At the beginning of the eighteenth century *Pandanus* was found growing naturally on Madagascar. The first species from there were described by du Petit Thouars. Subsequent discoveries revealed that it was one of the three great centers of the genus, with 63 species.

With support from a grant by the National Science Foundation, the writer spent ten weeks in 1961 exploring the island for *Pandanus*. First a map showing all known localities for the accepted species was prepared. Then, three expeditions were undertaken in search of *Pandanus*, the route in all cases being to regions from which no previous collector had obtained specimens. As the genus is widespread on the island, the result of the search was the discovery of numerous additional species. Several of them are here described as new.

Section Acanthostyla

*Pandanus columnaris* sp. nov. (sect. Acanthostyla)

Figs. 247, 253 bottom, left and right.

Nom. vern.: "fandran."

**Diagnosis of Holotype**: Arbor columnaris, trunco 20 m alto 25 cm diametro, cortice pallide brunneo cum spinis lonoris, radicibus fulturosis nullis vel paucis eis 20 cm longis 1.5 cm diametro, corona anguste cylindrica in apice cum foliis magnis in spiris deinde infratra examulis albis, marginibus basi ex 15 cm cum aculeis subullatis 0.5–1.2 mm longis 4–10 mm separatis vel cum serrulatis albis cum acicibus brunneis, midnervo infra ad medium vel ultra inermi, in sectione mediiali margine cum serrulatis albis, infrutescentia non visa sed dicet "in ramulis lateralibus et cum spicis luteis," phalangibus 20–22 mm longis 10–15 mm latis 8–11 mm crassis obovatoideis compressis 4–7-carpellatis parte supera libera, stylis 6–7 mm longis acicularibus arcatis in basi conico brevi affinis, stigmatibus 6–7 mm longis lineariibus proximalibus papillosis, endocarpio parte supera obovatoidei, mesocarpi 3 mm longo cum fibris validibus longitudinalibus, mesocarpo basali fibroso et carnoso.

**Diagnosis of Holotype**: Tree, columnar, the trunk 20 m tall, 25 cm in diameter; bark light brown, conic spiny; prop roots none or few and 20 cm long, 2.5 cm in diameter, light brown, spiny; crown narrowly cylindric, the apex with spirals of large leaves, but below them half or more than half of the length of the trunk with short secondary branchlets, all subequal, and bearing numerous small, narrow leaves; terminal leaves in spirals at apex of trunk, more than 2 m long, 24 cm wide near the base, thick coriaceous, furrowed above the midrib and the sides pleated, near the midsection with 98 parallel secondary veins in each half, near the base below the tertiary cross veins visible, forming short oblong meshes; blade

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FIG. 247. *Pandanus columnaris* St. John, from holotype. *a*, Phalange, lateral view, × 1; *b*, phalange, longitudinal median section, × 1; *c*, phalange, apical view, × 1; *d*, endocarp and seed cavities, transverse median section, × 1; *e*, style and stigma, lateral view, × 10; *f*, half of leaf base, lower side, × 1; *g*, half of leaf middle, lower side, × 1; *h*, leaf apex, lower side, × 1; *i*, branchlet, × 1.
ligulate, at the tip narrowing into a short trigonous subulate apex which 10 cm down is 6-10 mm wide; near the base beginning at 16-17 cm the margins with spines 3-5 mm long, 4-10 mm apart, subulate from a stout base, the lower ones divergent, then the next slightly ascending; the midrib below beginning at 19 cm with spines 3 mm long, 4-8 mm apart, the base broad conic, the apex subulate, recurved; at midsection the margins with prickles 2-3 mm long, 3-10 mm apart, subulate, ascending; the midrib below with prickles 1.5-2.5 mm long, 2-7 mm apart, subulate, appressed ascending; on the subulate apex the margins and midrib below with subulate serrulations 0.2-0.3 mm long, 0.5-3 mm apart, white; lateral branchlets 2-2.5 cm in diameter, brown, sharp conic spiny right up to the leaves; leaves 1-1.2 m long, 18-22 mm wide, thin, coriaceous, above dark olive-green, below pale green and glaucous, gently curved, not breaking across, above with a broad V-shaped furrow occupying the middle half, the lateral quarters parted but horizontal, near the apex the two pleats sharply serrulate above; at midsection with 21 parallel secondary veins in each half, no tertiary cross veins, blade ligulate, narrowing near the tip to a trigonous subulate apex, this 10 cm down 6-10 mm wide, the base unarmed and amplexicaul, white, the margins near the base beginning at 15 cm with prickles 0.5-1.2 mm long, 4-10 mm apart, from serrulate to subulate, ascending, white, brown-tipped; midrib below unarmed to the middle or beyond; at midsection the margins with serrulations 0.2-0.9 mm long, 2-4 mm apart, white; the midrib below unarmed or with serrulations 0.1-0.2 mm long, 7-12 mm apart, white; on the subulate apex the margins and midrib below with serrulations 0.3-0.5 mm long, 2-3 mm apart, white; pistillate inflorescence not seen, but reported to be "on the small, lateral branchlets, spicate, yellow." Phalanges 20-22 mm long, 10-15 mm wide, 8-11 mm thick, obovoid, compressed, 4-7-celled, upper $\frac{1}{2}$ of body free; styles 6-7 mm long, acicular, outward arcuate, borne from a short conic base; stigmas 6-7 mm long, linear, proximal, brown, papilllose; endocarp in upper $\frac{3}{4}$ of body, bony, brown, the lateral walls 1-1.5 mm thick, the inner surfaces dark brown, smooth, shining; seeds 3.5-5 mm long, ellipsoid; apical mesocarp 3 mm long, sparse, with strong longitudinal fibers; basal mesocarp fibrous and fleshy.

**HOLOTYPUS:** Malagasy Republika, Andasibe, ligne Cap Est, 20 km S of Antalaha, in remnant of coastal forest, infrequent, 5 m alt, 6 Sept. 1961, H. St. John 26,571 (BISH).

**DISCUSSION:** *P. columnaris* is a member of the section *Acanthostyla*, as is its closest relative, *P. mangokensis* Martelli, a species with the drupes 12-15 mm long, 7-9 mm wide, the body ovate-oblipyramidal and 9-11 mm long; styles 1-3, and 4-5 mm long; endocarp "ad basim drupae sita"; terminal leaves 1.4-1.6 m long, 8 cm wide; leaves of lateral branchlets 80 cm long, and 1-1.4 cm wide. *P. columnaris* has the drupes 20-22 mm long, 10-15 mm wide, the body 14-15 mm long, broad obovoid; styles 6-7 mm long; endocarp in the upper $\frac{3}{8}$; terminal leaves 2 or more meters long, 24 cm wide; leaves of the lateral branchlets 1-1.2 m long, and 1.8-2.2 cm wide.

The new epithet is the Latin adjective *columnaris*, columnar, and is descriptive of the shape of the crown of the tree.

**Pandanus pluriloculatus** sp. nov. (sect. *Acanthostyla*)

**Figs. 248, 249, 250a, b.**

**NOM. VERN.:** "fandran."

**DIAGNOSIS HOLOTYPE:** Arbor 22 m alta 30 cm diametro, cortice obscure brunneo cum spinis conicis, radicibus fulturos plurumque nullis, corona anguste cylindrica in apice cum spiris tribus foliarum grandium sed infra cum ramulis multis brevibus aquilibus cum foliis multis angustioribus et fructibus, foliis terminalibus 1.35-1.6 m longis 10-14 cm latis crassis coriaceis V-sulcatis et proxima apicem 2-plicatis in sectione mediai cum 79 nervis parallelsibi secundariis in dimidio quoque, in foliis vetustis siccis nervis tertii transversis conspicuis et reticulis oblongis brevibus formantibus, lamina ligulata supra olivacea infra pallide viridibus et glaucis, basi amplexicauli inermi sed ex 10 cm marginibus cum aculeis 1-2.5 mm longis 2-5 mm separatis subulatis rectis vel arcuatis albis, midnervo infra ex 19 cm cum aculeis 1 mm longis 3-10 mm separatis subulatis adpressis reflexis fragilibus, in sectione mediai marginibus cum aculeis 1-2 mm longis 1-2.5 mm separatis crassse subulatis albis valde adscendentibus, midnervo infra cum aculeis 0.5-1 mm longis 2-4 mm separatis subulatis fragilibus albis adpressae adscendentibus, in
Fig. 248. *Pandanus pluriloculatus* St. John, from holotype. 

