

## Revision of the Genus *Pandanus* Stickman, Part 9 Three New *Pandanus* Species from Queensland, Australia

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*Pandanus gemmiferus* sp. nov. (sect. *Australibrassia*)

Figs. 47-52

DIAGNOSIS HOLOTYPE: Arbor 8 m. alta 15 cm. diametro, cortice brunneo sublaeve in arboribus veteribus aliquando gemmiferis sed ramis omnibus plerumque infra foliis helices tribus 6-8 gemmarum, deinde post 6-7 nodas et cicatricem pedunculi helices tribus reversas in gemmis cum 6-15 foliis ad 3-7 cm. longis subintegris ferrentibus, deinde post intervallam helices tribus etiam reversis gemmae foliosae cum circa 43 foliis exterioribus bracteosis sed interioribus 25-45 cm. longis 4.6-6.4 mm. latis ad basem inermibus circa mediam marginibus cum aculeis 0.8-1 mm. longis 2-9 mm. distantibus subulatis luteis, foliis principalibus 2.26-2.30 m. longis 5 cm. latis coriaceis supra rotundato-sulcatis marginibus subrevolutis plerumque 4.5 cm. latis ligulatis sed in quarto superno sensim diminuentibus ad apicem subulatam eo 3 mm. lato in regione 10 cm. ex apice basi amplexicauli integri et inerme per 11-13 cm., proxima basi marginibus cum aculeis 1.5-2 mm. longis 3-10 mm. distantibus valde subulatis adscendentibus apicibus brunneis, midnervo proximo inermi, in sectioni mediali marginibus cum aculeis 1.5-2 mm. longis 3-6 mm. distantibus subulatis adpressi-ascendentibus, midnervo infra cum aculeis 1.5 mm. longis 13-55 mm. distantibus tenuiter subulatis adscendentibus adpressis, circa apicem marginibus et midnervo infra cum serrulis 0.3-0.5 mm. longis 1.5-3 mm. distantibus, pedunculo terminali 50 cm. longo 2 cm. diametro cernuo folioso, syncarpio 25 cm. longo 18 cm. diametro cylindrico rubro, phalangibus 5-5.6 cm. longis 4-4.4 cm. latis 3.4-3.7 cm. crassis obovoideo-subglobosis subcompressis 4-5-angulosis lateribus laevibus lucidis

subconvexis, parte 3/5 supera libera apice rotundato, regione stigmati 12-15 mm. latis concavis, suturis lateralibus nullis, sinibus apicalibus centralibus 2 mm. profundis angustis, carpellis 13-17, apicibus congregatis anguste pyramidalibus marginalibus obliquis inflexis et truncatis, stigmatibus 1.5-2 mm. longis cordatis vel deltoideis nigris papillois verticalibus centripetalibus, sinibus proximalibus 1/2 ad fondam extentis, endocarpio mediali solido mahoganibrunneo latere interiori lucido lateribus exterioribus 4-5 mm. crassis, seminibus 13-15 mm. longis 3-4 mm. diametro fusiformibus, mesocarpio apicali cavernoso fibrosoque et cum membranulis medullosis, mesocarpio basali fibroso et carnoso.

DESCRIPTION OF ALL SPECIMENS EXAMINED: Tree 8 m. tall, 15 cm. in diameter; bark brown, rather smooth, but with remote, low, rounded warts, on old trunks rarely bearing a few adventitious shoots; most branches bearing below the terminal plume of leaves three spirals of green, flattened, scaly, axillary buds, 6-8 in a series, then after an interval of 6-7 nodes and a peduncle scar, the spiral series of buds resume but in reverse direction, these buds having developed into leafy sprouts with 6-15 leaves, the inner ones the largest, 3-7 cm. long, 3-4 mm. wide, linear lanceolate, coriaceous, mostly entire but near the apex the margins and midrib below serrulate; then after a similar interval of bare nodes and a peduncle scar, there is found a third series of 6-9 axillary sprouts, of about 43 leaves, the outer lanceolate scale-leaves, the inner and younger ones 25-45 cm. long, 4-11.5 mm. wide, near the base unarmed, at the middle the margins only with ascending prickles 0.8-1 mm. long, 2-9 mm. apart, subulate, yellowish; near the apex the margins and midrib below with ascending prickles 0.4-0.5 mm. long, 1-3 mm. apart, subulate, pale but with brownish tips, these oldest sprouts being mature are detached

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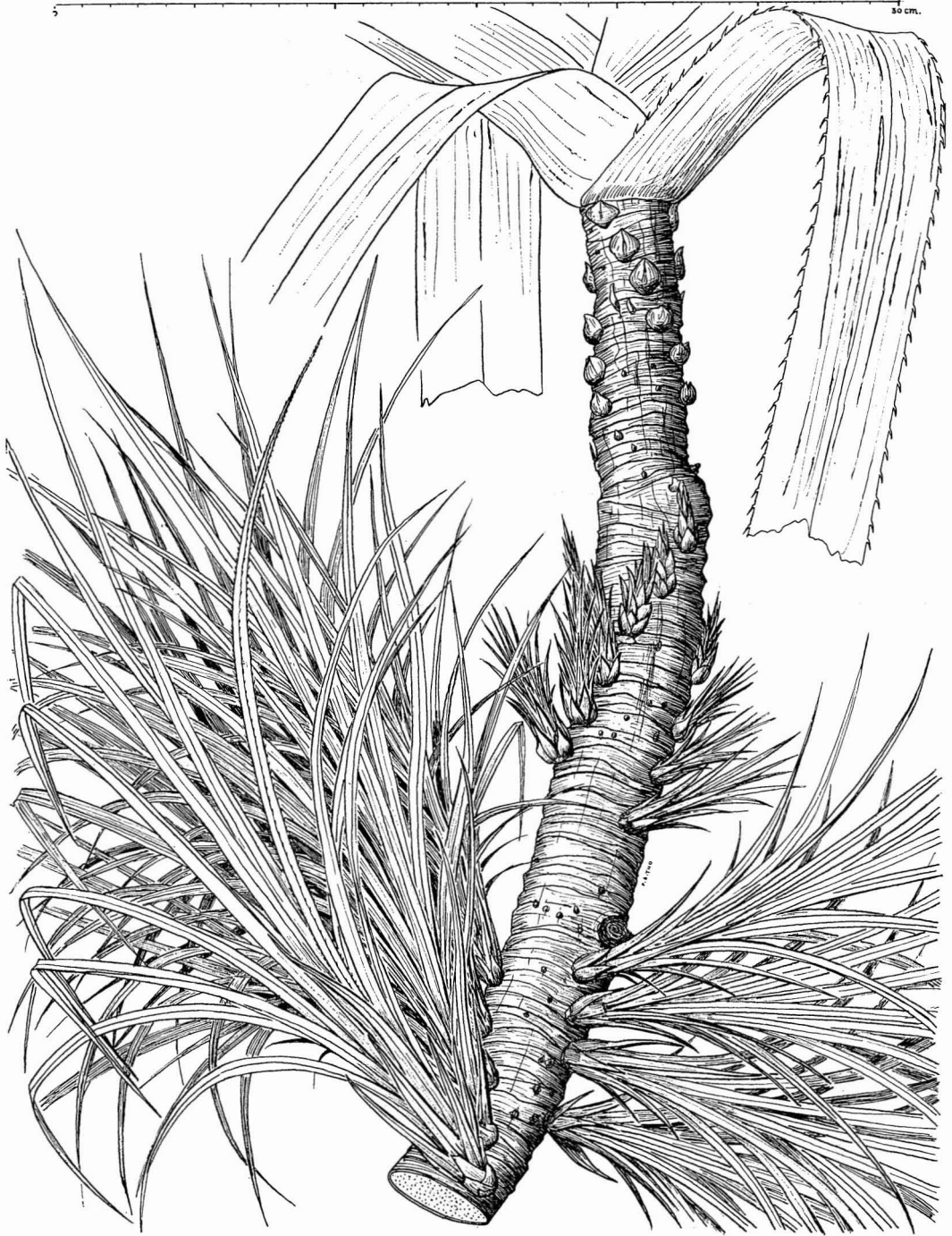


