

Revision of the Genus *Pandanus* Stickman

HAROLD ST. JOHN

Part 11, New Species from Malaya

R. E. HOLTUM¹ and HAROLD ST. JOHN²

DURING 1948–49 Mr. Holtum, of the Singapore Botanic Garden, studied the species of *Pandanus* of Malaya and Singapore. At this time he distinguished the following species and left them in manuscript. During 1960–61 Mr. St. John revised the Malayan species of *Pandanus*, illustrated them, and prepared expanded descriptions to include more of the diagnostic characters. Mr. Holtum has consented to the publication here of these new species under joint authorship.

SECTION *Acrostigma*

Pandanus alticola Holtum & St. John, sp. nov.
(sect. *Acrostigma*)

Figs. 98–99

DIAGNOSIS HOLOTYPE: Planta fruticosa epiphytica, caulibus 15–20 cm longis ramosis in apice 13 mm diametro in basi cum restis foliorum vetustiorum marcescentium obtectis, foliis 1.3 m longis 13–15 mm latis coriaceis supra viridibus infra pallidioribus 1-sulcatis 2-plicatis in sectione mediali cum 13–14 nervis secundariis in quoque latere proxime basem infra nervis tertialis reticulis oblongis formantibus, supra ad apicem plicis cum serris paucis remotis in apice subulato deltoideo 5 cm longo 1.5–2 mm lato sensim diminuentibus basi dilatata inermi amplexicauli sed ex 9–10 cm marginibus cum dentibus 1–1.5 mm longis 5–15 mm distantibus deltoideis salientibus luteis, midnervo ex basi ad mediam et ultra inermi, in sectione mediali marginibus cum serris crenatis 0.4–0.6 mm longis 3–6 mm distantibus, proxima apicem marginibus et midnervo infra cum serris 0.3–0.5 mm longis 2–6 mm distantibus et supra in plicis

cum serris simulantibus sed paucis et remotioribus, inflorescentia foeminea terminali, pedunculo 6 cm longo folioso cum syncarpio unico 4.3 cm longo 3 cm diametro ellipsoideo cum circa 832 drupis eis 7–8 mm longis 2–2.5 mm latis et crassis 6-angulosis parte $\frac{1}{2}$ supera libera corpore 4.5 mm longo ellipsoideo, pileo 4–5 mm longo anguste elliptico-pyramidalis laevi 6-anguloso, apice obliquo et proximale inclinato in stylo abrupte diminuento, stylo 1 mm longo cornoso proximale curvato, stigmatibus 1 mm longo sublineari brunneo fere ad apicem extenso, endocarpio in parte $\frac{2}{5}$ infera lateribus 0.1 mm crassis stramineis, semine 3 mm longo ellipsoideo, mesocarpio apicali cavernoso cum membranis paucis, mesocarpio basali in lateribus fibroso intra carnosum.

DIAGNOSIS OF HOLOTYPE: Plant bushy, epiphytic; stems 15–20 cm long, branched, at tip 13 mm in diameter, clothed with marcescent, shredded, old leaf bases; leaves 1.3 m long, 13–15 mm wide, coriaceous, green above, paler green below, 1-ribbed, 2-pleated, at midsection on each side with 13–14 parallel secondary nerves, and near the base on the lower side the tertiary cross veins form oblong meshes, above the apical pleats with a few remote serrae, the tip gradually narrowed into a 5 cm subulate, deltoid apex 1.5–2 mm wide, just above the base dilated and widening to the amplexicaul, unarmed base, beginning 9–10 cm up the margins with deltoid, salient teeth 1–1.5 mm long, 5–15 mm apart, yellowish; the midrib below unarmed to well beyond the middle; at midsection the margins with crenate serrations 0.4–0.6 mm long, 3–6 mm apart; on the subulate apex the margins and midrib beneath with serrae 0.3–0.5 mm long, 2–6 mm apart, and the pleats on the upper surface with similar serrations but these fewer and more distant; pistillate inflorescence terminal, peduncle 6 cm long, leafy bracted, bearing a single syncarp, this 4.3 cm long, 3 cm in

¹ 80 Mortlake Road, Kew Gardens, Richmond, Surrey, England.

² B. P. Bishop Museum, Honolulu 17, Hawaii, USA. Manuscript received April 18, 1961.

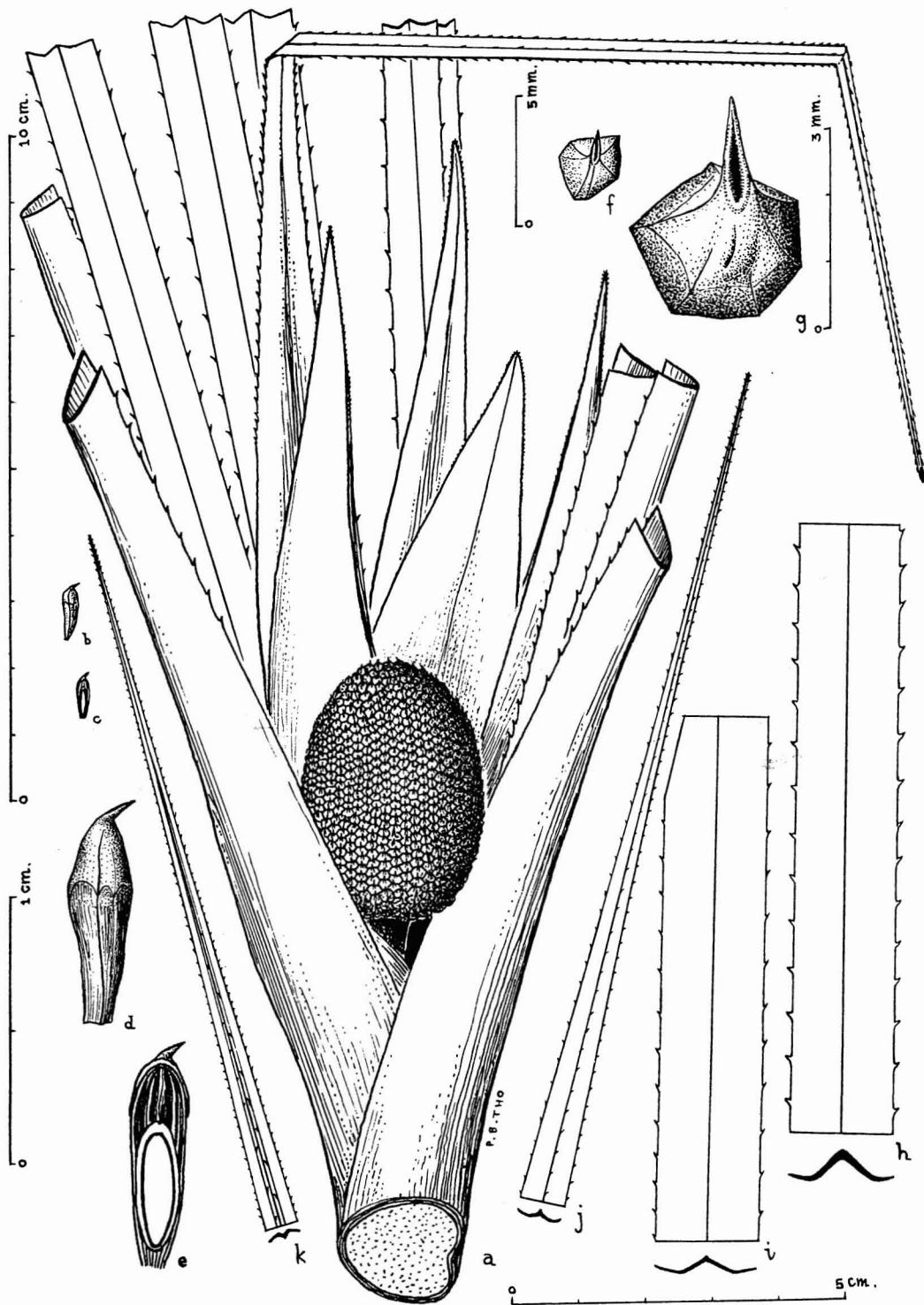


FIG. 98. *Pandanus alticola*, holotype. *a*, Leafy branch with syncarp, $\times 1$; *b*, drupe, lateral view, $\times 1$; *c*, drupe, longitudinal median section, $\times 1$; *d*, drupe, lateral view, $\times 4$; *e*, drupe, longitudinal median section, $\times 4$; *f*, drupe, apical view, $\times 4$; *g*, drupe with stigma, apical view, $\times 10$; *h*, leaf base, lower side, $\times 1$; *i*, leaf middle, lower side, $\times 1$; *j*, leaf apex, lower side, $\times 1$.

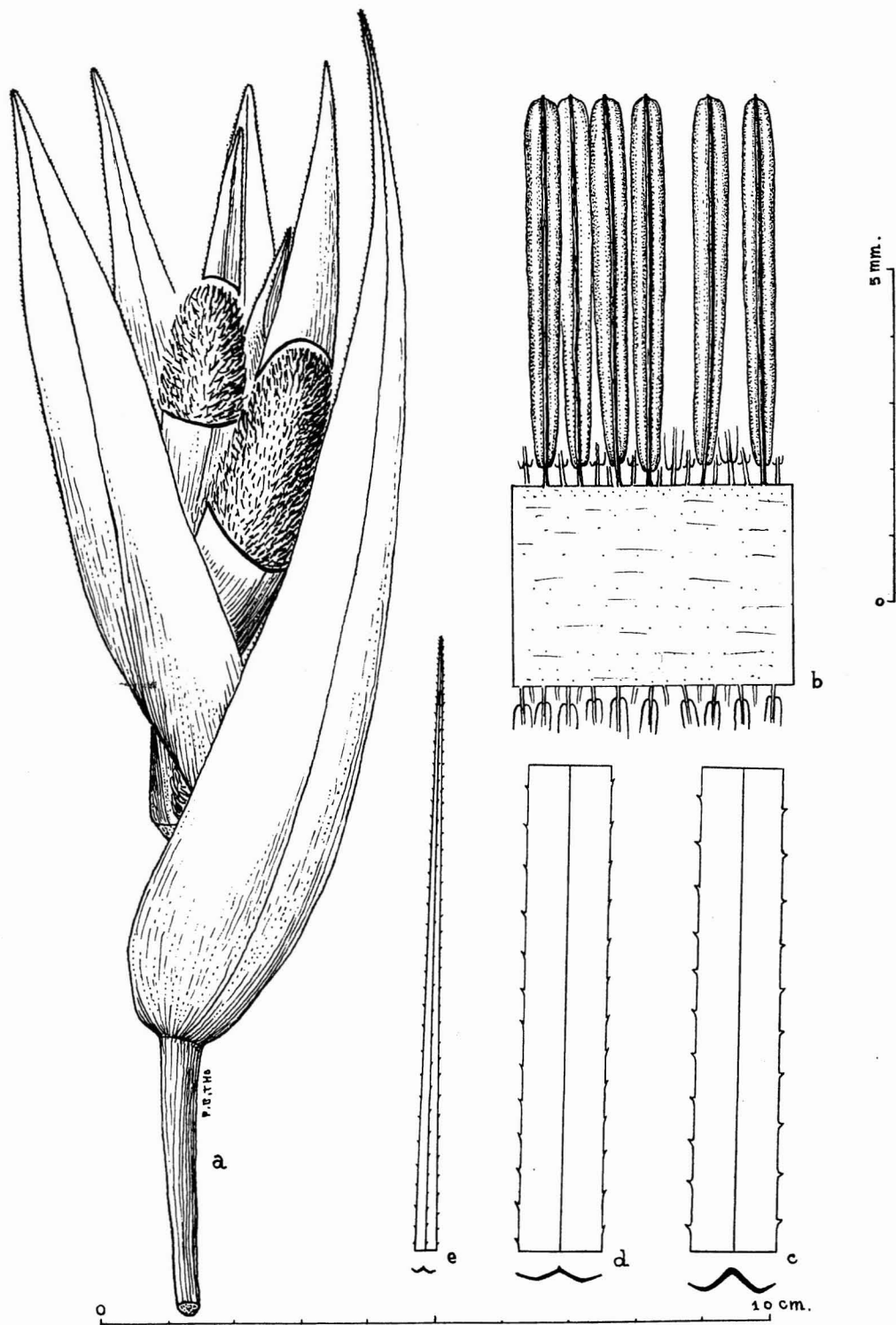


FIG. 99. *Pandanus alticola*, paratype, staminate, from S[ungei] Sedili, 28.7.37, Corner. *a*, Staminate inflorescence, $\times 1$; *b*, stamens, $\times 10$; *c*, leaf base, lower side, $\times 1$; *d*, leaf middle, lower side, $\times 1$; *e*, leaf apex, lower side, $\times 1$.