a, Fruiting lateral branchlet, \( \times \frac{1}{3} \); 
b, leaf base of same, lower side, \( \times 1 \); 
c, leaf middle of same, lower side, \( \times 1 \); 
d, leaf apex of same, lower side, \( \times 1 \); 
e, leaf apex of same, upper side, \( \times 1 \).
apice marginibus et midnervo infra cum serrulis 0.2–0.3 mm longis 0.5–1.5 mm separatis albis, ramulis lateralisibus cum foliis 71–83 cm longis 15–16 mm latiss coriaceis supra obscure olivaceis infra viridibus et glaucis supra midnervum profunde V-sulcatibus partibus lateralisibus quadrangularibus horizontalibus et cum plicis duobus et eis per sectionem ultimum supra subulato-serratis, in sectione mediiali cum 22 nervis paralleli et secundariis nervis tertiiis nullis lamina ligulata sed in apice subulato contracta eo in puncto 10 cm ex apice 12 mm lato, marginibus ex 8.5 cm cum subulato-serrulis 0.3–0.8 mm longis 2–3 mm separatis albis, midnervo ex basi ad medium inermi, in sectione mediiali marginibus et midnervo infra cum aculeis 0.2–0.4 mm longis 1.5–4 mm separatis subulatis, in apice marginibus et midnervo infra cum serrulis 0.2–0.3 mm longis 0.5–1 mm separatis albis, infructescentia in ramulis lateralisibus terminalibus, pedunculo 8–14 cm longo 1 cm diametro 3-laterato rhachidi 3–5 cm longo, syncaapiis 3–4 congestis 5–9 cm longis 5–6.5 cm diametro plerumque ellipsoideis sed eis minoribus ellipsoideis vel globosis illis terminalibus maximis et cum 86–92 phalangibus in seriebus plerumque verticalibus, eis minoribus cum 32 vel pluriis phalangibus, phalangibus 27–29 mm longis cum stylis 14–20 mm latis 11–14 mm crassis cuneatis parte ¼ supra libera (5)–6-angulosis laevibus lucidis apice depresse conico et marginibus canaliculatis lateribus planis, stylis (2)–3–5–(6) et 7–9 mm longis subulatis vel acicularibus in centro congregatis basi conica viridi 1–2 mm alta, stigmatibus 5–8 mm longis lineariis brun- neis papillosis centripetalibus ad apicem non extenti, endocarpio mediiali osseos brunneo bruneo 10 mm longo lateribus lateralisibus 2 mm crassis infra laevibus et lucidis, seminibus 5 mm longis ellipsoideis, mesocarpio apicali medulloso et cum fibris longitudinalibus, mesocarpio basali fibroso et carnoso.

**DIAGNOSIS OF HOLOTYPE:** Tree, 22 m tall, 30 cm in diameter, bark brown, conic spiny; prop roots mostly none; crown narrowly cylindric, the apex with three spirals of large leaves,
but below them most of the length of the trunk with many, equal, short branchlets with numerous narrow leaves and spikes of fruit; terminal leaves 1.35–1.6 m long, 10–14 cm wide, thick, coriaceous, with a V-shaped furrow above the midrib and near the tip the sides pleated, at midsection with 79 parallel secondary veins in each half, on old dry leaves the tertiary cross veins well marked and making short oblong meshes, blade ligulate, above olive-green, below pale green and glaucous, near the base beginning at 10 cm the margins with prickles 1–2.5 mm long, 2–5 mm apart, subulate, straight or arcuate, white; the midrib below beginning at 19 cm with prickles 1 mm long, 3–10 mm apart, subulate, reflexed, appressed, weak; at midsection the margins with prickles 1–2 mm long, 1–2.5 mm apart, thick subulate, closely ascending, white; the nearby midrib below with prickles 0.5–1 mm long, 2–4 mm apart, subulate, appressed ascending, white, weak; on the subulate apex the margins and midrib below with serrations 0.2–0.3 mm long, 0.5–1.5 mm apart, white; the narrow leaves of the lateral branchlets 71–83 cm long, 15–16 mm wide, coriaceous, above dark olive-green, below pale green and glaucous, the center half a deep V-shaped furrow above the midrib, the lateral
quarters horizontal and with two pleats that for the last few centimeters are subulate-serrate above, at midsection with 22 parallel secondary veins in each half, no tertiary cross veins, blade ligulate but contracted into a trigonous subulate apex which 10 cm down is 12 mm wide; near the base beginning at 8.5 cm the margins with subulate-serrulations 0.3–0.8 mm long, 2–3 mm apart, white; the midrib below unarmored to near the middle; at midsection the margins and midrib below with prickles 0.2–0.4 mm long, 1.5–4 mm apart, subulate; on the subulate apex the margins and midrib below with serrulations 0.2–0.3 mm long, 0.5–1 mm apart, white; the apex short subulate, and at the point 10 cm down 12 mm wide; the leaves of juvenile plants 3.63 m long, 18 cm wide; infructescence terminal on lateral branchlets; peduncle 8–14 cm long, 1 cm in diameter, 3-sided; rhachis 3–5 cm long; syncarps 3–4, crowded, 5–9 cm long, 5–6.5 cm in diameter, mostly ellipsoid, but the smaller lower ones ellipsoid to globose, the terminal one the largest, and this one bearing 86–92 phalanges in mostly vertical rows, the smaller lower syncarps with as few as 32 phalanges; phalanges 27–29 mm long (including the style), 14–20 mm wide, 11–14 mm thick, wedge-shaped, upper ⅔ of body free (⅛ free including style), on the free apex the center depressed conic, its sides arising from a shallow depression or canal within the obtuse rim, (5)–6–angled, the surface smooth, shiny, the sides flat; the (2)–3–5–(6) styles 7–9 mm long, subulate or acicular, irregularly grouped near the center; green conic style base 1–2 mm high; stigma 5–8 mm long, linear, brown, papillose, centripetal, not running to the apex; endocarp median in the body, bony, brown, 10 mm long, the lateral walls 2 mm thick, the inner surfaces smooth, shining; seeds 5 mm long, ellipsoid; apical mesocarp of pith and longitudinal fibers; basal mesocarp fibrous and fleshy.

**DISCUSSION:** *P. pluriloculatus* is a member of the section *Acanthostyla*, as is its closest relative, *P. pseudobathyiei* Pic. Ser., which has the pistillate spadix 25–35 cm long, 5–7 mm in diameter; syncarps 2–3, subglobose, 4–6.5 cm long, 3.5–5.5 cm in diameter; phalanges 1–(2–4)-celled, 26 mm long, 11–17 mm wide; endocarp in upper ⅔ and 14 mm long; and the leaves of the lateral branchlets 1 m or more in length. *P. pluriloculatus* has the peduncle 8–14 cm long, 1 cm in diameter; syncarps 3–4, mostly ellipsoid, but some lower ones globose, 5–9 cm long, 5–6.5 cm in diameter; phalanges (2)–3–5–(6)-celled, 27–29 mm long, 14–20 mm wide; endocarp median, 10 mm long; and the leaves of the lateral branchlets 71–83 cm long.

The new epithet is formed from the Latin *plur*., many; *loculatus*, with locules or carpels, and is given with reference to the more numerous locules of the compound ovary.

**Section Dauphinensis**

*Pandanus centrifugalis* sp. nov. (sect. *Dauphinensis*)

Figs. 251, 252, 253 top, left and right

**NOM. VERN.:** "hofa."

**DIAGNOSIS HOLOTYPE:** Arbor 10 m alta 20 cm diametro, corona lata, cortice bruneo cum spinis conicis multis, ramulis 8.5 cm diametro, cicatricibus foliarum 6 mm altae, radicibus fulturosis nullis vel paucis et 1 m longis 2.5 cm diametro pallide brunei cum spinis parvis remotis conicis breviis, foliis 1.58–1.65 m longis 9–11.6 cm latis crassiter coriaceis sensim curvatis sed non fractis excuditis supra olivaceis infraviridibus supra midnervum sulcatis anguste V-formatis sine pilicis in sectione mediiali cum 58 nervis parallelis secundarius in dimidio quoque nervis tertii evidentis solum in basi laminis ligulato-gladiformatis in apice trigono crassiter subulato diminuentibus eo 10 cm ex apice 6–14 mm lato basi amplexicaulis inerimi alba et cum extensionibus lateraliibus 15–20 cm longis 1–1.5 cm latis integris membranaceis, marginibus ex 15–20 cm cum spinis 4–10 mm separatis deltoideis ascendentibus albis opaquis cum apicibus subulatis bruneiis spinis biformatis majoribus 6–8 mm longis minoribus 3–5 mm longis, midnervo infra ex 25 cm cum spinis 3–4 mm longis 3–12 mm separatis inferioribus reflexis basibus latiter conicis apicibus subulatis alteris ascendentibus, in sectione mediiali marginibus cum spinis 3–5 mm longis 4–12 mm separatis irregularibus biformatis majoribus vel minoribus latiter subulatis ascendentibus, midnervo infra cum aculeis 2.5–3 mm longis 6–15 mm separatis irregularibus arcuato-

**HOLOTYPUS:** Malagasy Republika, Andrapengy, 22 km N of Antalaha, cut-over swampy forest, 8 m alt, Sept. 7, 1961, *H. St. John* 26,572 (BISH).