FIG. 47. *Pandanus gemmiferus* St. John, from *St. John* 26,276. A branch with three series of adventitious buds in reversing spirals,  $\times 41/100$ .

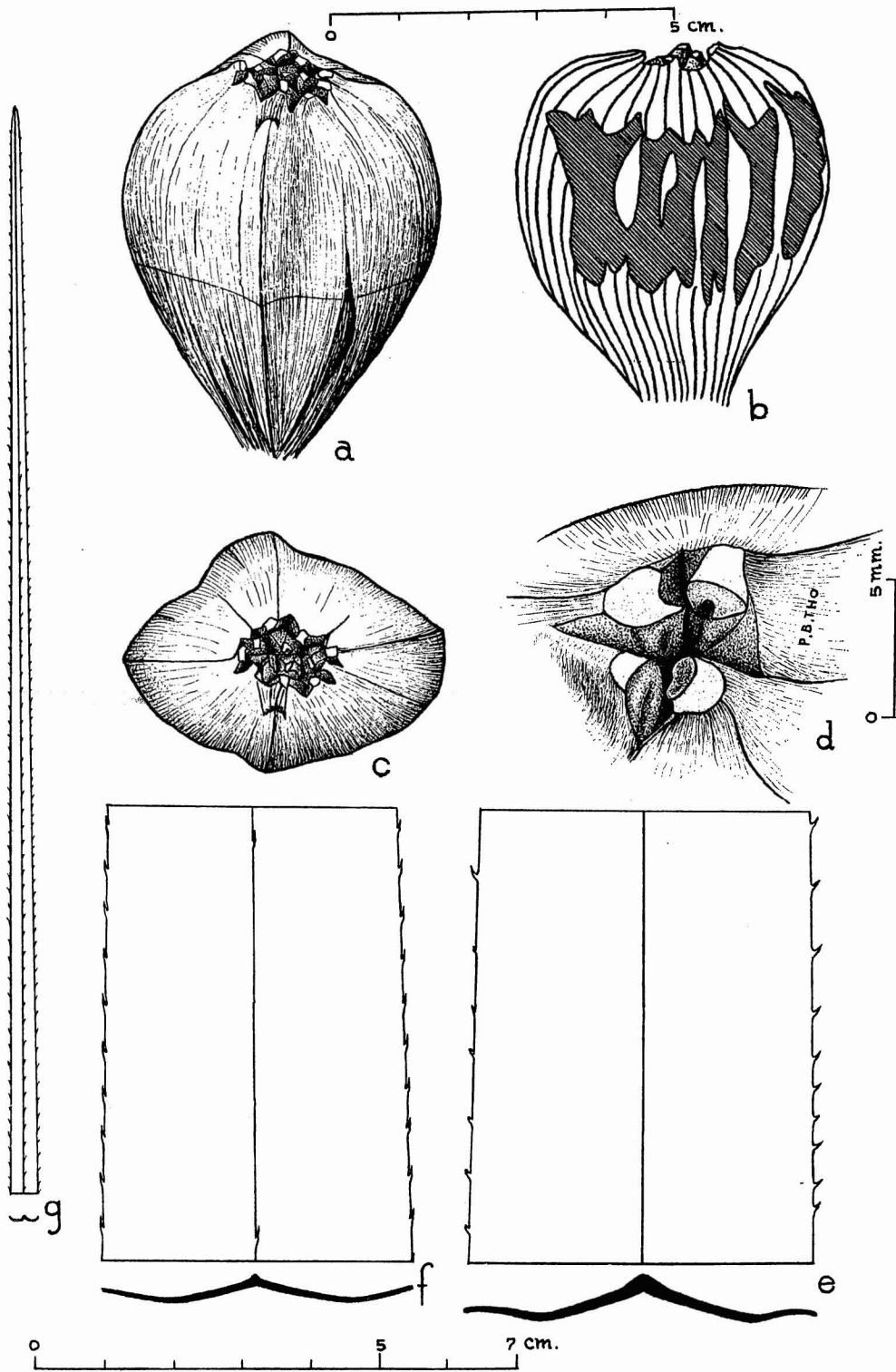


FIG. 48. *Pandanus gemmiferus* St. John, from the holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ ; *d*, carpel apices and stigmas, oblique view,  $\times 4$ ; *e*, leaf, lower side near base,  $\times 1$ ; *f*, leaf middle, lower side,  $\times 1$ ; *g*, leaf apex, lower side,  $\times 1$ .

at a touch or blow, fall to the ground where they readily take root; leaves 1.69–2.30 m. long, 5–5.7 cm. wide, coriaceous, above with a broad, half-rounded, central furrow and slightly revolute sides, the blade about 4.5 cm. wide for most of its length, ligulate, but in the apical quarter gradually tapering to the long subulate apex which 10 cm. down is 3 mm. wide, the base amplexicaul, unarmed and entire for 11–13 cm.; near the base the margins with prickles 1.5–4 mm. long, 3–10 mm. apart, stout subulate, ascending, brown tipped; nearby midrib unarmed and so almost to middle; at midsection the margins with prickles 1.5–3 mm. long, 3–6 mm. apart, subulate, appressed ascending; the midrib below with prickles 1.5 mm. long, 13–55 mm. apart, slender subulate, ascending, flat appressed; near the apex the margins and midrib below with serrulations 0.3–0.5 mm. long, 1.5–3 mm. apart; the almost basal leaves of young vigorous plants 2.35 m. long, 6.5 cm. wide, almost to the base the midrib below with prickles 3–4.5 mm. long, 6–15 mm. apart, stout subulate, arcuate, reflexed; at midsection the midrib below with prickles 2–3 mm. long, 4–11 mm. apart, ascending; and the tip 10 cm. down 1.5 mm. wide, but in other details the juvenile leaves similar to the others; peduncle terminal, 50 cm. long, 2 cm. in diameter, nodding, leafy bracted; syncarp observed in 1951 to be 23–25 cm. long, 10–18 cm. in diameter, with many persistent leafy bracts, cylindrical, red, the core 3-sided, the rind fibrous, firm and persistent, the center soft and evanescent; phalanges 4.2–5.6 cm. long, 3.2–4.4 cm. wide, 2.9–3.7 cm. thick, obovoid-subglobose, slightly compressed, 4–5-sided, the sides smooth, shining, gently convex, upper  $\frac{3}{5}$  free, apex rounded to the stigmatic cluster which is 12–15 mm. wide and concave; lateral sutures none; apical central sinuses narrow, 2 mm. deep from the base of the stigma (3–4 mm. from its apex); carpels 13–17, their apices crowded, narrow pyramidal, the marginal ones oblique, inflexed, and truncate; stigmas 1.5–2 mm. long, cordate to deltoid, black, papillose, on the proximal face of the apex, vertical and centripetal, the proximal crease running about half-way to the valley bottom; endocarp median, massive, mahogany brown, the inner surface shining, the lateral



