

Revision of the Genus *Pandanus* Stickman, Part 33  
Further Accounts of Australian Species, and a Key  
to the Section *Microstigma*

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SPECIES OF *Pandanus* were discovered in eastern and northern Australia at the beginning of the nineteenth century. Subsequent collections have revealed that the genus extends from the northern part of Western Australia, across the Northern Territory, over much of Queensland, and along the east coast down into New South Wales. Including the ones here described, there are 65 known species of *Pandanus* in Australia.

Section *Kaida*

*Pandanus Basedowii* C. H. Wright, Kew Bull. 158, pl. 6, 1930; St. John, Pacif. Sci. 16: 416-417, fig. 143, 1962 (sect. *Kaida*).

Fig. 280

ADDITIONAL DIAGNOSIS (from holotype): Leaves 40 cm long, 1.4 cm wide near the base, 1.5-1.7 cm wide at the middle, at midsection with 24-29 parallel secondary veins in each half, beginning at 2.5 cm up the margins with prickles 1-1.8 mm long, 3-8 mm apart, slender subulate, straight or arcuate, the lowest salient, the next strongly arcuate, ascending or descending, dark brown; beginning at 6-7 cm up the midrib below with prickles 1-1.5 mm long, 12-16 mm apart, arcuate slender subulate, irregularly ascending or reflexed, brown; at midsection the margins with prickles 1-1.5 mm long, 4-7 mm apart, arcuate slender subulate, strongly ascending, brown; the nearby midrib below with similar prickles; the subulate apex nearly unarmed, but in the last 5 mm the margins and midrib below with a few crenulations 0.2 mm long, then beginning 2-2.5 cm down the midrib below with prickles 0.4-0.6 mm long, 5-10 mm apart, arcuate slender subulate, strongly ascending, red-tipped; peduncle 6 cm long, 7-8 mm in diameter; phalanges 6-7 cm long, 3.8-4.8 cm wide, 3.5-4.3 cm thick.

HOLOTYPE: Australia, Arnhem Land, high tableland west of King River, 310 m alt., June 1928, Dr. Herbert Basedow (K)!

Section *Mammillarisa*

*Pandanus heronensis* sp. nov. (sect. *Mammillarisa*)

Fig. 281

DIAGNOSIS HOLOTYPE: Truncus ramuli syncarpiumque incogniti, radicibus fulurosus observatis, foliis 89-100 cm longis proxima basem 4.9-5.2 cm latis in medio 4 cm latis coriaceis supra palliditer viridibus infra albi-viridibus U-sulcatis 2-plicatis in sectione mediali cum 51 nervis parallelis secundariis in quoque dimidio nervis tertiis transversis supra et infra solum ad basem in parte mediali visibilibus et reticulis breviter oblongis vel rhombicis formantibus, lamina gladiata ex basi sensim in apice trigono graciliter subulato diminuenti eo in puncto 10 cm ex apice 3-3.5 mm lato basi inermi pallida, ex 4-5 cm marginibus cum aculeis 1.5-3 mm longis 1.5-6 mm separatis subulatis sed in basi geniculatis et subsigmoideis valde adscendentibus stramineis, ex 8-9.5 cm midnervo infra cum aculeis 1.3-2.2 mm longis 4-10 mm separatis arcuatis crassiter subulatis valde adscendentibus stramineis, in sectione mediali marginibus cum aculeis 0.7-1.2 mm longis 1.5-6 mm separatis subulatis adpresse adscendentibus pallidis cum apicibus brunneis, midnervo infra cum aculeis simulantibus 1-1.5 mm longis 3-10 mm separatis, in apice subulato marginibus cum aculeis 0.5-1 mm longis 0.5-3 mm separatis subulatis valde adscendentibus apicibus brunneis, midnervo infra per 3-4 cm ultimis inermi, phalangibus 4.4-4.7 cm longis 2.6-3.2 cm latis 2.3-2.9 cm crassis obovoideis 4-6-angulosis parte  $\frac{1}{2}$  supera libera lateribus subconvexis licet rubri-aurantiacis laevibus lucidis, apice truncato sinibus lateralibus nullis, carpelis 5-9 adscendentibus sed apicibus in regione centrali  $\frac{1}{2}$  tam latis quam phalangi, apicibus pyramidalibus subaequalibus, sinibus centralibus 2-3 mm profundis plerumque rectis V-formatis, stigmatibus 2-2.8 mm latis orbicularibus vel reniformis plerumque obliquis palliditer brunneis papillois sinibus proximalibus profundis  $\frac{1}{2}$ -1 ad fondam extensis, endocarpio supramediali 2 cm longo osseoso brunneo-rubro transverse elliptico in apice cum projectionibus conicis parvis supra semines lateribus lateralibus 3-3.5 mm crassis intra laevibus lucidis, mesocarpio in apice quaeque carpelae cavernam 7-10

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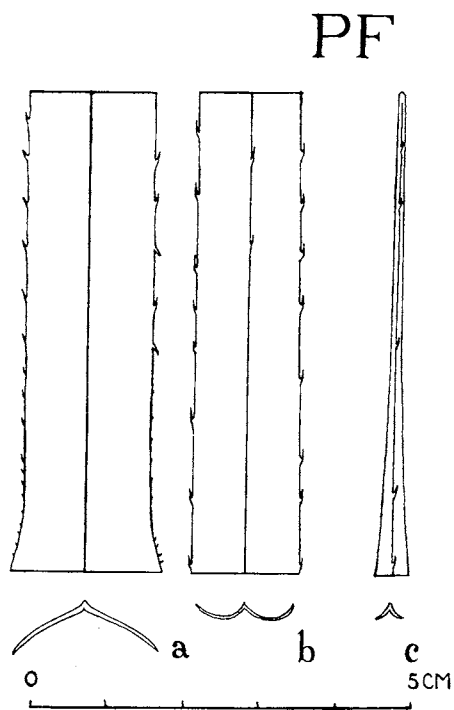


FIG. 280. *Pandanus Basedowii* C. H. Wright, from holotype. *a*, Leaf base, lower side,  $\times 1$ ; *b*, leaf middle, lower side,  $\times 1$ ; *c*, leaf apex, lower side,  $\times 1$ .

mm longam cum fibris longitudinalibus paucis et membranis transversis albis formanti, mesocarpio basali 15 mm longo fibroso et carnosio.

**DIAGNOSIS OF HOLOTYPE:** Trunk, branches, and syncarp unknown; prop roots observed; leaves 89–100 cm long, 4.9–5.2 cm wide near the base, 4 cm wide at the middle, coriaceous, above pale green, below whitish green, U-sulcate, 2-pleated, at midsection with 51 parallel secondary veins in each half, tertiary cross veins visible above and below near the base in vertical strips, forming short oblong or rhombic meshes; blade sword-shaped, tapering gradually from the base into the trigonous slender subulate apex, this at the point 10 cm down 3–3.5 mm wide, the base unarmed, pale, beginning at 4–5 cm from the base, the margins with prickles 1.5–3 mm long, 1.5–6 mm apart, subulate but geniculate at base and slightly sigmoid, strongly ascending, stramineous, beginning at 8–9.5 cm the midrib below with prickles 1.3–2.2 mm long, 4–10 mm apart, arcuate stout subulate, strongly ascending, stramineous; at midsection

the margins with prickles 0.7–1.2 mm long, 1.5–6 mm apart, subulate, appressed ascending, pale with brown tips; the midrib below with similar prickles 1–1.5 mm long, 3–10 apart; on the subulate apex the margins with prickles 0.5–1 mm long, 0.5–3 apart, subulate, strongly ascending, brown-tipped; the midrib below unarmed for the last 3–4 cm; phalanges 4.4–4.7 cm long, 2.6–3.2 cm wide, 2.3–2.9 cm thick, obovoid, 4–6-angled, upper  $\frac{1}{2}$  free, the sides gently convex, apparently reddish orange, smooth, shining, the apex truncate, lateral sinuses none; carpels 5–9, ascending but their apices in a central area half as wide as the phalange, the apices pyramidal, subequal; central apical sinuses 2–3 mm deep, mostly straight, V-shaped stigmas 2–2.8 mm broad, round to reniform, mostly oblique, pale brown, papillose; proximal sinuses deep, running half to all the way to the valley bottom; endocarp supramedian, 2 cm long, bony, brownish red, transversely elliptic, the apex with slight conic projections over the seeds; lateral walls 3–3.5 mm thick, within smooth, shining; mesocarp forming in the apex of each carpel a cavern 7–10 mm long, with a few longitudinal fibers and white transverse membranes; basal mesocarp 15 mm long, fibrous and fleshy.

**HOLOTYPE:** Australia, Queensland, Great Barrier Reef, Heron I., June 1960, *R. F. Thorne* 17,215 (BRI).

**SPECIMENS EXAMINED:** Australia, Queensland, Heron I., characteristic of most trees, both ants and rats relish the fruits, June 1958, *M. Gillam* (BRI); ditto, June 1958, *C. Poulsen*, Herb. Blake 20,376 (BRI); ditto, *R. F. Thorne* 17,210 (BRI); Northwest I., Capricorn Group, 3/21/1924, *Hedley* (FI).

**DISCUSSION:** *P. heronensis* is a member of the section *Mammillarisia*, as is its somewhat close relative, *P. Kaernbachii* Warb., of Australian New Guinea, a species with the phalanges 9 cm long, 3–4 cm wide, the apex concave; and the carpels 8–10. *P. heronensis* has the phalanges 4.4–4.7 cm long, 2.6–3.2 cm wide, the apex truncate; and the carpels 5–9.

S. T. Blake wrote on 17 Feb. 1961, "I have been able to get seven collections from Heron

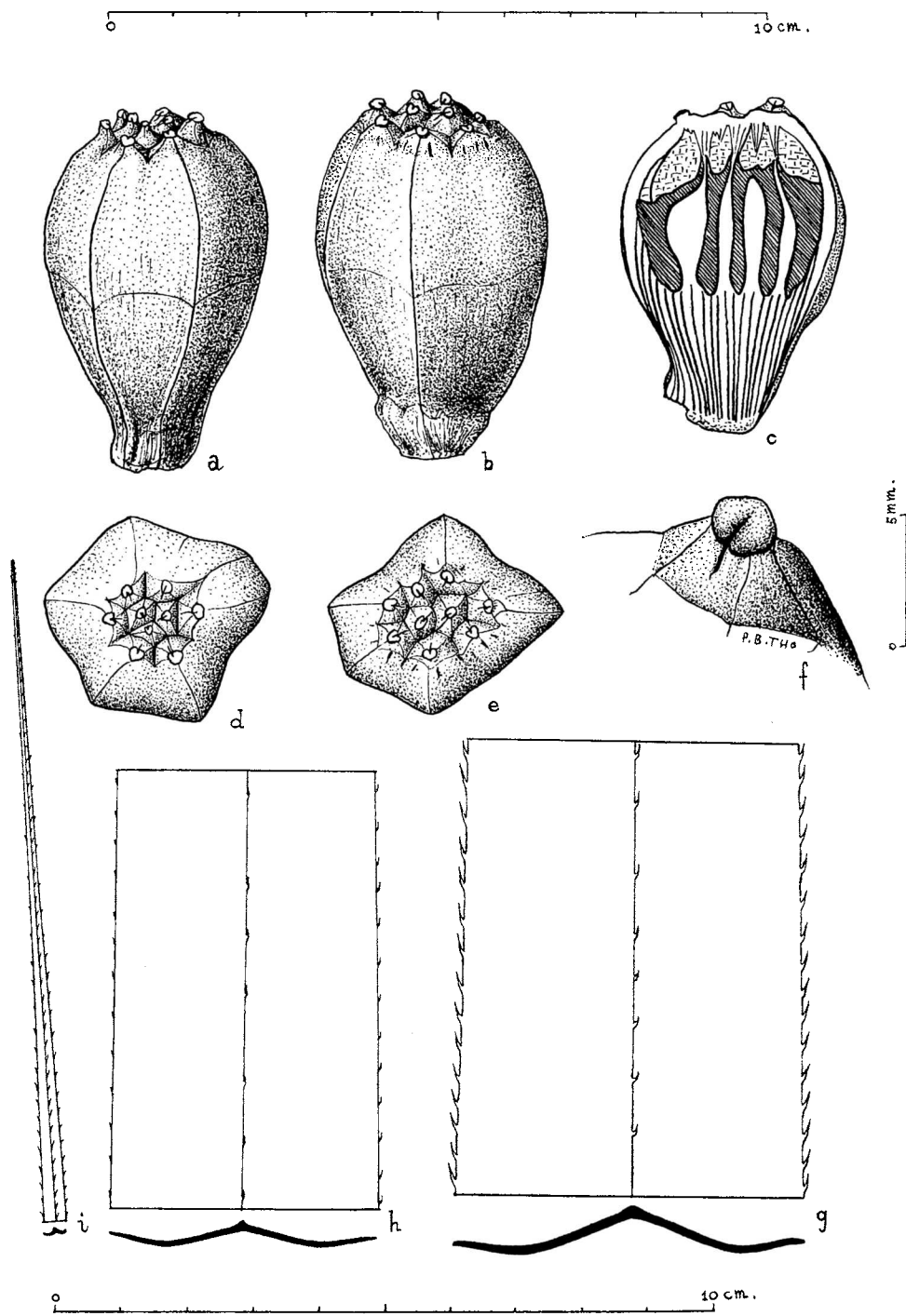


FIG. 281. *Pandanus heronensis* St. John, from holotype. *a, b*, Phalanges, lateral view,  $\times 1$ ; *c*, phalange, longitudinal median section,  $\times 1$ ; *d, e*, phalanges, apical view,  $\times 1$ ; *f*, stigma and carpel apex, oblique view,  $\times 4$ ; *g, h*, leaf base, lower side,  $\times 1$ ; *i*, leaf apex, lower side,  $\times 1$ .

I. Poulsen, who collected the two under my nos. . . . lives on the island and may be expected to know the trees very well. Gillam's material was possibly collected from trees pointed out by Poulsen. She wrote that the small ones [*P. heronensis*] characteristic of most trees. Large ones [*P. extralittoralis*] characteristic of trees by guest house (possibly planted) which have a larger, more 'open' fruit, less pineapple-like. Both ants and rats relish the fruits, the latter helping themselves to 2 per night from supposedly rat-proof parts of the lab., preferring the large ones. Ants make sunken tracks through the sand to fallen fruits and are particularly abundant in them at germination."

The new epithet is a geographic adjective, made from the name of the type locality, plus the Latin adjectival place suffix, *-ensis*.

*Pandanus stradbrokeensis* sp. nov. (sect. *Mammillarisia*)  
Figs. 282, 283.