**SPECIMENS EXAMINED:** Malagasy Republika, Andrapengy, same data as above, juvenile, *H. St. John* 26,573 (BISH).
Fig. 251. *Pandanus centrifugalis* St. John, from holotype. *a*, Syncarp, lateral view, × 1; *b*, bark of branchlet, × 1; *c*, bark of trunk, × 1.
FIG. 252. *Pandanus centrifugalis* St. John, from holotype. 

- *a*, Sketch of infructescence, × 8; 
- *b*, phalange, lateral view, × 1; 
- *c*, phalange, longitudinal median section, × 1; 
- *d–f*, phalanges, apical view, × 1; 
- *g*, stigmas, apical view, × 4; 
- *h*, half of leaf base, lower side, × 1; 
- *i*, leaf middle, lower side, × 1; 
- *j*, leaf apex, lower side, × 1.
Fig. 253. *Top left*, trunk of *Pandanus centrifugalis* St. John, holotype; *top right*, fruiting branch; *bottom left*, trunk and prop roots of *Pandanus columnaris* St. John, holotype; *bottom right*, trunk of same.
subulatatis compressis, in apice marginibus cum dentibus 0.7-2.5 mm longis 1-4 mm separatis irregularebus bifloris majoribus latiter arcuato-subulatis adscendentibus alicibus cum apicibus minime brunnneolis obovatis, midinerve infra cum subulato-serrulis 0.5-1 mm longis, inflorescentia foeminea terminali erecta spicata cum 9 syncarpiis in 3 seriebus, pedunculo 30 cm longo in apice 5 cm diametro clavato 3-laterato cum 2 bracteis basaliaribus foliaceis 80 cm longis 10 cm latissimae et cum bracteis binis caulinaribus caducis, rhachide 18 cm longo, syncarpiis congregatis 12-15.5 cm longis 8.5-9 cm latissimae 6-7.5 cm crassissimae ovoid-cylindricis sed latere proximo plano cum 65-71 phalangibus in seriebus verticalibus, axillaribus et fibrosis, phalangibus 3-3.5 cm longis 2-3.1 cm latissimae 1.7-2.6 cm crassissimae aurantiaco-luteis obovatis paucis sed basi longiter cuneato-opyramidalibus truncato parte 1/3 supra libera pyramidali-hemispherico (5)-6-anguloso in apice truncato vel vadoso concavo 7-10 mm lato orbiculari vel elliptico et cum (3-4)-5-7-(8) stigmatibus in margine circulli (rare cum stigmatibus unico centrali), stigmatibus 1.5-2 mm longis brunneolis papillosis horizontalibus superficialibus cordatis vel reniformibus vel cordato-ovatis plumque centrifugalibus sed paucis tangentialibus enim paucis centripetalibus, sinibus 1 mm longis profundis, endocarpio mediali osseo brunoneo lateribus laticaudatis 3-4 mm crassissimae intra laevibus et lucidis, seminibus 6-8 mm longis late ellipsoideis, mesocarpio apicali medulloso et cum fibris longitudinalibus, mesocarpio basali fibroso et carnoso.

**DIAGNOSIS OF HOLOTYPE:** Trees to 10 m tall, 20 cm in diameter; crown wide; bark brown, with numerous, sharp conic spines; branchlets 8.5 cm in diameter; leaf scars 6 mm high; prop roots none or less commonly present and up to 1 m long and 2.5 cm in diameter, light brown, with small, remote, short conic spines; leaves 1.58-1.65 m long, 9-11.6 cm wide, thick coriaceous, gently down-curved but not breaking across, dull, above olive-green, below green, narrowly furrowed above the midrib, in section V-shaped but somewhat curving towards the margin, not pleated, at midsection with 58 parallel secondary veins in each half, no visible tertiary cross veins except at the very base, blade ligulate-sword-shaped, narrowing to a stout, trigonous, subulate apex, this at 10 cm down 6-14 mm wide, the base amplexicaul, unarmed, white, and with membranous, entire, lateral flanges 1-1.5 cm wide and 16-20 cm long, at base beginning at 15-20 cm the spines 4-10 mm apart, ascending, deltoid with subulate brown tips, otherwise opaque white, of two sizes, the major ones 6-8 mm long, the smaller ones 3-5 mm long; the midrib below beginning at 25 cm with spines 3-4 mm long, 3-12 mm apart, the first several reflexed subulate from broad conic bases, the later ones ascending; at midsection the margins with spines 3-5 mm long, 4-12 mm apart, irregular, large or small, broad subulate, ascending; the nearby midrib below with prickles 2.5-3 mm long, 6-15 mm apart, flat arcuate subulate, irregular; on the subulate apex the margins with teeth 0.7-2.5 mm long, 1-4 mm apart, irregular, the smaller straight subulate and salient, white except for the slightly brown tip, the larger ones broad arcuate subulate, ascending, occasionally bidentate; the midrib below with prickles 0.5-1 mm long, 2-5 mm apart, subulate-serrations; pistilate inflorescence terminal, erect, spicate, bearing 9 syncarps attached in three rows; peduncle 30 cm long, 5 cm in diameter, claveate, in section deltoid but the angles obtuse, subtended by two basal, persistent foliaceous bracts 80 cm long, 10 cm wide, and the stalk bearing two caducous bracts; rhachis 18 cm long; syncarps crowded, 12-15.5 cm long, 8.5-9 cm broad, 6-7.5 cm thick, in profile ovoid-cylindric but the proximal face flat or nearly so, bearing 65-71 phalanges in nearly vertical rows; core fleshy and fibrous; phalanges 3-3.5 cm long, 2-3.1 cm wide, 1.7-2.6 cm thick, orange-yellow, obovoid but the base long cuneate obpyramidal, truncate, the upper 1/3 free, pyramidal-hemispheric, (5)-6-angled, the apical area truncate or shallow concave, 7-10 mm wide, circular or elliptic, (3-4)-5-7-(8)-celled, very rarely with one central stigma, normally with all on the margins of the apical circle or polygon; stigmas 1.5-2 mm long, brown, papilllose, flush, horizontal, cordate to reniform to cordate-ovate, mostly centrifugal, but some tangential, and a few centripetal, prolonged beyond the central crease is a deep sinus about 1 mm long; endocarp median, bony, brown, the lateral walls 3-4 mm thick, the inner surface smooth, shining; seeds 6-8 mm long, broad ellipsoid; apical mesocarp of solid pith, traversed by longitudinal fibers; basal mesocarp fibrous and fleshy.

**HOLOTYPE:** Madagascar, Ile Sainte Marie, Lambouantsira, 4 km S of Ambobifotra, forest remnant in cultivated fields, 4 m alt, Aug. 26, 1961, *H. St. John* 26,555 (BISH).
DISCUSSION: *P. centrifugalis* is a member of the section *Dauphimenisia*, as is its closest relative, *P. dauphimenensis* Martelli, a species with syncarps 18–20 cm long, cylindric, bearing 100 or more phalanges; endocarp submedian; leaves 12 cm or more in width, and especially above tessellate and cross-veined; near the leaf apex the midrib below with crenate-serrations 9–12 mm apart. *P. centrifugalis* has the syncarps 12–15.5 cm long, ovoid-cylindric, bearing 65–71 phalanges; endocarp median; leaves 9–11.6 cm wide, lacking cross veins except at the very base; and near the apex the midrib below with subulate-serrations 2–5 mm apart.

*P. centrifugalis* is native to the thickly settled, offshore islet, Ile Sainte Marie. It is not a littoral species, but it occurs commonly on the coastal plain of the western or leeward shore on coastal sand flats or on upland lateritic soils or on basalt gravels near to or remote from the shore. It makes a good, vigorous tree that is persisting due to its ferociously armed leaves and stems, despite the nearly complete agricultural exploitation of the land for the culture of coconut, breadfruit, clove, mango, vanilla, papaya, and truck crops. There is no remaining virgin forest, though on rough or steep slopes there are patches of vigorous secondary forest, and *Pandanus* persists better than any other tree. The fruits have a pleasant fruity smell, and their phalange bases have a pleasant fruity incipient taste, but then are irritating. Only children, rats, and other animals eat them. The dried side strips of the leaves are used to plait floor mats, baskets, hats, etc.

