Revision of the Genus *Pandanus* Stickman. Part 39

*Pandanus* of Rotuma Island, Pacific Ocean

HAROLD ST. JOHN

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 ............................................. §*Hombronia*.

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*.

1 The preparation of this illustrated report was assisted by a grant from the National Science Foundation.

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


_pearo_(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.

_Barronía tetrodon_ Gaud., _Bot. Voy. La Bonite_ t. 13, fig. 1–8, 1843, an invalid name.


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, subacute 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, subacute 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, subacute 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, subacute subulate, compressed, appressed ascending, stramineous; near the apex

PACIFIC SCIENCE, Volume 29, October 1975

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 9.5×2.5 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, ×1; b, phalange, longitudinal median section, ×1; c, phalange, apical view, ×1; d, leaf apex, lower side, ×1.
FIGURE 348. Pandanus compressus Martelli, from St. John 19,595. a, half of leaf base, lower side, ×1; b, half of leaf middle, lower side, ×1; c, staminate inflorescence, ×¼; d, fascicle of stamens, ×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 (rt)!

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


Bismarck Archipelago: Raul (Ralum, New Britain), riva al mare, 1905–1906, nom. vern. “vaum,” Parkinsson 1 (fr); 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 Tiuman, Jarua Bay, June 1915, I. W. Barkill (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); Juhore, Sungai Sedili Kechil, low alt., 20 June, 1934, Corner 28,463 (BO, FHO, CGE, K).

**DISCUSSION:** *Pandanus compressus* is a member of the section *Hombronia, and there it, when called *P. tetrodon,* 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 tetrodon* 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. tetrodon* was made by Balfour in 1878, but he did not accept it himself. Kanehira in 1938 adopted the binomial *P. tetrodon* (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. tetrodon* Ridl. (1915), a valid name for a different Malayan species. Of the synonyms cited by Kanehira, *P. Hombronia* 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. tetrodon.* *P. Syzozi* Kanehira, based on *Kanehira 3,727 from Babledaab, 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 x 6.8 x 3.2 cm. It is immature and its lower part is much shrunkened, 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 *Hombronia*.

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


*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).


**NOM. VERN.**: “haun wassi” (Ambon); “ima,” “imae” (Ceram); “wacun ranu” (Banda); “haun pantei” (Malay); “haun laymoeoelen” (Ambon); “haoen lainoelen” (Ambon); “haoen pantai” (Ambon); “poeng” (Wedan); “bokoe” (Gal., Halmahera; Ternate); “booe” (Tidore); “bidur” (Java); “pandan bañiang” (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.); “samoes” (Manikiong); “simoes” (Mejach); “ekembram” (Biak); “dimboh” (Kurudu); “na vaku” (Nguna, New Hebrides); “moi” (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 0.3–0.7 mm long, 2–7 mm apart, arcuate subulate, 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; 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, ×1; 
- **b**, phalange, longitudinal median section, ×1; 
- **c**, phalange, apical view, ×1; 
- **d**, phalange, median cross section, ×1; 
- **e**, leaf apex, lower side, ×1.
FIGURE 352. *Pandanus dubius* Spreng., from *St. John 18,998*, showing the infrequent 1-carpelate drupe. A, drupe, lateral view, × 1; b, drupe, longitudinal median section, × 1; c, drupe, median cross section, × 1; d, half of leaf base, lower side, × 1; e, half of leaf middle, lower side, × 1.
FIGURE 353. Pandanus dubius Spreng., from Beguin 764. 
a. staminate inflorescence, ×1/4; 
b. fascicle of stamens, ×10; 
c. leaf base, lower side, ×1; 
d. leaf middle, lower side, ×1; 
e. leaf apex, lower side, ×1.
52–86 phalanges, these 9.5–13.5 cm long, 4–6.5 cm wide, 3.6–5 cm thick, ob lanceoloid (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,
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 (Beguin 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
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
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 (fr).