DIAGNOSIS HOLOTYPE: "Arbor 5 m alta, radicibus fulturosus multis brevibus," foliis 77-96 (+ 8-15 ?) cm longis proxima basem 9-10.2 cm latis in medio 6 cm latis coriaceis supra viridibus infra pallidioribus et licet glaucis, in sectione mediali cum 62 nervis parallelis secundariis in quoque dimidio nervis tertiis obscuris, lamina U-sulcata 2-plicata gladiata ex basi in apice gracili diminuenti (apex deest) basi inermi pallida, ex 7-11 cm marginibus cum aculeis 1.3-2.5 mm longis 1-3 mm separatis arcuatis subulatis compressis adscendentibus pallidis, midnervo infra per partem  $\frac{1}{3}$  inferam inermi, in sectione mediali marginibus cum aculeis 1.2-1.5 mm longis 2-4 mm separatis subulatis adpresse adscendentibus in basi brunneis, midnervo infra cum aculeis 1.3-1.6 mm longis 4-7 mm separatis subulatis valde adscendentibus pallidis, ad apicem marginibus cum serrulis 0.2-0.3 mm longis 3-5 mm separatis brunneis, midnervo infra cum aculeis 0.3-0.4 mm longis 2-4 mm separatis subulatis adscendentibus brunneis, phalangibus 6-6.3 cm longis 3.3-5 cm latis 2.9-3.8 cm crassis latiter oblancei-ellipsoideis 4-5-angulosis parte  $\frac{1}{2}$  supera libera lateribus convexis vel subplanis laevibus lucidis quando siccis palliditer brunneis suturis lateralibus nullis apice truncato  $\frac{1}{2}$  tam lato quam in medio sinibus centralibus apicalibus 3-4 mm profundis subrectis anguste V-formatis, carpelis 9-15 apicibus marginalibus latiter pyramidalibus et cum areola plana vel concava distali apicibus interioribus pyramidalibus vel anguste pyramidalibus, stigmatibus 2-4 mm longis deltoideis oblanceolatis apicibus truncatis centripetalibus obscure brunneis papillois valde obliquis et intraspectis, sinibus proximalibus  $\frac{1}{2}$ -1 ad fondam extensis, endocarpio centrali osseoso obscure brunneo lateribus lateralibus 4-5 mm crassis supra et infra

cum mesocarpio albo denso obtectis, seminibus 8-10 mm longis anguste ellipsoideis, mesocarpio in apice quaeque carpelae cavernam cum fibris longitudinalibus paucis et membranis albis transversis, mesocarpio basali fibroso et carnosio.

DIAGNOSIS OF HOLOTYPE: "Tree, 5 m tall; prop roots numerous, short"; leaves 77-96 (+ 8-15 ?) cm long, 9-10.2 cm wide near the base, 6 cm wide at the middle, coriaceous, green above, paler green and apparently glaucous beneath, at midsection with 62 parallel secondary veins in each half, tertiary cross veins obscure; the blade U-sulcate, 2-pleated, sword-shaped, tapering from the base to the slender tip (apex missing), the base unarmed, pale, beginning at 7-11 cm up the margins with prickles 1.3-2.5 mm long, 1-3 mm apart, arcuate subulate, compressed, ascending, pale; the midrib below unarmed throughout lower  $\frac{1}{3}$ ; at midsection the margins with prickles 1.2-1.5 mm long, 2-4 mm apart, subulate, appressed ascending, brownish at base; the midrib below with prickles 1.3-1.6 mm long, 4-7 mm apart, subulate, strongly ascending, pale; near the apex the margins with serrulations 0.2-0.3 mm long, 3-5 mm apart, brown; the nearby midrib below with prickles 0.3-0.4 mm long, 2-4 mm apart, subulate, ascending, brown; phalanges 6-6.3 cm long, 3.3-5 cm wide, 2.9-3.8 cm thick, broadly oblance-ellipsoid, 4-5 angled, upper  $\frac{1}{2}$  free, the sides gently convex to nearly plane, smooth, shining, drying pale brown, the lateral sutures none, the apex truncate, and narrow, about  $\frac{1}{2}$  as wide as the middle; apical central sinuses 3-4 mm deep, nearly straight, narrow V-shaped; carpels 9-15, the apices of the marginal ones broad pyramidal and with a flat or concave distal platform, the inner apices pyramidal or narrowly so; stigmas 2-4 mm long, deltoid, oblanceolate, the apex truncate, centripetal, dark brown, papillose, strongly oblique and facing inward; proximal sinus running half or all the way to the valley bottom; endocarp central, bony, dark brown, the lateral walls 4-5 mm thick, above and below coated by white, dense mesocarp; seeds 8-10 mm long, narrowly ellipsoid; mesocarp forming in the apex of each carpel a cavity with a few longitudinal fibers and with white transverse membranes; basal mesocarp fibrous and fleshy.

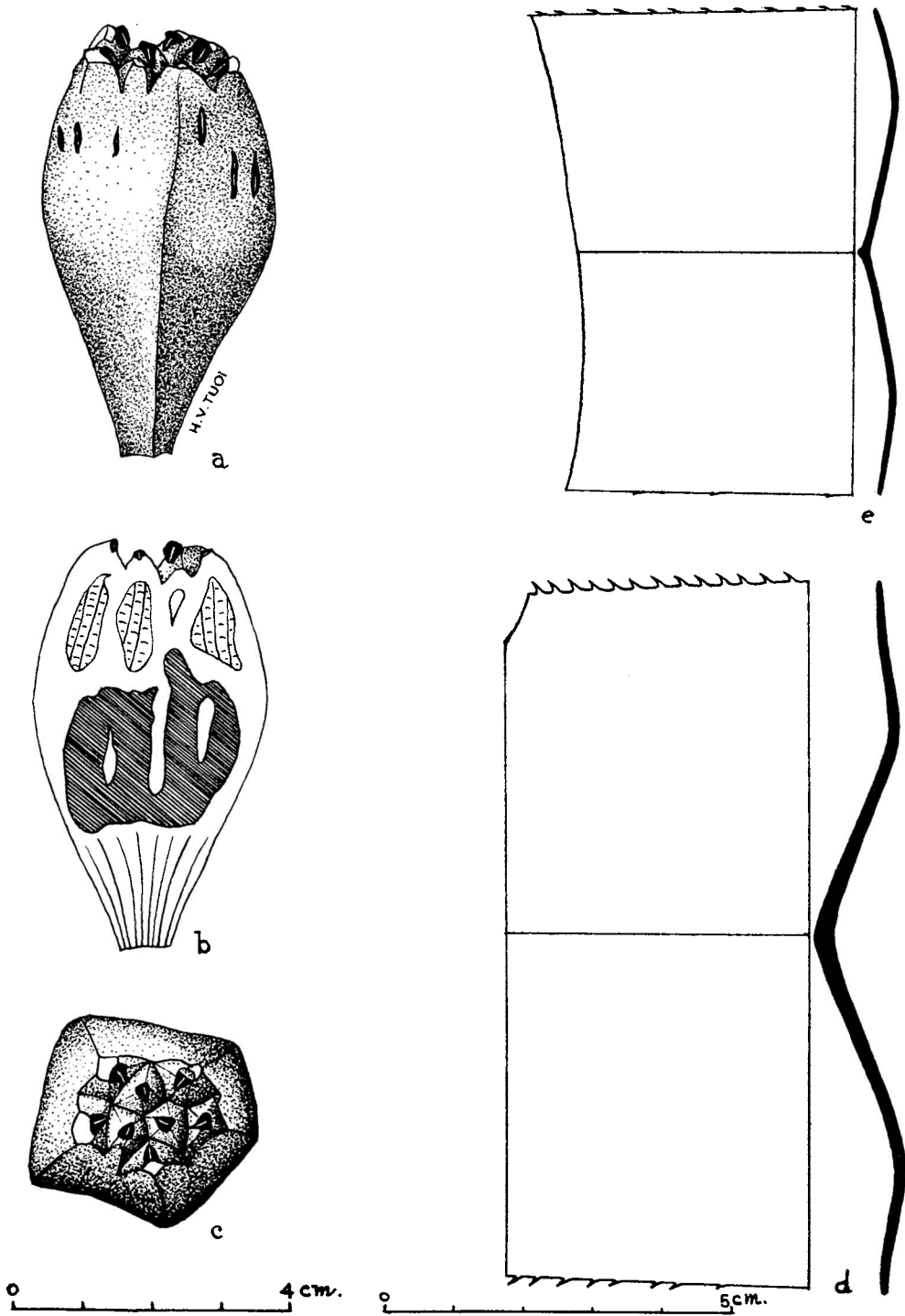


FIG. 282. *Pandanus stradbrokeensis* St. John, from holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ ; *d*, leaf base, lower side,  $\times 1$ ; *e*, leaf middle, lower side,  $\times 1$ .

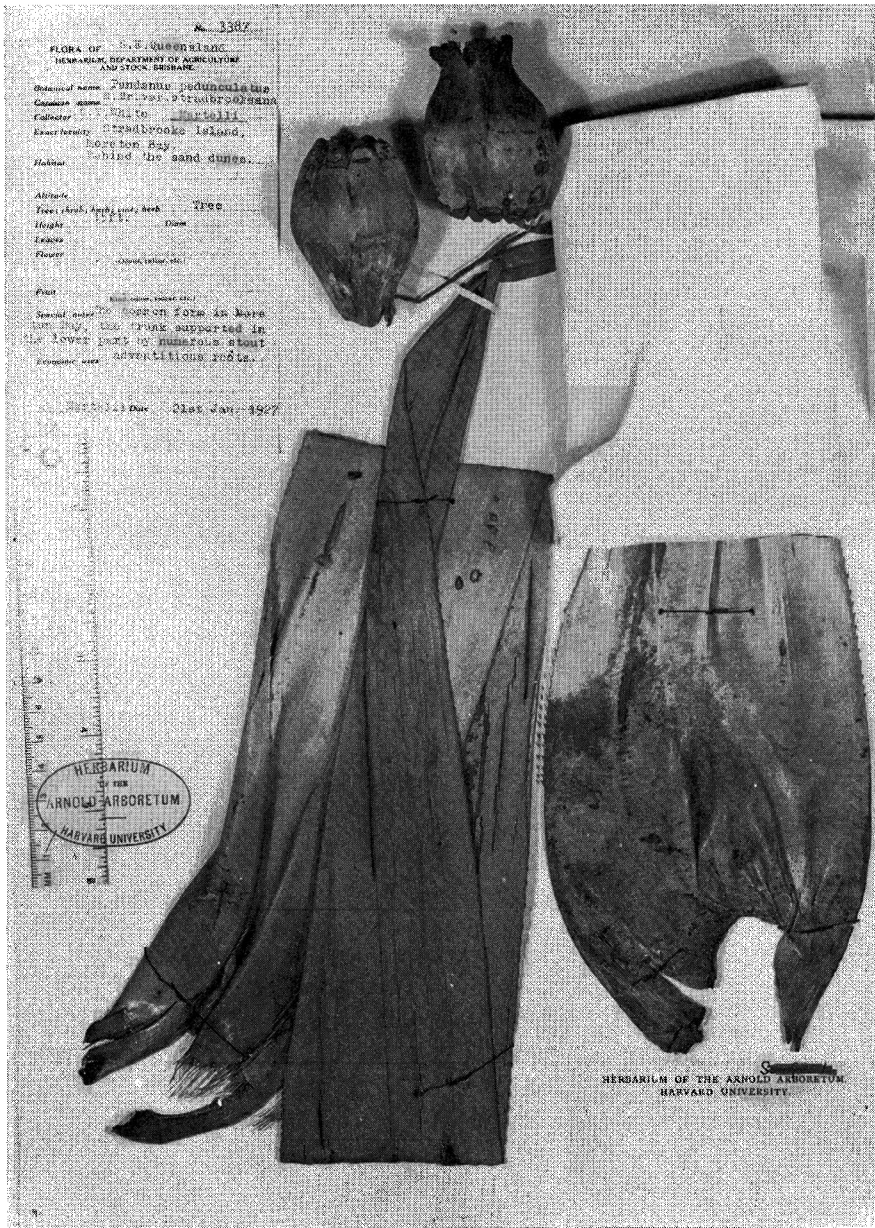


FIG. 283. *Pandanus stradbrokeensis* St. John, from holotype.

SUPPLEMENTARY DESCRIPTION: Phalanges 5–6.8 cm long, and 2.9–4.4 cm thick.

HOLOTYPE: Australia, Queensland, Stradbroke I., Moreton Bay, behind sand dunes, Jan. 21, 1927, C. T. White 3,387 (BRI). Isotypes (A, FI, K)!

SPECIMENS EXAMINED: Australia, Queensland, Stradbroke I., Amity Point, in forest, 19/4/1930, C. E. Hubbard 2,238 (K); Queensland, Fraser I., along beach in sand, 15. 10. 1930, C. E. Hubbard 4,487 (K); Stradbroke I., 19. 4. 1930, White 6,710A (FI).

New South Wales, Cudgera Headland, south of Hastings Point, S. T. Blake 18,498 (BRI).

DISCUSSION: *P. stradbrokeensis* is a member of the section *Mammillarisia*, as is its closest relative, *P. heronensis* St. John, of the Great Barrier Reef, a species with the phalanges 4.4–4.7 cm long, 2.6–3.2 cm wide; stigmas 2–2.8 mm broad, round to reniform; endocarp suprmedian, the lateral walls 3–3.5 mm thick; leaves 4.9–5.2 cm wide, on the subulate apex the midrib below unarmed for the last 3–4 cm. *P. stradbrokeensis* has the phalanges 6–6.3 cm long, 3.3–5 cm wide; stigmas 2–4 mm long, deltoid-oblancoolate; endocarp median, the lateral walls 4–5 mm thick; leaves 9–10.2 cm wide, on subulate apex the midrib below with subulate prickles 0.3–0.4 mm long, 2–4 mm apart right to the tip.

The type collection was studied and considered a new variety by Martelli, and is now found in several herbaria with his manuscript name. He also applied this name to a quite different population found in the same region.

The new epithet is a geographic adjective, made from the name of the type locality, plus the Latin adjectival place suffix, *-ensis*.

KEY TO AUSTRALIAN SPECIES  
IN THE SECTION *Microstigma*

Drupes 25–35 mm long,

Stigma apical, elliptic to obovate; leaves 4.5–8 cm wide . . . . . *P. de-Lestangii*

Stigma excentric on the margin, narrowly lunate; leaves 3.7 cm wide . . . . .

*P. kimberleyanus*

Drupes 39–44 mm long,

Stigma apical, horizontal to oblique; leaf margin beginning at 6–7 cm from the base with prickles 1–2.5 mm long, nearly straight, red-tipped . . . . . *P. Spechtii*

Stigma lateral, vertical or oblique; leaf margin beginning about 10 cm from the base with prickles 3–3.5 mm long, arcuate slender subulate, stramineous . . . . .