FIG. 49. *Pandanus gemmiferus* St. John, from *St. John* 26,276. Base of trunk and prop roots.

walls 4–5 mm. thick; seeds 13–15 mm. long, 3–4 mm. in diameter, fusiform; apical mesocarp cavernous, traversed by strong fibers and with medullary membranes; basal mesocarp fibrous and fleshy.

**HOLOTYPE:** Australia, North Queensland, Cairns, Fresh Water Creek, moist forest by stream, near intake, 500 ft. alt., Jan. 29, 1958, *H. St. John* 26,238 (BISH).

**SPECIMENS EXAMINED:** Australia, North Queensland, Cairns Intake, Freshwater Creek, Nov. 18, 1953, *H. Flecker* 14,558 (Herb. North Queensland Nat. Hist. Club); Lake Eacham, 4 miles N. W. of Yungaburra, rain forest by lake shore, with *Brassaia actinophylla*, *Mallotus*, *Blepharicarya*, and *Freycinetia*, 2,450 ft. alt., Feb. 11, 1958, *H. St. John* 26,276 and 26,276A (BISH).

**DISCUSSION:** *P. gemmiferus* is a member of the section *Australibrassia* and in that group finds its closest relative, *P. conicus* St. John of

Queensland. This species has its phalanges 6–6.2 cm. long, 4–4.5 cm. wide, upper half free; carpels 12–14; stigmas 2–3 mm. long; blades 2.7–3.25 m. long, 4.4 cm. wide, the apex 1 mm. wide at the point 10 cm. down; bark of the trunk with stout, upturned prickles; and the tree not bearing active, axillary shoots. On the other hand, *P. gemmiferus* has the phalanges 3.2–4.4 cm. long, 2.9–3.7 cm. wide, the upper 3/5 free; carpels 13–17; stigmas 3–4 mm. long; blades 1.69–2.30 m. long, 5–5.7 cm. wide, the apex 3 mm. wide at the point 10 cm. down; bark of the trunk smooth but with low, rounded warts; and the tree with abundant, leafy, axillary shoots.

This is a very remarkable species. It, like *P. reversispiralis* St. John of Vietnam, has a phyllotaxy of three spirals, reversing direction following each peduncle. However, unlike that Asiatic species, *P. gemmiferus* has active axil-

lary, adventitious buds. The youngest spirals of six to eight buds are mere, flattened, scaly things. The second have grown to leafy shoots, the inner and largest leaves of which are 3–7 cm. long. The third are of vigorous, leafy shoots, each with about 43 leaves, the largest of which are 25–45 cm. long. At a blow or even a touch these fall to the ground where they may take root and start new plants. At Lake Eacham the ground under the *Pandanus* trees was carpeted by fallen, axillary shoots, rooting and growing vigorously. So far as known, this is the first species in the genus with gemmipary and active vegetative propagation.

The new epithet is from the Latin, *gemma*, a bud; *fero*, to produce; in reference to the spectacular production of lateral, leafy buds.

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

Figs. 53–55

DIAGNOSIS HOLOTYPY: Arbor 10 m. alta 20 cm. diametro, cortice trunci et radicorum ful-turosorum cum radicillis adpresse adscendentibus 2–4 cm. longis et furcatis obtectis, radicibus futurosus 5 dm. longis 3 cm. diametro, ligno trunci pallidi duri, foliis 1.41–1.91 m. longis 7–8 cm. latis coriaceis supra in media sulcatis ligulatis sensim ex basi in apice subulato diminuentibus eo in puncto 10 cm. ex apice 3–3.5 mm. lato, basi per 17–20 cm. inermi tum marginibus cum aculeis 2–3 mm. longis 3–7 mm. distantibus subulatis adscendentibus brunneis, midnervo infra fere ad mediam inermi, in sectione mediali marginibus cum aculeis 1.2–1.5 mm. longis 4–11 mm. distantibus adpresse adscendentibus, midnervo infra cum aculeis simulantibus et 11–19 mm. distantibus, circa apicem marginibus cum aculeis 0.2–0.3 mm. longis 1.5–3 mm. distantibus divergentibus crasse subulatis brunneis, midnervo infra cum aculeis 0.5–0.8 mm. longis 5–10 mm. distantibus subulatis adscendentibus, syncarpio 12–14 cm. longo ovoideo, phalangibus 4.5–5.3 cm. longis 2.4–3.8 cm. latis 2.5–3 cm. crassis apparente rubris cuneatis apice late truncatis vel subconvexis multiangulosis, lateribus cum angulis secundariis multis dense papillosis, parte 1/2 supra libera, suturis lateralibus distinctis sed angustis, sinibus centralibus apicalibus 6–8 mm. pro-



FIG. 50. *Pandanus gemmiferus* St. John, from *St. John* 26,276. Main trunks with masses of adventitious, leafy buds.





FIG. 51. *Pandanus gemmiferus* St. John, from *St. John* 26,276. A branch with the adventitious, leafy buds, held by the forester, Edward Volk.

fundis, carpellis 8–13 apicibus adscendentibus sed minime divergentibus eis marginalibus anguste conicis et cum plana oblique truncata parva terminali ad stigmatem vicini vel eam praecipitanti, eis centralibus lanceoloideis acutis, stigmatibus 1–2 mm. longis ovalibus sulcatis nigris papillois centripetalibus obliquis vel verticalibus, sutura proximali ad fundam extenta, endocarpio mediali mahogani-colorato osseoso solido marginibus lateralibus 2.5–3 mm. crassis, seminibus 14–17 mm. longis 3 mm. diametro anguste ellipsoideis, mesocarpio apicali in carpella quaque cavernoso cum fibris paucis et membranis medullois, mesocarpio basali fibroso et carnosio.