diameter, ellipsoid, bearing about 832 drupes, these 7–8 mm long, 2–2.5 mm wide and thick, 6-angled, upper $\frac{1}{2}$ free, the body 4.5 mm long, ellipsoid, pileus 4–5 mm long, narrowly elliptic pyramidal, smooth, 6-angled, the tip oblique and proximally inclined, abruptly narrowed to the style, this 1 mm long, horn-like, proximally curved; stigma 1 mm long, almost linear, brown, extending almost to the tip; endocarp in lower $\frac{2}{5}$, the walls 0.1 mm thick, stramineous; seed 3 mm long, ellipsoid; apical mesocarp a cavern with a few membranes; basal mesocarp sparse, fibrous up the sides, fleshy within.

DESCRIPTION OF STAMINATE PLANT (from *Corner*, S. Sedili, 28.7.37): Leaves 1.15 m long, 9–12 mm wide, the pleats above unarmed; staminate inflorescence 13–16 cm long, the bracts creamy white, the median one 8–8.5 cm long, 3 cm wide, lanceolate, the margin at the midsection denticulate, beyond it serrulate; the 4–5 spikes 2.5–4 cm long, 8–10 mm in diameter, yellow, heavily scented; stamens yellow, numerous, crowded on the rhachis; filaments 2–2.5 mm long; anthers 5.5 mm long, 0.5 mm wide, linear-oblong, obtuse, terminating in a 0.2 mm umbonate projection of the connective.

HOLOTYPE: Malaya, Johore, S[ungei] Kayu, Mawai-Jemaluang Road, Feb. 1935, *E. J. H. Corner* (SING).

SPECIMENS EXAMINED: Malaya, Johore, Sungei Sedili, then cult. in Singapore Botanic Garden, staminate, flowered 28.7.37, and 1.10.37, *E. J. H. Corner* (SING); from Johore, Ulu Tiram in 1932, then cult. in Singapore Botanic Garden, flowered 31 May 1936, *E. J. H. Corner* 31,443 (SING); Trengganu, Sungei Tong Forest Reserve, off 23rd mile, Kuala Trengganu-Besut road, epiphytic, *J. Sinclair & Kiah bin Salleh* 40,482 (SING).

DISCUSSION: *P. alticola* is a member of the section *Acrostigma*. There also is its closest relative, the Malayan *P. collinus* Ridl., which species is autophytic, and has the leaves 25–45 cm long, 8–11 mm wide, with 10–11 secondary veins on a side, the subulate tip 1.5–2 cm long, 0.6–0.8 mm wide, the margins beginning at 2 cm from the base with prickles 0.7–1 mm long, 3–7 mm apart, subulate; syncarp subglobose, 3 cm long, 2.5 cm in diameter; drupes 5–7 mm wide, the body obovoid; and the style 4–5 mm

long. *P. alticola* is an epiphyte with leaves 1.1–1.3 m long, 9–15 mm wide, with 13–14 secondary veins on a side, the subulate tip 5 cm long, 1.5–2 mm wide, the margins beginning 9–10 cm from the base with deltoid teeth 1–1.5 mm long, 5–15 mm apart; syncarp ellipsoid, 4.3 cm long, 3 cm in diameter; drupes 2–2.5 mm wide, the body narrowly ellipsoid; and the style 1 mm long.

The new epithet is coined from the Latin, *altum*, height; *cola*, dweller in, and given in reference to its epiphytic habitat. This species has long been known in the sterile condition. Only recently have flowers and fruit been discovered.

Pandanus undulifolius Holttum & St. John, sp. nov. (sect. *Acrostigma*)

Fig. 100

DIAGNOSIS HOLOTYPE: Frutex 4 m alta paucе ramosa, apice caulinis 13 mm diametro brunneo laevi, internodis 3–5 mm longis, foliis multis 45–75 cm longis 7.8–9.1 cm latis subcoriaceis supra pallide viridibus infra minime pallidioribus sed non glaucis 1-sulcatis et paene 2-plicatis marginibus partim undulatis, apice pendentis 5 cm longo 1.5–2.5 mm lato subulato deltoideo, basi amplexicauli alba, in sectione mediali cum 36–39 nervis secundariis 1–1.5 mm distantibus conspicuis in quoque latere, nervis tertialis supra indistinctis sed infra distinctis et reticulis oblongis vel rhombicis brevibus formantibus, basi inermi sed ex 5 cm marginibus cum aculeis 0.5–0.8 mm longis 2.5–6 mm distantibus subulatis adscendentibus apicibus brunneis, midnervo infra ex 15–22 cm cum papillis deinde aculeis 0.2 mm longis 4–14 mm distantibus breve subulatis adscendentibus, in sectione mediali marginibus cum serris 0.7–1 mm longis 1–3 mm distantibus apicibus subulatis, midnervo infra plerumque inermi, in sectione apicali rotundato marginibus cum aculeis simulantibus sed approximioribus, midnervo infra cum aculeis 1–1.3 mm longis tenuiter subulatis salientibus vel subadscendentibus, apice caudato cum marginibus et midnervo infra cum aculeis 0.5–0.7 mm longis 0.2–1 mm distantibus subulatis adscendentibus congregatis solitariis vel compositis, pedunculo foemineo 14 cm longo 8 mm diametro erecto trigono bracteoso, in flore floribus sub bracteis foliosis occulatis, syncarpio solitario 6.5 cm longo 4.5 cm diametro erecto

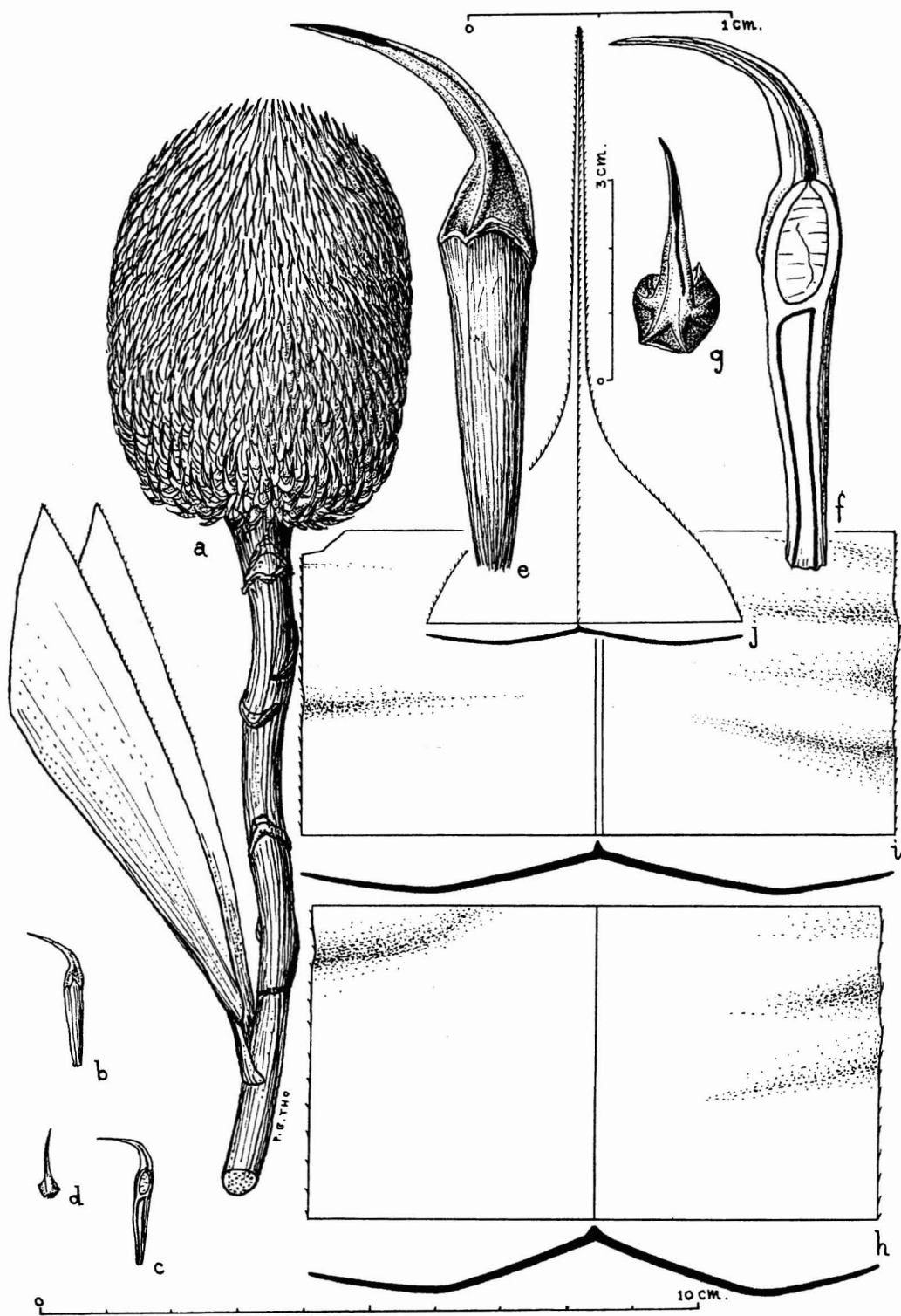


FIG. 100. *Pandanus undulifolius*, holotype. *a*, Syncarp and peduncle, $\times 1$; *b*, drupe, lateral view, $\times 1$; *c*, drupe, longitudinal median section, $\times 1$; *d*, drupe, apical view, $\times 1$; *e*, drupe, lateral view, $\times 4$; *f*, drupe, longitudinal median section, $\times 4$; *g*, drupe with stigma, apical view, $\times 4$; *h*, leaf base, lower side, $\times 1$; *i*, leaf middle, lower side, $\times 1$; *j*, leaf apex, lower side, $\times 1$.

cylindrico-ellipsoideo subtrigono cum circa 1,120 drupis eis 22–23 mm longis 2.5–3 mm latis et crassis valde adpresse adscendentibus corpore 13 mm longo cuneato-oblongo obtuso, pileo 12 mm longo basi pyramidalis acutius 5-anguloso sed ad basem angulis ceteris 1–2-divisis in stylo sensim diminuentibus, stylo 8–9 mm longo crassius subulato valde proxime curvato dimidia infera acutius 5-anguloso dimidia supera tereti osseoso, stigmate 4–5.5 mm longo lineari distali brunneo papilloso ad apicem extensa, endocarpio in parte 2/5 infera stramineo lateribus 0.1 mm crassis, semine 5–6 mm longo cylindrico sed infra cuneato, mesocarpio apicali cavernoso cum membranis medullosis paucis, mesocarpio basali 3 mm longo in lateribus fibroso intra carnosum.