*P. oblancooideus*

*Pandanus oblancooideus* sp. nov. (sect. *Microstigma*)

Fig. 284

DIAGNOSIS HOLOTYPE: "Caulibus ad 6.5 m altis simplicibus gracilibus erectis vel flexuosis, cortice palliditer flavi-griseo sublaevi sed cum papillis, radicibus fulurosus paucis solum in basi," foliis 1.7–1.85 m longis proxima basem 5.7 cm latis in medio 3.9 cm latis "intense viridibus" infra pallidioribus coriaceis non transruptis in sectione mediali cum 48 nervis parallelis secundariis in quoque dimidio nervis tertiis in parte 2/3 infera evidentis in parte 1/3 infera conspicuis et reticulis breviter oblongis formantibus, lamina ultra mediam U-sulcatis 2-plicatis gladiatis ex basi sensim in apice trigono gracili subulato diminuenti eo in puncto circa 10 cm ex apice 1 mm lato, plus minusve 10 cm ex basi cum aculeis 3–3.5 mm longis 6–15 mm separatis arcuatis gracilibus subulatis compressis adscendentibus stramineis, midnervo infra plus minusve ex 10 cm cum aculeis 2–3 mm longis 10–15 mm separatis rectis gracilioribus adpresse adscendentibus stramineis, in sectione mediali marginibus cum aculeis 5–10 mm separatis adscendentibus stramineis biformatis eis majoribus 3–3.5 mm longis compressis arcuatis subulatis et illis minoribus interspersis paucis 1.7–2 mm longis, midnervo infra cum aculeis 3–3.5 mm longis 10–16 mm separatis arcuatis gracilibus subulatis adscendentibus sed in latere midnervi curvatis stramineis, apice subulato inermi, drupis 38–41 mm longis 8–11 mm latis 7–9 mm crassis anguste cuneatis 5–6-angulosis parte 1/6 supera libera ovoidea subangulosa laevi habiti exlucida in sicca brunnea, apice cum rugis inflatis infra stigmatem lateralem verticalem vel obliquum 1.5 mm longam latiter ellipticam palliditer brunneam, pileo persistenti, endocarpio supra-mediali 10–11 mm longo osseoso extra stramineo intra olivacei-brunneo laevi lucido apice convexo et cum humeris laterilibus lateribus lateralibus 1–1.5 mm crassis, seminibus 8 mm longis ellipsoideis, mesocarpio apicali 10–11 mm longo ovoideo cavernoso sed cum membranis albis transversis remotis, mesocarpio basali fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: "Stems up to 6.5 m tall, simple, slender, erect or flexuose; bark light

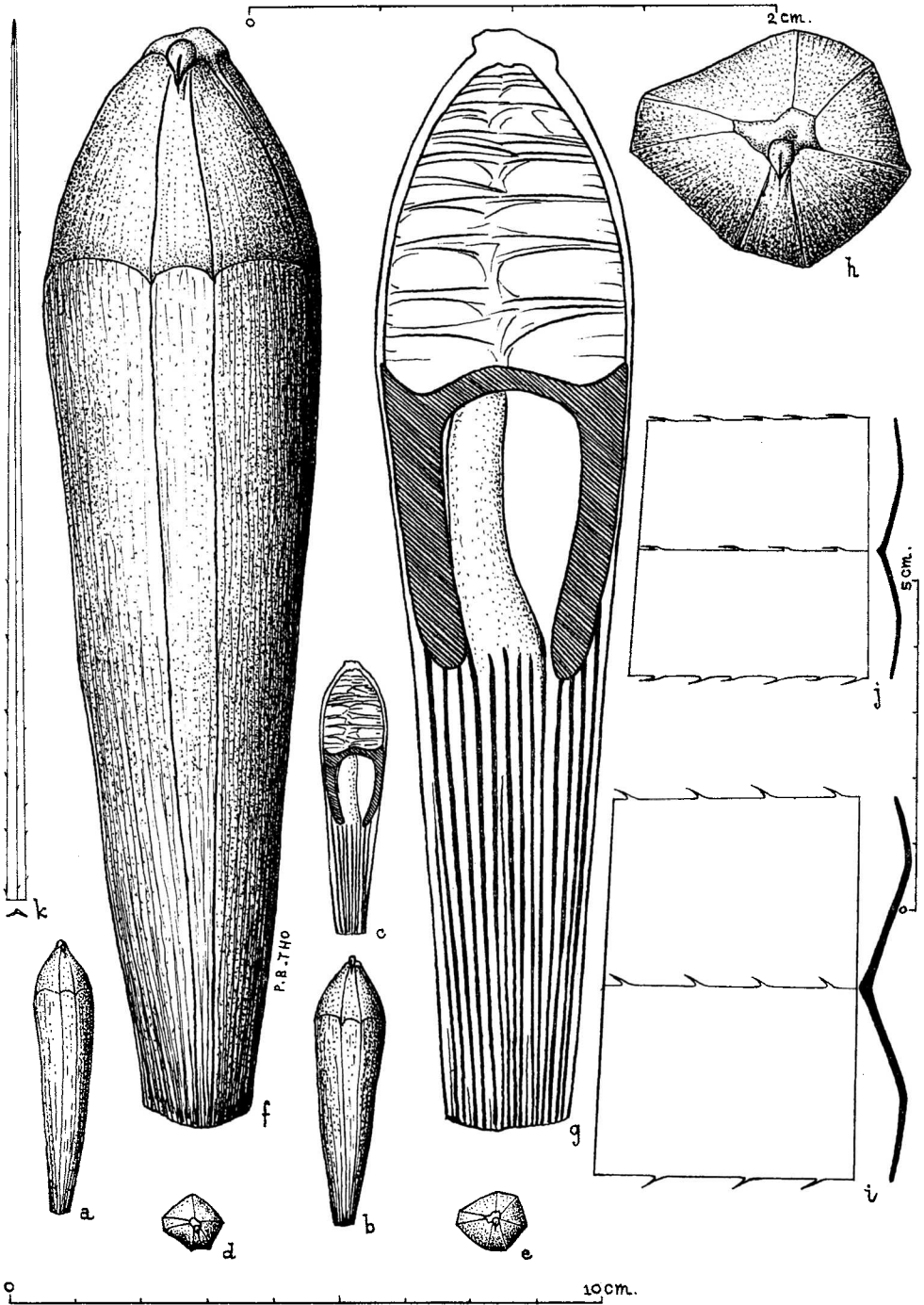


FIG. 284. *Pandanus oblanceoloideus* St. John, from holotype. *a, b*, Drupes, lateral view,  $\times 1$ ; *c*, drupe, longitudinal median section,  $\times 1$ ; *d, e*, drupes, apical view,  $\times 1$ ; *f*, drupe, lateral view,  $\times 4$ ; *g*, drupe, longitudinal median section,  $\times 4$ ; *b*, drupe, apical view,  $\times 4$ ; *i, j*, leaf base, lower side,  $\times 1$ ; *k*, leaf apex, lower side,  $\times 1$ .



yellowish gray, smooth except for numerous papillae; prop roots few, at stem base only"; leaves 1.7–1.85 m long, 4.5–5.7 cm wide near the base, 3.9 cm wide at the middle, "rich green," slightly paler beneath, produced in terminal rosettes, coriaceous, not breaking across, at midsection with 48 parallel secondary veins in each half, tertiary cross veins visible throughout lower  $\frac{2}{3}$  and conspicuous in lower  $\frac{1}{3}$ , forming short oblong meshes, above the midrib U-sulcate, 2-pleated, the blade sword-shaped, tapering evenly from the base into the slender, trigonous, subulate apex, this at the point about 10 cm down 1 mm wide, beginning apparently about 10 cm from the base the margins with prickles 3–3.5 mm long, 6–15 mm apart, arcuate slender subulate, compressed, ascending, stramineous; the midrib below beginning apparently at about 10 cm up with prickles 2–3 mm long, 10–15 mm apart, straight, very slender subulate, appressed ascending, stramineous; at midsection the margins with prickles 5–10 mm apart, ascending, stramineous, of two sorts, the major ones 3–3.5 mm long, compressed, arcuate subulate, and between them are occasionally smaller ones 1.7–2 mm long; the midrib below with prickles 3–3.5 mm long, 10–16 mm apart, arcuate slender subulate, ascending but bent over one side of the midrib, stramineous; the subulate apex with the margins and midrib unarmed; drupes 38–41 mm long, 8–11 mm wide, 7–9 mm thick, narrowly cuneate, 5–6-angled, upper  $\frac{1}{5}$  part free, ovoid, slightly angled, smooth, dull, when dried brown, the apex with corky, swollen ridges subtending the stigma which is lateral, vertical or oblique, 1.5 mm long, broadly elliptic, pale brown, papillose; pileus persistent; endocarp supra-median, 10–11 mm long, bony, the apex convex and with ascending shoulders, without stramineous, within olive brown, smooth, shining, the lateral walls 1–1.5 mm thick; seed 8 mm long, inverted bullet-shaped; upper mesocarp 10–11 mm long, ovoid, cavernous, but with remote white, transverse membranes; basal mesocarp fibrous and fleshy.

**HOLOTYPE:** Australia, Queensland, edge of Gregory River at Riversleigh, approx. 138° 45' E, 19° 0' S, April 21, 1935, *S. T. Blake* 8,694 (BRI).

**SPECIMENS EXAMINED:** Australia, N. Territory, Katherine, in water at river edge, 14 Feb. 1961, *H. S. McKee* 8,423 (BISH).

**DISCUSSION:** *P. oblancoideus* is a member of the section *Microstigma*, as is its closest relative, *P. Spechtii* St. John, of the Northern Territory, a species with the drupes 39–44 mm long, and the 1-celled ones 8–14 mm wide; endocarp 9 mm long; stigma apical, nearly horizontal to somewhat oblique; leaf margins beginning at 6–7 cm from the base with prickles 1–2.5 mm long, 2–8 mm apart, subulate, nearly straight, and red-tipped. *P. oblancoideus* has the drupes 38–41 mm long, 8–11 mm wide; endocarp 10–11 mm long; stigma lateral, vertical or oblique, subtended by swollen, corky ridges; leaf margins beginning apparently about 10 cm from the base with prickles 3–3.5 mm long, 6–15 mm apart, arcuate slender subulate, compressed, stramineous.

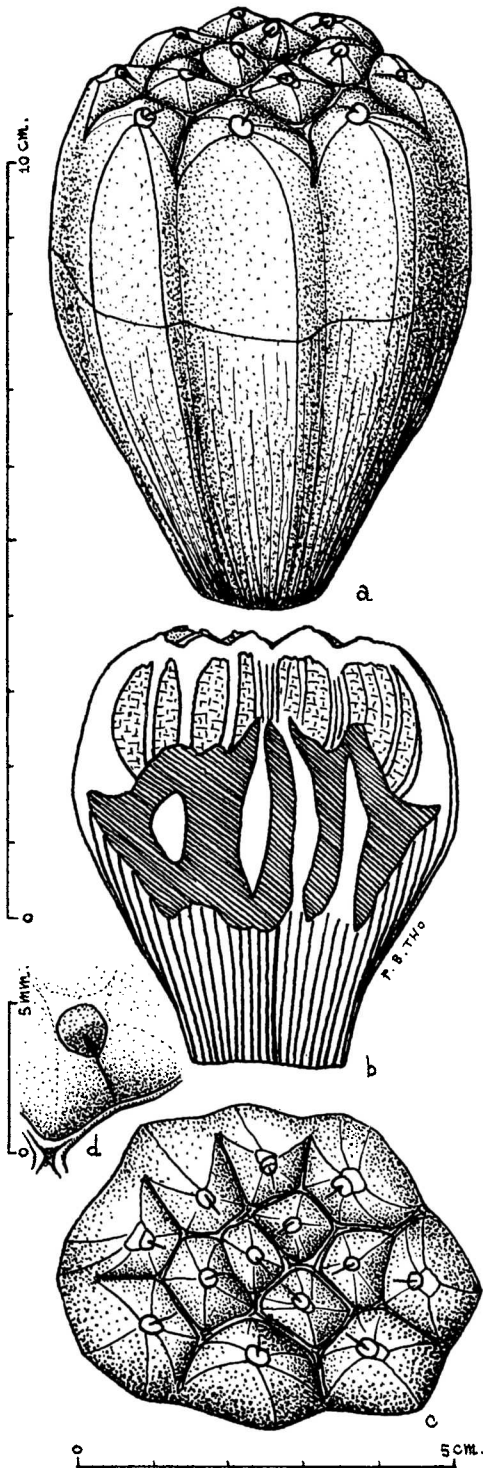
The new epithet is the Latin adjective *oblancoideus*, indicating a solid of inverted lance-shape, and it refers to the shape of the drupes.

#### Section *Pandanus*

#### *Pandanus bowenensis* sp. nov. (sect. *Pandanus*)

Fig. 285

**DIAGNOSIS HOLOTYPE:** "Arbor ad 5 m alta, trunco griseo cum projectionibus acutis conicis suberectis, ramis paucis, cum radicibus fulurosus, pedunculo brevi, syncarpio circa 15 cm longo 10 cm diametro ovoideo, foliis circa 70 cm longis supra viridibus infra pallidioribus in fasciculis terminalibus" (eis non visis), phalangibus 5.7–6.5 cm longis 4.7–6.8 cm latis 3.7–4.8 cm crassis (sed in geminis cum 36 carpelibus 8.6 cm latis) late obovoideis 5–6-angulosis suturis lateralibus nullis parte  $\frac{1}{2}$  supera libera lateribus subcurvatis laevibus lucidis apice oblato-convexo sinibus apicalibus centralibus 3–5 mm profundis latiter V-formatis rectis, carpelibus (15–) 18–22 apicibus pyramidalibus vel oblato-pyramidalibus, eis interioribus  $\frac{2}{3}$  tam grandibus quam marginalibus, stigmatibus 1.5–2 mm latis cordatis sulcatis brunneis papillosis obliquis centripetalibus, sinibus proximalibus late V-formatis  $\frac{1}{2}$ – $\frac{3}{4}$  ad fondam extensis, endocarpio mediali 2.5 cm longo osseoso obscure brunneo solido lateribus lateralibus 3–3.5 mm crassis intra lucidis sublaevibus et striatis, seminibus 10–12 mm longis ellipsoideis vel obliquiter ellipsoideis, mesocarpio in apice quaeque carpelae cavernam cum fibris in medulla et cum membranis delicatis albis formanti, mesocarpio basali fibroso et carnoso.



DIAGNOSIS OF HOLOTYPE: "Tree to 5 m tall; trunk gray, with many sharply conical, more or less erect processes; branches few; prop roots present; peduncle short; syncarp about 15 cm long, 10 cm in diameter, ovoid; leaves about 70 cm long, in terminal, spiral tufts, green above, paler beneath," (these parts not preserved); phalanges 5.7–6.5 cm long, 4.7–6.8 cm wide, 3.7–4.8 cm thick (in a double with 36 carpels 8.6 cm wide), broadly obovoid, 5–6-angled, lateral sutures none, upper  $\frac{1}{2}$  free, its sides gently curving, smooth, shining, the apex low convex, central apical sinuses 3–5 mm deep, broad V-shaped, straight; carpels (15–) 18–22, the apices pyramidal to oblate pyramidal, the inner ones about  $\frac{2}{3}$  as large as the marginal ones; stigmas 1.5–2 mm wide, cordate, sulcate, brown, papillose, oblique, centripetal; proximal sinus wide V-shaped, running  $\frac{1}{2}$ – $\frac{3}{4}$  way to valley bottom; endocarp median, 2.5 cm long, bony, dark brown, massive, the lateral walls 3–3.5 mm thick, within rather smooth but in part horizontally striate; seeds 10–12 mm long, ellipsoid or obliquely so; mesocarp forming in the apex of each carpel a cavern traversed by longitudinal fibers surrounded by pith and connected by delicate white membranes; basal mesocarp fibrous and fleshy.