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 baggea maritimum Rumph., Herb. Amb. 4: 151, t. 80, 1743. Amboina. (Excluding Rumph. t. 75 which is P. sparius 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,
Governor (fl); Halmahera I., Galela, 24/10/21, Beguin 1,842 (l); Lingga Archipel., P. Sebangka, 16/8/19, Bannemeijer 7,506 (p); Ternate I., Soelamadaha, 6/6/21, Beguin 1,651, and 728, 764, 814, 815, 1,652, and 1,770 (l); Ceram, Lohi, Feb. 1904, Kayer (or Kayer?) (fl); ditto, Warburg (fl); Ali Is., Vokan, VII 1873, Beccari (fl); Batjan, Moluccas, Warburg (fl).

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 12,438 (a, bish, fl, k, mo, us, z); Leyte I., Gigantangan, Jan.-Feb. 1957, Y. Kondo & G. Edoño 36,506 (bish, us); Mindanao, Davao Dist., March 1904, E. B. Copeland 613 (fl, us); Sulu I., Mt. Bayao, Jan.-Feb. 1957, Kondo & Edoño 36,507 (bish).

Mariana Is.: Saipan, July-Aug. 1930, R. Kanebira 900 (ny); ditto, B. C. Stone 1,366, 1,367, and 7,371 (bish). Rota, July 1932, Kanebira (fl, fu); Sinapal, VII. 10.1934, T. Hozokawa 7,588 (rai); Tetacho, Feb. 1941, T. Teyama (fl). Guam, Tantapalo 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, fl, k, m, ny); Talofobo, 130 m. alt., June 15, 1956, St. John 25,804 (bish); Chalongguay, flat forested area, March 15, 1957, Stone 1,689 (bish); Barrigada, 21 March 1962, Stone 4,025 (bish).


Irian Barat (Netherlands New Guinea): Pulo Manim, Presso Mafor (Soron), 1875, O. Boccari (fl); Cape Soeadja, coastal swamp, Dec. 20, 1957, St. John 26,163 A (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, Sela 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 (fl).

Australian New Guinea: Wewak, St. John 26,184 (bish); Hatzfeldhafn, Warburg 21,007 (a).

Papua: Robinson Bay, R. D. Hoogland 3,430 (fl); Cape Caution, Holnicote Bay, W. McGregor (bm).


Bismarck Archipelago: New Ireland, Stone 2,638 (bish); ditto, 31.8.75, Naumann 5 (a); Nordup, Gazelle Penin., April 1935, Waterhouse 397, and 29,596 (ny); New Hanover, 21.7.75, Naumann 5, and 482 (a); Boiku, 20/10/55, J. S. Womersley 7,964 (a); New Ireland, s. coast, Kulube Plantation, 1/4/58, Stone 2,623 (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 Bagga, but in his chapter heading it was written F. baggea 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 re-published 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 Ambonea 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 oblanceloid, 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 secundaris in dimidio quoque nervis tertii transversis in dimidio basali evidenti et reticula breve oblonga formantibus, laminis gladiatis ex basi in apice gracili trigono deminentibus (apex deest), basi inermi pallida, ex 6–7 cm marginibus cum aculeis 1–1.5 mm
FIGURE 356. *Pandanus basalticola* St. John, from holotype. a, phalange, lateral view, ×1; b, phalange, longitudinal median section, ×1; c, phalange, apical view, ×1; d–f, phalange of smaller depauperate head; g, half of leaf base, lower side, ×1; h, leaf middle, lower side, ×1; i, leaf apex, lower side, ×1; j, profile of phalange, ×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 compressis adscendentibus stramineis sed cum apicibus rubris, infructescetia cum syncarpio solitario, pedunculo ultra 17 cm longo 13 mm diametro trilaterato foliosis-bracteato, syncarpio 16 cm longo 13 cm diametro latiter ellipsoideo, nucleo in sicco 8 x 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 oblanceoloides vel anguste oblan­ceoloides 3–5–angulosus apice truncato lateri­bus inferioribus planis intus aurantiaci car­nosi parte 1/3 supera libera lateribus subcurva­tis laevibus lucidi viridibus cum cicatricibus, phalangibus 4.2–4.8 cm longis 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, 3–5­angled, 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 sinusae 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 sinusae 5–7 mm deep, narrow V-shaped; stigmas 1–1.5 mm wide, reniform, horizontal or inflexed, brown, papilllose; proximal sinusae 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. basaltico/a* is a member of the section *Pandanus,* as is its closest relative, *P. upouensis* 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. basaltico/a* 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, *basaltico/a,* 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.
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 brunnis papillosis 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 ellipsoido in basi concavo apice cum projectionibus rotundatis lateribus lateribus 1-1.5 mm crassis intra luidicis sub-laevibus spiraliter striatis vel rugosis, seminibus 7-9 mm longis ellipsoides, mesocarpio in apice carpeleae cuisque cavernam 3-9 mm longam formatum cum fibris et parenchyma, mesocarpio assali 11-14 mm longo fibroso et carnoso.

