

**ON THE GENUS *PANDANUS* (PANDANACEAE)
IN NEW CALEDONIA**

par Benjamin C. STONE

ABSTRACT : A preliminary list of species, subsections, and sections in *Pandanus* of New Caledonia is presented. Two new species, four new sections, and two new subsections are described. Seventeen species are admitted, and the probable existence of several as yet undescribed is indicated.

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The *Pandanaceae* of New Caledonia have not been revised for many years, although GUILLAUMIN in his *Flore Analytique et Synoptique de la Nouvelle-Calédonie* (1948) presented a key to the species. The last work of much significance was that by A. BRONGNIART (1875), although one new species (*P. mckeei*) was published by ST. JOHN (1967) recently. Including this, the total number of species of *Pandanus* recognized in New Caledonia is 18, but among them are four which are so incompletely known that they are extremely doubtful, and at least a few synonyms. In the ORSTOM Herbarium (NOU) there are numerous recent collections made over the past few years by the staff of that organization and other collectors. Among these specimens several are clearly undescribed species. Some of these have manuscript (unpublished) names as a result of being studied by Prof. H. ST. JOHN, of the B.P. Bishop Museum, Honolulu. Apart from these are some which were still unnamed and unclassified at the time of my visit. Two such species are herein described.

BRONGNIART's pioneer study (1875) recognized two genera within what is now generally considered the single large genus *Pandanus*. He based his genus *Barrotia* on the concepts of Ch. GAUDICHAUD, but modified GAUDICHAUD's intent by incorporating several New Caledonian plants,

evidently unknown to, or at least not included by GAUDICHAUD. BRONGNIART also accepted the genus *Bryantia* Webb in Gaudich. and extended it to include two New Caledonian species. These two genera, in BRONGNIART'S sense, cannot be maintained, but are useful at the sectional level. These, as well as some new infrageneric taxa, are discussed below.

PANDANUS

1. Sect. LOPHOSTIGMA (Brongn.) Warb.

The species pertaining to this section, from New Caledonia, are: *P. viscidus*, *P. oblongus*, *P. clandestinus* sp. nov., and *P. verecundus* sp. nov. Three other species, *P. aragoensis*, *P. sphaerocephalus*, and *P. serpentinicus*, also belong here but form a subsection of their own described below.

Subsect. LOPHOSTIGMA

1. *Pandanus viscidus* (Brongn.) Solms

Linnaea 42 : 54 (1878).

- *P. viscidus* PANCHER MS in herb., nom. nud. ex BRONGNIART, Ann. Sci. Nat., ser. 6, 1 : 287 (1875); nom. nud. ex BALF. f., J. Linn. Soc. Bot. 17 : 65 (1878). (July 31).
- *Bryantia (Lophostigma) viscida* BRONGN., loc. cit. (1875).

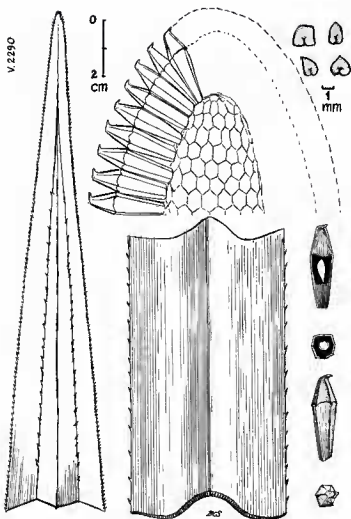
This is selected as lectotype of Sect. *Lophostigma*.

There is a difficulty in ascertaining the correct authority for the binomial. SOLMS explicitly made a combination under the generic name *Pandanus*, so I have cited SOLMS as author of the combination. However, BALFOUR fil. also published the name as " 53. *P. viscidus* Panch. in herb. " and cited BRONGNIART'S paper. BALFOUR'S publication is dated 31st July, 1878; SOLMS' paper is mentioned by BALFOUR, who gives at the end of his paper a Postscript, dated April 1878, in which he states: " Since the foregoing list was laid before the Society, Count Solms (sic) Laubach has published (Linnaea xlii.1. February 1878) his " Monographia Pandanacearum ". This appears to give the date of priority to Solms, although on the title-page the 42nd volume of Linnaea reads " Berlin 1878 u. 1879 ". In any case, BALFOUR fil. did not explicitly make a new combination but merely cited PANCHER'S unpublished name under *Pandanus*. Therefore it seems fairly clear that SOLMS is author of the transfer of the epithet which first was published by BRONGNIART under *Bryantia*.