DESCRIPTION OF ALL SPECIMENS EXAMINED:

Tree 10 m. tall, 20 cm. in diameter; bark of trunk and prop roots shaggy with appressed ascending rootlets 2–4 cm. long and branching; prop roots 5 cm. long, 3 cm. in diameter; wood

pale, dense and hard; leaves 1.41–1.91 m. long, 7–8 cm. wide, coriaceous, above with a median furrow, ligulate, gradually tapering from the base into deltoid subulate apex which 10 cm. down is 3–3.5 mm. wide, near the base beginning 17–20 cm. up the margins with prickles 2–3 mm. long, 3–7 mm. apart, subulate, ascending, brown; the midrib below unarmed almost to the middle; at the midsection the margins with prickles 1.2–1.5 mm. long, 4–11 mm. apart, appressed ascending; the midrib below with similar prickles 11–19 mm. apart; near the apex the margins with prickles 0.2–0.3 mm. long, 1.5–3 mm. apart, divergent, stout subulate, brown; the midrib below with prickles 0.5–0.8 mm. long, 5–10 mm. apart, subulate, ascending; syncarp 12–14 cm. long, ovoid; phalanges 4.5–5.3 cm. long, 2.4–3.8 cm. wide, 2.5–3 cm. thick, apparently reddish, cuneate, the apex broad truncate or perceptibly curved,



FIG. 52. *Pandanus gemmiferus* St. John, from *St. John* 26,276. A branch showing the three reversing spirals of adventitious buds.

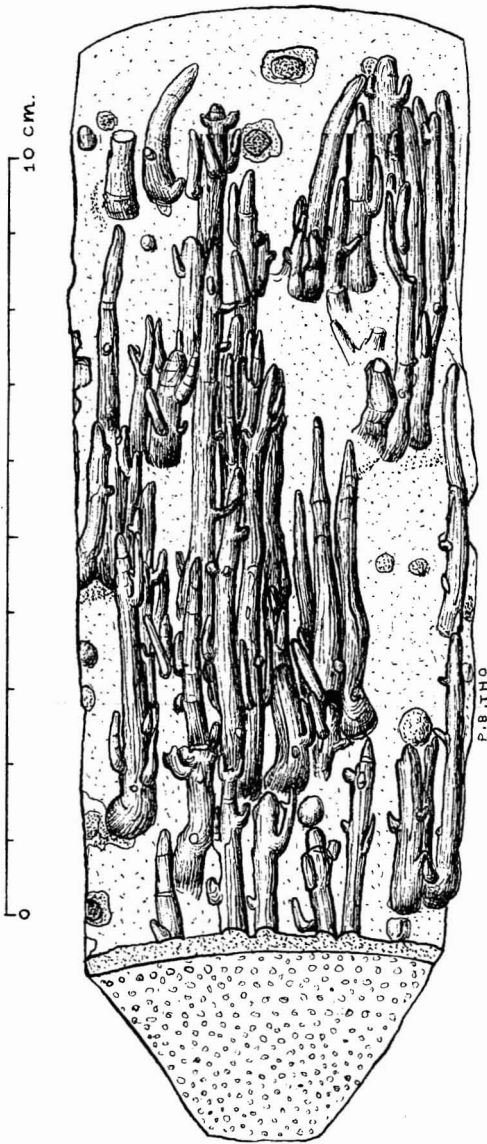


FIG. 53. *Pandanus kurandaensis* St. John, from the holotype. Lateral view of trunk, showing bark and appressed ascending adventitious rootlets,  $\times 1$ .

many-angled, the sides with many secondary angles, closely papillose, upper  $\frac{1}{2}$  free, lateral sutures distinct but narrow; apical central sinuses 6–8 mm. deep; carpels 8–13, the apices ascending but slightly diverging, the outer narrowly conic with a small terminal oblique truncate plane leading to and often projecting over the stigma, the central ones lanceoloid, acute;

stigmas 1–2 mm. long, oval, creased, blackish, papillose, centripetal, oblique or vertical, exposed on the proximal face or below the apical tooth; proximal crease extending to valley bottom; endocarp median, mahogany-colored, bony, massive, the lateral margins 2.5–3 mm. thick; seeds 14–17 mm. long, 3 mm. in diameter, narrowly ellipsoid; apical mesocarp forming in each carpel a cavern with a few longitudinal fibers and delicate medullary membranes; basal mesocarp fibrous and fleshy. Staminate trees similar to the pistillate; trunk 13 m. tall, 24 cm. in diameter; crown widely branched; bark of trunk and prop roots with many appressed ascending rootlets; leaves 1.75–1.89 m. long, 6–6.5 cm. wide, ligulate, coriaceous, above furrowed and in section M-shaped, gradually tapering from near the base to the long subulate apex about 30 cm. long and 10 cm. down only 1 mm. wide, the base amplexicaul, entire, and the margins unarmed for 23–43 cm., the lowest marginal prickles 1–1.9 mm. long, 5–10 mm. apart, heavy based, arcuate, ascending, subulate, pale; the midrib unarmed, at the midsection the margins with prickles 1–1.7 mm. long, 2–32 mm. apart, subulate, appressed ascending, brown tipped; the nearby midrib unarmed; near the apex the margins with serrae 0.2–0.5 mm. long, 2–5 mm. apart, subulate tipped; the nearby midrib below with similar serrae but these 3–6 mm. apart; staminate inflorescences terminal, nodding, 1 m. long, leafy bracted; peduncle 14–17 cm. long, 7–8 mm. in diameter, fleshy; lower bracts 90–95 cm. long, 4.8–5 cm. wide, the lower third slightly expanded and pale, the rest foliaceous, narrowing to the long subulate tip; median bracts 23 cm. long, 3 cm. wide, lanceolate, coriaceous but white; flowering part of spike 30 cm. long, bearing 15–20 lateral racemes, these 4–10 cm. long, 3 cm. in diameter, cylindrical, densely flowered; stamens 10–20 in racemes, the fused axis 5–7 mm. long; free filament tips 1–2 mm. long; anthers 2–3 mm. long, bearing terminal subulate connective prolongation 0.4–0.6 mm. long.

HOLOTYPUS: Australia, North Queensland, Davies Creek, 12 miles W. of Kuranda, fringing forest by stream, with *Tristania laurina*, and *Eucalyptus tereticornis*, 1,270 ft. alt., Feb. 10, 1958, *H. St. John 26,271* (BISH).