The new epithet is the Latin *centrifugalis*, being centrifugal, and is given in allusion to the orientation of the stigmas, which is very exceptional in the genus.

*Pandanus circularis* sp. nov. (sect. *Dauphimenisia*)

Figs. 254, 255a, 255b top

NOM. VERN.: "hofs." 

DIAGNOSIS HOLOTYP: Arbor 12 m alta 20 cm diametro, cortice obscure brunneo cum spinis conicis, ramulis in apice 10 cm diametro, radicibus fultuosos paucis 20 cm longis 1.5 cm diametro spinosis, foliis 2.35–2.6 m longis 14–15 cm latis erassiter coriaceis sensim recurvantis apicibus caducis supra olivaceis infra viridibus et glaucis in sectione V-formatis in sectione mediial cum 72 nervis parallælis secundaris in dimidio quoque nervis tertii olim ad basem evidentis lamina gladiiformis in apice trigono crassiter subulato diminuenteribus eo 10 cm ex apice 8 mm lato basi inermi amplexicaulis alba et cum extensionibus lateralibus 16–20 mm latiss 33 cm longis integris membranaceis, 26 cm ex basi marginibus cum spinis 5–6 mm longis 6–11 mm separatis crassioriter subulatis subarccuatis ascendentibus pallidis, midnervo proximo infra ex 30 cm cum aculeis 2–2.5 mm longis 5–15 mm separatis subulatis valde reflexis basi crassa, in sectione mediial marginibus cum spinis 3.5–5.5 mm longis 5–18 mm separatis arcurato-subulatus compressis albis ascendentibus, midnervo infra cum spinis simulantibus sed 12–16 mm separatis, in apice marginibus et midnervo infra cum subulato-serrulis 0.6–1 mm longis 1–2.5 mm separatis albis, infloroscentia foemina terminali erecta spicata cum 9 syncarpiis in 3 seriebus affixis, pedunculo 36 cm longo in apice 5.5 cm, diametro clavato 3-laterato in parte superiori cum 2 bracteis caducis, rhachidi 20 cm longo, syncarpiis 14–18 cm longis 9–10 cm latis 7–8 cm crassis congr egatis ascendentibus cylindrico-ovoideis sed lateri proximo compresso cum 52–78 phalangibus, axili carnoso et fibroso, phalangibus 3.5–4 cm longis 2.7–3.8 cm latis obovoides "luteis" in basi truncatis parte 3–3 supera libera oblatasa obtuso-pyramidalis (5)–6-angulosa concava ellipso apicali cum 4–9 stipmatibus (rariter stigmatem unique minori centrali), stipmatibus marginalibus 1.5–2 mm longis elliptics vel lanceolatis vel deltoideis plerumque centrifugalis sed paucis tangentialibus vel enim centripetalibus, sinibus 0.5–1 mm longis profundis, endocarpio osseoso brunneo supramediali 14 mm longo lateribus 4–6 mm crassis intra laevibus et lucidis, seminibus 8 mm longis ellipsoideis, mesocarpio apicali meduloso denso cum fibris longitudinalibus paucis, mesocarpio basali carnoso et fibroso.

DIAGNOSIS OF HOLOTYPE: Tree, 12 m tall, 20 cm in diameter; bark dark brown, with conic spines; branchlets at apex 10 cm in diameter; prop roots few, 20 cm long, 1.5 cm in diameter, spiny; leaves 2.35–2.6 m long, 14–15 cm wide, thick coriaceous, gently down-curved, all mature leaves having lost their apices, above olive green, below green and glaucous, in section V-shaped, at midsection with 72 parallel secondary veins in each half, no visible tertiary cross veins except at the very base, blade sword-shaped, narrowing to a stout trigonoan subulate apex, this 10 cm down 8 mm wide, the base unarmed and amplexicaul, white, and with membranous, entire, lateral flanges 16–20 mm wide and 33 cm long, near the base beginning at 26 cm the margins with spines 5–6 mm long, 6–11 mm apart, very stout subulate, slightly arcuate, ascending, pale; the midrib below beginning at 30 cm with prickles 2.2–5.5 mm long, 5–15 mm.
Fig. 254. *Pandanus circularis* St. John, from holotype. *a*, Phalange, lateral view, × 1; *b*, phalange, longitudinal median section, × 1; *c*, phalange, apical view, × 1; *d*, stigmas, apical view, × 4; *e*, half of leaf base, lower side, × 1; *f*, leaf middle, lower side, × 1; *g*, leaf apex, lower side, × 1; *h*, bark of trunk, × 1; *i*, branchlet, × 1.
**Fig. 255a. Pandanus circularis St. John, holotype. Left, base of trunk and prop roots; right, trunk and leaf bases.**

apart, subulate, heavy based, strongly reflexed; at midsection the margins with spines 3.5–5.5 mm long, 5–18 mm apart, flattened arcuate subulate, ascending, white; the nearby midrib below with similar spines but 12–16 mm apart; on the subulate apex the margins and midrib below with subulate-serrations 0.6–1 mm long, 1–2.5 mm apart, white; pistillate inflorescence terminal, erect, spicate, bearing 9 syncarps, these attached in three rows; peduncle 36 cm long, 5.5 cm in diameter at apex, clavate, in section deltoid, but the angles obtuse, the upper part with two caducous bracts; rachis 20 cm long; syncarps crowded, ascending, 14–18 cm long, 9–10 cm broad, 7–8 cm thick, in profile cylindric-ovoid, but the proximal face flat or nearly so, bearing 52–78 phalanges in vertical rows; core fleshy and fibrous; phalanges 3.5–4 cm long, 2.7–3.8 cm wide, said to be "yellow," obovoid, the broad base truncate, upper 1/4–1/3 free, oblate obtuse-pyramidal (5)–6angled, the apical area shallow concave, hexagonal to elliptic, bounded by a distinct rim on which are placed the 4–9 stigmas (though rarely there is a smaller, central one); marginal stigmas 1.5–2 mm long, elliptic to lanceolate or deltoid, mostly centrifugal, but a few are tangential, and rarely there is a centripetal one, the sinus a deep crack 0.5–1 mm long; endocarp bony, brown, supramedian, 14 mm long, the lateral walls 4–6 mm thick, the inner surfaces smooth, shining; seeds 8 mm long, ellipsoid; apical mesocarp of solid pith, traversed by a few longitudinal fibers; basal mesocarp fleshy and fibrous.

**HOLOTYPE:** Malagasy Republika, Farankaraina, 14 km NE of Maroantsetra, wooded sandy flat near seashore, 2 m alt, Sept. 2, 1961, H. St. John 26,565 (BISH).

**DISCUSSION:** *P. circularis* is a member of the section *Dauphinensis*, as is its closest relative, *P. erectus* St. John, a Malagasy species with the peduncle 53 cm long; phalanges 2.6–3.1 cm long, 1.5–2.2 cm wide, (2)–3–4-celled; endocarp lateral walls 1 mm thick; leaves 3.2–3.25 m long, 15–16 cm wide, at midsection with 83 parallel secondary veins in each half, and at
midsection the margins with prickles 1.5–2.2 mm long, and 5–11 apart. *P. circularis* has the peduncle 36 cm long; phalanges 3.5–4 cm long, 2.7–3.8 cm wide, 4–9-celled; endocarp lateral walls 4–6 mm thick; leaves 2.35–2.6 m long, 14–15 cm wide, at midsection with 72 secondary parallel veins in each half, and at midsection the margins with spines 3.5–5.5 mm long, 5–18 mm apart.

The new epithet is the Latin *circularis*, in a circle, a name given in reference to the placement of the stigmas on an apical circle or hexagon.