**DIAGNOSIS OF HOLOTYPE:** Tree 8 m tall, 2 dm diameter, few branched into an open crown; leaves 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 1.5-1.7 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-
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, subarcuate stout subulate, strongly ascending, red-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...
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.


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, ×1; *b*, phalange, longitudinal median section, ×1; *c*, phalange, apical view, ×1; *d*, half of leaf base, lower side, ×1; *e*, leaf middle, lower side, ×1; *f*, leaf apex, lower side, ×1; *g*, profile of phalange, ×1.
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, 360A, 360B

*NOM. VERN.:* “hata,” “hat” (Rotuman).

**DIAGNOSIS HOLOTYPI**: *Arbor* 8 m alta 2 dm diametro, truncus muricato, ramulis 4 cm diametro palliditer bruneis sublaevibus lucidis, folis 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 mediale cum 60 nervis parallelis secundaritis in dimidio quoque nervis tertii transversis praesertim infra reticula breviter oblonga vel rhombica formantibus laminis gladiatis ex basi in apice trigono gracili subulato deminuentibus (apice perdito), basi inermi pallida ex 5–6 cm marginibus cum aculeis 1.5–2 mm longis 2–7 mm separatis geniculatis subulatis vel subtenui inter se adscendentibus stramineis, midnervo infra ex 12 cm aculeis 1.5 mm longis 17–58 mm separatis arcuatis crassiter subulatis adscendentibus stramineis, in sectione mediale 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 simulanteibus 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 bruneis, syncarpio 20 cm diametro subgloboso cum 94 phalangibus eis 5.8–6.2 cm longis 2.5–3.7 cm longa.
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 lateralisibus nullis, carpelis
5–8 adsendentibus parallelis eis marginalibus
cum apicibus semiobovoidis vel later
ovoideis eis majoribus cum areola concava
paucis distalis 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 diver-
gentibus, stigmatibus apicalibus 2–3 mm longis
vel latissimis vel reniformibus horizontalibus
vel obliquis brunniscis papillosis, sinibus proxi-
malibus profundis 1/2–2/3 ad fondam extentis,
endocarpo in parte 1/3 supera et 22–23 mm
longo osseo obscure brunneo transverse
ellipsoideo basi concava apice cum projectioni-
bus conicos parvis lateribus lateralisibus cum alis
validis adsendentibus lateralisibus 3.5–4 mm
crassis intra lucidis sublaevibus sed spiraliter
striatis, seminibus 9–13 mm longis ellipsoideis
vel asymmetricis, mesocarpo in apice carpelae
quiesque caverna 7–15 mm longam cum fibris
longitudinalibus et membranis albis transversis
formanti, mesocarpo 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 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.