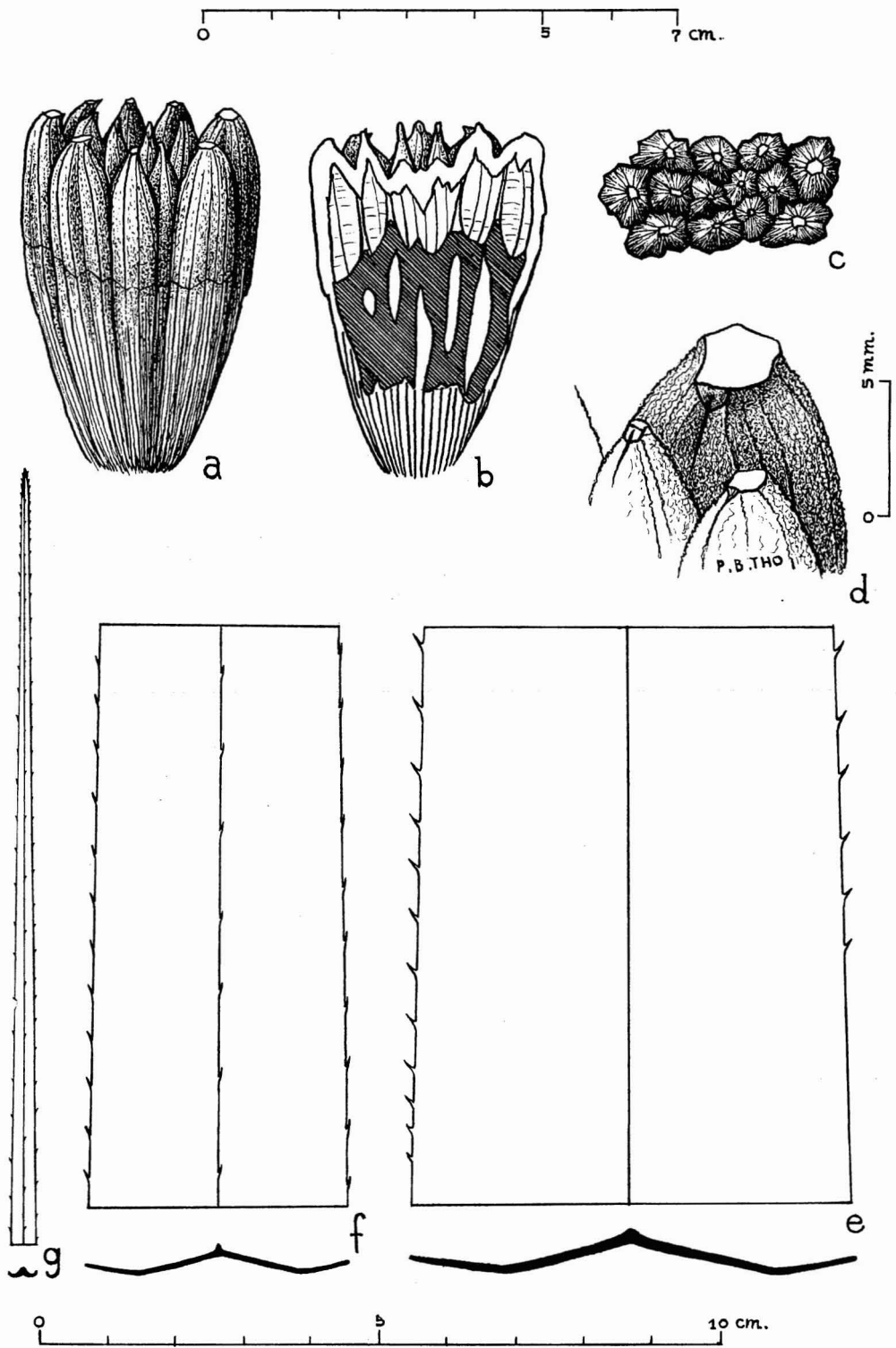


FIG. 54. *Pandanus kurandaensis* St. John, from the holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ ; *d*, carpel apices and stigmas, oblique view,  $\times 4$ ; *e*, leaf base, lower side,  $\times 1$ ; *f*, leaf middle, lower side,  $\times 1$ ; *g*, leaf apex, lower side,  $\times 1$ .



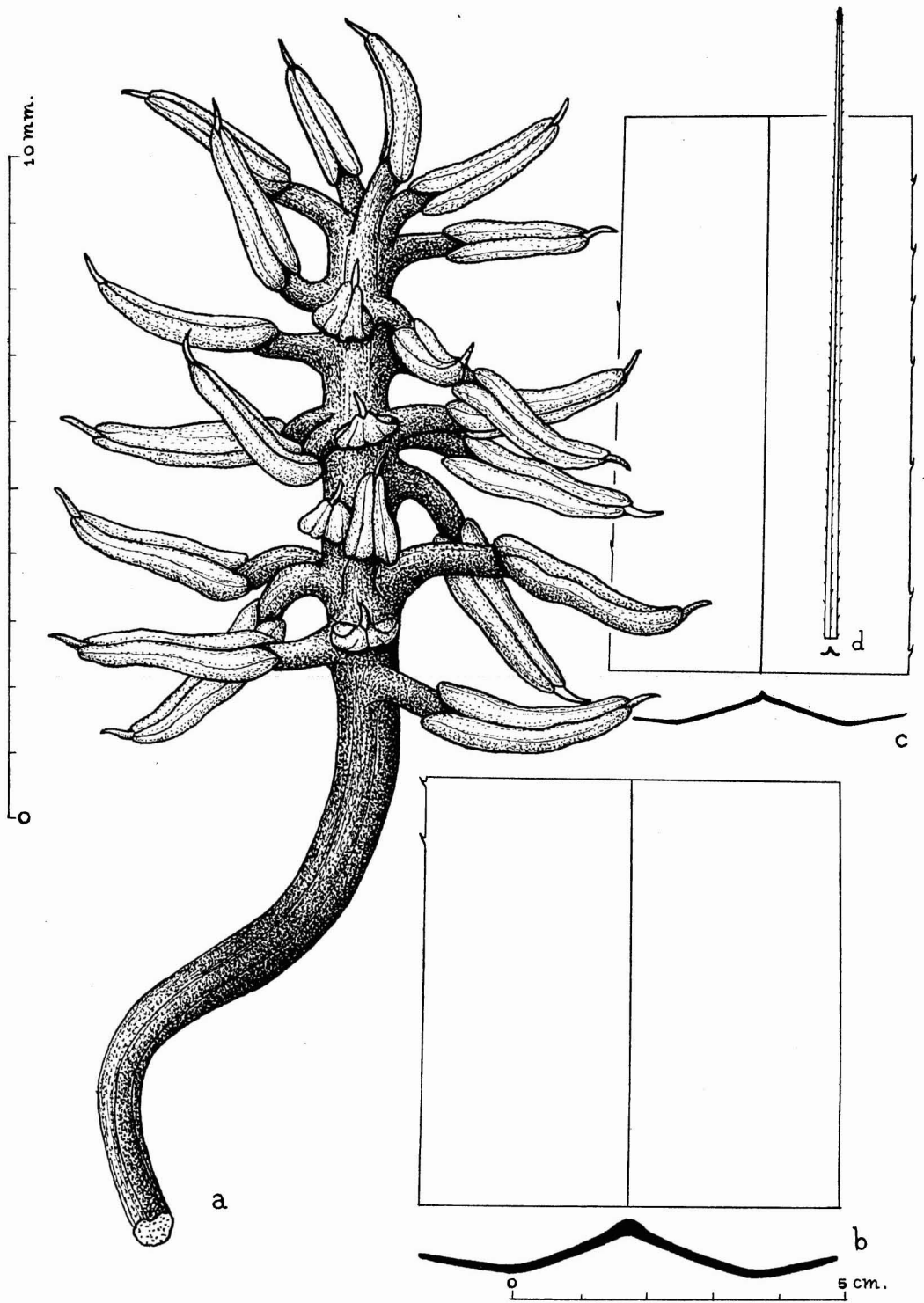


FIG. 55. *Pandanus kurandaensis* St. John, from *St. John* 26,272. *a*, Column of stamens,  $\times 10$ ; *b*, leaf base, lower side,  $\times 1$ ; *c*, leaf middle, lower side,  $\times 1$ ; *d*, leaf apex, lower side,  $\times 1$ .