DESCRIPTION OF ALL SPECIMENS EXAMINED: Shrub 1–4 m tall; stem slender, grayish white, simple or with 1–2 branches, at apex 11–15 mm in diameter, brown, smooth; internodes 3–10 mm long; leaves 45–85 cm long, 7.5–9.1 cm wide, subcoriaceous, appearing pale, light green above, paler below, and towards the base greenish white, 1-ribbed, and with 2 faint pleats, the lamina arching outwards, not broken, but the subulate apex pendent, the margins somewhat wavy, the broad apex shallow cucullate, the ultimate caudate tip 4.5–5 cm long, 1.5–2.5 mm wide, trigonous, the base amplexicaul, whitish, ascending and somewhat sheathing, the longitudinal parallel secondary tertiary veins conspicuous and 1–1.5 mm apart, 36–39 on each side at midsection, the cross veins scarcely visible above, but below clearly so and forming a pattern of oblongs or rhombics shorter than wide, the base unarmed, but beginning at 5 cm up the margins with prickles 0.5–0.8 mm long, 1–6 mm apart, subulate, ascending, with brownish tips; the midrib below beginning at 15–22 cm up with first papillae, then prickles 0.2 mm long, 4–14 mm apart, short, subulate, ascending; at midsection the margins with subulate-tipped serrae 0.5–1 mm long, 1–3 mm apart; the nearby midrib below mostly glabrous; where the blade rounds off the margins with prickles similar to those of the middle but more crowded; the midrib below with prickles 1–1.3 mm long, slender subulate, salient or slightly ascending; the caudate tip with margins and midrib below with prickles 0.4–0.7 mm long, 0.2–1 mm apart, subulate, ascending, crowded, single or multiple; pistillate peduncle erect, 10–14 cm long, 8 mm

in diameter, 3-sided, bracted, in anthesis the foliaceous bracts hiding the flowering head; syncarps 1–2, erect, 6–6.5 cm long, 4.1–4.5 cm in diameter, cylindric-ellipsoid, slightly 3-sided, bearing about 1,120 drupes, these strongly appressed ascending, 22–23 mm long, 2.5–3 mm wide and thick, the body 11–13 mm long, cuneate oblong, obtuse; the pileus 12 mm long, the base 3 mm long, pyramidal, sharply 5-angled, but near the base some the angles 1–2-divided, tapering gradually into the heavy subulate style 8–9 mm long, this sharply curved proximally, the lower half sharply 5-angled, the upper half terete, bony; stigma 4–5.5 mm long, linear, distal, brown, papillose, running to the apex; endocarp centering in lower 2/5, stramineous, the walls 0.1 mm thick; seed 5–6 mm long, cylindric; apical mesocarp cavernous, with a few medullary membranes; basal mesocarp 3 mm long, fibrous up the sides, fleshy within.

HOLOTYPE: Malaya, Johore, S[ungei] Kayu, Mawai-Jemaluang Road, locally not uncommon in swampy forest, like a big stalked *Aspidistra*, 11 Oct. 1936, E. J. H. Corner 32, 477 (SING).

SPECIMENS EXAMINED: Malaya, Johore, Sungei Kayu, 22 Oct. 1936, Kiah bin Haji Satleh (SING); S[ungei] Buloh Kasap, Mawai-Jemaluang Road, 4th mile, 5 Jan. 1936, E. J. H. Corner 29,996 (SING).

DISCUSSION: *P. undulifolius* is a member of the section *Acrostigma*. In that section is its closest relative, *P. glaucophyllus* Ridl. of Perak in Malaya, a species with the stem internodes brown to yellowish; leaves 5.7–6.7 cm wide near the apex which is the broadest part, flaccid, without tertiary cross veins, midrib below beginning 4–9 cm from the base with prickles 0.8–1 mm long, 0.5–6 mm apart; syncarp with about 320 drupes; drupes 16–18 mm long, 5–6 mm wide; and the style 5–6.5 mm long. *P. undulifolius* has the contrasting characters: stem internodes grayish white; leaves 7.5–9.1 cm wide near the middle, the broadest part, subcoriaceous, with conspicuous tertiary cross veins, the midrib beginning at 15–22 cm up with first papillae, then prickles 0.2 mm long, 4–14 mm apart; syncarp with about 1,120 drupes; drupes 22–23 mm long, 2.5–3 mm wide; and the style 8–9 mm long.

The new epithet is from the Latin *undulatus*, wavy; *folium*, leaf, in reference to the partly wavy leaf margin.

Bidens, St. John, sect. nov.

Carpellis (1)–2–3 connatis, stylis corniformatis bifurcatis, stigma lanceolato bifurcato proximali, seminibus in 1–2 lineis transversis, plantis masculis incognitis.

Carpels (1)–2–3 connate; styles hornlike, bifurcate; stigma lanceolate, bifurcate, proximal; seeds in 1–2 transverse rows; staminate plants unknown.

HOLOTYPE: *Pandanus piniformis* Holtum & St. John, here described.

Pandanus piniformis Holtum & St. John, sp. nov. (sect. *Bidens*)

Fig. 101

DIAGNOSIS HOLOTYPE: Planta fasciculus formans, caulibus 3.3 m altis ramosis, foliis 1.7 m et plus longis proxima basem 7 cm latis coriaceis supra viridibus infra pallide viridibus in sectione mediali cum 50–51 nervis secundariis in quoque latere, nervis tertialis evidentis nullis, lamina in apice circa 4–5 cm longa subulata trigona abrupte diminuenti, basi crassa dura apparente cupracea amplexicauli inermi sed ex 15–16 cm marginibus cum spinis 5–8 mm longis 18–28 mm distantibus validis compressis subulatis rectis subadscendentibus nigris, midnervo infra ex 15 cm cum spinis circa 4–5 mm longis 19–32 mm distantibus conicis divergentibus (apices desunt), in sectione mediali marginibus cum serris 1 mm longis 15–18 mm distantibus apicibus nigris, midnervo infra angusto salienti cum serris 1.5 mm longis 20–28 mm distantibus, in sectione apicali marginibus et midnervo infra cum aculeis 0.5–0.8 mm longis 1–2 mm distantibus subulatis adscendentibus, inflorescentia foeminea spicata cum 7 syncarpiis maximo infero alteris minoribus, pedunculo 14 cm et ultra longo 2 cm diametro folioso bracteato, syncarpio infero 11 cm longo 7.5 cm diametro cum circa 70 drupis eo supero 8.5 cm longo 7 cm diametro ellipsoideo, drupis 3.2–3.4 cm longis 1–2 cm latis 1–1.8 cm crassis cuneatis obtusis 6-angulis parte $\frac{1}{4}$ supera libera lateribus minute papillois viridibus apice obtuso 6-subangulato, drupis (1)–2–3-loculatis, stylis 5–8 mm longis obscure brunneis lucidis complanatis cornosis acute $\frac{1}{3}$ bifurcatis valde proxime inclinatis, stigmatibus 4–6 mm longis lanceolatis bifurcatis brunneis papillois proximis ad apicem non ex-

tensis, endocarpio mediali obscure brunneo vel nigro osseoso solido lateribus 2–3 mm crassis, seminibus 8–11 mm longis in 1–2 seriebus anguste ellipsoideis, mesocarpio apicali cum fibris longitudinalibus fortibus multis et membranis medullosis multis, mesocarpio basali fibroso et medullosa.

DIAGNOSIS OF HOLOTYPE: Plant forming clumps; stem 3.3 m tall, branched; leaves more than 1.7 m in length, 7 cm wide near the base, coriaceous, green above, pale green below, at midsection with 50–51 secondary parallel veins on each side, no visible cross veins, narrowed rather abruptly to a subulate, trigonous apex estimated to be 4–5 cm long, the base thick, hard, apparently copper-colored, amplexicaul, unarmed; beginning 15–16 cm up the margins with thorns 5–8 mm long, 18–28 mm apart, stout, flattened subulate, straight, only slightly ascending, black; the midrib below beginning at 15 cm with thorns about 4–5 mm long, 19–32 mm apart, conical, divergent (the tips broken off, but apparently divergent); at midsection the margins with serrae 1 mm long, 15–18 mm apart, black-tipped; the midrib below narrow, salient, with subulate-tipped serrae 1.5 mm long, 20–28 mm apart; on the subulate tip the margins and midrib below with subulate prickles 0.5–0.8 mm long, 1–2 mm apart, ascending; pistillate inflorescence a spike of 7 syncarps, the largest below, the smaller ones above; peduncle more than 14 cm in length, 2 cm in diameter, leafy bracted; lowest syncarp 11 cm long, 7.5 cm in diameter, the upper ones 8.5 cm long, 7 cm in diameter, ellipsoid, the larger one with about 70 drupes, these 3.2–3.4 cm long, 1–2.4 cm wide, 1–1.8 cm thick, cuneate obtuse, 6-angled, upper $\frac{1}{4}$ free, the surface minutely papillose, green, the apex obtuse, faintly 6-angled; drupes (1)–2–3-celled; styles 5–8 mm long, bony, dark brown, shining, flattened, hornlike, sharply bifurcate for about $\frac{1}{3}$ their length, sharply bent proximally; stigma 4–6 mm long, lanceolate, bifurcate, brown, papillose, proximal, not reaching the tip; endocarp median, dark brown to black, bony, massive, the lateral walls 2–3 mm thick; seeds in 1–2 rows, 8–11 mm long, narrow ellipsoid; apical mesocarp continuous, with strong longitudinal fibers and many medullary membranes; basal mesocarp fibrous and with pithy membranes.

