark shiny green, below pale green and apparently glaucous, U-sulcate, 2-pleated, at midsection with 65 parallel secondary veins in each half, the tertiary cross veins obscure, the blade broad ligulate, but in outer third tapering into the slender apex (tip lost); the base unarmed, pale; beginning at 5–6 cm the margins with prickles 1.8–2.5 mm long,

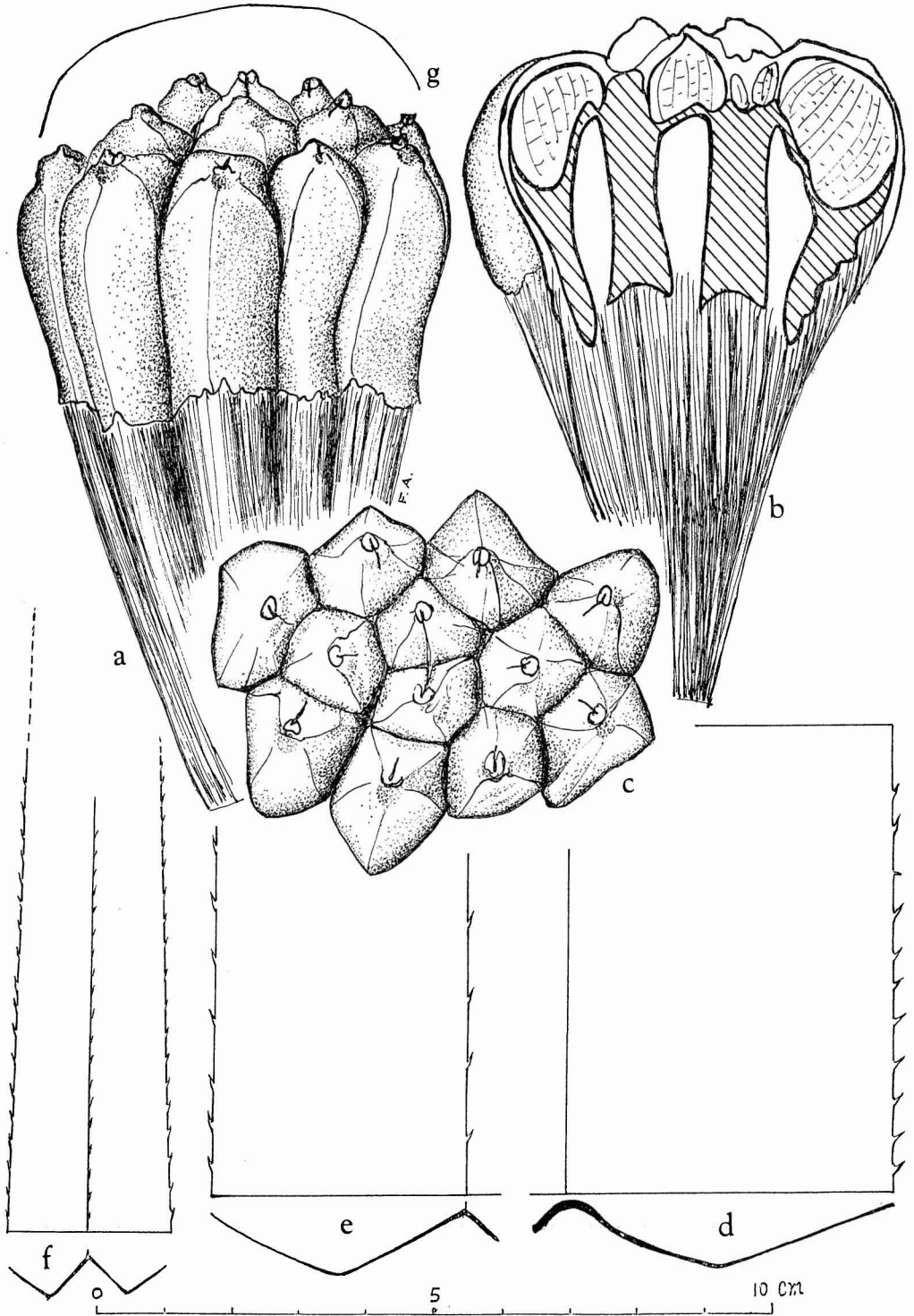


FIGURE 363. *Pandanus tectorius* Warb. var. *novi-caledonicus* Martelli, cv. 'Farkoi', from holotype. *a*, phalange, lateral view, $\times 1$; *b*, phalange, longitudinal median section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d*, half of leaf base, lower side, $\times 1$; *e*, half of leaf middle, lower side, $\times 1$; *f*, leaf apex, lower side, $\times 1$; *g*, profile of phalange, $\times 1$.