HOLOTYPE: Australia, Queensland, North Kennedy District, near Bowen, among boulders near beach, 25 Sept. 1950, S. T. Blake 18,559 (BRI).

DISCUSSION: *P. bowenensis* is a member of the section *Pandanus*, as are its relatives. The most similar species is an Australian one, *P. extralittoralis* St. John, a species with the phalanges 6–6.4 cm long, 3.7–5.1 cm wide; central apical sinuses 4–5.5 (–7) mm deep, narrow V-shaped; carpels 11–14, their apices lanceoloid on most phalanges; proximal sinuses narrow, running  $\frac{1}{3}$ – $\frac{1}{4}$  way to valley bottom; and the stigmas 1.5–2 mm wide. *P. bowenensis* has the

FIG. 285. *Pandanus bowenensis* St. John, from holotype. a, Phalange, lateral view,  $\times 1$ ; b, phalange, longitudinal median section,  $\times 1$ ; c, phalange, apical view,  $\times 1$ ; d, stigma and carpel apex, oblique view,  $\times 4$ .

phalanges 5.7–6.5 cm long, 4.7–6.8 cm wide; central apical sinuses 3–5 mm deep, broad V-shaped; carpels (15–) 18–22, their apices pyramidal to oblate pyramidal; proximal sinuses wide, running  $\frac{1}{2}$ – $\frac{3}{4}$  way to valley bottom; and the stigmas 2.5–3.2 mm wide.

The new epithet is a geographic adjective, made by adding the Latin place-termination, *-ensis*, to the name of the type locality.

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

Fig. 286

DIAGNOSIS HOLOTYPE: Arboriformis 4 m alta, radices truncus rami non preservati, foliis 1.77 (+ 0.05–0.08 ?) m longis proxima basem 7.8 cm latis in medio 5.6–6.5 cm latis gladiatis coriaceis U-sulcatis 2-plicatis in sectione mediali cum 65 nervis parallelis secundariis in quoque dimidio nervis tertiis transversis supra ad basem evidentis et reticulis breviter oblongis formantibus, lamina per parte  $\frac{3}{4}$  ultima in apice gracili trigono subulato diminuenti eo in puncto circa 10 cm ex apice 2 mm lato basi inermi pallida, ex 9–12 cm marginibus cum aculeis 3.5–4.5 mm longis 9–14 mm separatis arcuatis subulatis adscendentibus dimido ultimo rubro-brunneo, per partem  $\frac{3}{4}$  inferam midnervo infero inermi, in sectione mediali marginibus cum aculeis 2.5–3 mm longis 9–16 mm separatis debiliter subulatis adpresse adscendentibus basibus rubro-brunneis apicibus stramineis, in apice subulato marginibus inermibus sed midnervo infra cum aculeis 0.4–0.6 mm longis 7–13 mm separatis subulatis adpresse adscendentibus rubris, phalangibus 5.5–6 cm longis 4.5–6 cm latis 4.4–5.2 cm crassis "rubris" suborbicularibus cuneatis subcompressis 5–6-angulosis parte  $\frac{2}{3}$  supra libera, sinibus lateralibus majoribus angustis profundis et ad basem notatis, tertia carpelarum sine sinibus, lateribus superis laevibus lucidis sed cum rimis brunneis longis multis, lateribus carpelarum subcurvatis sed plurimis ad basem partis liberae cum fugis brevibus indistinctis pluribus et valleculis, apice phalangis oblato-obtusis, sinibus centralibus apicalibus 2–3.5 mm profundis latiter V-formatis rectis, carpelis 13–19 apicibus rotundati-pyramidalibus subaequalibus eis marginalibus paucis cum areola concava parva distali, stigmatibus 2–2.5 mm longis cordatis obliquis nigris papillois centripetalibus, sinibus proximalibus  $\frac{1}{3}$ – $\frac{2}{3}$  ad fondam extentis, endocarpio 3 cm longo osseoso in parte  $\frac{2}{3}$  infera obscure brunneo-mahogani-colorato lateribus lateralibus 5–7 mm crassis intra laevibus lucidis, seminibus 20–23 mm longis ellipsoideis, mesocarpio in apice quaeque carpelae cavernam cum medulla flocculosa et fibris longitudinalibus fortibus, mesocarpio basali fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Tree-like, 4 m tall; roots, trunk, and branches not preserved; leaves 1.77 (+ 0.05–0.08 ?) m long, 7.8 cm wide

near the base, 5.6–6.5 cm wide at the middle, sword-shaped, coriaceous, U-sulcate, 2-pleated, at midsection with 65 parallel secondary veins in each half, the tertiary cross veins visible above near the base, forming short oblong meshes, blade tapering throughout outer  $\frac{3}{4}$  into the slender trigonous subulate apex, this at the point about 10 cm down 2 mm wide, the base unarmed, pale, the margins beginning at 9–12 cm with prickles 3.5–4.5 mm long, 9–14 mm apart, arcuate subulate, ascending, the outer half reddish brown; the midrib below unarmed throughout the lower  $\frac{3}{4}$ ; at midsection the margins with prickles 2.5–3 mm long, 9–16 mm apart, weak subulate, appressed ascending, the base reddish brown, the tips stramineous; on the subulate apex the margins unarmed, the midrib below with prickles 0.4–0.6 mm long, 7–13 mm apart, subulate, appressed ascending, reddish; infructescence not seen; phalanges 5.5–6 cm long, 4.5–6 cm wide, 4.4–5.2 cm thick, "red," suborbicular, cuneate, slightly compressed, 5–6-angled, upper  $\frac{2}{3}$  free, the major intercarpelary lateral sinuses narrow, deep, and distinct well towards the base, about a third of the outer carpels lacking intercarpelary sinuses; the upper sides smooth, shining, but with numerous long, brown cracks, the sides gently curving and most of them towards base of free part with several low, rather indistinct longitudinal ridges and valleys, these running less than half way to the free apices, the phalange apex low obtuse; central apical sinuses 2–3.5 mm deep, broad V-shaped, straight; carpels 13–19, their apices rounded pyramidal, subequal, a few of the marginal ones with a small distal concave platform; stigmas 2–2.5 mm long, cordate, oblique, blackish papillose, centripetal; proximal sinus running  $\frac{1}{3}$ – $\frac{2}{3}$  way to valley bottom; endocarp 3 cm long, bony, centering in lower  $\frac{2}{3}$ , dark brown-mahogany colored, the lateral walls 5–7 mm thick, within smooth, shining; seeds 20–23 mm long, ellipsoid; upper mesocarp forming in the apex of each carpel a cavern with light, floccose medulla traversed by strong longitudinal fibers; basal mesocarp fibrous and fleshy.

HOLOTYPE: Australia, Queensland, Sarina, on the bank of and near creek in forest in dark

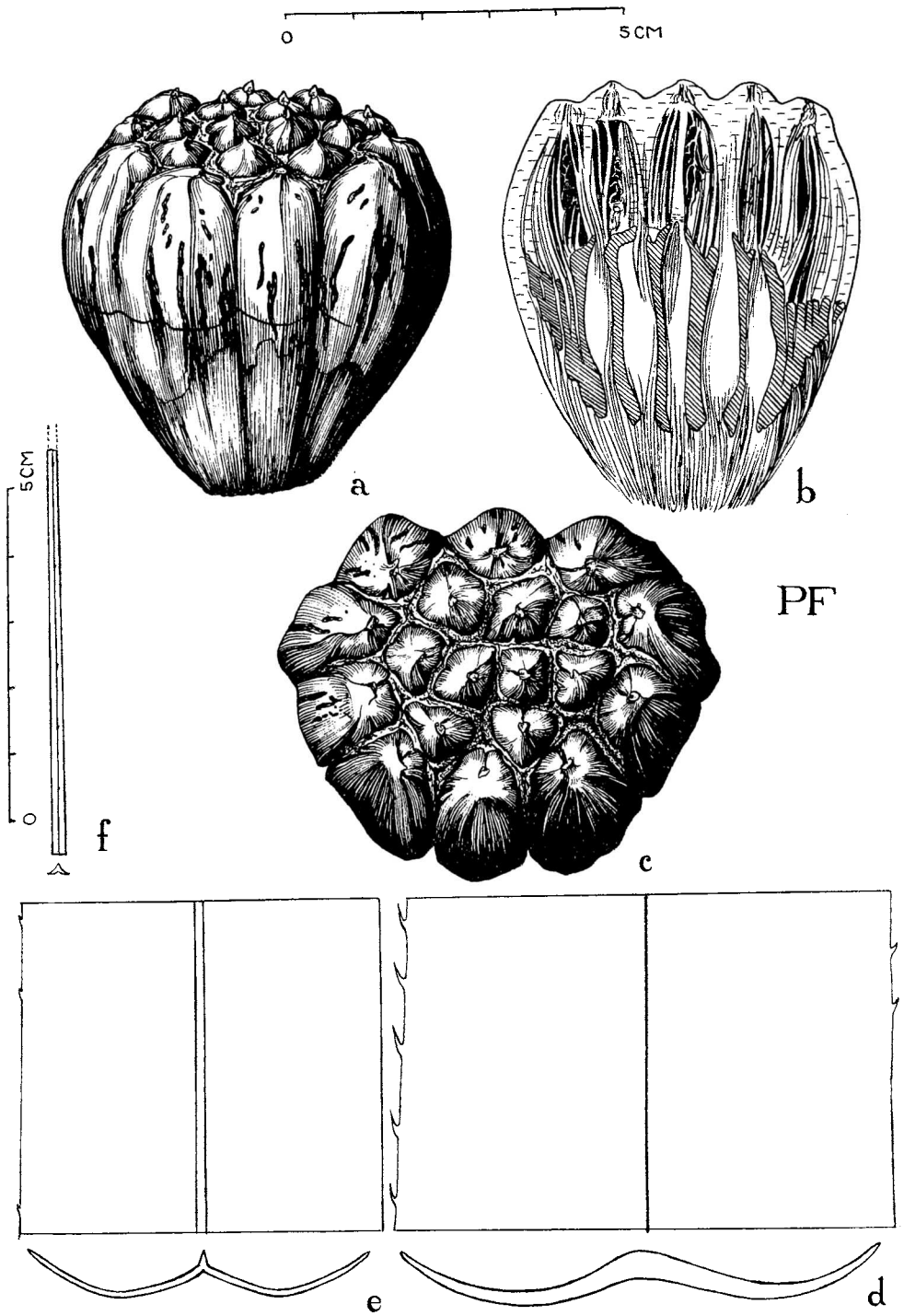


FIG. 286. *Pandanus cordatus* St. John, from holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ ; *d*, leaf base, lower side,  $\times 1$ ; *e*, leaf middle, lower side,  $\times 1$ ; *f*, leaf apex, lower side,  $\times 1$ .

grey loam, 50 ft alt, 14. 1. 31, *C. E. Hubbard & C. W. Winders 6,473* (K).

DISCUSSION: *P. cordatus* is a member of the section *Pandanus*, as is its closest relative, *P. stolonifer* St. John, of Queensland, a species with the phalanges 5.7–6.5 cm long, 5.2–7.5 cm wide, the upper  $\frac{1}{2}$  free; carpels 12–15, the apices pyramidal or the outer ones oblate pyramidal; stigmas 2.5–4 mm long, suborbicular to elliptic; leaves 5.2–6.2 cm wide, beginning 12.5–14 cm from the base the margins with prickles 2.5–3.5 mm long, 7–15 mm apart, subulate, straight or arcuate, ascending, red-tipped. *P. cordatus* has the phalanges 5.5–6 cm long, 4.5–6 cm wide, the upper  $\frac{2}{3}$  free; carpels 13–19, the apices rounded pyramidal; stigmas 2–2.5 mm long, cordate; leaves 7.8 cm wide, beginning at 9–12 cm from the base the margins with prickles 3.5–4.5 mm long, 9–14 mm apart, arcuate subulate, ascending, the outer half reddish brown.

The new epithet is the Latin adjective *cordatus*, heart-shaped, and is given with reference to the heart-shaped stigmas.

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

Figs. 287, 288

DIAGNOSIS HOLOTYPE: Caulibus foliisque incognitis, radicibus fulurosus notatis, infructescentia terminali cum syncarpio solitario, pedunculo trigono 15 mm diametro cum bracteis foliaceis terminalibus numerosis, syncarpio 12.5 cm longo 10.1 cm diametro late ellipsoideo subtrilaterato cum circa 68 phalangibus in spiris affixis, phalangibus 6–7 cm longis 3.7–5.1 cm latis 2.6–4.2 cm crassis obovoideis compressis 4–8-angulosis parte  $\frac{1}{4}$ – $\frac{1}{3}$  supera lutea circulo mediali aurantiascenti parte  $\frac{1}{2}$  vel plus supera libera lateribus sublucidis subcurvatis apice oblato-convexo suturis lateralibus nullis sinibus centralibus apicalibus 4–5.5 (–7) mm profundis anguste V-formatis subrectis, carpelis 11–20 apicibus plerumque lanceoloideis praecipue in eis angustioribus et illis marginalibus cum apicibus extra curvatis, in phalangibus latioribus apicibus ovoideis et plerumque erectis, sinibus proximalibus angustis et  $\frac{1}{3}$ – $\frac{1}{4}$  ad fondam extentis, endocarpio paene supramedioli 2.7–3 cm longo osseoso exluciditer mahogani-brunneo lateribus lateralibus 3–3.5 mm crassis intra brunneis laevibus lucidis, seminibus 9–13 mm longis ellipsoideis, mesocarpio in apice quaeque carpelae cavernam cum fibris longitudinalibus paucis et membranarum delicatis albis formantibus, mesocarpio basali fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Stems and leaves unknown; prop roots present; infructescence terminal, bearing a solitary syncarp on a trigonous peduncle 15 mm in diameter, bearing numerous leafy bracts at apex; syncarp 12.5 cm long, 10.1 cm in diameter, broadly ellipsoid, somewhat 3-sided, bearing about 68 phalanges attached in spirals; phalanges 6–7 cm long, 3.7–5.1 cm wide, 2.6–4.2 cm thick, obovoid, compressed, 4–8-angled, upper  $\frac{1}{4}$ – $\frac{1}{3}$  yellow, the middle band becoming orange, upper  $\frac{1}{2}$  or slightly more than half free, the sides smooth, somewhat shiny, gently curving, the apex low convex, lateral sutures none; central apical sinuses 4–5.5 (–7) mm deep, narrow V-shaped, nearly straight; carpels 11–20, their apices lanceoloid on most phalanges and especially on the slender ones and on these the marginal apices outcurved, on the broader phalanges the apices ovoid and all or mostly erect; proximal sinuses narrow, running  $\frac{1}{3}$ – $\frac{1}{4}$  way to valley bottom; stigmas 2.5–3.2 mm wide, cordate orbicular or cordate elliptic, dark brown, papillose; endocarp slightly supramedioli, 2.7–3 cm long, bony, dull mahogany-brown, the lateral walls 3–3.5 mm thick, within medium brown, smooth, shiny; seeds 9–13 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavity with a few longitudinal fibers and many delicate white membranes; basal mesocarp fibrous and fleshy.