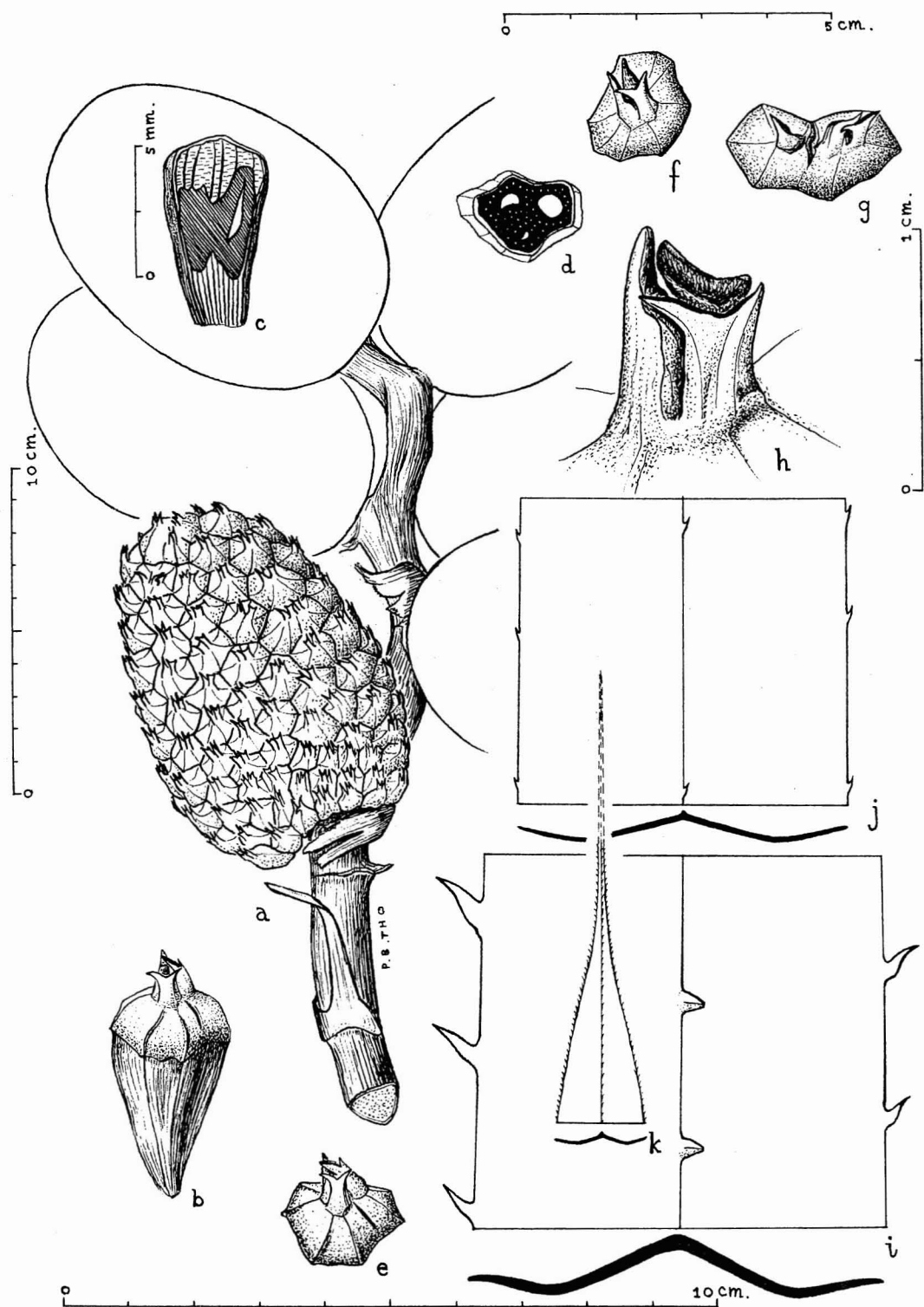


FIG. 101. *Pandanus piniformis*, holotype. *a*, Infructescence with syncarp, $\times \frac{1}{2}$; *b*, drupe, lateral view, $\times 1$; *c*, drupe, longitudinal median section, $\times 1$; *d*, drupe, transverse median section, $\times 1$; *e*, *f*, *g*, drupes, apical view, $\times 1$; *h*, styles and stigmas, oblique view, $\times 4$; *i*, leaf base, lower side, $\times 1$; *j*, leaf middle, lower side, $\times 1$; *k*, leaf apex, lower side, $\times 1$.

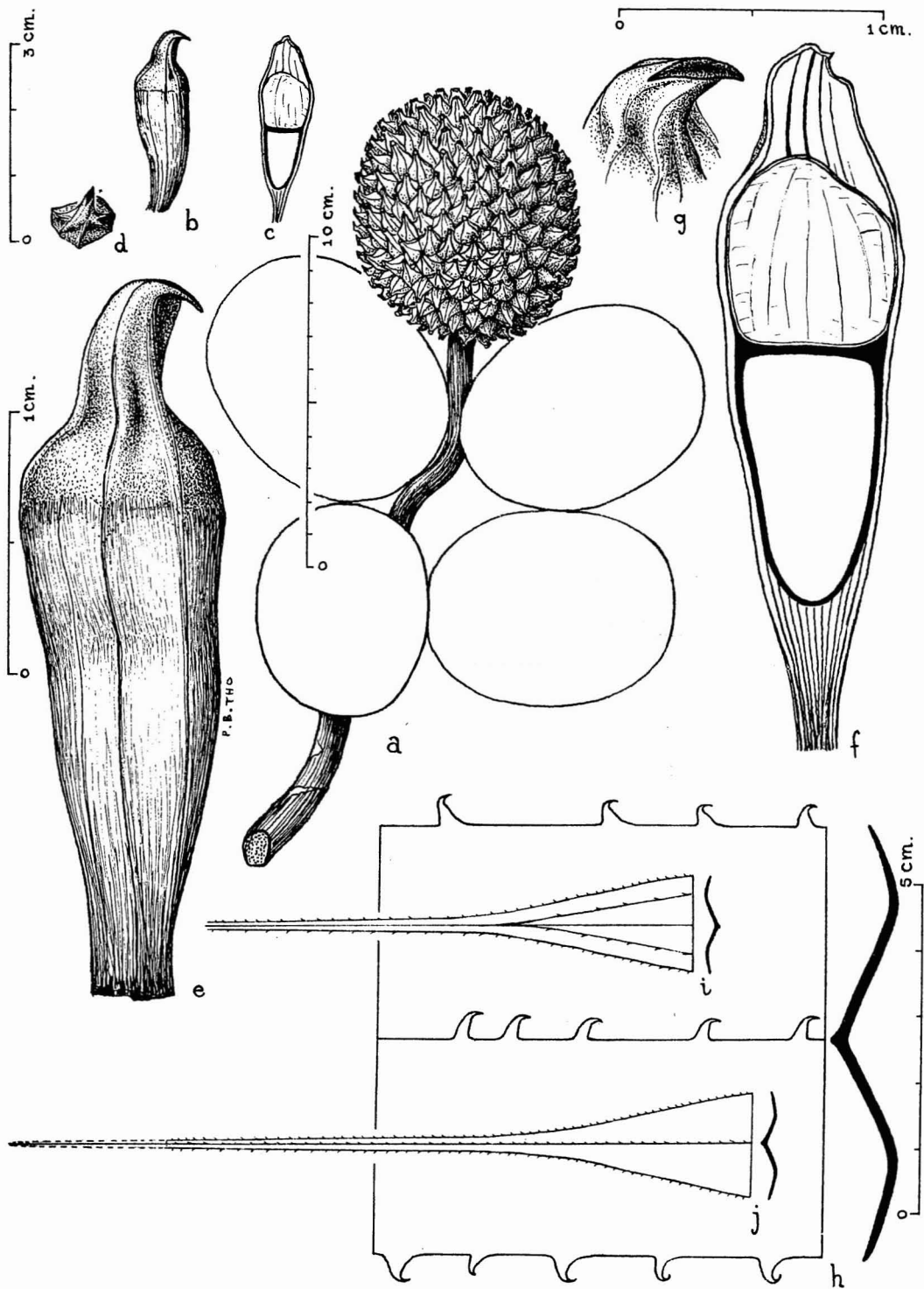


FIG. 102. *Pandanus dumetorum*, holotype. *a*, Infructescence and syncarp, $\times \frac{1}{2}$; *b*, drupe, lateral view, $\times 1$; *c*, drupe, longitudinal median section, $\times 1$; *d*, drupe, apical view, $\times 1$; *e*, drupe, lateral view, $\times 4$; *f*, drupe, longitudinal median section, $\times 4$; *g*, drupe apex with stigma, $\times 4$; *h*, leaf base, lower side, $\times 1$; *i*, leaf apex, upper side, $\times 1$; *j*, leaf apex, lower side, $\times 1$.

HOLOTYPE: Malaya, Perak, Pulau limestone, not very abundant on cliffs, 400 ft. alt., 2 June 1930, M. R. Henderson 23,759 (SING).

DISCUSSION: *P. piniformis* is here made the holotype of the new section *Bidens*. The species is distinctive in having styles and stigmas that resemble those of the section *Rykia*, but the drupes are (1-)2-3-celled.

The collector noted that the leaves were glaucous, but this coating does not show on the dried specimen.

The new epithet is from the generic name *Pinus*; and the Latin *formis*, shaped, as the syncarps resemble small, closed pine cones.

Fusiforma, St. John, sect. nov.

Carpellis distinctis 1-loculatis fusiformibus, stylo nullo, stigmate lanceolato vel elliptico distali subapicali.

Carpels distinct, 1-celled, fusiform; style none; stigma lanceolate or elliptic, subapical, distal.

HOLOTYPE: *Pandanus dumetorum* Holtum & St. John.

Pandanus dumetorum Holtum & St. John, sp. nov. (sect. *Fusiforma*)

Fig. 102

DIAGNOSIS HOLOTYPI: Acaulescens viridaria formans, foliis 3-4 m longis 6-8 cm latis ad basem crassiter coriaceis ad apicem exilibus et subcoriaceis vel chartaceis apice pendente 1-sulcatis 2-plicatis in sectione M-formatis in quoque latere cum 50-51 nervis secundariis evidentis et infra cum nervis tertialis transversis, lamina ligulata subabrupte diminuentibus et apice cucullato et per 7-8 cm caudato et 1-2 mm lato basi amplexicauli inermi sed ex 8-20 cm marginibus cum spinis 4-5 mm longis 8-20 mm distantibus crassiter subulatis arcuato-recurvatis pallidis, midnervo infra ex 5 cm cum spinis simulantibus reflexis sed brevioribus, in sectione 80 cm ex apice marginibus cum serrulis 0.1-0.3 mm longis 15-31 mm distantibus obtusis, infra midnervo exili salientibusque cum serrulis 0.5-0.8 mm longis 7-14 mm distantibus subulatis, per 30 cm ex apice plicis binis supra cum aculeis 0.4-0.5 mm longis 3-18 mm distantibus subulatis rigidis adscendentibus, proxima apicem marginibus et midnervo infra cum serrulis 0.3-

0.5 mm longis 2-5 mm distantibus, inflorescentia foeminea in foliis subclausa cum 2-5 syncarpiis, pedunculo 25 cm longo 8-10 mm diametro trigono folioso-bracteato, bracteis in syncarpiis adpressis luteis, syncarpiis ultimis majoribus, infimis 6.5 cm longis 5.5 cm latis 4 cm crassis ellipsoideis compressis cum circa 224 drupis, ultimo 8 cm longo 6.8 cm diametro elliptico-subgloboso cum circa 376 drupis, drupis 25-27 mm longis 6-9 mm latis 5-7 mm crassis oblanceo-fusiformibus 5-6-angulosis corpore 21-23 mm longo oblanceoloideo parte $\frac{1}{3}$ supera libera lateribus laevibus, apice late pyramidalibus cum rostro 6-7 mm longo valde 5-6-anguloso obliquo anguste lanceolo-pyramidalis, stigmate 2-3 mm longo lanceolato vel elliptico brunneo papilloso apicali sed in latere distali extenso, endocarpio in $\frac{2}{5}$ parte infera situato olivaceo osseoso lateribus 0.5 mm crassis, seminibus 10-11 mm longo anguste obconico, mesocarpio supero cavernoso 8 mm longo cum membranis latis albis paucis, mesocarpio basali in lateribus fibroso intra carnosio.