2–6 mm apart, narrowly deltoid subulate, compressed, ascending, stramineous but with red tips; beginning at 32 cm from the base the midrib below with prickles 2 mm long, 21–30 mm apart, arcuate stout subulate, strongly ascending, stramineous with red tips; at midsection the margins with prickles 2–2.6 mm long, 6–12 mm apart, subarcuate subulate from a broad oblique base, strongly ascending, stramineous with red tips; the nearby midrib below with similar prickles 9–16 mm apart; syncarp 30 cm long, 25 cm in diameter; phalanges 9–9.7 cm long, 4.7–7.4 cm wide, 4.1–5.7 cm thick, broadly obovoid (or obovoid), the apex convex, 5–6 angled, each marginal carpel with its back rounded salient and with 1–3 angles, upper 1/4 free, the sides rounded and angled, smooth, shining; carpels 10–17, the marginal apices ovoid or broadly so, acute and mostly outcurving; central apical sinuses 6–9 mm deep, V-shaped, straight or gently curving; stigmas 2–3 mm long, broadly elliptic, mostly oblique, brownish, papillose; proximal sinuses deep, running 1/3–1/2 way to valley bottom; endocarp in upper 1/4 and 35 mm long, bony, stramineous, transversely ellipsoid, the base concave, the apex with conic projections over the seeds, the upper rim with curved, ascending, winglike shoulders, lateral walls 5–7 mm thick, within dark reddish brown, shining but deeply spirally striate; seeds 15–18 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavern 10–22 mm long, with aerenchyma of a few longitudinal fibers and cross membranes; basal mesocarp 50–52 mm long, fibrous, and with edible flesh.

HOLOTYPE: Rotuma Island, Mea, Itutiu Dist., 15 ft. alt., one tree, cultivated by house of a Gilbert Islander, Aug. 8, 1938, *H. St. John 19,451* (BISH).

SPECIMENS EXAMINED: Gilbert Islands, Onotoa, July 1951, *E. T. Moul 8,412* (BISH).

DISCUSSION: This new plant, a member of the section *Pandanus*, is not a native of Rotuma, occurring there as a single cultivated tree, in the yard of a Gilbert Islands man who had introduced the tree from his former home in those

islands. The tree was grown for its large fruit (phalanges), about 9.5 cm long, and the lower two-thirds with abundant edible fruit pulp, and with large edible seeds. There is but a single published species from the Gilbert Islands, *P. gilbertanus* Martelli. From the large size of its phalanges, and the great extent of the basal mesocarp, this is evidently a cultivar, and not an indigenous, native species. Unnamed collections of three or four additional ones have been studied by the writer, and these too are certainly cultivars. Anthropologists have recorded many score of vernacular names of *Pandanus* cultivars in the Gilberts, but have not returned with voucher specimens for identification. Their vernacular names are different from those in the Marshall Islands, as their language is different, so the cultivars may or may not be in part identical. In any case, the Gilbert Islands must be regarded as one of the two regions with a great development of edible-fruited cultivars of *Pandanus*.

The cultivar 'Farkoi' does not seem to be a derivative of any known wild species or cultivated variety of *Pandanus* known in the Marshall Is. Since it is a cultivar, it should not be described as a species. The most similar known wild plant is *P. tectorius* Warb. var. *novicaledonicus* Martelli, of New Caledonia. This differs in having the phalanges 5.2–5.5 cm long, 3.5–4 cm wide; apical central sinuses 2–3.5 mm deep; carpel apices 7 and very obtusely hemispheric; endocarp slightly suprmedian; leaves 6 cm wide at the middle, and beginning at 6 cm from the base the margins with prickles 3–4 mm long, 4–9 mm apart, subulate, ascending from a geniculate base, wholly stramineous or with slight reddish tips. When the wild species of the adjacent islands to the north and to the west of Rotuma are better known, it may be better to attach this cultivar to some other species.

Another collection from the Gilbert Islands has the data: Tarawa, cult., inner part of phalange orange red, juicy, edible, Aug. 1955, *H. Shiels 3,152* (BISH), and has the vernacular name "te ara maonimaai." It consists of ripe phalanges only, and these are 10.6–11 cm long. In other regards they seem identical with the cv. 'Farkoi', and they are here classified as of the same cultivar.

Pandanus variegatus Miq., Anal. Bot. 2: 28, 1851.

NOM. VERN.: "sa'anga farfisi."

DESCRIPTION (from *St. John 19,794*): Stem at least to 2 m in height, branching; prop roots present; leaves 50–100 cm long, 3.8–4.5 cm wide at the middle, 2.5–3.5 cm wide near the base, thin subcoriaceous, V-sulcate, 2-pleated, at the middle with 30–31 parallel secondary veins in each half, the blade variegated with prominent longitudinal white stripes, ligulate, but in outer 1/3 tapering into the trigonous subulate apex, this at the point 10 cm down 6–9 mm wide, the base white, unarmed, but beginning at 4–6 cm up the margins with prickles 0.5–1.3 mm long, 3–11 mm apart, arcuate subulate, ascending, stramineous; the midrib below beginning at 12–15 cm with prickles 1 mm long, 12–32 mm apart, stout subulate, strongly reflexed, stramineous; at midsection the margins with prickles 1.2–1.5 mm long, arcuate subulate, ascending, stramineous; the nearby midrib below with prickles 1.5–1.8 mm long, 15–28 mm apart, arcuate

slender subulate, ascending, brownish; on the subulate apex the margins and midrib below with prickles 0.4–0.8 mm long, 1.3 mm apart, arcuate subulate, ascending, stramineous.

Itutiu District, Salvaka, 20 ft. alt., cult. in bush gardens, Aug. 29, 1938, *St. John 19,794* (BISH).

Observed only once, and then in cultivation. The leaves were said to be used for plaiting matting.

The plant was described from material cultivated in Indonesia, but of unknown origin. In Rotuma it is surely an introduced, cultivated plant. It was described as a species, but it is surely not a true species, rather it is a cultivar with variegated leaves, derived from some wild species, but just which one is unknown.

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