2. *Pandanus oblongus* (Brongn.) Solms

Linnaea 42 : 55 (1878).

- *Bryantia (Lophostigma) oblonga* BRONGN., Ann. Sci. Nat., ser. 6, 1 : 288 (1875).
- *P. minda* PANCH. in herb.; non VIEILLARD, in Pl. ul. Nouv.-Caled. 24, (fide BRONGNIART).



Pl. 1. — *Pandanus clandestinus* B. C. Stone : Leaf apex, adaxial surface (left); leaf segment from midregion of leaf, abaxial surface (lower centre); portion of cephalium apex, some drupes removed, to show apex of receptacle with polygonal scars (upper centre); drupes in profile, longitudinal section, transverse section through endocarp, and top view (lower right); diversity of stigma shapes (upper right). (After holotype.)

The same reasoning as followed in the discussion above appears to disclose SOLMS as the correct author of the combination of this epithet under *Pandanus*, although he uses the form "*P. oblongus* Brongn." which is incorrect. Again, BALFOUR fil. (loc. cit., p. 54, appears also to make the combination but by his own account he had already seen SOLMS' paper, although too late to add citations in the main body of his text. Whether or not *Pandanus minda* Panch. has been published validly (outside synonymy) and whether this is different from *P. minda* Vieill. are matters as yet unsolved.

3. *Pandanus clandestinus* B. C. Stone, *sp. nov.* (Sect. *Lophostigma*).
fig. 1, 2.

A. *P. oblongo* valde affinis, sed cephalis drupisque minoribus.

Arbor minor erecta, trunco ad 5 cm diametro, basi radicibus aereis paucis brevibus ad 30 cm longis instructo. Folia linearia, ad 220 cm longa, 6 cm lata, apicem versus attenuata acuta; pagina superior (in sicco) minute reticulata, pagina inferior striatulo-venulosa, venis inter se c. 0,5 mm separatis (106-108 in toto); marginibus serrulato-denticulatis, dentibus antrorsis; basi dentibus vix 2 mm longis, 2-8 mm sese separatis; in parte media dentibus minoribus congestioribusque, ad 1 mm longis et 1-2 mm sese separatis; apicem versus dentibus 0,5-0,7 mm longis, vix 1 mm sese separatis. Foliorum apices plicis binis denticulatis per spatiam longam (30-40) cm, dentibus c. 1 mm longis 2-6 (vel plus) mm sese separatis quam dentibus marginorum adjacenti paulo robustioribus. Costa media basi dorso inermis; in parte apicali minute denticulata, dentibus antrorsis appressis vix 0,33 mm longis, 2-5 mm sese separatis; apicem versus, quam dentes marginorum adjacenti minus congestioribus sed = aequilongis. Inflorescentia fœminea (tamum nota) terminalis solitaria; cephalium oblongum subtrigonum c. 20 cm longum et 9,5-10 cm latum, e drupis c. 1000 omnibus unilocularibus compositum. Pedunculus c. 1-2 cm latus et 20-25 cm longus, apice incrassato subtrigono. Spathae interiores c. 25-30 cm longae et 10 cm latae, ovato-naviculares; exteriores foliaceae. Receptaculum c. 17-17,5 cm longum. Drupae 28-30 mm longae, 7-11 mm latae, 5-6-angulatae, truncato-fusiformae vel subclavatae, in tertia parte apicali liberae; pileo inconspicue demarcato c. 1 cm longo, apice truncato-pyramidato cum areola 3 x 3 mm; stylo proximale horizontale 1-2 x 2 mm, irregulariter deltoideo vel truncato; stigmatibus ovato-rhomboides nigro c. 2 x 2 mm, paulo infra rostram sito. Pericarpium tenue. Mesocarpium superum 5-7 mm altum cavernoso-fibrosus; inferum 6-8 mm longum fibrosus. Endocarpium in parte tertia media drupae, uniloculare, pariete c. 2 mm crasso; loculo vix 4 mm lato, 6-7 longo. Semen c. 6-7 mm longum endospermio albo.