DIAGNOSIS OF HOLOTYPE: Acaulescent, forming small thickets; leaves 3-4 m long, 6-8 cm wide, towards the base thick coriaceous, towards the tip thin and subcoriaceous to chartaceous, eventually half broken near the end and the tip pendent, 1-ribbed and 2-pleated, in section M-shaped, the median section not available but at the region 80 cm from the tip on each side with 50-51 parallel secondary veins, from here to the tip these veins visible on both sides, and on the lower side visible tertiary cross veins slightly oblique, making meshes shorter than wide, the blade ligulate, fairly abruptly obtusely narrowed and cucullate to a 7-8 cm caudate apex, this 1-2 mm wide, the base amplexicaul, unarmed, but beginning at about 8-20 cm the margins with thorns 4-5 mm long, 8-20 mm apart, heavy subulate, arcuate recurved, pale; the midrib below beginning at about 5 cm up with reflexed thorns like the marginal ones but sharper; at the region 80 cm from the apex the margins with blunt serrulations 0.1-0.3 mm long, 15-31 mm apart; below the slender salient midrib with subulate tipped serrulations 0.5-0.8 mm long, 7-14 mm apart; from the cucullate contraction down for about 30 cm the 2 lateral pleats above with prickles 0.4-0.5 mm long, 3-18 mm apart, subulate, rigid, ascending;

the caudate deltoid apex with the margins and midrib below with serrulations 0.3–0.5 mm long, 2–5 mm apart; pistillate inflorescence partly hidden in the clump of leaves, bearing 2–5 syncarps; peduncle 25 cm long, 8–10 mm in diameter, 3-sided, leafy bracted; bracts surrounding syncarps appressed, clear yellow; syncarps increasing upwards in size, the lowest 6.5 cm long, 5.5 cm wide, 4 cm thick, ellipsoid, compressed; the apical one 8 cm long, 6–8 cm in diameter, elliptic-subglobose, the lowest with about 224 drupes, the apical with about 376 drupes, these 25–27 mm long, 6–9 mm wide, 5–7 mm thick, oblance-fusiform, 5–6-angled, the body 21–23 mm long, oblanceoloid; the exposed apex $\frac{1}{3}$ of total length, the sides smooth, this with a broad pyramidal base, prolonged into an oblique, narrow, lance-pyramidal beak 6–7 mm long, sharply 5–6-angled; stigma of the fruit 2–3 mm long, lanceolate to elliptic, brown, papillose, apical but extending down distal side; endocarp centering in lower $\frac{2}{5}$, olivaceous, bony, the walls 0.5 mm thick; seed 10–11 mm long, narrowly obconic; upper mesocarp a cavern 8 mm long, with a few broad, white membranes; basal mesocarp fibrous up the margins, fleshy within.

HOLOTYPE: Malaya, Trengganu, Kemaman, Ulu Bendong, common in hillside forest, 500 ft. alt., 30 Oct. 1935, *E. J. H. Corner* 30,066 (SING).

DISCUSSION: Because of its peculiar drupes, ending in narrow pyramidal tip bearing a lanceolate or elliptic stigma, this species is made the basis of a new section of the genus. It differs from the section *Acrostigma* which has a subulate style bearing a linear stigma.

The new epithet is from the Latin noun *dumetorum*, a thicket.

SECTION *Pulvinistigma*

Pandanus echinodermops Holtum & St. John,
sp. nov. (sect. *Pulvinistigma*)

Fig. 103

NOM. VERN.: "siakum."

DIAGNOSIS HOLOTYPE: Ramis 2–2.5 cm diametro decumbentibus in paludibus viridaria formantibus, nodis superis stramineis, foliis 93–125 cm longis 3.5–3.6 cm latis subcoriaceis supra obscure viridibus infra pallidis 1-costatis 2-

plicatis in sectione M-formatis in sectione mediali cum 30–31 nervis secundariis in quoque latere et eis ubique evidentibus, nervis tertiis paene evidentibus, laminis ligulatis sed subcuneatis et proxima basem 30 mm latis apice acuto basi alba amplexicauli et inermi venulosa et ex 5 cm marginibus cum aculeis 1.5–2 mm longis 3–5 mm separatim valide subulatis adscendentibus pallidis vel cum apicibus rubris, midnervo infra ex 8 cm cum aculeis 1.5–2 mm longis 2–8 mm distantibus simulantibus sed reflexis, in sectione mediali marginibus cum aculeis simulantibus sed gracilioribus et 3–8 mm distantibus adscendentibus, midnervo infra angusto salienti et cum aculeis simulantibus 6–13 mm distantibus, proxima apicem marginibus undulatis et cum serris 1.5–2 mm longis 2–6 mm distantibus apicibus subulatis, midnervo infra cum serris simulantibus 3–7 mm distantibus, supra per 30 cm ultimos plicis cum aculeis acutis 1–1.3 mm longis 4–11 mm distantibus rigidis subulatis adscendentibus, inflorescentia foeminea erecta cum 3 syncarpiis, pedunculo 15 cm longo 7 mm diametro trigono folioso, syncarpio terminali majori 9 cm longo 8 cm diametro viridibus sed auranti-rubrescentibus subglobo-ovoideis cum circa 448 drupis, syncarpiis in spica congregatis, syncarpiis inferis 7–8 cm longis 5.5–6 cm diametro late ellipsoideis cum 208–320 drupis, drupis 27–32 mm longis 6–9 mm latis 4–7 mm crassis oblanceo-fusiformibus 5–6-angulosis parte $\frac{1}{3}$ supera libera 5–6-angulosa lateribus laevibus apice recto vel proxime inclinato truncato et cum stigmatibus 2.5–3 mm lato reniformi vel late cordato pallide brunneo in juventa cum pilis brevibus, endocarpio in parte $\frac{1}{3}$ infera lateribus 0.2 mm crassis osseosis pallide brunneis, semine 4 mm longo obovoideo apice truncato, mesocarpio supero cavernam 12–15 mm longam cum membranis paucis formantibus, mesocarpio basali cum lateribus fibrosis et intra carnosum.

DESCRIPTION OF ALL SPECIMENS EXAMINED: Stems 2–2.5 cm in diameter, decumbent, forming thickets in fresh water or in swamps, the upper nodes stramineous; leaves 92–125 cm long, 3.3–3.6 cm wide, subcoriaceous, dark green above, pale but not glaucous beneath, 1-ribbed, 2-pleated, in section M-shaped, at mid-section on each side with 30–31 parallel secondary veins, these distinct on both sides through-

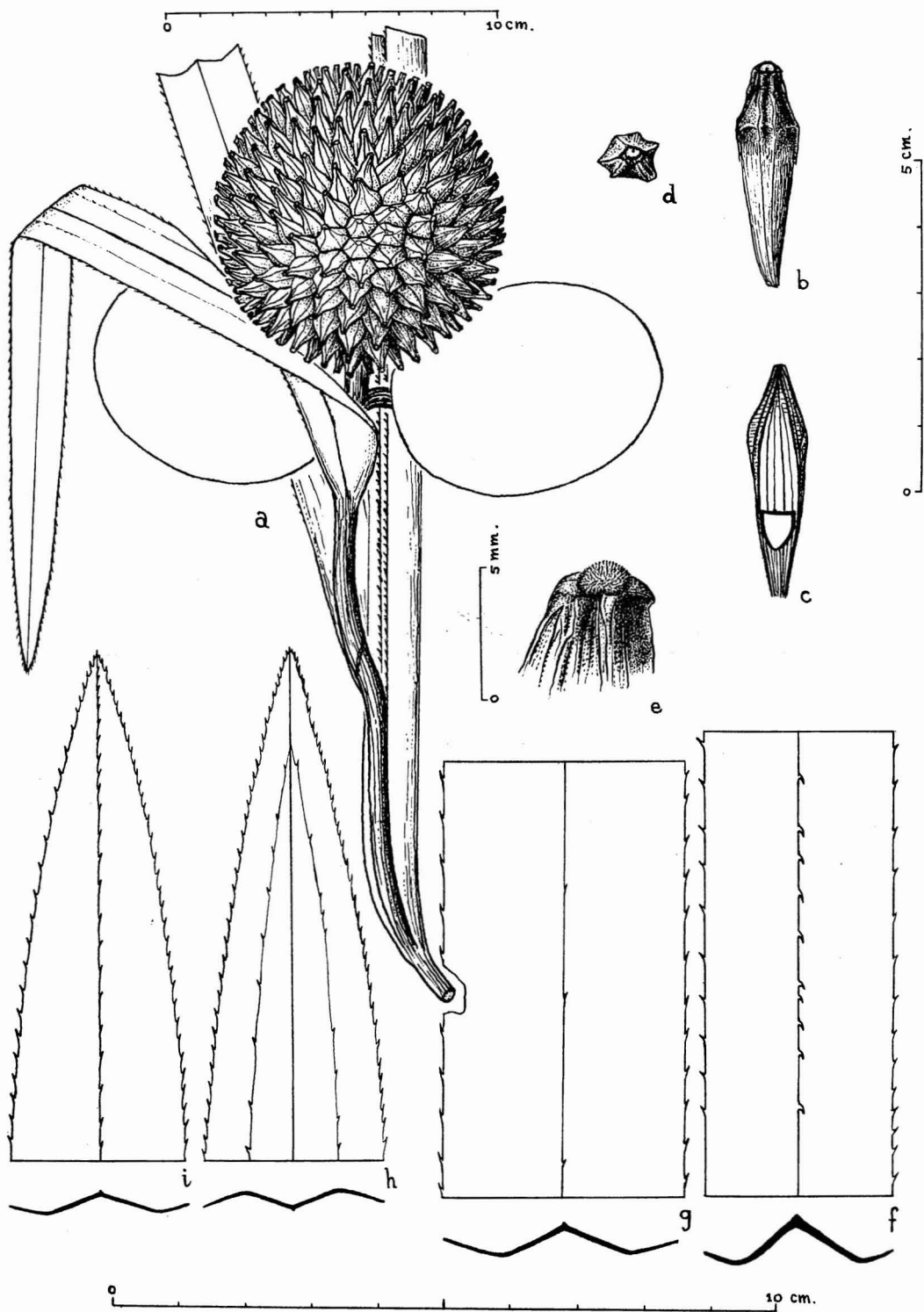


FIG. 103. *Pandanus echinodermops*, holotype. *a*, Infructescence with syncarps, $\times \frac{1}{2}$; *b*, drupe, lateral view, $\times 1$; *c*, drupe, longitudinal median section, $\times 1$; *d*, drupe, apical view, $\times 1$; *e*, drupe apex with stigma, $\times 4$; *f*, leaf base, lower side, $\times 1$; *g*, leaf middle, lower side, $\times 1$; *h*, leaf apex, upper side, $\times 1$; *i*, leaf apex, lower side, $\times 1$.

out; tertiary cross veins almost invisible, the blade ligulate, but slightly narrowed downwards and near the base about 30 mm wide, the apex acute, the base white, amplexicaul and unarmed, veiny, beginning at 5–7 cm the margins with prickles 1.5–2 mm long, 3–5 mm apart, stout subulate, ascending, pale or with dark reddish tips; the midrib below beginning 8 cm up with prickles 1.5–2 mm long, 2–8 mm apart, similar but reflexed; at midsection the margins with similar but more slender prickles 3–8 mm apart, ascending; the midrib below narrow, salient, with similar prickles 6–13 mm apart; near the tip the margins undulate between the subulate tipped serrae 1.5–2 mm long, 2–6 mm apart; the midrib below with similar serrae but 3–7 mm apart; on the upper surface for the last 30 cm of the tip the two lateral pleats with sharp prickles 1–1.3 mm long, 4–11 mm apart, rigid, subulate, ascending; pistillate inflorescence erect, bearing 1–3 syncarps; peduncle 15–20 cm long, 7 mm in diameter, 3-sided, leafy bracted; terminal syncarp the largest, 9 cm long, 8 cm in diameter, green, turning orange-red, subglobose-ovoid, bearing about 448 drupes, the syncarps crowded in a close spike, the lower ones 7–8 cm long, 5.5–6.5 cm in diameter, broadly ellipsoid to subglobose, bearing about 208–320 drupes, these 27–32 mm long, 6–9 mm wide, 4–7 mm thick, oblance-fusiform, 5–6-angled, upper $\frac{1}{3}$ free, the tip apparently not detachable, sharply 5–6-angled, the sides smooth, apex straight or proximally inclined, truncate, bearing the stigma which is 2.5–3 mm wide, reniform to broad cordate, pale brown, when young with short hairs; endocarp in lower $\frac{1}{3}$, the walls 0.2 mm thick, bony, light brown; seed 4 mm long, obovoid, the apex truncate; upper mesocarp a cavern 12–15 mm long, with a few white, delicate membranes near the sides; basal mesocarp with longitudinal fibers up the sides, fleshy within.