**SPECIMENS EXAMINED:** Australia, North Queensland, 12 miles W. of Kuranda, fringing forest by stream, staminate tree growing with the pistillate ones, 1,270 ft. alt., Feb. 10, 1958, *H. St. John* 26,272 (BISH).

**DISCUSSION:** *P. kurandaensis* is a member of the section *Pandanus*. Its only close relative seems to be represented by *St. John* 26,240 from Australia, a species as yet undescribed.

Only one species was present in the area, occurring in the strips of forest by the streams in the bottoms of narrow valleys. Pistillate trees were abundant; so also were staminate trees which at a glance seemed identical, in stature and shape, and in the rootlet-clothed trunks and prop roots. On close study, however, there are apparent several sex-linked differences in the foliage. The leaves of the staminate trees are narrower at base, but broader at the middle, the margins of base and middle are much less spiny, and the midrib below at the middle is unarmed. Despite these differences in foliage, the author who was also the collector, is certain that these two, male and female, are a pair, representing one species.

Many of the fallen phalanges were minus the upper half which had been chewed off by white-tailed rats seeking the edible, oily seeds.

The new epithet is the Latin adjective, *medialis*, middle, given in reference to the median position of the endocarp.

*Pandanus rivularis* sp. nov. (sect. *Pandanus*)  
Figs. 56–59

**DIAGNOSIS HOLOTYPI:** Arbor 10 m. alta 20 cm. diametro, ramis dichotomis, cortice brunneo sublaeve, trunco ramisque dense etiam junioribus cum radicillis adpresse adscendentibus 1.5–2.5 cm. longis obtectis, radicibus futurosus nullis, foliis 1.68–1.81 m. longis 6–7.6 cm. latis supra in media sulcatis coriaceis ligulatis in media extrema in apice acuto diminuentibus eo in 10 cm. ex apice 16 mm. lato, basi amplexicauli et per 17–25 cm. inermi deinde marginibus cum aculeis 2.5–4 mm. longis 2–5 mm. distantibus valde arcuato-subulatis obscure brunneis, midnervo proximo inermi, in sectione mediali marginibus cum aculeis 1–2 mm. longis 6–13 mm. distantibus subulatis adpressis, midnervo infra cum aculeis simulantibus paucis

remotis, circa apicem aculeis 0.5–0.7 mm. longis subulatis divergentibus vel semiadscendentibus eis marginali 1.5–2.5 mm. distantibus illis midnervi infra in hoc nullis in eo 3–5 mm. distantibus, inflorescentia foeminea terminale cernua foliosa, pedunculo 45 cm. longo obtuse trigono ad apicem incrassato et 2 cm. diametro, syncarpio unico 23 cm. longo 18 cm. diametro late ellipsoideo brunneo-rubro cum 91 phalangibus eis 5.1–5.3 cm. longis 2.7–3.6 cm. latis (in geminis 4.3–4.4 cm. latis et cum 19–20 carpellis) 1.8–2.8 cm. crassis cuneatis compressis et in sectione plerumque oblongis cum 5–6 angulis majoribus, lateribus expositis subconvexis densiter papillosis excepta in apice, lateribus quaeque carpellae cum 2–4 angulis secundariis et valleculis, parte  $\frac{1}{2}$  supera libera, apice truncato, suturis lateribus distinctis in parte  $\frac{2}{3}$  supera sed angustis, sinibus apicalibus centralibus 4–7 mm. profundis, carpellis 9–11 apicibus erectis semiorbiculari-pyramidalibus ceteris marginalibus cum concavitate distali subhorizontali, stigmatibus 1.5–2 mm. longis suborbicularibus ad reniformibus valde obliquis centripetalibus papillosis pallide brunneis, sinu proximali breve plerumque  $\frac{1}{4}$ – $\frac{1}{2}$  distantia ad fondam extenta, endocarpio in parte  $\frac{2}{5}$  infera solido obscure mahogani-colorato osseoso lateribus lateralibus 4–6 mm. crassis, seminibus 14 mm. longis 3.5 mm. diametro ellipsoideo, mesocarpio apicali in quaque carpella cavernoso cum fibris validis marginalibus et membranibus medullosis, mesocarpio basali parvo sed fibroso et carnosio.

**DESCRIPTION OF ALL SPECIMENS EXAMINED:** Tree 10 m. tall, 20 cm. in diameter; crown with dichotomous branching; bark brown, rather smooth, but even on youngest branches and densely on older stems and trunk more or less covered by appressed ascending rootlets 1.5–2.5 cm. long; prop roots none; leaves 1.68–1.81 m. long, 6–7.6 cm. wide, above with a broad central furrow, coriaceous, ligulate, tapering in outer half to an acute apex which 10 cm. down is 16 mm. wide, the base amplexicaul unarmed for 17–25 cm., then the margins with prickles 2.5–4 mm. long, 2–5 mm. apart, stout arcuate subulate, dark brown; the nearby midrib unarmed; at the midsection the margins with prickles 1–2 mm. long, 6–13 mm. apart, sub-