HOLOTYPUS : New Caledonia : Mt Panié, c. 350 m. altitude, forêt humide et dense, sol humifère, 21 septembre 1970, J. M. Veillon 2290 (O.R.S.T.O.M.-Nouméa).

Endemic ; know only from the type.

This species has drupes intermediate in size between those of *Pandanus oblongus* (Panch. ex Brongn.) Balf. f. and *P. verecundus* B. C. Stone, described herein. It is clearly a member of Sect. *Lophostigma*.

4. *Pandanus verecundus* B. C. Stone, *sp. nov.* (Sect. *Lophostigma*).
fig. 3.

P. oblongo (Panch. ex Brongn) Balf. f. valde affinis, differt foliis, cephalis, drupisque sat minoribus.

Arbuscula trunco brevi usque ad 7-10 cm diametro, ramis paucis, cortice griseo-albo.



Pl. 2. — *Pandanus clandestinus* B. C. Stone : Herbarium specimen to show leaf; inset at lower left, view of cephalium. (After holotype.)

Truncus basi radicibus aereis brevibus 20-30 cm longis instructus. Folia linearia 80-240 cm longa, 2-4 cm lata, basi rubicunda, apice longe attenuata acutissima; marginibus minute serrulato-denticulatis, dentibus parvis vix 0,5 mm longis antrorsis, 0,5-3 mm sese separatis; apicem versus congestioribus minoribusque; costa media dorso basi per spatium longam (40-80 cm) inermis deinde in parte apicali minutissime denticulata dentibus valde appressis vix 0,5 mm longis, 1-3 sese separatis. Apex foliae supra biplicato plicis binis dense denticulatis, dentibus antrorsis e. 0, 3 mm longis et 1-5 mm sese separatis. Inflorescentia foeminea terminalis solitaria pedunculata, pedunculo ad 15 (-20) cm longo. Inflorescentia mascula ignota. Cephalium oblongum subtrigonum maturitate c. 20 cm longum, 7 cm latum, e drupis c. 500 compositum. Spathae exteriores c. 50 cm longae, 5 cm latae, foliaceae; interiores naviculari ovato-lanceolatae chartaceae, 22 cm longae, 6 cm latae, vel minores. Drupae omnes uniloculares, oblongae 5-6-gonae truncatae, maturitate 17 mm longae, 6-9 mm latae, pileo 3-4 mm alto, truncato-pyramidato, in vertice areolato, areola 5-6-angulata applanata paullo depressa, e. 4-5 x 3-3,5 mm. Stylus brevis proximalis 1-1,5 mm latus, stigmatibus nigro 1-1,5 mm lato, infra rostram sito. Mesocarpium superum brevissimum vix 1,5 mm altum fibrosum; inferum 4-5 mm longum fibrosum. Endocarpium magnam partem drupae occupans, apice truncatum uniloculare, densiter osseum, ferrugineum, pariete 1,2-1,8 mm crasso. Semen c. 8 x 3 mm endospermio albo.

HOLOTYPE : New Caledonia : Port Boisé, au Sud du Pic, maquis fourré à *Gymnostoma deplancheana*, sur pèridotite, sol à cuirasse. Stipe 7-8 cm de diamètre, peu ramifié, écorce blanchâtre; racines échasses 20-30 cm; feuilles à 150 x 4 cm, base légèrement rougeâtre; inflor. 20 x 7 cm. 5 octobre 1970. *J. M. Veillon 2188* (Herb. O.R.S.T.O.M. du Nouméa).