HOLOTYPE: Malaya, Johore, Kangka Sedili, Ketchil, low elevation, 18 June 1934, *E. J. H. Corner* 28,597 (SING).

SPECIMENS EXAMINED: Malaya, Johore, Kangka Sedili Kechil, low elevation, 18 June 1934, *E. J. H. Corner* 28,483 (= 28,579), (SING); Johore, S[ungei] Sedili, Mersing Road, in swampy stream, forming thickets in the water or muddy hollows, 30 Sept. 1936, *E. J. H. Corner* 31,948 (SING).

DISCUSSION: *P. echinodermops* is a new member of the small section *Pulvinistigma*. It is closely related to *P. dasystigma* Kanehira of Indonesian Borneo, a species which has the syncarp globose, 8 cm in diameter; the drupes 3.5–4 cm long, the apex acute, and the upper $\frac{1}{3}$ free; and the leaves 60 cm long, 2.5–3 cm wide. *P. echinodermops* has the syncarps broadly ellipsoid to subglobose-ovoid, 5.5–8 cm in diameter; drupes 2.7–3.2 cm long, the apex truncate, and the upper $\frac{1}{3}$ part free; and the leaves 93–125 cm long, 3.3–3.6 cm wide.

The new epithet is coined from the Greek *echinoderm*; and *ops*, of like appearance, since the fruiting syncarps look much like an echinoderm.

SECTION *Rykia*

Pandanus calcicola Holtum & St. John, sp. nov. (sect. *Rykia*)

Fig. 104

DIAGNOSIS HOLOTYPE: Caule 1 m alto, foliis 3.9 m longis 9 cm latis rigidis crassis coriaceis supra viridibus infra minime pallidioribus 1-sulcatis 2-plicatis in sectione mediali cum 62 nervis secundariis in quoque latere in lateribus ambis excepta in basi nervis tertialis evidentis ex medio ad apicem reticulum ex oblongis formantibus laminis ligulatis ad apicem per 20 cm diminuentibus et cum 12–14 cm apice valido subulato trigono caudato eo 10 cm ex apice 5 mm lato, basi crassa dura rubro-brunnea amplexicauli et inermi sed ex 15 cm marginibus cum spinis 3–4.5 mm longis 9–22 mm distantibus crasse subulatis adscendentibus subarcuatis brunneis in basi crassis, midnervo infra ex 22 cm cum spinis 4–5 mm longis 25–41 mm distantibus crasse subulatis salientibus in basi crassis, in sectione mediali marginibus cum aculeis 1–2 mm longis 18–23 mm distantibus subulatis adpresse adscendentibus, midnervo infra inermi, in apice caudato marginibus et midnervo infra cum serris 0.3–0.6 mm longis 1.5–5 mm distantibus, inflorescentia foeminea terminali et cum 4 syncarpiis, pedunculo 10 cm et ultra longo 2 cm diametro trigono bracteoso, bracteis syncarpiorum 30–40 cm longis 4–6 cm latis lanceolatis striatis per $\frac{2}{3}$ parte ultima minute serratis, syncarpio ultimo majore 8 cm longo 3.5 cm diametro ellipsoideo cum circa

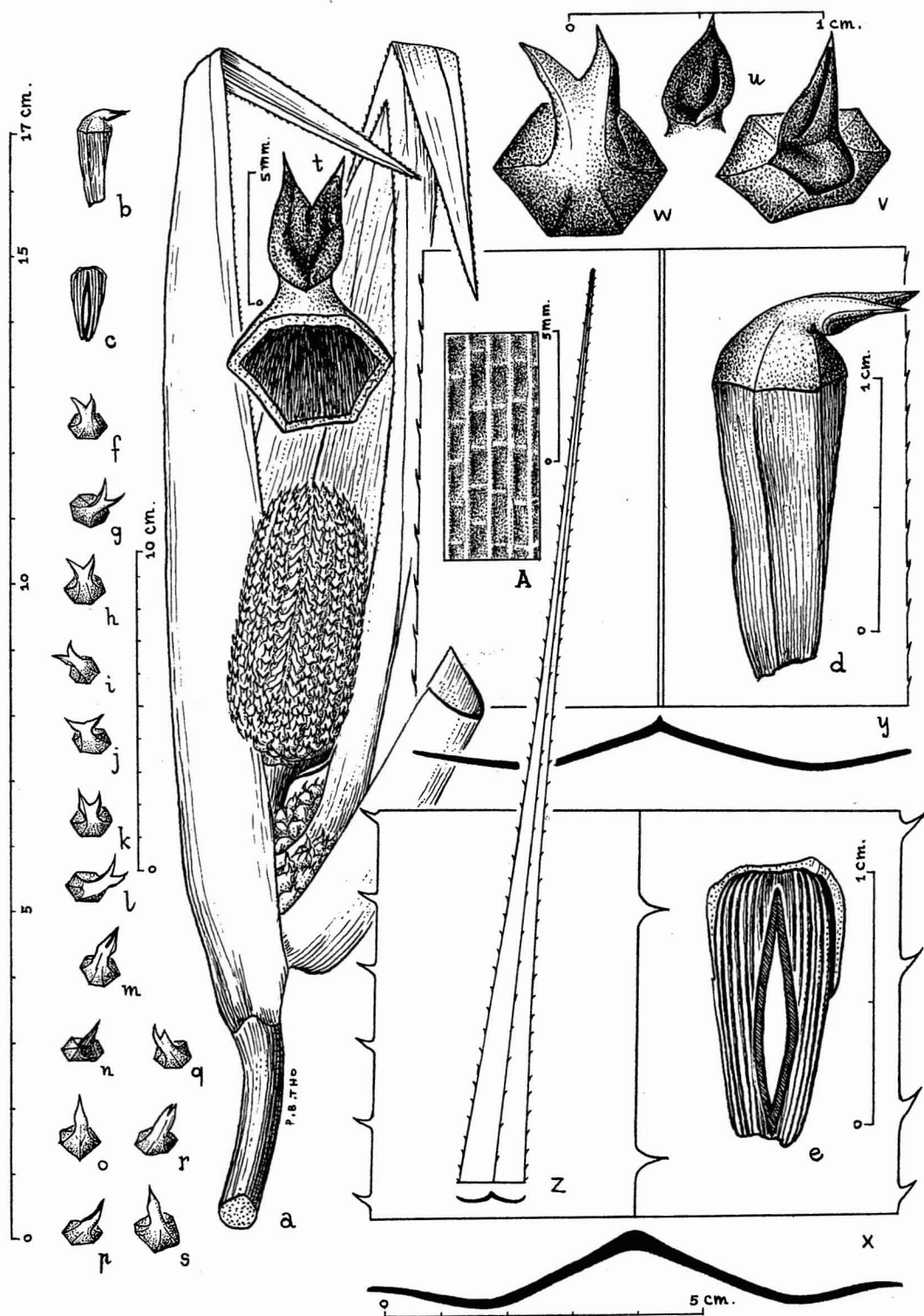


FIG. 104. *Pandanus calcicola*, holotype. *a*, Infructescence with syncarps, $\times \frac{1}{2}$; *b*, drupe, lateral view, $\times 1$; *c*, drupe body, longitudinal median section, $\times 1$; *d*, drupe, lateral view, $\times 4$; *e*, drupe body, longitudinal median section, $\times 4$; *f*, *g*, drupes, apical view, $\times 1$; *h*, drupe with the most typical bifid style, $\times 1$; *i*, *j*, *k*, *l*, *m*, drupes, all also lateral, showing style forks, $\times 1$; *n*, *o*, *p*, *q*, *r*, *s*, drupes all apical, apical view, $\times 1$; *t*, style branches and stigma of lateral drupe, proximal view, $\times 4$; *u*, *v*, stigmas of apical drupes, lateral view, $\times 4$; *w*, style, apical view, $\times 4$; *x*, leaf base, lower side, $\times 1$; *y*, leaf middle, lower side, $\times 1$; *z*, leaf apex, lower side, $\times 1$; *A*, vein network in leaf midsection, lower side, $\times 4$.

312 drupis, syncarpiis alteris 4 cm longis subglobosis sub bracteis clausis, drupis 15–16 mm longis (immaturis) eis superis 6–7 mm latis et crassis, alteris 5–6 mm latis 4–5 mm crassis parte $\frac{1}{3}$ supera libera corpore 12–13 mm longo cuneato 5–6-anguloso obtuso, pileo cum basi 4–5 mm alto pyramidalis-semiorbiculari minute papilloso, stylo 5–5.5 mm longo cornoso luteo lucido $\frac{1}{2}$ bifurcato dentibus divergentibus (vel in drupis terminalibus paucis stylo integris), stigmatibus 3–4 mm longo late lanceolato et bifurcato brunneo ad apicem non extenso, endocarpio in parte $\frac{1}{2}$ infera brunneo lateribus 0.2 mm crassis, semine 6 mm longo anguste ellipsoideo, mesocarpio apicali cavernoso cum membranis paucis, mesocarpio basali in lateribus cum fibris fortibus intra carnosum.

DIAGNOSIS OF HOLOTYPE: Stem 1 m tall; leaves 3.9 m long, 9 cm wide, rigid, thick coriaceous, green above, slightly paler beneath, furrowed above the 1 rib, 2-pleated, at midsection on each side with 62 parallel secondary veins, these visible on both sides except at base; tertiary cross veins visible and from the middle outwards conspicuous on both sides, forming a reticulate surface, slightly oblique, forming short oblong meshes, ligulate, towards the apex within a distance of 20 cm tapering and bearing a 12–14 cm stout subulate, trigonous caudate apex which 10 cm down is 5 mm wide, the base thick and hard, reddish brown, amplexicaul and unarmed, but beginning about 15 cm up the margins with thorns 3–4.5 mm long, 9–22 mm apart, thick subulate, ascending and slightly arcuate, brown, broad based; the midrib below from about 22 cm up with thorns 4–5 mm long, 25–41 mm apart, thick subulate, broad based, salient; at midsection the margins with prickles 1–2 mm long, 18–23 mm apart, subulate, appressed ascending, the midrib below unarmed; on the caudate apex the margins and midrib below with serrae 0.3–0.6 mm long, 1.5–5 mm apart; pistillate inflorescence terminal, a spike bearing 4 syncarps, peduncle more than 10 cm long, 2 cm in diameter, 3-sided, bracteate; each syncarp with a subtending bract 30–40 cm long, 4–6 cm wide, lanceolate, striate veined, minutely serrulate throughout outer $\frac{2}{3}$'s; terminal syncarp the largest, 8 cm long, 3.5 cm in diameter, ellipsoid, bearing about 312 drupes; lateral syncarps about 4 cm long, subglobose, all closely en-

wrapped by the bract bases; drupes 15–16 mm long (following the curve of the style), immature, the uppermost ones 6–7 mm wide and thick, the lateral and lower ones 5–6 mm wide, 4–5 mm thick, upper $\frac{1}{3}$ free; the body 12–13 mm long, cuneate, 5–6-angled, obtuse; pileus with the base 4–5 mm high, pyramidal-semiorbicular, minutely papillose; style 5–5.5 mm long, hornlike, yellowish, shining, bifurcate nearly half way, the forks spreading (or a few terminal drupes with the style hornlike, undivided); stigma 3–4 mm long, broad lanceolate and bifurcate, brown, not reaching the tips; endocarp in lower $\frac{1}{2}$, brownish, the walls 0.2 mm thick; seed 6 mm long, narrowly ellipsoid; apical mesocarp a cavern with a few membranes; basal mesocarp with strong fibers up the sides, fleshy within.