**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 *Hombronia*, 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 HOLOTYPE:** Arbor 8 m alta, trunco 1 dm diametro lutei-brunneo sublaevi lucido, folii 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-sulcatiis 2-plicatis in sectione mediali cum 72 nervis parallelis secundariis in dimidio quoque nervis tertiis tertiiis reticula breviter oblonga formantibus, laminis ligulatis sed in parte 1/8 ultima in apice longo gracili deminuentibus (apici perdito) 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 ellipsoideum 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 oblancoeloides compressis 4–6-angulosis apice subconvexo sinibus lateralis nullis lateribus inferis paene planatis lutescentibus parte 1/3 supera 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 profundi V-formati subrectis, stigmatibus 2–3 mm longis ellipticiis obliquis pallidis brunneis papillosis, sinibus proximalibus angustis 1/4–3/4 ad fondam extentis, endocarpi mediiali osseoso subrubro-brunneo late cuneato in basi late concavo apice convexo et supra semines cum projectionibus conicis humeris curvatis adscendentibus lateribus lateralis 2.5 cm crassis infra lucidis sublaevibus sed spiraler stratias, seminibus 13–14 mm longis ellipsoideis, mesocarpio in apice carpelae cuisque cavernam 12–22 mm longam cum aerenchyma fibris ordinatinalibus pauci 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 361 A. Pandanus rotumanensis St. John, from holotype. a, phalange, lateral view, ×1; b, phalange, longitudinal median section, ×1; c, phalange, apical view, ×1; d, half of leaf base, lower side, ×1; e, half of leaf middle, lower side, ×1; f, leaf apex, lower side, ×1; g, profile of phalange, ×1.
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 oblancoeloid, 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.


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 lanceoloid; 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 oblongoloid, the apex low convex; 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 HOLOTYP: Arbor 8 m alta 2.5 dm diametro, folis 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 mediiali cum 66 nervis parallelis secundariis nervis tertii ob-scuris laminis gladiatis ex basi in apice gracili deminuentibus (apice perdito) basi inermi pallida, ex 7–8 cm marginibus cum aculeis 1–2.3 mm longis 2–7 mm separatis subulatis in-finis subrectcis alteris arcuratis adscendentibus stramineis et plerumque cum apicibus sub-rubris, midnervio infra ex 21–26 cm cum aculeis 1–2 mm longis 8–19 mm separatis arcuratis gracilibus subulatis adscendentibus stramineis, in sectione mediiali marginibus cum aculeis 1.5–2 mm longis 4–8 mm separatis subarcuatis subulatis valde adscendentibus stramineis cum apicibus rubris, midnervio infra cum aculeis 1.3 mm longis 8–18 mm separatis subulatis valde adscendentibus stramineis, proxima apicem marginibus et midnervio infra cum aculeis 0.4–0.8 mm longis 2–4 mm separatis arcuratis crassi-ter 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, ollancneo-loideis 4–5–angulosis parte 2/5 infera ellipsioidea et subcarnosa incressata intese rubri et 3–4 mm crassiori quam parte supera, supra parte carnosa parte contracta et intese rubri, parte 2/5 supera libera subrubri vel rubri sed in sicco brunnea lateribus subplanatis vel subcurvatis sublaevibus lucidis sinibus lateribus nullis, carpelis 3–9 adscendentibus subparallelis, car­pelis marginalibus cum apicibus pyramidalis-semiornicularibus (vel latiter pyramidalii-ovoideis), 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, ×1; b, fresh phalange, lateral view, ×1; c, phalange, longitudinal median section, ×1; d, phalange, apical view, ×1; e, half of leaf base, lower side, ×1; f, leaf middle, lower side, ×1; g, leaf apex, lower side, ×1; h, profile of phalange, ×1.

Latiter pyramidali-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 papillosis plurumque obliquis, sinibus proximalibus angustis et 1/4–1/2 ad fondam extentis et apice obscuro expanso, endocarpio in parte 2/5 supera 17–22 mm longo osseo 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 carpeae 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, arcuate 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.


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, ×1; *b*, phalange, longitudinal median section, ×1; *c*, phalange, apical view, ×1; *d*, half of leaf base, lower side, ×1; *e*, half of leaf middle, lower side, ×1; *f*, leaf apex, lower side, ×1; *g*, profile of phalange, ×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 obovate (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, Ituti District, 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. *novicaldonicus* 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 oblately hemispheric; 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.

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.

LITERATURE CITED