HOLOTYPE: Australia, Queensland, Port Curtis District, Heron I., a coral cay, 23° 21' S, 151° 55' E, June 1958, *C. Poulsen* in herb. *S. T. Blake 20,375* (BRI).

SPECIMENS EXAMINED: Australia, Queensland, Heron I., characteristic of trees by guest house (possibly planted) which have a larger, more "open" fruit, less pineapple-like. Both ants and rats relish the fruits, June 1958, *M. Gillam* (BRI); Heron I., *C. Poulsen* in herb. *S. T. Blake 20,376* (photos only) (BRI).

DISCUSSION: *P. extralittoralis* is a member of the section *Pandanus*, as is its closest relative, *P. Cookii* Martelli, a species from Cooktown, north Queensland. It has the syncarp 31 cm long, cylindrical; phalanges 6.8–7.2 cm long, 4.5–5.7 cm wide, the upper  $\frac{2}{3}$  free, lateral

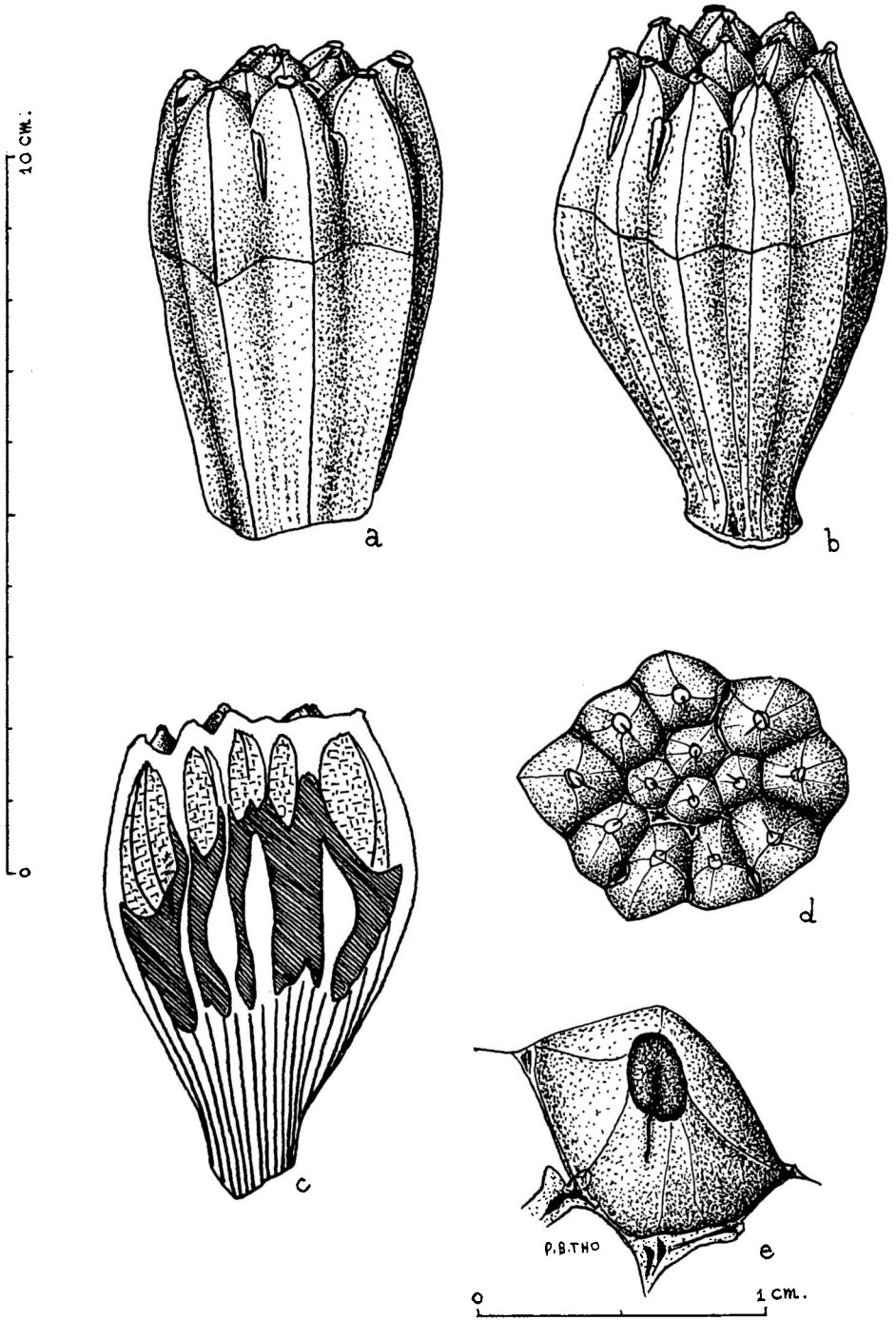


FIG. 287. *Pandanus extralittoralis* St. John, from holotype. *a, b*, Phalanges, lateral view,  $\times 1$ ; *c*, phalange, longitudinal median section,  $\times 1$ ; *d*, phalange, apical view,  $\times 1$ ; *e*, stigma and carpel apex, oblique view,  $\times 4$ .

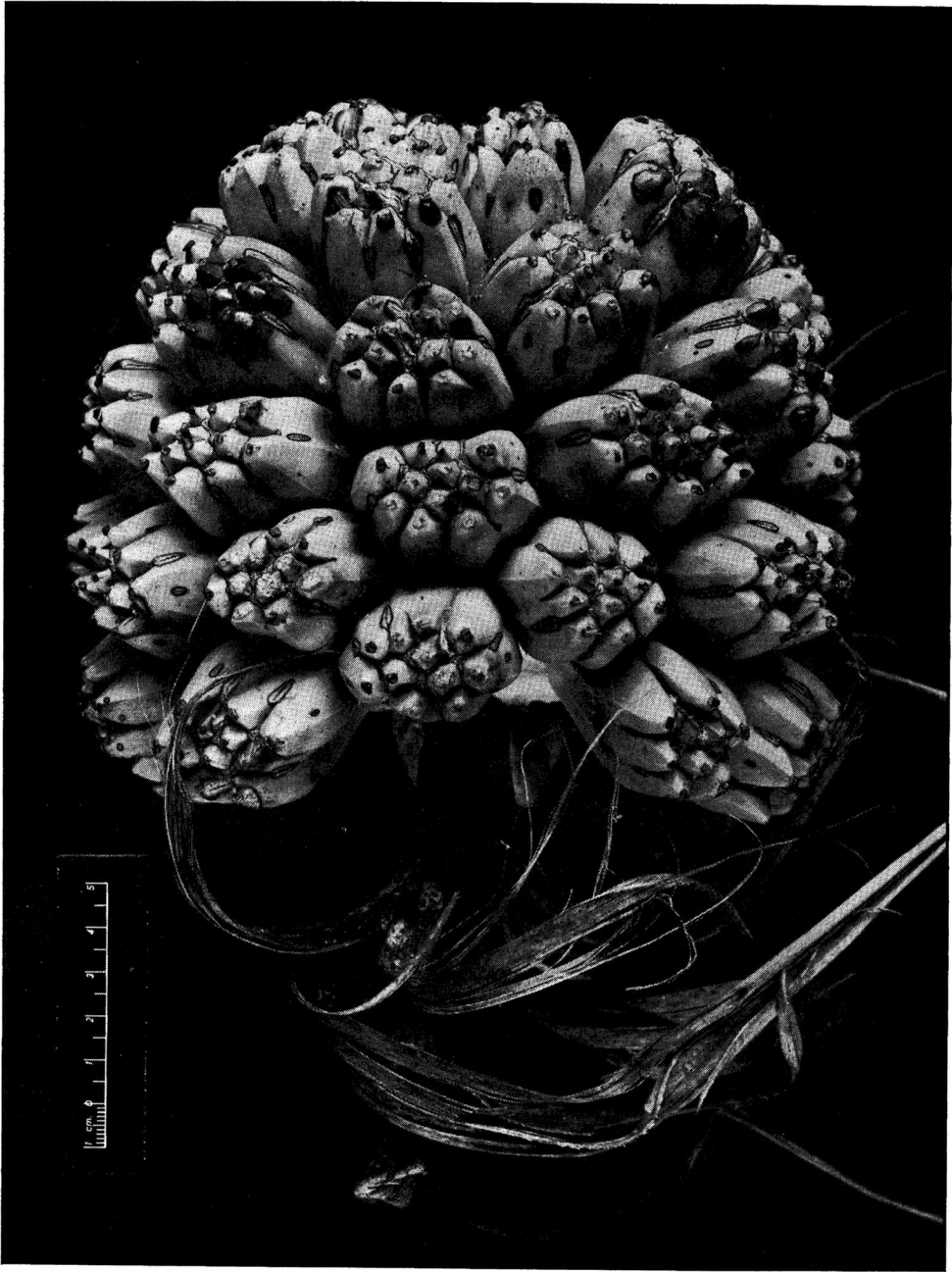


FIG. 288. *Pandanus extralittoralis* St. John, from holotype.

sutures narrow and distinct throughout the free part; endocarp lateral walls 5–15 mm thick. *P. extralittoralis* has the syncarp 12.5 cm long, broadly ellipsoid; phalanges 6–6.4 cm long, 3.7–5.1 cm wide, the upper  $\frac{1}{2}$  free, the lateral sutures none; endocarp lateral walls 3–3.5 mm thick.

The new epithet is from the Latin, *extra*, outside; *littoralis*, coastal, and refers to its off-shore locality.

See biologic notes printed under our *P. heronensis*.

***Pandanus Hubbardii* sp. nov. (sect. *Pandanus*)**  
Fig. 289

DIAGNOSIS HOLOTYPE: Radicibus et caulibus non visis, foliis 1.26 (+0.02–0.04 ?) m longis proxima basem 8 cm latis in medio 6.7 cm latis coriaceis supra viridibus infra pallidioribus et glaucis in sectione mediali cum 59 nervis parallelis secundariis in quoque dimidio nervis tertiis supra visibilibus et reticulis breve oblongis formantibus lamina U-sulcata 2-plicata gladiata sensim e basi in apice valido trigono subulato diminuente eo in puncto circa 10 cm ex apice 2.5 mm lato basi inermi pallida vel rosacea, marginibus ex 9 cm cum aculeis 1.5–3 mm longis 3–8 mm separatis arcuatis subulatis validis adscendentibus cum apicibus rubris, midnervo infra inermi licet ultra mediam, in sectione mediali marginibus cum aculeis 2–2.3 mm longis 3–7 mm separatis gracilibus subulatis adscendenti-subadpressis obscure rubris proxima apicem marginibus plus minusve inermibus, midnervo infra cum aculeis 0.6–1 mm longis 1.5–7 mm separatis subulatis subadpressis subrubris, syncarpio cum 62 phalangibus eis 5.5–6 cm longis 3.7–5.5 cm latis 3.2–4.2 cm crassis late obovoideis compressis 5–6-angulosis parte  $\frac{1}{2}$  supera libera, suturis lateralibus nullis vel paucis, lateribus superis subconvexis laevibus lucidis, apice oblate convexo, sinibus apicalibus centralibus 3.5–5 (–7) mm profundis subrectis latiter V-formatis, carpelis 11–19 apicibus conico-pyramidalibus vel exterioribus oblati omnibus adscendenti-radiatis, majoribus carpelarum exteriorum cum stigmatate in margine exteriori sed paucis cum stigmatate apicali et cum areola concava distali parva, stigmatibus 2.5–4 mm longis late ellipticis vel suborbicularibus horizontalibus vel obliquis brunneis papillosis, sinibus proximalibus angustis  $\frac{1}{2}$ – $\frac{2}{3}$  ad fundam extentis, endocarpio in parte  $\frac{2}{5}$  infera corpore 2.5 cm longo sed supra semines cum projectionibus 8–12 mm longis osseoso solido obscure mahogani-brunneo lateribus lateralibus 4–5 mm crassis intra laevibus et lucidis, seminibus 11–12 mm longis ellipsoideis, mesocarpio in apice quaeque carpelae cavernam cum fibris paucis fortibus et membranibus albis delicatis formanti, mesocarpio basali fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Roots and stems not seen or recorded; leaves 1.26 (+0.02–

0.04 ?) m long, 8 cm wide near the base, 6.7 cm wide at the middle, coriaceous, green above, pale green and glaucous below, at midsection with 59 parallel secondary veins in each half, the tertiary cross veins visible above, forming short oblong meshes; blade U-sulcate, 2-pleated, sword-shaped, gradually tapering from the base into the stout, trigonous subulate apex, this at the point about 10 cm down 2.5 mm wide, the base unarmed, pale or pinkish, the margins beginning 9 cm up with prickles 1.5–3 mm long, 3–8 mm apart, arcuate stout subulate, ascending, red-tipped; the midrib below unarmed apparently to beyond the middle; at midsection the margins with prickles 2–2.3 mm long, 3–7 mm apart, slender subulate, ascending subappressed, dark red; near the apex the margins almost unarmed; the midrib below with prickles 0.6–1 mm long, 1.5–7 mm apart, subulate, ascending, subappressed, reddish; syncarp bearing 62 phalanges, these 5.5–6 cm long, 3.7–5.5 cm wide, 3.2–4.2 cm thick, broadly obovoid, compressed, 5–6-angled, upper  $\frac{1}{2}$  free, lateral sutures none or few, the exposed sides gently convex, smooth, shining, the apex low convex; apical central sinuses 3.5–5 (–7) mm deep, nearly straight, broad V-shaped; carpels 11–19, their apices conic-pyramidal, or the outer ones somewhat oblately so, all ascending like radii from the base, hence the apex almost the broadest part of the phalange, most of the marginal ones with the stigma on the outer edge above the nearly vertical lateral face, but a few of them with the stigma apical and central and with a small distal concave platform; central carpels about  $\frac{2}{3}$  as large as the marginal; stigmas 2.5–4 mm long, broadly elliptic to suborbicular, flush and horizontal or oblique, brown, papillose; proximal sinuses narrow, running  $\frac{1}{2}$ – $\frac{2}{3}$  way to valley bottom; endocarp in lower  $\frac{2}{5}$ , the body 2.5 cm long, but with upward processes from above the seeds extending 8–12 mm towards the apex, bony, massive, dark mahogany-brown, the lateral walls 4–5 mm thick, within smooth and shining; seeds 11–12 mm long, ellipsoid; upper mesocarp forming in the apex of each carpel a cavern with a few strong fibers and with white, delicate membranes; basal mesocarp fibrous and fleshy.