HOLOTYPE: Malaya, Perlis, Kaki Bukit, on limestone, 100 ft. elev., 13 April, 1938, *Kiah* 35,285 (SING).

DISCUSSION: *P. calcicola* is a member of the section *Rykia*. Its closest relative, *P. heterostigma* (Martelli) Martelli of Sumatra, has the leaves 2 m and more in length, 10 cm wide; raceme 7–10-headed, spathes papery, lance acuminate at base; syncarps 12–15 mm long, 9–19 cm in diameter; and the style 6–7 mm long. *P. calcicola* has the leaves 3–9 m long, 9 cm wide; spike 4-headed, spathes foliaceous, lanceolate; syncarps 4–8 cm long, 3.5–4 cm in diameter; and the style 5–5.5 mm long.

The new epithet is derived from the Latin *calx*, lime; *cola*, a dweller, and applied in allusion to the calcicolous habitat.

P. calcicola, as well as *P. piniformis* Holtum & St. John and *P. irregularis* Ridl., is confined to the precipitous limestone, elongate ridges so conspicuous in the interior of Malaya.

Pandanus longicaudatus Holtum & St. John,
sp. nov. (sect. *Rykia*)
Figs. 105–107A

DIAGNOSIS HOLOTYPE: Caule 1–4 m alto 7.5–9 cm diametro, cortice argento-albo et cum radicillis adventiviis paucis, radicibus futuriosis paucis ad 90 cm longis, foliis 2.4–3.3 m longis proxima basem 5 cm latis in media 6 cm latis obscuro-viridibus non glaucis crassis et coriaceis parte ultima pendente late 1-sulcatis 2-plicatis ligulatis sed sensim in apice subulato 15 cm

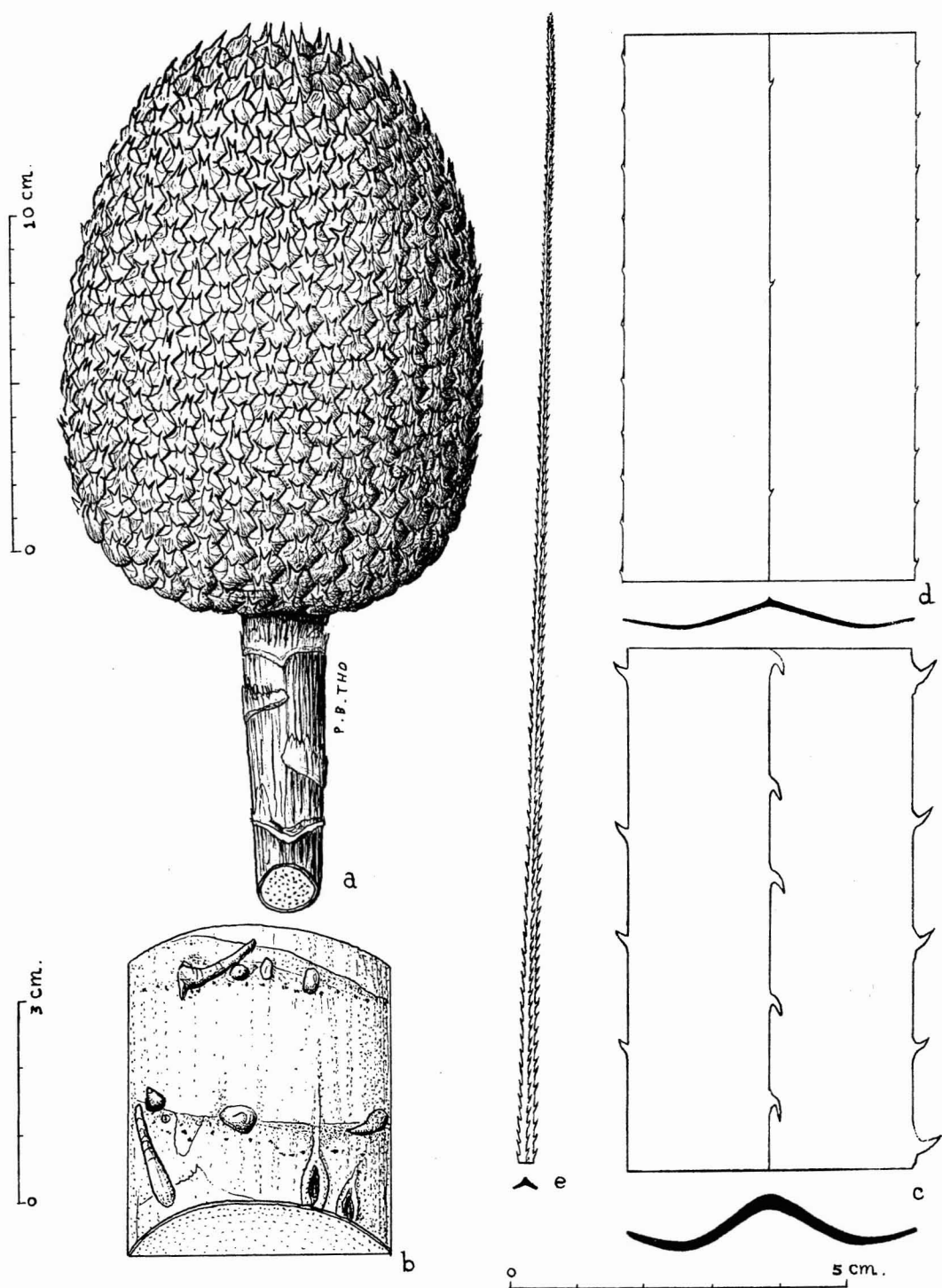


FIG. 105. *Pandanus longicaudatus*, holotype. *a*, Syncarp, $\times \frac{1}{2}$; *b*, stem with bark and adventitious rootlets, $\times 1$; paratype, staminate, Nur 32,632; *c*, leaf base, lower side, $\times 1$; *d*, leaf middle, lower side, $\times 1$; *e*, leaf apex, lower side, $\times 1$.

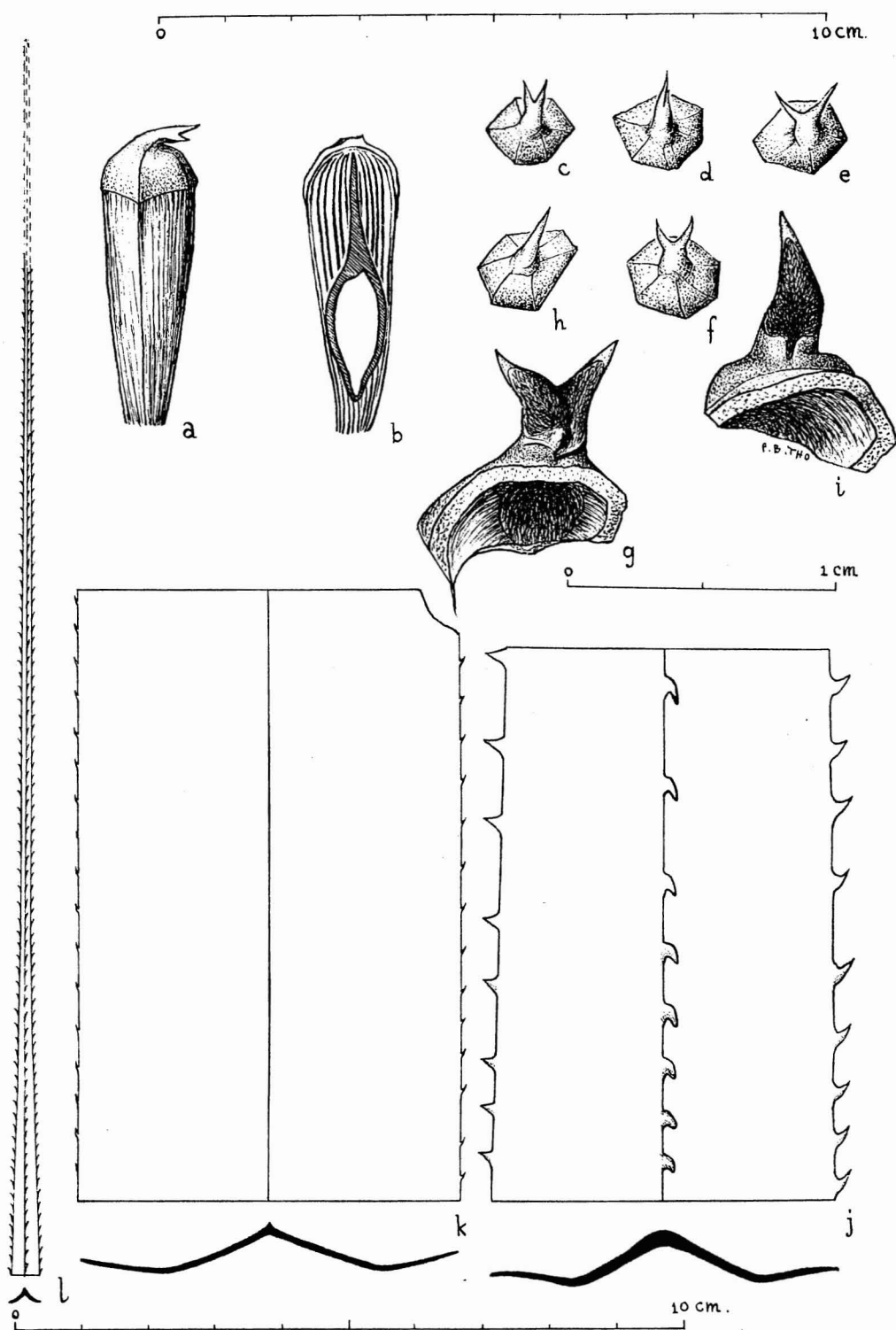


FIG. 106. *Pandanus longicaudatus*, holotype. *a*, Drupe, lateral view, $\times 1$; *b*, drupe, longitudinal median section, $\times 1$; *c*, *d*, *e*, *f*, lateral drupes, apical view, $\times 1$; *g*, style and stigma of lateral drupe, proximal view, $\times 4$; *h*, apical drupe, apical view, $\times 1$; *i*, style and stigma of apical drupe, proximal view, $\times 4$; *j*, leaf base, lower side, $\times 1$; *k*, leaf middle, lower side, $\times 1$; *l*, leaf apex, lower side, $\times 1$.