**Figs. 255b bottom, 256, 257, 261 top left.**

**DESCRIPTION FROM St. John 26,579:** Tree 3–8 m tall, 15–20 cm in diameter, branchlets several, 12 cm in diameter below the leaves and clothed for some distance with marcescent leaf bases; crown broad; bark of trunk light brown, with a few conic spines or later with a few ascending rootlets; prop roots none; leaves
FIG. 256. *Pandanus dauphinensis* Martelli in Martelli & Pic. Ser., from *St. John* 26,579. *a*, Inflorescence, \( \times \frac{1}{40} \); *b*, syncarp, lateral view, \( \times \frac{1}{3} \); *c*, phalange, lateral view, \( \times 1 \); *d*, phalange, longitudinal median section, \( \times 1 \); *e*, phalange, apical view, \( \times 1 \); *f*, stigmas, apical view, \( \times 4 \); *g*, half of leaf base, lower side, \( \times 1 \); *h*, leaf middle, lower side, \( \times 1 \); *i*, leaf apex, lower side, \( \times 1 \).
Fig. 257. *Pandanus dauphinensis* Martelli in Martelli & Pic. Ser., from St. John 26,579. *Top left*, tree in dune hollow; *top right*, tree trunk; *bottom left*, tree branches; *bottom right*, infructescence.
1.85–2.73 m long, 16–17.5 cm wide near the base where the spines begin, 10–10.5 cm wide at the middle, thick coriaceous, gently curved, but breaking across about ¼ of the way out, above olive-green, below light green, broad V-furrowed above the midrib, in the outer half the two lateral quarters horizontal but not pleated, at midsection with 70 parallel secondary veins in each half, no visible tertiary veins, blade sword-shaped, gradually tapering to the stiff, trigonous subulate apex, this at the point 10 cm down 9 mm wide, the base unarmed, white, with entire lateral flanges 25–33 cm long, 12–17 mm wide, membranous margined, beginning at 26–34 cm up the margins with spines 4–7 mm long, 5–15 mm apart, the body conic, greenish, the apex subulate, dark brown, the lower ones divergent, the next ones somewhat ascending; the midrib beginning at 40 cm up with spines 3–4 mm long, 7–12 mm apart, conic, acute, reflexed; at midsection the margins with spines of two kinds, the larger ones 3.5–5 mm long, 13–20 mm apart, arcuate heavy subulate serraee, white with brown tips, the alternating smaller ones 2–2.8 mm long, 12–17 mm apart, similar; the nearly midrib below with spines like the smaller marginal ones, 1.5–2 mm long, 6–15 mm apart; along the subulate apex the margins with subulate-serraee 1–1.9 mm long, 2–3 mm apart, and often doubly serrate; the midrib below with similar teeth 4–8 mm apart; infructescence terminal, erect, bearing 11 ascending syncarps attached in 3 rows; peduncle 46 cm long, 5.5 cm in diameter at apex, distinctly clavate, 3-sided, with a few leafy bracts, these with an entire sheathing base, then a foliaceous blade 1.63 m long, 12 cm wide at base, tapering all the way to the subulate tip, the margins and midrib below with heavy white spines; rhachis 25 cm long; syncarps crowded, 17.5–21 cm long, 6–7.5 cm in diameter, cylindrical, obtuse, but the proximal face flat or nearly so, bearing 96–145 phalanges in mostly vertical rows; core fleshy and fibrous, 15–25 mm in diameter; phalanges 22–25 mm long, 16–23 mm wide, 14–22 mm thick (in a double 34 mm wide and with 11 carpels), still green, but apparently fully grown and as large as the old, fallen ones, becoming yellow, the lower part oblong, upper ⅔ free and oblate pyramidal ovoid, 6-angled, the apical area shallow concave, 6–11 mm wide, circular or elliptic, 3–7-celled, the stigmas always on the periphery; stigmas 1.5–2 mm wide, ovate to reniform or elliptic, brown, papillose, mostly centrifugal, but rarely a few tangential or centripetal, and prolonged beyond the central crease is a deep sinus 0.5–1 mm long; endocarp inframedian, 12–15 mm long, bony, dark brown, the lateral walls 1.5–3 mm thick, the inner surfaces smooth, shining; seeds 6–8 mm long, ellipsoid; apical mesocarp of continuous pith with a few strong longitudinal fibers; basal mesocarp scant, fleshy and fibrous.

**HOLOTPUS:** Madagascar, "Est: C'est l`espèce la plus commune sur les dunes de la côte littorale de Fort-Dauphin, à Mananjary, Bas Matitanana, Oct. 1911 (Perrier de la Bathie, n°11888)." (P).

**SPECIMEN HERE DESCRIBED:** Malagasy Republica, 2 km N of Fort-Dauphin, thicket on coastal sand dunes, with "voanat" (Sapotaceae), "hily" (Helmiospis Hily), Lycium sp., and Ipomoea brasiliensis, 10 m alt, Sept. 22, 1961, H. St. John 26,579 (BISH).

**DISCUSSION:** *P. dauphinensis* is the type species of the section *Dauphinensis*. The type locality of the species is on the same coast as the collection here described in detail, but a few kilometers to the north. The two collections tally quite well, except that the holotype was described as with phalanges 3 cm long, and the syncarps 8 cm in diameter, but on the isotype (FI) the phalanges are 2.6–3 cm long. Ours are a little narrower, and the phalanges are ¼ shorter. To be sure, ours were not fully ripe, yet they seemed nearly full-sized and their seeds and endocarp were well formed. They were as large as the fallen, weathered ones on the ground. Surrounding trees of other genera were much shattered by a cyclone five months previous, but as usual the *Pandanus* trees survived in good condition. It does not seem likely that all the phalanges seen on the many trees and all the mature, fallen ones would be uniformly smaller owing to the cyclone. In ours the carpels of the lateral phalanges were from 3 to 7.

Later, when in Paris, it was possible to study
the holotype of *P. dauphinensis*, Perrier de la Bathie 11,888. This consists of a dried fruit rhachis; a piece of a leaf 20 cm long, 11 cm wide, and one half of it continuing 55 cm more; a single syncarp 18 cm long, 7 cm in diameter, cylindrical but one side flat, complete except that about 9 phalanges have been removed. The phalanges are nearly all 24–26 mm long, only one near basal one on the narrow angular side is 3 cm long. Thus, it is clear that there are no significant differences between this holotypic collection from Bas Matitana and the writer’s from Fort-Dauphin, here illustrated.

The specimen here described was in a partly sheltered habitat, in a dune hollow, 75 m back from the beach. The others on dune crests or nearer the beach were wind battered and the syncarps were smaller. They were as small as 12 cm long, and 5 cm in diameter, but they had the same elongate oblong profile.

The inhabitants regularly gather the leaves, especially the larger ones borne by young plants, for the making of mats.

**Pandanus erectus** sp. nov. (sect. Dauphinen-sia)

Figs. 258, 259

Nom. vern.: "hoafa."

**Diagnosis Holotype**: Tree 15 m tall, 25 cm in diameter; trunk erect, unbranched almost to the top, the few branches 0.5–1 m long, 15 cm in diameter, strictly ascending; bark brown, with short conic spines; prop roots few, 20 cm long, 1.5 cm in diameter, light brown, spiny; leaves 3.2–3.25 m long, 15–16 cm wide, rigid, thick coriaceous, stiffly erect, but the outer ones ⅔ breaking and pendent, olive-green above, paler and somewhat glaucous below, broadly V-furrowed above the midrib, and beyond the middle with 2 lateral pleats, the veins rather obscure but at midsection with 83 parallel secondary veins in each half, blade ligulate, gradually tapering in outer third to a stout, trigo nous subulate apex, this about 10 cm down 5 mm wide, the base amplexicaul, unarmed, white, with membranous, entire lateral flanges 38 cm long, 2 cm wide; at base beginning at 38 cm the margins with prickles 2–2.5 mm long, 3–6 mm apart, subulate, diverging, then the upper ones ascending; the midrib below unarmed for 90 cm; at midsection the margins with prickles 1.5–2.2 mm long, 5–11 mm apart, arcuate subulate, closely ascending, white, with small brown tips; the nearby midrib below with serrations 0.6–1 mm long, 3–7 mm apart, brown tipped; on the subulate apex the margins and midrib below with serrulations 0.2–0.9 mm long, 1–2.5 mm apart; infructescence terminal, erect, spicate, bearing 10 syncarps attached in three rows; peduncle 53 cm long, 6 cm in diameter at apex, clavate, 3-sided, subtended by two basal, leafy bracts 1.7 m long, 8.5 cm wide; rhachis 23 cm long; syncarps seen only as remnants; phalanges 2.6–3.1 cm long, 1.5–2.2 cm wide, 1.4–1.9 cm thick, said to be "yellow," obovoid or broadly so, the base truncate, upper ⅔ free, semiroticu-
Fig. 258. *Pandanus erectus* St. John, from holotype.  

- **a**, Phalange, lateral view, × 1
- **b**, phalange, longitudinal median section, × 1
- **c-f**, phalanges, apical view, × 1
- **g**, stigmas, apical view, × 4
- **h**, leaf base, lower side, × 1
- **i**, leaf middle, lower side, × 1
- **j**, leaf apex, lower side, × 1
lar, (5)–6-angled, the apical area concave, 6–8 mm wide, polygonal or elliptic, (2)–3–4-celled, the stigmas mostly on the margin of the apical rim; stigmas 1–1.5 mm long, elliptic, oblique, mostly centrifugal, but lacking a projected sinus; endocarp 15 mm long, supramedian, bony, brown, the lateral walls 1 mm thick, the inner surface smooth, shining; seeds 5–6 mm long; apical mesocarp sparse, with dense pith and longitudinal fibers; basal mesocarp fibrous and fleshy.