HOLOTYPE: Australia, Queensland, Stradbroke I., Amity Point, in *Eucalyptus* forest



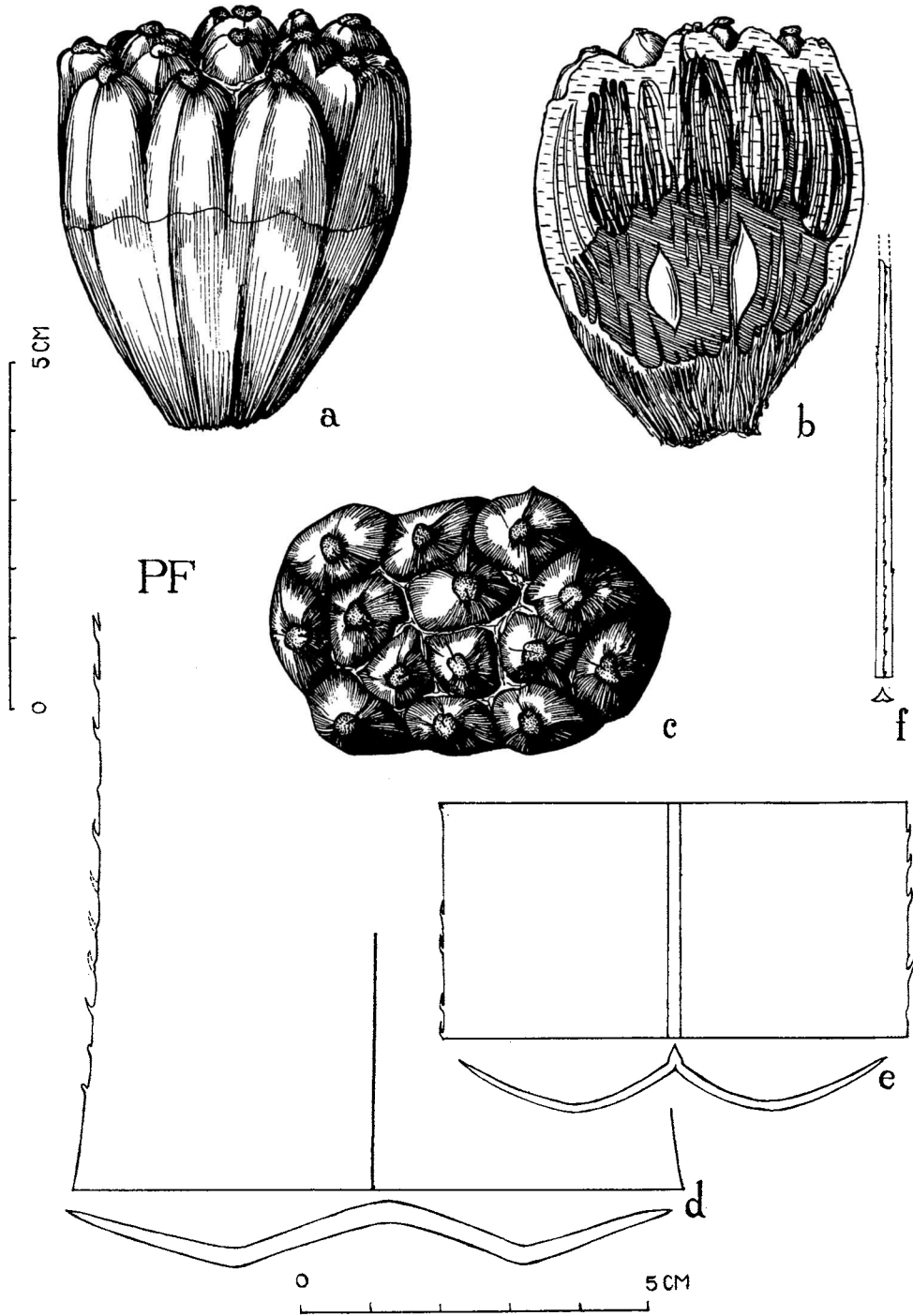


FIG. 289. *Pandanus Hubbardii* St. John, from holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ ; *d*, leaf base, lower side,  $\times 1$ ; *e*, leaf middle, lower side,  $\times 1$ ; *f*, leaf apex, lower side,  $\times 1$ .

country, 19/4/1930, C. E. Hubbard 2,238A (K).

DISCUSSION: *P. Hubbardii* is a member of the section *Pandanus*, as is its closest relative, *P. terrareginae* St. John, of Port Danger, Queensland, a species with the phalanges 5–5.1 cm long, 4.5–4.9 cm wide, the apex convex; central carpels about  $\frac{3}{4}$  as large as the marginal; endocarp in lower  $\frac{1}{4}$ , the lateral walls 2–3 mm thick; leaves unknown. *P. Hubbardii* has the phalanges 5.5–6 cm long, 3.7–5.5 cm wide, the apex low convex; central carpels about  $\frac{2}{3}$  as large as the marginal ones; endocarp in lower  $\frac{2}{5}$ , and the lateral walls 4–5 mm thick.

The epithet is given in honor of the collector, Charles Edward Hubbard, long on the staff, and recently made Keeper of the Herbarium, Royal Botanic Gardens, Kew, England.

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

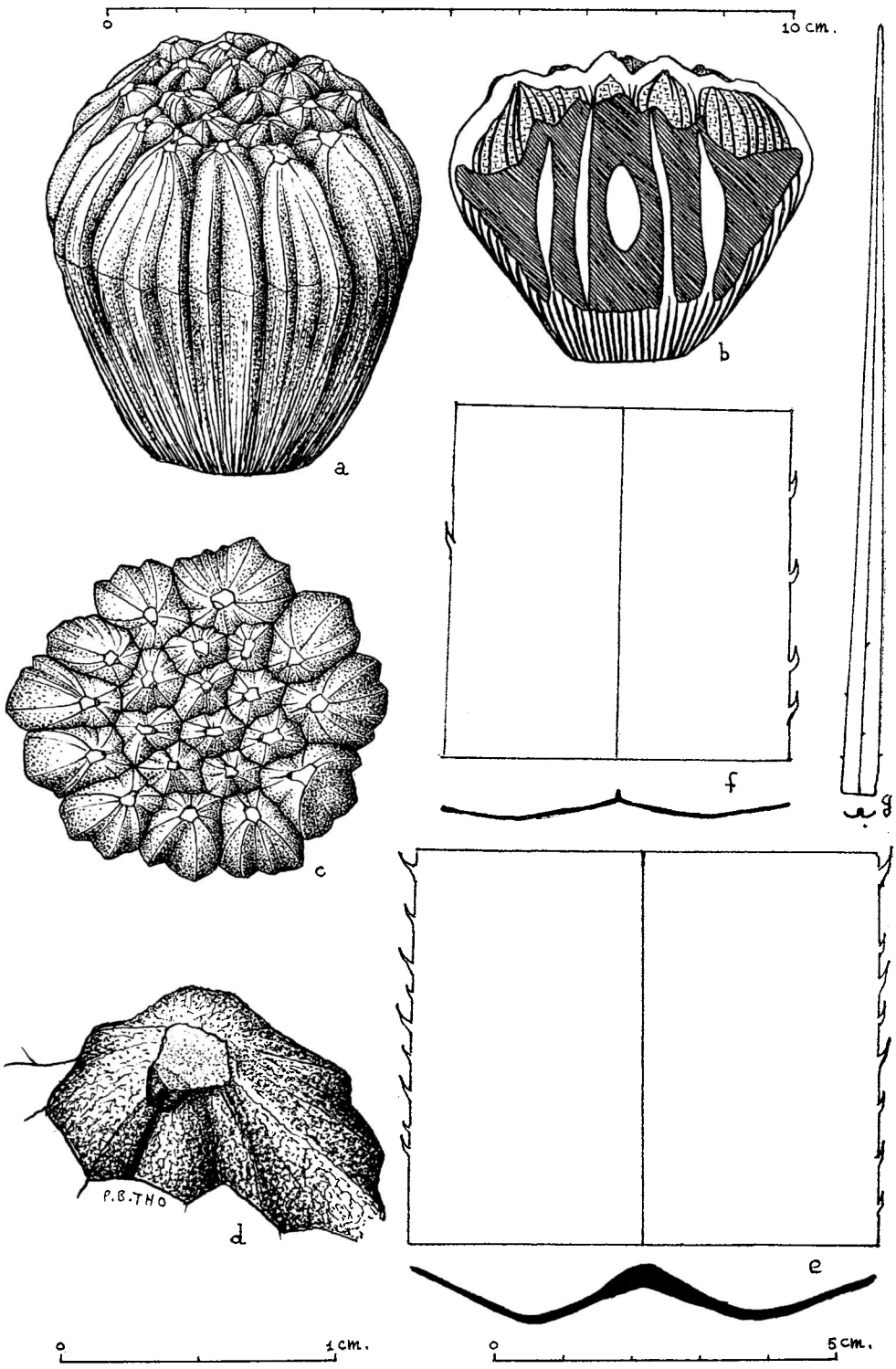
Fig. 290

DIAGNOSIS HOLOTYPE: Arbor 4.5–9 m alta, radicibus fulturosis nullis, ramis paucis, cortice palliditer griseo squamoso et cum radicillis spiniformis erectis multis ad 1 cm longis, novellis interdum, foliis 1.2–1.7 m longis proxima basem 6.5–6.8 cm latis in medio 4.9 cm latis terminalibus in spiris "in planta una eis dextrorotatis in altera laevorotatis" (foliis arboris juvenalis 2.4 m longis 6.2 cm latis) coriaceis supra viridibus infra pallidioribus in sectione mediali cum 52–58 nervis parallelis secundariis in quoque dimidio U-sulcatis 2-plicatis lamina gladiata sensim in dimidio infero tum rapiditer in apice trigono subulato diminuenti eo in puncto 10 cm ex apice 4 mm lato basi inermi pallida vel subcupracea, ex 15–18 cm marginibus cum aculeis 4–11 mm separatis et per 3–4 cm infera cum aculeis biformatis majoribus 3–4 mm longis arcuati-subulatis in basi geniculatis adscendentibus apicibus brunneis tum ultra 4 cm majoribus continuatis sed cum alteris parvis alternantibus illis 0.7–2 mm longis simulantibus, midnervo infra per  $\frac{3}{4}$  basalem inermi, in sectione mediali marginibus paene inermibus vel uno cum aculeis 1.5–2.5 mm longis 7–15 mm separatis majoribus cum minoribus alternantibus arcuati-subulatis valde adpresse adscendentibus apicibus brunneis, apice subulato plerumque inermibus, phalangibus 4.4–4.8 cm longis 4.3–5.7 cm latis 2.9–5 cm crassis incarnatis subglobosis 4–5-angulosis lateribus contiguis infra planis supra cum rugis, suturis lateralibus omnibus angustis sed profundis in parte supera, parte  $\frac{1}{2}$  supera libera lateribus

rugosis et punctatis convexis sublucidis et in carpelis omnibus cum 4–10 rugis longitudinalibus acutis et valleculis in lateribus exterioribus et hinc cum phalangibus proximis interobseratis, sinibus apicalibus centralibus 3–5 mm profundis V-formatis sed sinuatis, carpelis 10–19 apicibus pyramidalibus interioribus angustioribus et  $\frac{1}{2}$ – $\frac{3}{4}$  tam grandibus quam exterioribus illis cum areola apicali concava et ex ea cum galea supra stigmatem, stigmatibus 1–1.5 mm longis ellipsoideis obliquis centripetalibus nigris papillois exterioribus truncatis, sinibus proximalibus  $\frac{1}{2}$ –1 ad fondam extentis, endocarpio mediali 25–27 mm longo solido osseoso in basi et centro obscure brunneo in lateribus et apice albo et supra seminem cum projectionibus brevibus lateribus lateralibus 7–8 mm crassis intra laevibus lucidis brunneis, mesocarpio in apice carpelae quaeque cavernam cum fibris fortibus pallidis et membranis albis formanti, mesocarpio basali parvo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: "Sparsely branched tree, 4.5–9 m high, without prop roots; bark light grey, scaly, with many almost spine-like processes up to 1 cm long; short leafy adventitious shoots sometimes present on trunks; leaves 1.2–1.7 m long, green, in terminal spiral tufts, the spirals anticlockwise on some plants, clockwise on others"; leaves 1.2–1.7 m long, 6.5–6.8 cm wide near the base, 4.9 cm wide at the middle (the leaf of juvenile plants 2.4 m long, 6.2 cm wide), coriaceous, green above, slightly paler green below, at midsection with 52–58 parallel secondary veins in each half, no tertiary cross veins, U-sulcate, 2-plicate, the blade sword-shaped, tapering gradually in the lower half, then more rapidly into the trigonous subulate apex, this at the point 10 cm down 4 mm wide, the base unarmed, pale or slightly copper-colored, beginning at 15–18 cm the margins with prickles 4–11 mm apart, and for the first 3–4 cm having two sorts alternating, the larger ones 3–4 mm long, arcuate subulate, geniculate at base, ascending, brown-tipped, and beyond the 3–4 cm limit these larger ones continuing, the alternating smaller prickles similar, but only 0.7–2 mm long; the midrib below unarmed for lower  $\frac{3}{4}$ ; at midsection the margins nearly unarmed or one side with prickles 1.5–2.5 mm long, alternating large and small, 7–15 mm apart, arcuate subulate, strongly appressed

FIG. 290. *Pandanus bumifer* St. John, from holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ ; *d*, stigma and carpel apex, oblique view,  $\times 4$ ; *e*, leaf base, lower side,  $\times 1$ ; *f*, leaf middle, lower side,  $\times 1$ ; *g*, leaf apex, lower side,  $\times 1$ .



ascending, brown-tipped; on the subulate apex essentially unarmed; "syncarps scarlet, with fruity smell, oval, on peduncles up to as long as themselves"; phalanges 4.4–4.8 cm long, 4.3–5.7 cm wide, 2.9–5 cm thick, scarlet, subglobose, 4–5-angled, the contiguous sides flat below, fluted above, lateral sutures narrow but deep, between all carpels on exposed upper part, upper  $\frac{1}{2}$  free, its sides rugose and punctate, slightly shiny, curving, with 4–10 sharp longitudinal valleys and ridges the full length of the outer part of each carpel, thus mortised with the adjacent phalanges, apical central sinuses 3–5 mm deep, V-shaped, but the bottom zigzag due to the mortising; carpels 10–19, the apices pyramidal, the innermost ones more narrowly so,  $\frac{1}{2}$ – $\frac{1}{4}$  as large as the outer ones, all except the central ones with a small apical concave platform from which a visor projects over the stigma; stigma 1–1.5 mm long, ellipsoid, oblique, centripetal, blackish, papillose, the outer ones truncate; proximal sinus narrow, running from half to all the way to the valley bottom; endocarp median, 25–27 mm long, massive, bony, dark brown at base and center, whitish at sides and apex, with shallow lobes projecting above each carpel, lateral walls 7–8 mm thick, within smooth, shining, chocolate brown; mesocarp forming in the apex of each carpel a cavity with strong pale fibers and white membranes; basal mesocarp scant, fibrous and fleshy.

HOLOTYPE: Australia, Queensland, North Kennedy District, Ravenswood, scattered singly or in groups, *Eucalyptus* forest, pale grey podsolized soil, 285 m alt, 15 Nov. 1942, S. T. Blake 14,691 (BRI).