longo trigono diminuentibus eo 10 cm ex apice 0.7 mm lato, nervis secundariis in dimidia ultima conspicuis in paginis ambis et in sectione mediali 48 in quoque latere, nervis tertialis crassioribus salientibusque et reticulis squarrosis formantibus basi amplexicauli inermi olivaceo-ochracea sed ex 7–15 cm marginibus cum spinis 3–5 mm longis 6–14 mm distantibus deltoideis crasse subulatis basi incrassata et 3–4 mm lata subarcuatis adscendentibus brunneis, midnervo infra cum spinis 4–6 mm longis 7–18 mm distantibus simulantibus crassis sed reflexis, in sectione mediali marginibus cum aculeis 1–2 mm longis 3–8 mm distantibus subulatis rectis vel subarcuatis adscendentibus, midnervo infra angusto salienti inermi, in apice caudato marginibus et midnervo infra cum serrulis 0.4–0.7 mm longis 1–5 mm distantibus, inflorescentia foeminea recta cum syncarpio unico in bracteis siccis pallide brunneis scariosis convolutis, pedunculo 30 cm longo in basi 7 mm diametro in apice 22 mm diametro trigono bracteoso, syncarpio 17 cm longo 10.5 cm diametro elliptico-ovoideo viridi aurantiaco-rosaceo-tincto cum circa 900 drupis eis 41–44 mm longis 8–14 mm latis 7–13 mm crassis eis-tertiarum superarum majoribus cuneato-oblongis corpore 36–38 mm longo, pileo cum basi pyramidalis-hemisphaerica 4–6 mm alta 5–6-angulosa laevi, stylo 4–8 mm longo adpresse adscendenti osseoso brunneo lucido eis apicalibus integris et crassiter subulatis omnibus alteris bifurcatis lobis aequalibus sed diversis eis parvis $\frac{1}{3}$ lobatis et lobis adscendentibus illis majoribus $\frac{1}{2}$ lobatis et lobis divergentibus, stigmate 3–3.5 mm longo lanceolato vel cum lobis binis lanceolatis brunneis papillois proximalibus, endocarpio cum corpore ellipsoideo in parte $\frac{2}{5}$ infera obscure brunneo summo interiore lucido in apice cum projectione subulata ad stylam, semine 13–15 mm longo 6 mm diametro late ellipsoideo, mesocarpio apicali cavernoso cum fibris fortibus longitudinalibus, mesocarpio basali fibroso et carnoso.

DESCRIPTION OF ALL SPECIMENS EXAMINED: Stem 1–4 m tall, 7.5–9 cm in diameter, the bark dull silvery whitish, with sparse adventitious rootlets, these probably ascending; prop roots few, up to 90 cm long; leaves 2.4–3.3 m long, eventually partly broken and the outer part pendent, 4.7–6 cm wide at the middle, 5 cm wide near the base, dark green, not glaucous,

thick and coriaceous, in section with a broad central furrow and on each side one pleat, ligulate, tapering gradually towards the tip and ending in a subulate trigonous caudate apex 15–22 cm long, this at about 10 cm down from the tip 0.7 mm wide, the secondary longitudinal parallel veins obscure towards the base but beyond it conspicuous above and below, at mid-section 48 on a side, and the tertiary cross veins still heavier and salient, forming mostly square meshes, the base amplexicaul, unarmed, olive-ochre, beginning at 7–15 cm the margins with thorns 3–5 mm long, 6–14 mm apart, deltoid, heavy subulate, the base much thickened, 3–4 mm wide, slightly arcuate ascending, brown; the midrib below with similar heavy thorns 4–6 mm long, 7–18 mm apart but reflexed; at mid-section the margins with prickles 1–2 mm long, 3–8 mm apart, subulate, straight or slightly arcuate, ascending; the midrib below narrow, sharp, salient, unarmed; on the caudate tip the margins and midrib below with serrations 0.4–0.7 mm long, 1–5 mm apart; pistillate inflorescence erect, bearing 1 syncarp enclosed in dry, pale brown, scarios bracts; peduncle 30 cm long, at base 7 mm in diameter, at apex 22 mm, 3-sided, bracted; syncarp 16–17 cm long, 10.5 cm in diameter, elliptic-ovoid, green, flushed with orange-pink, with about 900 drupes 41–44 mm long, 8–14 mm wide, 7–13 mm thick, the larger and fatter ones mostly on the upper third of the syncarp, cuneate oblong, the body 36–38 mm long; pileus with the base pyramidal-hemispheric, 4–6 mm high, 5–6-angled, smooth; style 4–8 mm long, appressed ascending, bony, brown, shining, on the apical ones entire, heavy subulate, on all the rest bifurcate, the lobes subequal, but of various kinds, on the small, narrow drupes the styles lobed about $\frac{1}{3}$ way and the lobes ascending, on the larger drupes lobed about $\frac{1}{2}$ way and the lobes widely divergent; stigma 3–3.5 mm long, lanceolate or with two lanceolate lobes, brown, papillose, proximal; endocarp with the main body ellipsoid, centering in the lower $\frac{2}{5}$, dark brown, the walls 1.5–2 mm thick, the inner surface shining, bearing a heavy subulate apical prolongation reaching to the style; seed 13–15 mm long, 6 mm in diameter, broad ellipsoid; apical mesocarp a long cavern, traversed by heavy longitudinal fibers; basal mesocarp fibrous and fleshy.

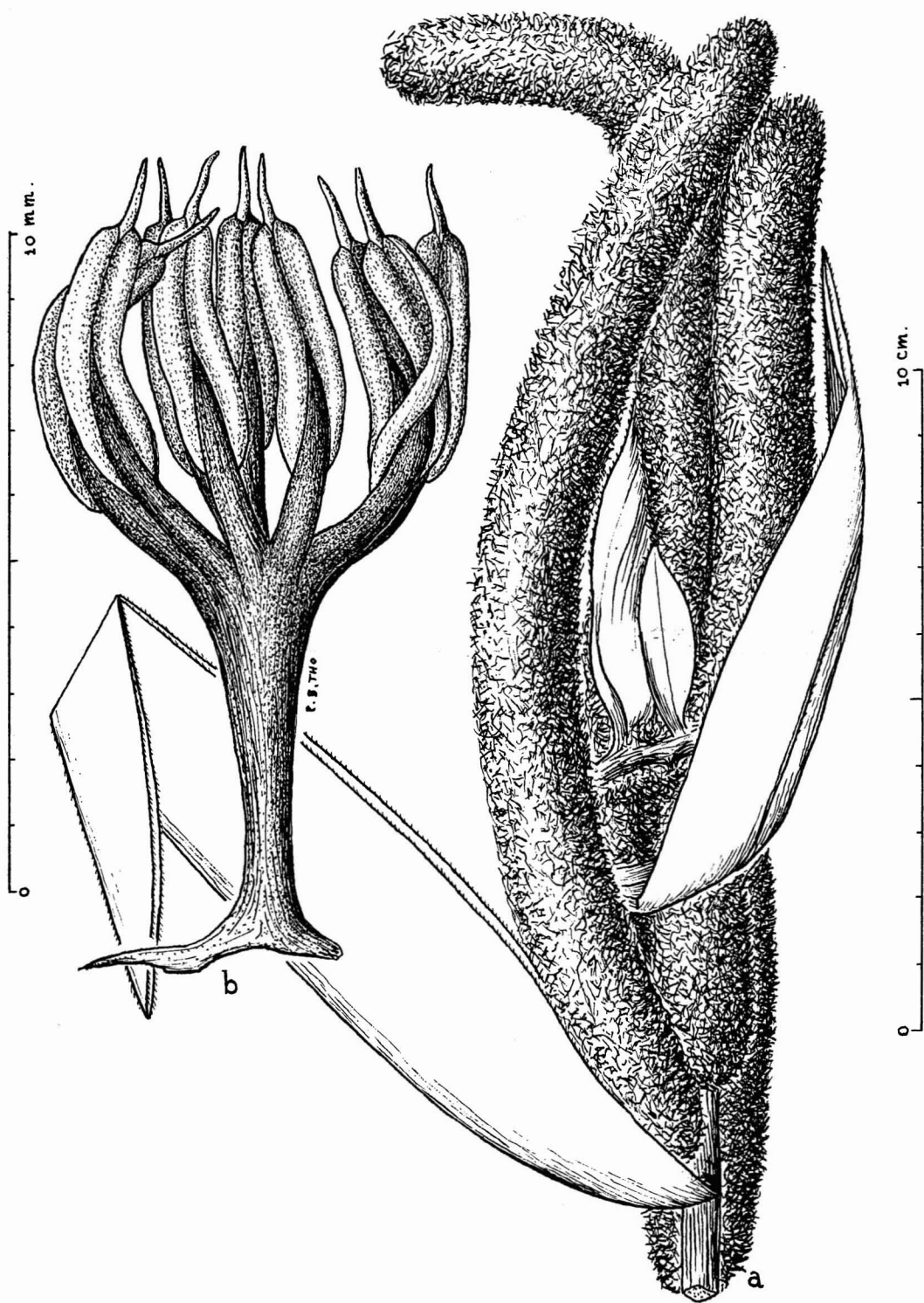


FIG. 107A. *Pandanus longicaudatus*, paratype, staminate, Nur 32,632; a, Staminate inflorescence, $\times 1$; b, staminal column and anthers, $\times 10$.

DESCRIPTION OF STAMINATE PLANT: Leaves 4–5 m long, 4.5 cm wide at the middle, 4.4 cm wide at the base, at midsection with 35–36 longitudinal parallel secondary veins on each side, near the base the margins with thorns 20–32 mm apart; those of the midrib below 16–25 mm apart; staminate inflorescence with flowering part about 25 cm long, the bracts apparently pale; lowest floral bract 33 cm long, 7.2 cm wide, lanceolate, the margins with subulate teeth less than 1 mm long; median bract 11 cm long, 2.8 cm broad, elliptic lanceolate; spikes 5 or more, 12–20 cm long, 15–17 mm in diameter, dense; staminate flowers very numerous, 9–11 mm long; column 5–5.5 mm long, bearing at the apex 10–11 whorled stamens, the free filament tips 1–2 mm long, rarely 2 of these partly connate; anther body 3–4 mm long, oblong, bearing an apical prolongation of the connective 0.9–1.1 long, subulate, pale.

HOLOTYPE: Malaya, Pahang, Fraser's Hill, quite a common jungle pandan in forest on ridges and valleys or solitary crests, 4,000 ft. alt.,

13 Aug. 1937, E. J. H. Corner 33,196 (SING).

PARATYPI: Malaya, Pahang, Boh Plantation, Cameron Highlands, 4,000 ft. alt., 12 April 1937, Md. Nur 32,632, staminate (SING); Pahang, Fraser's Hill, 4,000 ft. alt., 7 Sept. 1923, Md. Nur 11,256 (SING); Pahang, Gunong Tahan, 14 Sept. 1937, E. J. H. Corner (KEP).

DISCUSSION: *P. longicaudatus* is a member of the section *Rykia* and in that section is its closest relative, *P. bicornis*, a species of Perak in Malaya, one with the stems up to 2 m in height; leaves 1.2 m long; syncarp 7 cm in diameter, subglobose; drupes 3.4 cm long; styles 3 mm long; seed cavity cubical; and the endocarp central. *P. longicaudatus* has the stems 1–4 m tall; leaves 2.4–3.3 m long; syncarp 10.5 cm in diameter, elliptic-ovoid; drupes 4.1–4.4 cm long; styles 4–8 mm long; seed cavity ellipsoid; and the endocarp in the lower 2/5.

The new epithet is coined from the Latin *longus*, long; *caudatus*, tailed, in reference to the long, attenuate leaf apex.