**HOLOTPUS**: Malagasy Republika, Varingohitra, 5 km S of Maroantsetra, secondary forest, with "voapaka" (*Uapaca Thouarsii*), "nanto" (Sapotaceae), and "hintsi na" (*Afzelia bijuga*), 5 m alt, 3 Sept. 1961, H. St. John 26,567 (BISH).

**SPECIMENS EXAMINED**: Malagasy Republika, Varingohitra, with same data, H. St. John 26,566 (BISH).

**DISCUSSION**: *P. erectus* is a member of the

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**Fig. 259.** *Pandanus erectus* St. John, holotype. Top left, trunk and crown of tree; top right, prop roots; bottom left, trunk and bark; bottom right, infructescence with shedding phalanges.
section Dauphinensis, as is its closest relative, Pandanus centrijugalis St. John, from Ile Ste. Marie, a species which has the phalanges (3–4)–5–7–(8)–celled, 3–3.5 cm long, 2–3.1 cm wide; stigma 1.5–2 mm long; endocarp with lateral walls 3–4 mm thick; tree with wide crown; leaves 1.58–1.65 m long, 9–11.6 cm wide, at midsection with 58 parallel secondary veins in each half, and the margin beginning 15–20 cm from the base with spines 6–8 mm long. P. erectus has the phalanges (2)–3–4-celled, 2.6–3.1 cm long, 1.5–2.2 cm wide; stigmas 1–1.5 mm long; endocarp with lateral walls 1 mm thick; tree with the few branches strictly ascending; leaves 3.2–3.25 m long, 15–16 cm wide, at midsection with 83 parallel secondary veins in each half, and the margins beginning 38 cm from the base with prickles 2–2.5 mm long.

In P. erectus but few of the phalanges fall to the ground, as most are caught and held in the leaf axils. Some germinate there, and may fall to the ground when the holding leaf falls. Several examples of this were observed on the collection St. John 26,566.

The new epithet is the Latin adjective erectus, erect, and is given in reference to the strictly ascending branches.

Pandanus spicatus sp. nov. (sect. Dauphinensis)

Figs. 260, 261 top right and bottom left
 NOM. VERN.: “vacoua madik” (= Pandanus small).

DIAGNOSIS HOLOTYPE: Arbor 8 m alta 15 cm diametro cum ramis pluribus suberectis eis in apice 15 cm diametro et cum restis marcescentibus foliariis obtectis, cortice pallide brunoexcum spinis multis late conici, radicibus fulturosis nullis, folis 1.6–3.2 cm longis 15–16.5 cm latiss ligulatis crassiter coriaceis subulcidis supra obscure olivaceis infra olivaceis supera midnervum late U-sulcatis 2-plicatis in sectione mediali cum 96–97 nervis parallelis secundaris in dimidio quoque nervis tertiiis nullis lamina in apice valido trigono subulato subiter contracto eo 10 cm ex apice 18 mm lato basi amplexicali inermi rosacea, marginibus ex 21–26 cm cum spinis 3–5 mm longis 4–16 mm separatis valde subulatis ex basi conica lata ascendentibus inimis rosaceis alteris subviridibus, midnervio infra ad medium vel ultra inermi, in sectione mediiali marginibus cum spinis 3–3.5 mm longis 8–26 mm separatibus valde arcuato-subulatis compressis valde ascendentibus viridibus cum apice breve brunoexcet olime margine uno cum spinis brevioribus vel enim in parte inermi, midnervio infra in sectione mediiali vel distancia parva ultra cum aculeis 1.5–2 mm longis 7–14 mm separatibus subulatis subviridibus proxime ascendentibus, in apice marginibus et midnervio infra cum subulato-serris 0.7–1 mm longis 2–5 mm separatis, infructescenta terminali erecta cum circa 9 syncarpis in fascicula foliariun clausis et paene drupis omnibus retentis, pedunculo 20 cm longo 2 cm diametro camoso, syncarpis circa 9 cm longis et 7 cm diametro ovoides compressis cum drupis multis, eis 20–26 mm longis 10–20 mm latis 10–17 mm crassis (sed in geminis 27 mm latis et 6–7-loculatis) licet luteo cuneat et vel obvoideis 3–5-loculatis parte 2 supera libera laevibus lateribus contiguis subplanis, stigmatibus 2–2.5 mm latiss cordatis horizontalibus exproxientcentibus bruneis papillosis circa apicem congrgatam, inter stigmatem licet cum valleculis vadosis, endocarpio centrali 10 mm longo pallide brunoexc oreoso lateribus lateraliibus 1.5–2 mm crassis intra transverse rugosis et cum projectione apicali in locula omnina, mesocarpio apicali cum fibris longitudinalibus fortibus, mesocarpio basali fibroso et camoso.

DIAGNOSIS OF HOLOTYPE: Tree 8 m tall, 15 cm in diameter, with several suberect branches, these at apex 15 cm in diameter and long clothed with persistent leaf bases; bark light brown, with numerous broad conic spines; prop roots none; leaves 1.6–3.2 m long, 15–16.5 cm wide, ligulate, thick coriaceous, somewhat shiny, above dark olive-green, below olive-green, with a broad U-shaped furrow above the midrib and two lateral pleats, at midsection with 96–97 parallel secondary veins in each half, no visible tertiary cross veins, the blade abruptly narrowed to a stout trigonous subulate apex, this 10 cm down 18 mm wide, the base amplexical, unarmed, pink, but beginning 21–26 cm up the margins with spines 3–5 mm long, 4–16 mm apart, stout subulate, ascending from a broad conic base, the lowest pink, the next greenish, the midrib below unarmed to or beyond the middle; at midsection the margins with spines 3–3.5 mm long, 8–26 mm apart, heavy arcuate subulate, flattened, strongly ascending, green, with short brown tips, and not infrequently one of the margins has shorter spines or even in places is unarmed for a short span; the midrib below, beginning at or shortly above the middle, with prickles 1.5–2 mm long, 7–14 mm apart, subulate, closely ascending, greenish; near the apex the margins and midrib below with subulate-serrations 0.7–1 mm long, 2–5 mm apart; infructescence terminal, erect, bearing about 9 syncarps, concealed in the large plume of erect or ascending leaves which trap the
Fig. 260. Pandanus spicatus St. John, from holotype. 

- a-d, Phalanges, lateral view, × 1; e, phalange, longitudinal median section, × 1; f, phalange, apical view, × 1; g-h, phalanges, median transverse section, × 1; i, stigmas, apical view, × 4; j, leaf base, lower side, × 1; k, leaf middle, lower side, × 1; l, leaf apex, lower side, × 1.
Fig. 261. Top left, Pandanus dauphinensis Martelli in Martelli & Pic. Ser., fruiting branch from St. John 26,579; top right, Pandanus spicatus St. John, holotype, view of trunk; bottom left, Pandanus spicatus St. John, holotype, branch with leaf bases; bottom right, Pandanus aridus St. John, holotype, two trunk bases, with prop roots.
Section Mammillarisia

Pandanus aridus sp. nov. (sect. Mammillarisia)
Figs. 262, 261 bottom right, 264 top left and right

NOM. VERN.: "fandranana."

DIAGNOSIS HOLOTYPE: Shrub with many stems, 7 m tall, 4 cm in diameter; bark gray, sharp spiny; prop roots few, 20–30 cm long, 2 cm in diameter; leaves 35–45 cm long, 16–20 mm wide, subcoriaceous, gently curving, above dark olive-green, below pale green and glaucous, above the midrib with a narrow V-shaped furrow, otherwise nearly plane, at midsection with 17 parallel secondary veins in each half, no tertiary cross veins, blade ligulate but the outer half tapering to a trigonous, subulate apex, this 10 cm down 6.5 mm wide, the base amplexicaul, unarmed, white, but begin-
Fig. 262. *Pandanus aridus* St. John, from holotype. *a*, Fruiting branch, ×1; *b*, phalange, lateral view, ×1; *c*, phalange, longitudinal median section, ×1; *d*, phalange, apical view, ×1; *e*, stigmas, apical view, ×4; *f*, leaf base, lower side, ×1; *g*, leaf middle, lower side, ×1; *h*, leaf apex, lower side, ×1.
ning at 1.3–2 cm the margins with prickles 2–2.3 mm long, 2–12 mm apart, deltoid subulate, ascending, white with brownish tips; the midrib below beginning at 3.5–4 cm with prickles 1.3–2 mm long, 4–11 mm apart, subulate, reflexed, close, white; at midsection the margins with prickles 1–1.8 mm long, 6–15 mm apart, subulate, arcuate ascending, white; the midrib below with prickles 0.5–0.9 mm long, 7–13 mm apart, slender subulate, divergent, white; on the subulate tip the margins and midrib below with subulate serrulations 0.3–0.7 mm long, 1.5–4 mm apart; pistillate in- florescence terminal, erect, bearing a solitary syncarp; peduncle 8 cm long, 8 mm in diameter, 3-sided, leafy bracted, and at the apex with 6 marcescent bracts, the outer one 2.5 cm long, 1 cm wide, elliptic, navicular, the margins spiny fimbriate; syncarp 5.5–6 cm in diameter, globose, green, bearing 21 phalanges, these 22–25 mm long, 12–23 mm wide, 10–22 mm thick, obovoid, firmly connate, upper ⅔ free, slightly pyramidal conic, 5–6-angled, 2–4-celled, lobed about 0.5 mm deep between the apices of the carpels; stigmas 1–1.5 mm wide, cordate, dark brown, papilllose, centripetal, horizontal, slightly raised, congregate; endocarp 13–14 mm long, supramedian, brownish, bony, massive, obovoid, the lateral walls 2 mm thick, the inner surfaces pale, smooth, shining; seeds 6–8 mm long, ellipsoid; apical mesocarp scant, of pith and a few fibers; basal mesocarp fleshy and fibrous.