DISCUSSION: *P. humifer* is a member of the section *Pandanus*, as is its closest relative, *P. subinermis* St. John, of White Cliff Point, Queensland, a species with the phalanges 5–5.7 cm long, 4–5.3 cm wide, broadly obovoid; carpel apices low rounded pyramidal, smooth; endocarp 25–27 mm long, with slender lateral shoulders; apical mesocarp 7–15 mm long; leaf midrib unarmed throughout, and the margins throughout the outer two thirds. *P. humifer* has the phalanges 4.4–4.8 cm long, 4.3–5.7 cm wide, subglobose; carpel apices pyramidal,

punctate; endocarp 31 mm long, with massive lateral shoulders; apical mesocarp 3–11 mm long; leaf midrib armed in outer  $\frac{1}{4}$  and the margins with prickles beginning at from 15–18 cm from the base and continuing to near the apex.

The observations by the collector, Dr. Blake, that the leaf spirals were "anticlockwise on some plants, clockwise on others" records a growth habit that has seldom been noticed. It seems probable that this species, like *P. gemmifer* St. John, of Queensland, and *P. reversispiralis* St. John, of Vietnam, have a phyllotaxy of leaves in three spirals, and with these spirals reversing direction above each fruiting peduncle. This condition is rare in *Pandanus*, and unknown in other genera.

The new epithet is formed from the Latin, *humerus*, shoulder, *fero*, to bear, and is given with allusion to the prominent shoulders of the endocarp.

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

Figs. 291, 292

DIAGNOSIS HOLOTYPE: Licet arbor, ramulis 3–3.5 cm diametro, cortice griseo-brunneo subcorrugato laevi, foliis fasciculatis circa 1.05 m longis proxima basem 2.9–3.2 cm latis in medio 2.3 cm latis debiliter coriaceis supra viridibus infra pallidioribus in sectione mediali cum 35–40 nervis parallelis secundariis in quoque dimidio nervis tertiis nullis supra midnervum U-sulcatis 2-plicatis lamina anguste gladiata ex basi in apice trigono subulato diminuenti (apex deest), marginibus ex 14–15 cm cum aculeis 1.5–2 mm longis 5–13 mm separatis arcuatis graciliter subulatis adscendentibus apicibus rubrescentibus, midnervo infra per partem  $\frac{1}{3}$  inferam inermi, in sectione mediali margine uno subinermi altero cum aculeis 3–15 mm separatis et biformatis majoribus 1.5–2 mm longis arcuatis graciliter subulatis adscendentibus alteris cum eis alternantibus minimis, midnervo infra cum aculeis 1–1.5 mm longis 18–24 mm separatis arcuatis subulatis adscendentibus apicibus brunneis, in apice subulato marginibus cum crenato-serrulis 0.1–0.2 mm longis 1.5–5 mm separatis brunnescentibus, midnervo infra cum aculeis 0.2–0.3 mm longis subulatis adscendentibus brunnescentibus, infructescencia laterali cum syncarpio unico, pedunculo 17 cm longo 12 mm diametro trigono folioso-bracteato, syncarpio 13.5 cm longo subglobooso cum circa 26 phalangibus, nucleo latiter ovoideo medullosa fibrosoque, phalangibus 3.8–4 cm longis 3.6–4.5 cm latis 2.7–3.7 cm crassis aurantiacis subglobois apice depresso convexo truncato cum 5–6-angulis majoribus lateribus exterioribus carpelae quaeque cum 4–6 serris et valculis longitudinalibus ad basem partis liberae et in-

terobseratis suturis lateralibus angustis in parte  $\frac{2}{3}$  supera distinctis parte  $\frac{1}{2}$  supera libera lateribus curvatis corrugatis vel verrucosis exlucidis (aurantiacis ?) sinibus apicalibus centralibus 2–5 mm profundis V-formatis sed in fondo interobseratis, carpelis 7–10 apicibus oblato-hemisphaericis illis interioribus  $\frac{2}{3}$  tam grandibus quam marginalibus anguste angulatis omnibus cum concavitate apicali parvo profundo et in

marginem proximo cum stigmate 1.5–2 mm lato lunato subnigro papilloso obliquo centripetali valde obliquo et infra galea parva, sinibus proximalibus latis  $\frac{1}{3}$ – $\frac{1}{2}$  ad fundam extensis, endocarpio mediali osseoso plerumque obscure brunneo 19 mm longo lateribus lateralibus 5–7 mm crassis intra pallide castanea-brunneis laevibus lucidis, seminibus 13–15 mm longis ellipsoideis, mesocarpio in apice quaeque carpelae cavernam

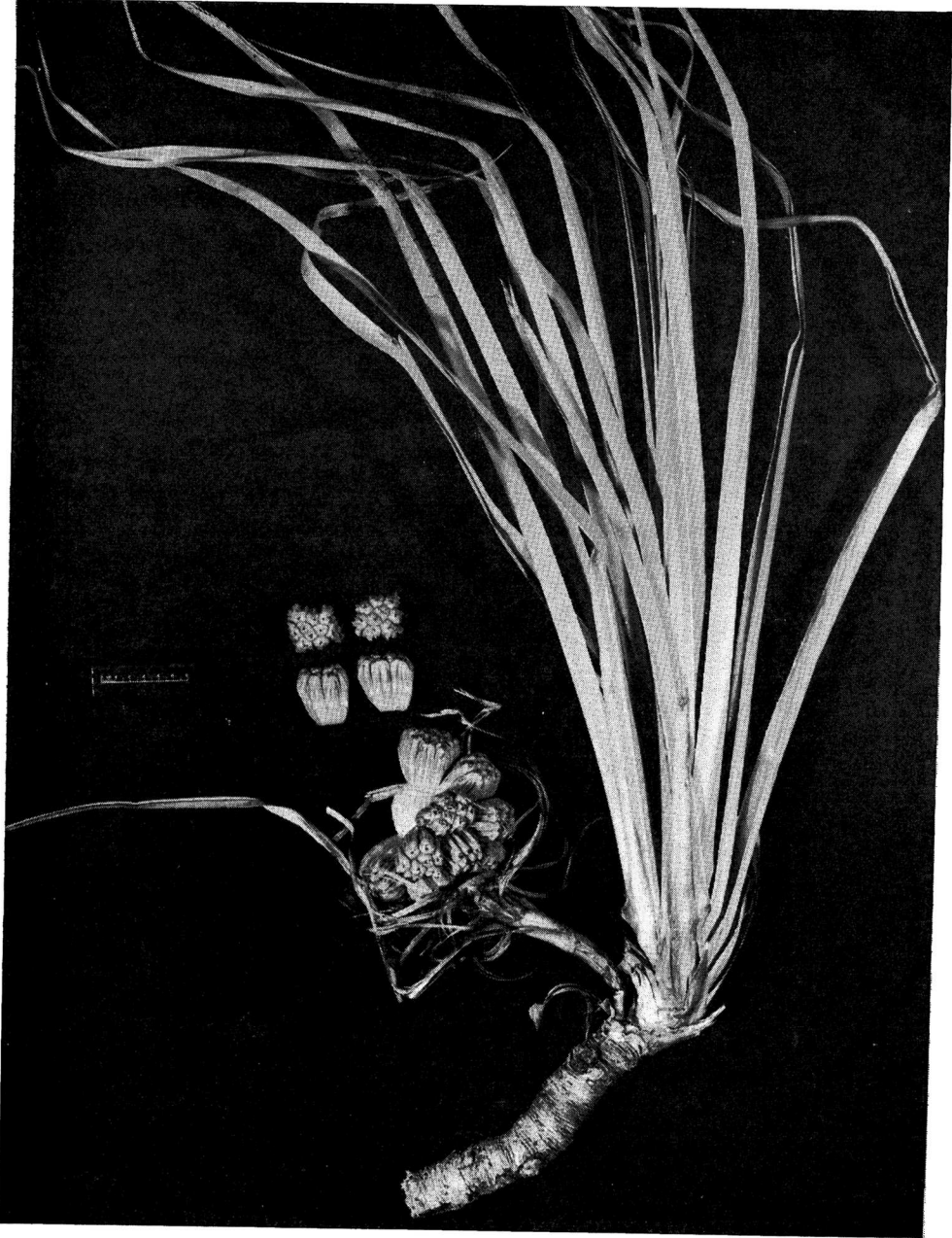


FIG. 291. *Pandanus kennedyensis* St. John, from holotype.

cum fibris paucis et membranis delicatis albis formanti, mesocarpio basali fibroso et carnosio.

DIAGNOSIS OF HOLOTYPE: Evidently tree-like; branchlets 3–3.5 cm in diameter; bark grayish brown, slightly corrugated but rather smooth; branchlets with a terminal plume of leaves, these about 1.05 m long, 2.9–3.2 cm wide near the base, 2.3 cm wide at the middle, thin coriaceous, green above, paler green below, at midsection with 35–40 parallel secondary veins in each half, no tertiary veins, above the midrib U-sulcate, 2-pleated, not breaking across, the blade narrow sword-shaped, tapering gradually from the base into the trigonous subulate apex, of which the tip is missing; beginning at 14–15 cm from the base the margins with prickles 1.5–2 mm long, 5–13 mm apart, arcuate slender subulate, ascending, the tips reddish; the midrib below unarmed throughout the lower  $\frac{1}{3}$ ; at midsection one margin nearly unarmed, the other with prickles 3–15 mm apart, of two sorts, the major ones 1.5–2 mm long, like the basal ones, alternating with tiny more or less abortive ones; the midrib below with prickles 1–1.5 mm long, 18–24 mm apart, slender arcuate subulate, ascending, brown-tipped; on the apex the margins with crenate-serrulations 0.1–0.2 mm long, 1.5–5 mm apart, brownish; the midrib below with prickles 0.2–0.3 mm long, subulate, ascending, brownish; infructescence becoming lateral, pendent, bearing a single syncarp; peduncle 17 cm long, 12 mm in diameter, trigonous, leafy bracted; syncarp 13.5 cm long, subglobose, bearing about 26 phalanges; core broadly ovoid, pithy and fibrous; phalanges 3.8–4 cm long, 3.6–4.5 cm wide, 2.7–3.7 cm thick, bright orange throughout, subglobose in outline, the apex very low convex truncate, with 5–6 major angles, the contiguous outer sides of each marginal carpel with 4–6 sharp longitudinal ridges and valleys continuing to the base of the free carpel apex, and thus mortised, lateral sutures narrow, distinct down to the fleshy lower  $\frac{1}{3}$ , upper  $\frac{1}{2}$  free, its

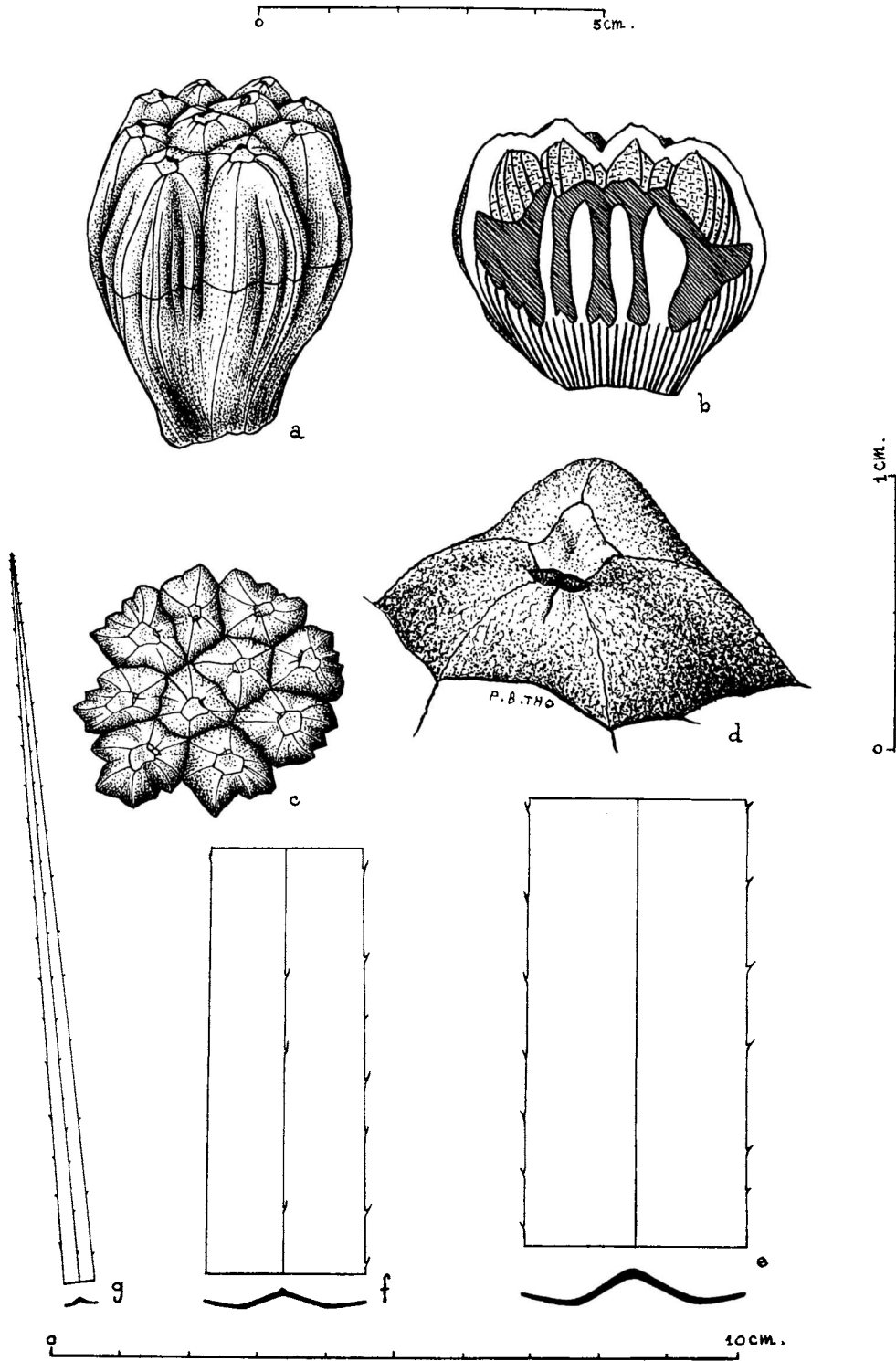
sides curving, corrugated or verrucose, dull, probably orange, apical central sinus 2–5 mm deep, V-shaped, but the bottom zigzag due to the mortising; carpels 7–10, the apices low dome-shaped, the inner ones  $\frac{2}{3}$  as large as the outer, sharply angled, all with an apical, small but deep hollow, on the proximal margin of which is the stigma 1.5–2 mm wide, lunate, blackish, papillose, oblique, centripetal, very oblique, under a slight visor, proximal sinus wide, running  $\frac{1}{3}$ – $\frac{1}{2}$  way to valley bottom; endocarp median, bony, mostly dark brown, 19 mm long, the lateral walls 5–7 mm thick, within light chestnut brown, smooth, shining; seeds 13–15 mm long, ellipsoid; mesocarp forming in the apex of each carpel a cavity traversed by a few fibers and with white, delicate membranes; basal mesocarp fibrous and fleshy.

HOLOTYPE: Australia, Queensland, North Kennedy District, 10 miles south of Ingham, grassland near road, July 20, 1960, *W. G. Trapnell, F. Boyes & K. A. W. Williams* 302 (BRI).