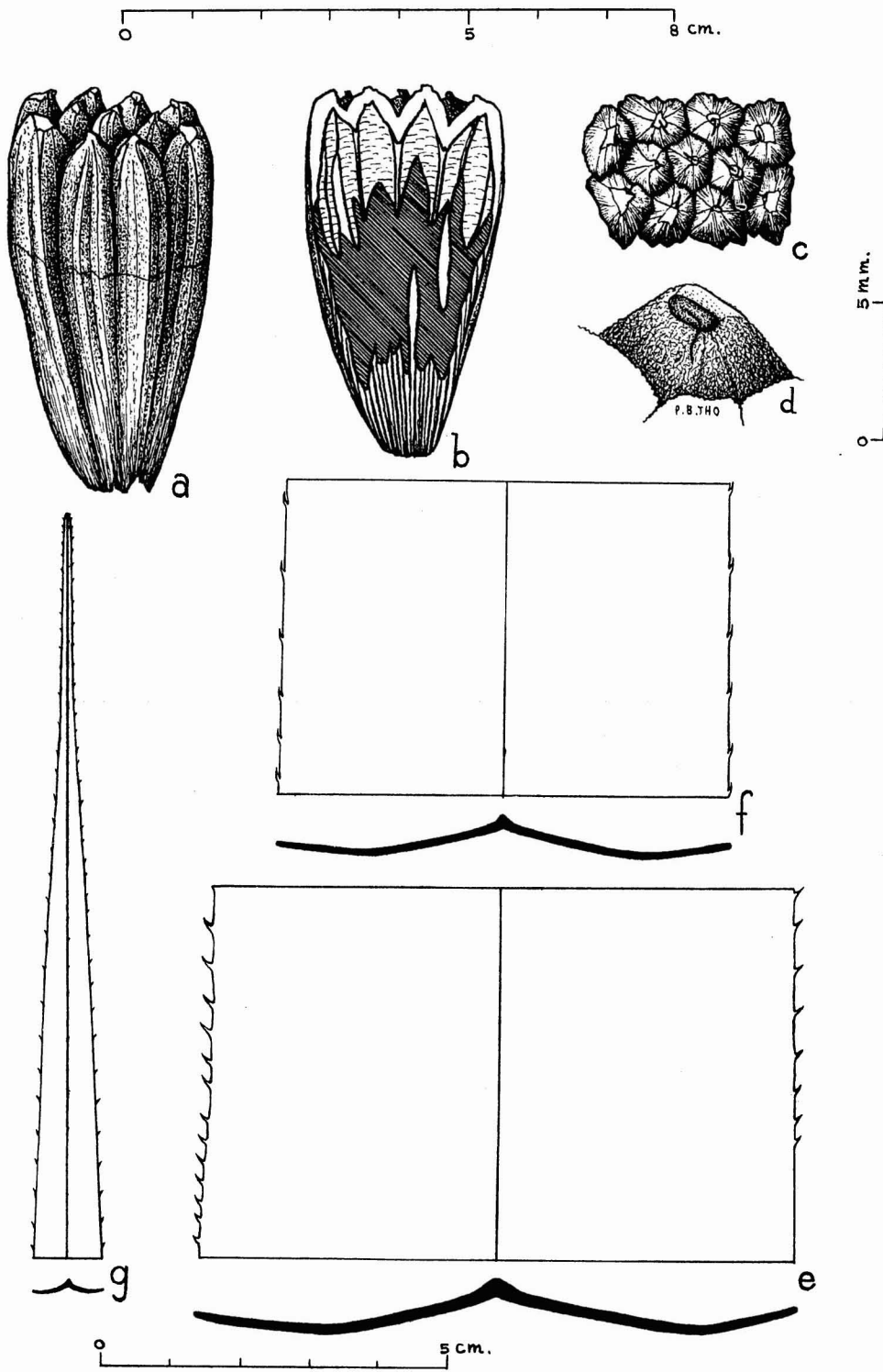


FIG. 56. *Pandanus rivularis* St. John, from holotype. *a*, Phalange, lateral view,  $\times 1$ ; *b*, phalange, longitudinal median section,  $\times 1$ ; *c*, phalange, apical view,  $\times 1$ ; *d*, carpel apex and stigma, oblique view,  $\times 4$ ; *e*, leaf base, lower side,  $\times 1$ ; *f*, leaf middle, lower side,  $\times 1$ ; *g*, leaf apex, lower side,  $\times 1$ .

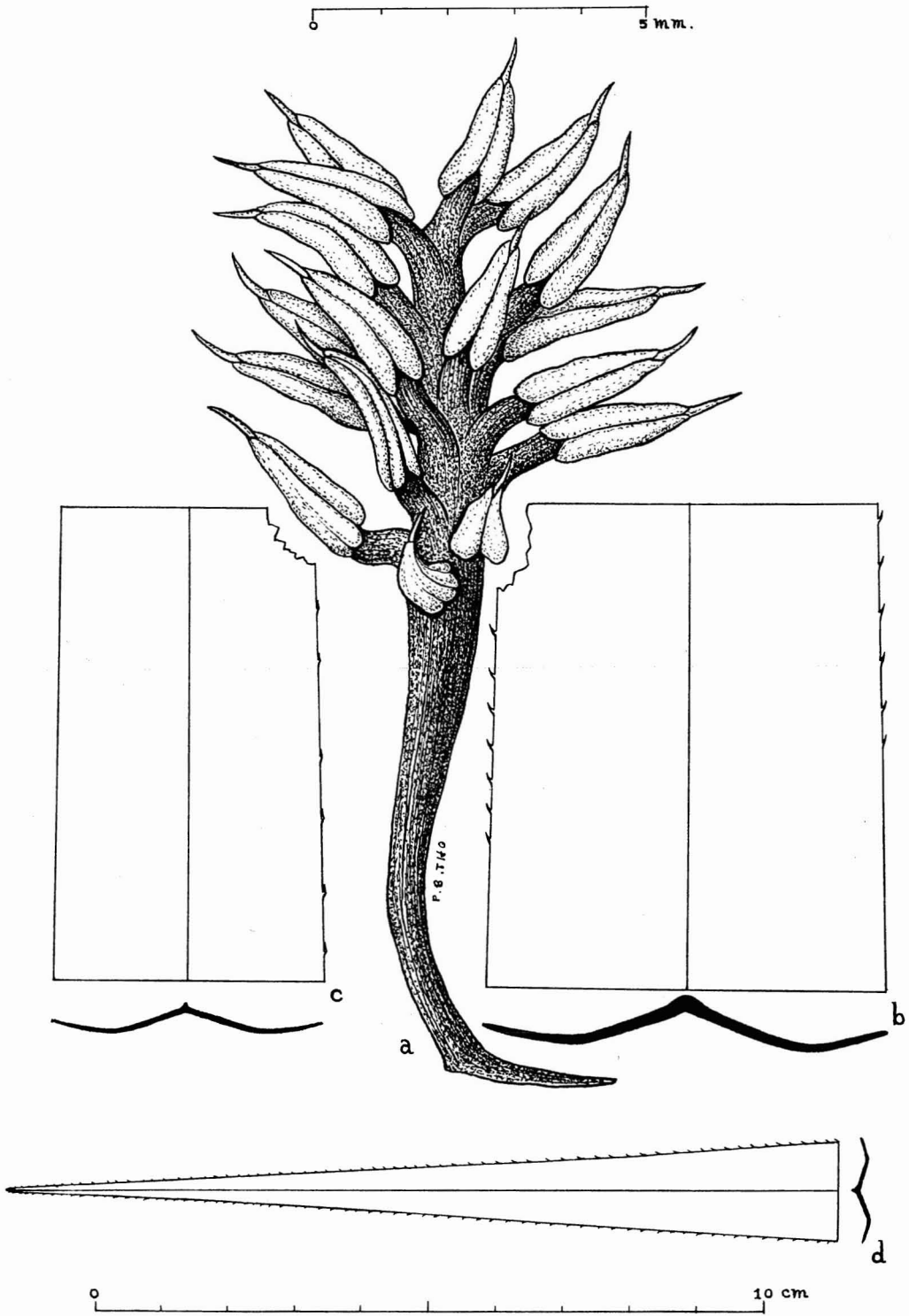


FIG. 57. *Pandanus rivularis* St. John, from *St. John* 26,241. *a*, Column of stamens,  $\times 10$ ; *b*, leaf base, lower side,  $\times 1$ ; *c*, leaf middle, lower side,  $\times 1$ ; *d*, leaf apex, lower side,  $\times 1$ .