HOLOΤYPUS: Malagasy Republika, Ranomainty, 18 km E of Amboasary, W of Fort-Dauphin, dry arid scrub with *Euphorbia* sp., *Croton* sp., 175 m alt, Sept. 26, 1961, H. St. John 26582 (BISH).

DISCUSSION: *P. aridus* is a member of the section *Mammillaria*, as is its closest relative, *P. saxatilis* Martelli, of northern Madagascar, a species with the phalanges 23–27 mm long, the upper ⅔ free; endocarp occupying almost the whole interior of the phalange; lower bract of the inflorescence 2 cm wide; prop roots none. *P. aridus* has the phalanges 22–25 mm long, the upper ⅔ free; endocarp 13–14 mm long, slightly supramedian, occupying about ⅕ of the interior of the phalange; basal mesocarp 7 mm long; lower bract of the inflorescence 1 cm wide; prop roots few, 20–30 cm long, 2 cm in diameter.

The new epithet is the Latin adjective, *aridus*, dry, and is given with reference to the dry forest habitat.

*Pandanus connatus* sp. nov. (sect. *Mammillaria*)

*P. acuminatus* Hort. ex Wendl., Ind. Palm. 45, 1854, nomen nudum.


Figs. 263, 264 bottom left and right

NOM. VERN.: "vacoua madik" (= Pandanus small).

DIAGNOSIS HOLOTYPE: Arboriformata 10 m alta 9 cm diametro, cortice bruneo cum spinis conicos brevibus, ramulis 2.5 cm diametro, radicibus fulturosis nullis, foliis 90–109 cm longis 2–2.3 cm latis curvatis sed non fractis ligulatis subcoriaceis supra obscure olivaceis infra intense viridibus supra midnervum sil­lonatis V-formatis et in media ultima 2-plicatis in sectione mediiali cum 23–27 nervis parallelos secundarios in dimidio quoque nervis tertiiis solum in basi in tertia ultima sensim in apice trigo­nulo subulato diminuenter co in puncto 10 cm ex apice 6 mm lato basi amplexicauli inermi sed ex 6–7.5 cm marginibus cum aculeis 1.5–2.5 cm longis 3–8 mm separatis crassiter arcutuo-subulato adscendentibus albis cum apicibus bruneis, midnervo infra per 8 partem inermi, in sectione mediiali marginibus cum serrulis 0.3–0.9 mm longis 3–7 mm separatis albis cum apicibus bruneis, in apice marginibus et midnervo infra cum serrulis 0.2–0.5 mm longis 1–3.5 mm separatis albis cum apicibus bruneis, infiorescentia foeminea erecta terminali, pedunculo 8 cm longo in apice 2 cm diametro clavato trigo­nulo folioso-bracteato, bracteis superis 4–5 cm longis 2.5–3 cm latis deltoideis subulatis ciliatis papyraceis quando siccos bruneis, syncarpio solitario 9.5 cm diametro globoso cum 79 phalangibus eius 3.3–3.5 cm longis 1.6–2.1 cm latis 1.3–1.7 cm crassis conantis ob lanceolateis compressis 1–3–locu­latis 5–6-angulosis laevisibus lucidis parte ⅛ supra libera lateribus liberis subcurvatis illis contiguis planis, apicibus cum 2–3 stigmatibus cum vallecula 0.5 mm profunda subclausa, stigmatibus 1.5 mm diametro asymmetricalibus cordatis horizontalibus superficialibus pallide bruneis papillosis, endocarpio 20–23 mm longo supramediali osseo bruneo cum numeris medialisibus latis lateribus 5–6 mm crassis intra laevisibus et lucidis, seminibus 10–12 mm longis lineari-ellipsoidibus, mesocarpio apicali medulloso et cum fibris paucis, mesocarpio basali fibroso et carnoso.

DIAGNOSIS OF HOLOTYPE: Tree-like, 10 m tall, 9 cm in diameter; bark brown, with short conic spines; branchlets 2.5 cm in diameter; prop roots none; leaves arching and recurving.
Fig. 263. *Pandanus connatus* St. John, from holotype. *a*, Fruiting branch, × 1/2; *b–e*, phalanges, lateral view, × 1; *d*, phalange, longitudinal median section, × 1; *e*, phalange, apical view, × 1; *f*, stigmas, apical view, × 4; *g*, leaf base, lower side, × 1; *h*, leaf middle, lower side, × 1; *i*, secondary and tertiary veins, near the leaf base, × 4; *j*, leaf base, lower side, × 1.
FIG. 264. Top left, Pandanus aridus St. John, holotype, two trunks; top right, fruiting branch; bottom left, Pandanus connatus St. John, holotype, trunk; bottom right, fruiting branch.
not breaking across, 90–109 cm long, 2–2.3 cm wide, ligulate, subcoriaceous, above dark olive-green, below bright green, with a broad V-shaped furrow above the midrib and beyond the middle with two lateral pleats, at midsection with 23–27 parallel secondary veins in each half, with tertiary cross veins only in the sheathing base, in the outer third the blade gradually narrowing to a trigonous subulate apex which 10 cm down is 6 mm wide, the base amplexicaul, unarmed, but beginning 6–7.5 cm up the margins with prickles 1.5–3.5 mm long, 3–8 mm apart, stout arcuate subulate, ascending, white with brown tips; the midrib below unarmed to the outer third; at midsection the margins with serrulations 0.3–0.9 mm long, 3–7 mm apart, white with brown tips; on the subulate apex the margins and midrib below with serrulations 0.2–0.5 mm long, 1–3.5 mm apart, white with brownish tips; pistillate in-florescence erect, terminal; peduncle 8 cm long, 2 cm in diameter at apex, clavate, trigonous, leafy bracted, the upper bracts 4–5 cm long, 2.5–3 cm wide, deltoid, subulate ciliate, papryraceous, drying brown; syncarp solitary, 9.5 cm in diameter, globose, bearing 79 phalanges, these 3.3–3.5 cm long, 1.6–2.1 cm wide, 1.3–1.7 cm thick, connate, oblanceoloid, compressed, 1–3-celled, 5–6-angular, the surface smooth, shining, upper ⅔ free, the contiguous sides flat, the free part with gently curving surfaces, when several-celled with a narrow, almost closed valley 0.5 mm deep; stigmas 1.5 mm in diameter, asymmetrically cordate, horizontal, flush, light brown, papillose; endocarp 20–23 mm long, supramedian, bony, brown, with broad median flanges, the lateral walls 5–6 mm thick, the inner surfaces smooth, shining; seeds 10–12 mm long, linear ellipsoid; apical mesocarp of dense pith and a few fibers; basal mesocarp fibrous and fleshy.

**HOLOTYPUS:** Malagasy Republika, near Jardin Botanique, Gravirage, 6 km SW of Joffreville, Montagne d’Ambre, 1,000 m alt, native forest, 14 Sept. 1961, *H. St. John* 26,578 (BISH).

**SPECIMENS EXAMINED:** Madagascar?, C. Gaudichaud (FI, P); Madagascar, 1903, de Vilmorin (FI).

**DISCUSSION:** *P. connatus* is a member of the section *Mammillaristia*, as is its closest relative, *P. vanDamii* Martelli & Pic. Ser., a species of Madagascar which has the peduncle 18–20 cm long; phalanges 35–40 mm long, 20–28 mm wide, (2)–3–4–(5–7)-celled; endocarp 11–12 mm long, the apex irregularly convex; and the leaves 40 cm long, 2–5 cm wide. *P. connatus* has the peduncle 8 cm long; phalanges 33–35 mm long, 16–21 mm wide, 1–3-celled; endocarp 20–23 mm long, with a long, conic, central apex; and the leaves 90–109 cm long, 2–2.3 cm wide.