DISCUSSION: *P. kennedyensis* is a member of the section *Pandanus*, as is its closest relative, *P. endeavourensis* St. John, of Cooktown, Queensland, a species having the phalanges 5–5.8 cm long, 4.1–4.8 cm wide, broadly obovoid; carpels 11–14, the apices subequal; endocarp 35 mm long; leaves 1.6–1.7 m long, 6–7.5 cm wide, at midsection with 59–61 secondary veins in each half, and the margins unarmed from middle to tip. *P. kennedyensis* has the phalanges 3.8–4 cm long, 3.6–4.5 cm wide, subglobose; carpels 7–10, the inner apices  $\frac{2}{3}$  as large as the outer; endocarp 19 mm long; leaves 1 m long, 2.9–3.2 cm wide, at midsection with 35–40 secondary veins in each half, and the margins sparsely prickly from middle to tip.

The new epithet is geographic, formed from the name North Kennedy District, plus *ensis*, the Latin adjectival place ending.

FIG. 292. *Pandanus kennedyensis* St. John, from holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ ; *d*, stigma and carpel apex, oblique view,  $\times 4$ ; *e*, leaf base, lower side,  $\times 1$ ; *f*, leaf middle, lower side,  $\times 1$ ; *g*, leaf apex, lower side,  $\times 1$ .



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

Fig. 293

DIAGNOSIS HOLOTYPE: Arboriformis 5 m alta, radicibus trunco ramulis non preservatis, foliis 1.95 m longis proxima basem 7.7 cm latis in medio 4 cm latis gladiatis crassiter coriaceis U-sulcatis 2-plicatis in sectione mediali cum 54 nervis parallelis secundariis in quoque dimidio nervis tertiis nullis lamina in parte  $\frac{5}{6}$  ultima in apice gracili trigono subulato diminuenti eo in puncto circa 10 cm ex apice 1.5 mm lato basi inermi pallida, marginibus in toto inermibus, midnervo paulo infra mediam et ad punctum  $\frac{3}{4}$  ad apicem cum aculeis parvis eis in sectione mediali 0.8–1 mm longis 10–30 mm separatis arcuatis subulatis valde ascendentibus obscure rubris, phalangibus 5.5–6 cm longis 6.7–7.7 cm latis 5.2–5.4 cm crassis latiter subglobois compressis 6-angulosis parte  $\frac{1}{2}$  supera libera lateribus superis laevibus sed punctatis sublucidis pallidis sensim curvatis, carpelis cum 2–9 fugis prominentibus acutis longitudinalibus et valleculis ex medio paene ad apicem apice obtuso sinibus lateralibus angustis et profundis et ad basem continuis, sinibus centralibus apicalibus 2.5–7 mm profundis angustis sinuosis tum lateribus divergentibus, carpelis 22–30 apicibus oblate semiorbicularibus subaequalibus cum 5–6 angulis majoribus et angulis secundariis pluribus et eis cum vicinis interobseratis, carpelis marginalibus plerumque cum areola concava parva distali, illis interioribus plerumque cum apicibus rotundatis, stigmatibus 2–3 mm latis cordatis vel truncati-cordatis horizontalibus vel obliquis obscure brunneis papillosis sulcatis centripetalibus, sinibus proximalibus  $\frac{1}{2}$ – $\frac{2}{3}$  ad fundam extentis, endocarpio 3 cm longo submediali solido osseoso obscure mahogani-brunneo lateribus lateralibus 7–10 mm crassis intra lucidis laevibus, seminibus 17–19 mm longis ellipsoideis, mesocarpio in apice quaeque carpelae cavernam cum fibris longitudinalibus et medulla molle formanti, mesocarpio basali parvo fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Tree-like, 5 m tall; roots, trunk, and branches not preserved; leaves 1.95 m long, 7.7–11 cm wide near the base, 4 cm wide at the middle, sword-shaped, thick coriaceous, U-sulcate, 2-pleated, at midsection with 54 parallel secondary veins in each half, no tertiary veins, the blade tapering throughout the outer  $\frac{5}{6}$  into the slender, trigonous subulate apex, this at the point about 10 cm down 1.5 mm wide, the base unarmed, pale, the margins unarmed throughout, the midrib below beginning just below the middle and continuing to  $\frac{3}{4}$  way out with tiny prickles, those at midsection 0.8–1 mm long, 10–30 mm apart, arcuate subulate, strongly ascending, dark red; inflorescence and syncarp not seen; phalanges 5.5–6 cm

long, 6.7–7.7 cm wide, 5.2–5.4 cm thick, broadly subglobose, compressed, 6-angled, upper  $\frac{1}{2}$  free, the upper sides smooth but punctate, a little shiny, pale (probably yellowish), gently curving and each carpel with 2–9 prominent, sharp longitudinal ridges and valleys, these continuing nearly to the apex, the apex obtuse; lateral sutures narrow and deep, continuing well toward the base; central apical sinuses 2.5–7 mm deep, the bottom narrow and sinuous, then the middle and upper sides flaring; carpels 22–30, their apices oblate semiorbicular, subequal, with 5–6 major angles and several secondary ones, and these mortised with the neighboring carpels, the marginal carpels mostly with a small concave distal platform, the inner ones mostly merely rounded at apex; stigmas 2–3 mm wide, cordate or truncate cordate, horizontal or oblique, dark brown, papillose, sulcate, centripetal; proximal sinus deep, running  $\frac{1}{2}$ – $\frac{2}{3}$  way to valley bottom; endocarp 3 cm long, submedian, massive, bony, dark mahogany-brown, the lateral walls 7–10 mm thick, within smooth, shining; seeds 17–19 mm long, ellipsoid; upper mesocarp forming in the apex of each carpel a cavern with longitudinal fibers and a loose, soft medulla; basal mesocarp scant, fibrous and fleshy.

HOLOTYPE: Australia, Queensland, Magnetic I., near Townsville, in littoral forest in sandy valley, 20 ft alt, 18. 1. 1931, C. E. Hubbard & C. W. Winders 6,653 (K).

DISCUSSION: *P. multicaepelatus* is a member of the section *Pandanus*, as is its closest relative, *P. orbicularis* St. John, of Cooktown, Queensland, a species with the phalanges 5.4–6.5 cm wide, 4.3–4.8 cm thick, subglobose; central apical sinuses broad V-shaped; carpels 7–12, their apices pyramidal semiorbicular; stigmas obdeltoid to oblanceolate; endocarp median; leaves 1.1 m long, 5.5–5.6 cm wide, the margins unarmed except at the middle having prickles 1.3–1.8 mm long, 5–15 mm apart, stout subulate, ascending, brown. *P. multicaepelatus* has the phalanges 6.7–7.7 cm wide, 5.2–5.4 cm thick, broadly subglobose; central apical sinuses narrow V-shaped in bottom third, then wide flaring; carpels 22–30, their apices oblate semiorbicular; stigmas cordate or truncate cordate;



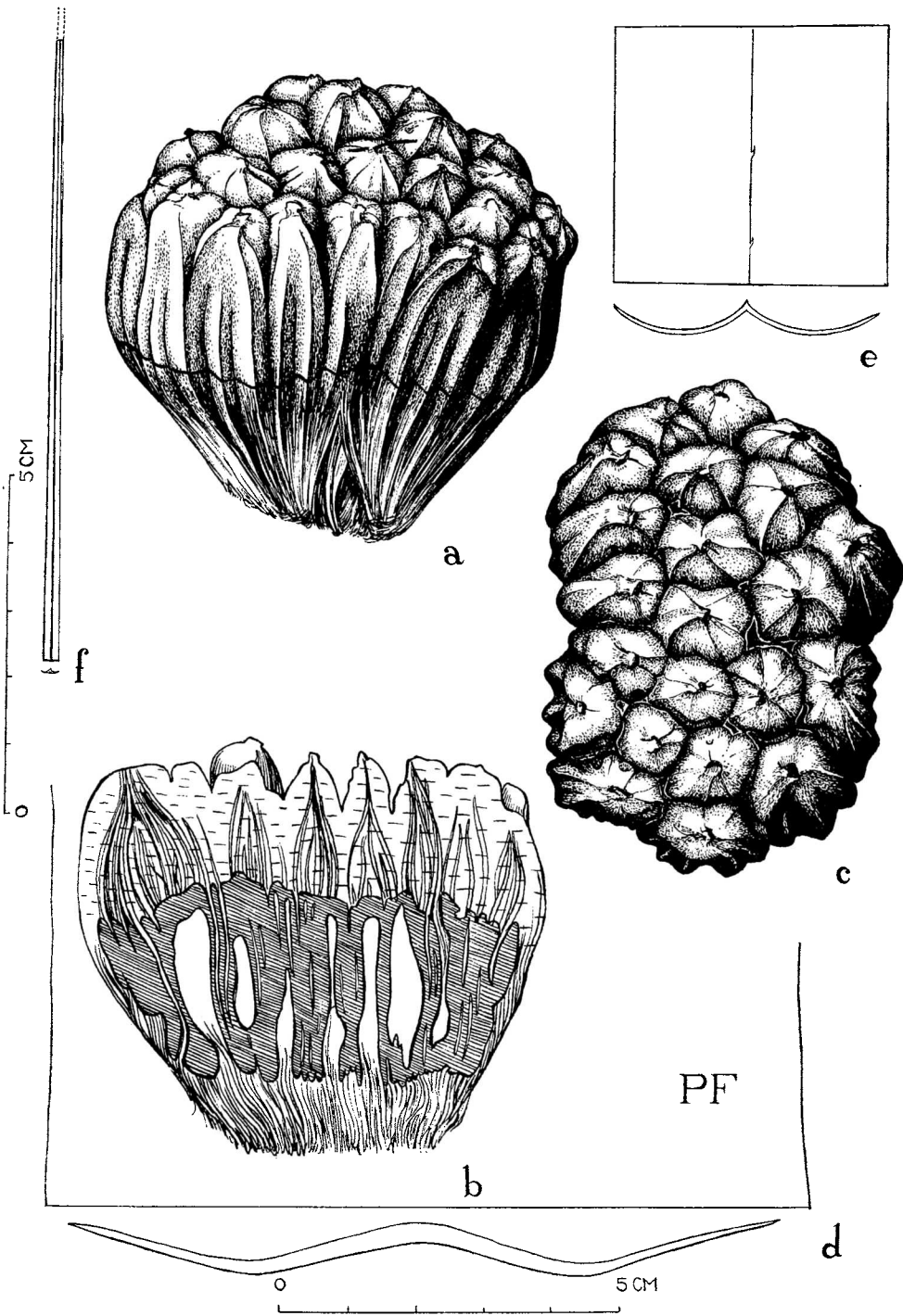


FIG. 293. *Pandanus multicarpetatus* St. John, from holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ ; *d*, leaf base, lower side,  $\times 1$ ; *e*, leaf middle, lower side,  $\times 1$ ; *f*, leaf apex, lower side,  $\times 1$ .

endocarp submedian; leaves 1.9 m long, 7.7 cm wide, the margins wholly unarmed but the midrib below from  $\frac{1}{2}$ – $\frac{3}{4}$  way out with prickles 0.8–1 mm long, 10–30 mm apart, arcuate subulate, strongly ascending, dark red.

The new epithet is from the Latin, *multus*, many, and the technical word, *carpel* (from the Greek, *karpos*, fruit), and is given with reference to the many carpels of the phalange.

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

Fig. 294

DIAGNOSIS HOLOTYPE: Phalanges 5–5.1 cm longis 4.5–4.9 cm latis 2.9–3.3 cm crassis late cuneatis apice convexo 4–5-angulatis laevibus lateribus cum planis angustis pluribus parte  $\frac{1}{5}$  supera libera, suturis lateralibus nullis, carpellis 15 apicibus hemisphaericis 3–5-angulatis, carpellis interioribus minoribus, sinibus centralibus apicalibus 3–4 mm profundis, stigmatibus 2–3 mm longis apicalibus minime obliquis ellipticis vel reniformibus vel subcordatis sulcatis centripetalibus, endocarpio in parte  $\frac{1}{4}$  infera lateribus 2–3 mm crassis, carpellis apparente sterilibus, foliis incognitis.

DIAGNOSIS OF HOLOTYPE: Phalanges 5–5.1 cm long, 4.5–4.9 cm broad, 2.9–3.3 cm thick, broadly cuneate, the apex convex, the sides 4–5-angled, the surface smooth, drying brown, the sides of several narrow planes; lateral sutures not evident, widest near the apex, upper  $\frac{1}{5}$  free; carpels 15, the apices hemispheric with 3–5 sharp ridges, the inner carpels perceptibly the smaller; apical central sinuses 3–4 mm deep; stigmas 2–3 mm long, apical, elliptic to reniform or subcordate, creased, slightly oblique, centripetal; endocarp in lower  $\frac{1}{4}$ , pale brown, the walls 2–3 mm thick; carpels apparently sterile; leaves unknown.

HOLOTYPE: Australia, Queensland, Port Danger, ca. 95 km south-east of Brisbane, near Coolangatta, July 1925, *T. G. B. Osborn* (AD).

DISCUSSION: *P. terrireginae* is a member of the section *Pandanus*. Its closest relative is *P. tectorius* Warb. var. *timorensis* Martelli, of Timor, which has the phalanges 4 cm long, 4 cm broad, the lateral sutures none or running less than  $\frac{1}{4}$  way; central apical sinuses appar-

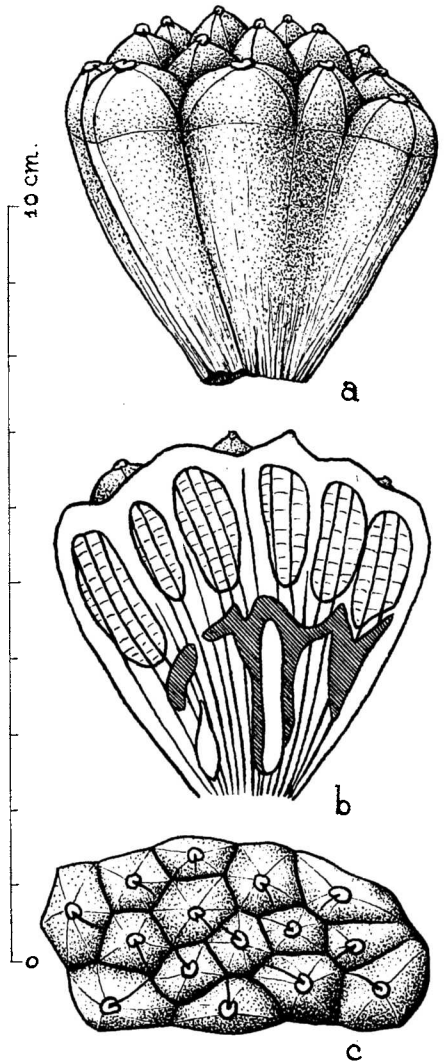


FIG. 294. *Pandanus terrireginae* St. John, from holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ .

ently 1–2 mm deep. *P. terrireginae* has the phalanges 5–5.1 cm long, 4.5–4.9 cm wide, the lateral sutures not evident; and the central apical sinuses 3–4 mm deep.

The new epithet is from the Latin, *terra*, land; *reginae*, of the queen, in reference to its locality in Queensland.