FIG. 58. *Pandanus rivularis* St. John, from holotype, in its habitat, and showing Dr. S. T. Blake.

ulate, appressed; the midrib below with few remote, similar prickles; near the tip the prickles 0.5–0.7 mm. long, subulate, divergent or somewhat ascending, those of the margins 1.5–2.5 mm. apart, those of the midrib below in places none, in others 3–5 mm. apart; pistillate inflorescence terminal, nodding, leafy bracted; peduncle 45 cm. long, obtusely triangular, in diameter increasing upwards and near the apex 2 cm. in diameter; syncarp solitary, 23 cm. long, 18 cm. in diameter, broadly ellipsoid, brownish red, bearing 91 phalanges, these 5.1–5.3 cm. long, 2.7–3.6 cm. wide (in doubles 4.3–4.4 cm. wide and with 19–20 carpels), 1.8–2.8 cm. thick, wedge-shaped, compressed, in cross section mostly oblong, with 5–6 major angles, the sides gently convex, densely papillose on exposed parts except at summit, the sides of each carpel with 2–4 secondary angles and valleys, upper  $\frac{1}{2}$  or nearly that part free, apex truncate; lateral sutures distinct but narrow down to

lower  $\frac{1}{3}$ , apical central sinuses 4–7 mm. deep; carpels 9–11, the apices erect, semiorbicular-pyramidal, some of the marginal ones with a concavity nearly horizontal and distal of the stigma; stigmas 1.5–2 mm. long, suborbicular to reniform, sharply oblique, centripetal, papillose, light brown; proximal crease short, mostly running  $\frac{1}{4}$ – $\frac{1}{2}$  way to valley bottom; endocarp centering in lower  $\frac{2}{5}$ , extensive, darkish mahogany-colored, bony, the lateral walls 4–6 mm. thick; seeds 14 mm. long, 3.5 mm. in diameter, ellipsoid; apical mesocarp outlined by heavy fibers, forming in each carpel a cavern with wide, white, medullary membranes; basal mesocarp small, but fibrous and fleshy. Staminate trees 7 m. tall, 20 cm. in diameter; prop roots 30–40 cm. long, the surface with ascending rootlets; leaves 1.06 m. long, 5.5–6 cm. wide, similar but near the base the margins with spines 1.5–2 mm. long, 4–7 mm. apart, subulate, ascending, brownish tipped; the midrib un-

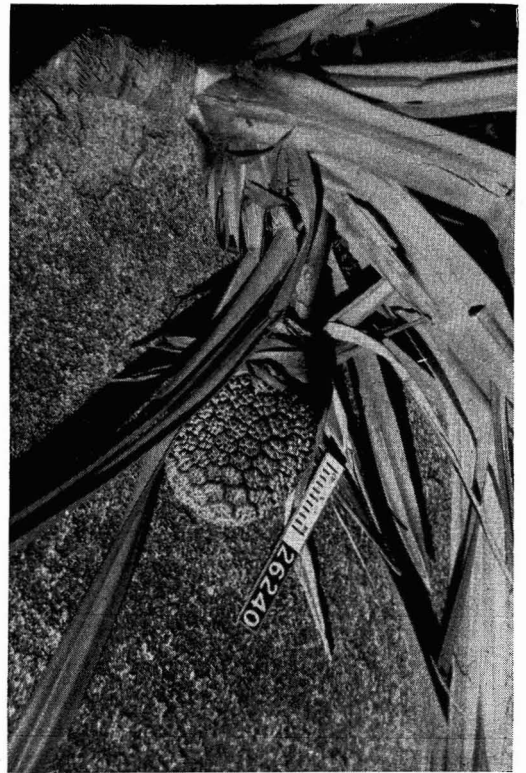


FIG. 59. *Pandanus rivularis* St. John, from the holotype, showing fruiting branch.



armed near the base, middle, and tip; at mid-section the spines similar on one margin but lacking on the other; near the apex the margins with serrae 0.2–0.3 mm. long, 1.5–3 mm. apart; the midrib unarmed; staminate inflorescence terminal, nodding, 40–50 cm. long; peduncle fleshy, its bracts caducous; lowest floral bract 80 cm. long, the lower half lanceolate, 3 cm. wide, white, the upper half long subulate, both minutely subulate toothed; median bracts 20 cm. long, 3 cm. wide, white, lanceolate; staminate spikes numerous, sessile, 3–5 cm. long, 2 cm. in diameter; staminate column 10–15 mm. long, the lower half naked; free filament tips 1–1.5 mm. long; anthers 2–2.5 mm. long, lanceolate, bearing an apical prolongation of the connective 0.6–0.8 mm. long, subulate.

HOLOTYPE: Australia, North Queensland, Endeavour River, Jansons Crossing, 8 miles W. of Cooktown, fringing forest by river, along brackish (?) streams, with *Heritiera*, *Rhizophora*, *Dillenia alata*, and *Randia sessilis*, 20 ft. alt., Jan. 31, 1958, *H. St. John* 26,240 (BISH).

SPECIMENS EXAMINED: Australia, North Queensland, Endeavour River, same locality,

habitat, and date as above, staminate tree, *H. St. John* 26,241 (BISH).

DISCUSSION: *P. rivularis* is a member of the section *Pandanus*. In that section one finds its closest relative in *P. kurandaensis* St. John of Queensland, which species has the prop roots 50 cm. long, 3 cm. in diameter; leaves 7–8 cm. wide, the subulate apex 3–3.5 mm. wide at the point 10 cm. down from the tip, the marginal prickles near the apex 0.2–0.3 mm. long; the syncarp 12–14 cm. long, ovoid; phalanges with apical central sinuses 6–8 mm. deep; stigmas 1–2 mm. long, oval; and the proximal crease extending to the valley bottom. On the other hand, *P. rivularis* lacks prop roots; has the leaves 6–7.6 cm. wide, the subulate apex 16 mm. wide at the point 10 cm. down from the tip, marginal prickles near the apex 1–2 mm. long; syncarp 23 cm. long, broadly ellipsoid; phalanges with apical central sinuses 4–7 mm. deep; stigmas 1.5–2 mm. long, suborbicular to reniform; and the proximal crease running  $\frac{1}{4}$ – $\frac{1}{2}$  way to the valley bottom.

The new epithet is the Latin adjective, *rivularis*, by a small stream, chosen to describe the habitat of the species.