The binomials *Pandanus acuminatus* Hort. ex Wendl. and *Vinsonia acuminata* Gaud. ex Warb. were both nomina nuda. In the herbarium at Paris is a specimen with an original label by Gaudichaud, “Vinsonia acuminata Ch.G., mss. ?Madagascar?” It consists of six loose, somewhat eroded phalanges that well match those of *P. connatus*. A duplicate of this consists of 5½ phalanges (FI). On the voyage of La Bonite, Gaudichaud obtained most of his Madagascar specimens by gift from A. Pervillé, formerly a gardener at the Paris Jardin des Plantes, later a voyager to the Seychelles and Nosy-bé, and then a colonist in Madagascar.

The new epithet is the Latin adjective *connatus*, joined or united, and is given with reference to the connate carpels.

**Section Microstigma**

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

Figs. 265, 266.

**DIAGNOSIS HOLOTYPI:** Frutex, caule 5–7 m longo 3–4 cm diametro in media plus minusve horizontali cum radicibus fulturos multis, cortice bruneo remote breviter spinoso, ramulis 7–8 mm diametro multis, horizontalibus vel adscendentibus, radicibus futuros 2–3 m longis 2 cm diametro viridibus vel griseis micratis, foliis 28–42 cm longis 4–7 mm latis supra viridibus infra pallide viridibus cum nervis obscure viridibus in sectione mediiali cum 8–9 nervis parallelis secundariis in dimidio quoque nervis tertii nullis supra midnervum late sulcatis explicatis lamina ligulata sed parte á ultima sensim in apice 10–15 cm longo compresso subulato diminuenti eo 10 cm ex apice 2–3 mm lato basi amplexicaulis inermi in toto viridi, aculeis omnibus albis translucentibus, ex 9–10 mm marginibus cum aculeis inferioribus 0.8–1.2 mm longis 1.5–3 mm separatis obliquiter deltoidis subadscendentibus sequentibus 1.3–2 mm longis 2–6 mm separatis arcuato-subulatis adscendentibus basibus deltoidis, ex 4–5 cm midnervo infra cum aculeis 0.5–0.6 mm longis 2–5 mm separatis arcuatis subulatis adscendentibus, in sectione mediiali marginibus...
FIG. 265. *Pandanus subglobosus* St. John, from holotype. *a*, Fruiting branch, ×1; *b*, drupe, lateral view, ×1; *c*, drupe, longitudinal median section, ×1; *d*, drupe, apical view, ×1; *e*, stigma, apical view, ×4; *f*, leaf base, lower side, ×1; *g*, leaf middle, lower side, ×1; *h*, leaf apex, lower side, ×1.
Fig. 266. *Pandanus subglobocephalus* St. John, holotype. *Top left*, leaning shrub and prop roots, and photo of M. Rabonary Rajaona, ingénieur, Service des Eaux et Forêts; *top right*, prop roots; *bottom left*, trunk and fruiting branchlets; *bottom right*, fruiting branchlets.
et midnervo infra cum aculeis 0.6–1 mm longis 2.5–4 mm separatis arcuato-sululatis adscendentibus, in apice subulato marginibus et midnervo infra cum subulato-serrulis 0.3–0.6 mm longis 1.5–3 mm separatis, infructescencia terminali cum syncarpio unico, pedunculo 2–2.5 cm longo 3–4 mm diametro recto adscendenti cum bracteis terminalibus pluribus binis exterioribus cum basi 10–12 mm longis 4–10 mm latiis distenti lanceolatula naviculari lutea cum apice foliaceo 3–12 cm longo 2–2.5 mm lato in basi et subulato, syncarpio 3.5–4 cm diametro globo cum (5)–6–(7) drupis viridibus eis 16–21 mm longis 16–20 mm diametro subglobosis viridibus 1-carpellatis 3–5 angulosis parte infera cuneata cum lateribus planis parte à supera et plus libera laevi lucida; stigmati apicali horizontali 2–2.5 mm diametro orbiculari-cordato elevato pallide bruneo papilloso, endocarpio supramediiali 13–14 mm longo osseo pallido bruneo late ovoideo cum humere mediali laterali lateribus lateraliis 5–6 mm crassis intrapallide castaneo-bruneo laevi lucido, semine 5 mm longo 3 mm diametro obligeri ellipsoido, mesocarpio apicali medulloso humido, mesocarpio basali carnoso et fibroso.

**DIAGNOSIS OF HOLOTYPY:** Shrub, its main stem 5–7 m long, 3–4 cm in diameter, its vertical base usually decaying and vanishing, the middle section more or less horizontal, supported by numerous horizontal or ascending prop roots 2–3 m long, 2 cm in diameter, green to gray, muricate; leaves 28–42 cm long, 4–7 mm wide, above green, below pale green with dark-green veins, at midsection with 8–9 parallel secondary veins in each half, tertiary veins none, over the midrib with a broad, shallow furrow, then the sides gently down-curved but not pleated, blade ligulate but the outer 1/3 gradually long tapering into a 10–15 cm flattened, subulate apex, this 10 cm down 2–3 mm wide, base amplexicaul, unarmed, dark shiny green even where covered, prickles all white, translucent, at base beginning at 6–10 cm up the margins with prickles, the lowest ones 0.8–1.2 mm long, 1.5–3 mm apart, oblique deltoid, slightly ascending, then the next series 1.3–2 mm long, 2–6 mm apart, arcuate subulate from a deltoid base, ascending; beginning at 4–5 cm up the midrib below with prickles 0.5–0.6 mm long, 2–5 mm apart, arcuate subulate, ascending; at midsection the margins and midrib below with prickles 0.6–1 mm long, 2.5–4 mm apart, arcuate subulate, ascending; on the subulate apex the margins and midrib below with subulate-serullations 0.3–0.6 mm long, 1.5–3 mm apart; infructescence terminal, bearing one syncarp; peduncle 2–2.5 cm long, 3–4 mm in diameter, straight, ascending, with several apical bracts closely subtending the syncarp, the two outer ones with the base 10–12 mm long, 4–10 mm wide, expanded, yellowish, lanceolate, navicular, bearing a foliaceous tip 3–12 cm long, 2–2.5 mm wide at base, subulate; syncarp 3.5–4 cm in diameter, globose, bearing (5)–6–(7) drupes, green (perhaps always so); drupes 16–21 mm long, 16–20 mm in diameter, 1-celled, subglobose, green, 3–5-angled, the lower section cuneate with flattened sides, slightly more than upper 1/2 free, smooth, shining; stigma apical, horizontal, 2–2.5 mm in diameter, orbicular-cordate, elevated, pale brown, papillosa; endocarp supramedian, 13–14 mm long, bony, pale brown, broad ovoid, with median lateral flange, lateral walls 5–6 mm thick, within light chestnut-brown, smooth, shining; seed 5 mm long, 3 mm in diameter, oblique ellipsoid; apical mesocarp of moist pith; basal mesocarp fleshy and fibrous.

**JUVENILE PLANT (St. John 26,534):** Stem 60 cm tall, 1.5 cm in diameter; leaves 45–55 cm long, 8–10 mm wide, at midsection with 10–11 secondary parallel veins in each half; near the base the principal marginal spines 4–4.5 mm long, 9–24 mm apart; midrib below unarmed to beyond the middle.

**HOLOTYPUS:** Malagasy Republika, Amaninomy, 20 km N.E. of Majunga, 2 km inland, low scrub forest of *Terminalia* sp. and *Sideroxylon* sp., on dry sand plain, 10 m alt, Aug. 8, 1961, *H. St. John* 26,533 (*BISH*).

**DISCUSSION:** *P. subglobosus* is a member of the section *Microstigma*, as is its closest relative, *P. oligocarpus* Martelli, of the nearby plateau d’Antanimena, a species with the syncarp bearing 9 drupes; drupes 13–15 mm long, ovoid, the upper 2/3 free; endocarp in longitudinal section irregularly ovate; and the leaves 40–70 cm long. *P. subglobosus* has the syncarp with usually 6 drupes; drupes 16–21 mm long, subglobose, upper 1/2 free; endocarp in longitudinal section irregularly cruciform; and the leaves 28–42 cm long.

The new epithet is the Latin adjective, *sub-globosus*, almost spherical, and is given in allusion to the shape of the drupes.