ADDITIONAL SPECIMEN : Pic du Pin vers Sud, bords du Lac, 260 m d'altitude, forêt dense, sol avec blocs de cuirasse; stipe court, 10 cm de diamètre, peu ramifié, feuilles 240 x 3,5 cm, syncarpe 17 x 7 cm dressé. 6 Aug. 1970. *J. M. Veillon 2182* (Herb. O.R.S.T.O.M. du Nouméa).

This remarkably distinct small species of Sect. *Lophostigma* is most closely related to the newly described *P. clandestinus*, though clearly also to both *P. oblongus* and *P. viscidus*. In its short drupes and compact fruit head, and rather narrow leaves, it is well characterized; nonetheless it conforms readily with the diagnostic characters of the section *Lophostigma*.

With these two discoveries by M. VELLON, the number of species of Sect. *Lophostigma* which occur in New Caledonia is brought up to four. There are also, in the Herbarium ORSTOM in Noumea, several other undescribed species represented by collections made by VELLON, by SCHMID, by JAFFRÉ, and by MCKEE. These bear manuscript species names of, and will be reported on by, Prof. ST. JOHN, Bishop Museum, Honolulu.

Subsect. *CARDIOSTIGMA* B.C. Stone, subsect. nov.

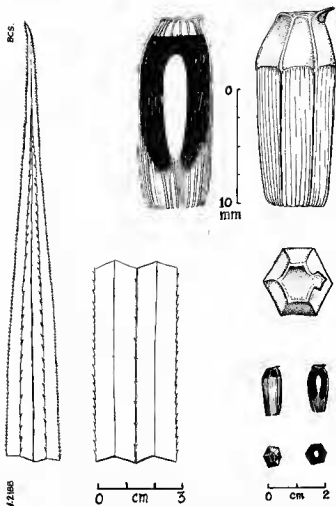
Drupae uni- vel pauciloculares, plerumque uniloculares; stigmata cardioformia, magna, infra stylo antrorse deflecto posita.

Type species : *Pandanus aragoensis*.

1. *Pandanus aragoensis* (Brongn.) Solms

Linnaea 42 : 45 (1878).

— *Barrotia aragoensis* BRONGN., Ann. Sci. Nat., ser. 6, 1 : 278 (1875).



Pl. 3. — *Pandanus vercundus* B. C. Stone : Leaf apex, adaxial surface (left); drupes in profile, longitudinal section, transverse section through endocarp, and top view (lower right); drupes much enlarged in profile and longitudinal section (upper right). (After holotype).

2. *Pandanus sphaerocephalus* (Brongn.). Solms

Linnaea 42 : 46 (1878).

— *Barrota sphaerocephala* BRONGN., *Ann. Sci. Nat.*, ser. 6, 1 : 284 (1875).

These species are much alike. Although BRONGNIART assigned them to his genus *Barrota*, I consider that they are more closely related to *P. viscidus* and *P. oblongus* than to *P. altissimus*, the lectotype species of

Sect. *Barrotia*. There is an undescribed species of this subsection, named by ST. JOHN, in the ORSTOM Herbarium, Noumea; the name indicates its occurrence on serpentine substrates.

2. Sect. **BARROTIA** (Brongn.) B. C. Stone, *stat. nov.*

Larrotia (as genus) "Gaud. (partim)" in BRONGN., Ann. Sci. Nat., ser. 5, 1 : 277 (1876). Not *Barrotia* Gaudich. nom. illegit. sine descriptio (a name based on illustrations only). As *Barrotia* Gaud., Bot. Voy. Bonite, was not monotypic but based only on "plate with analyses" it (and its species) are not legitimate names.

Carpidia in phalanges plerumque 2-8-loculares adnatae. Stigmata uniseriatim vel biseriatim disposita, sursum spectantia.

Type species : *Pandanus altissimus*.

1. **Pandanus altissimus** (Panch. ex Brongn.) Solms

Linnaea 42 : 43 (1878).

— *Barrotia altissima* BRONGN., Ann. Sci. Nat., ser. 6, 1 : 277 (1875).

— *P. altissimus* PANCH. ex BRONGN., loc. cit., in synon.

2. **Pandanus mc-keei** St. John

Pacif. Sci. 21 (2) : 282-285, fig. 238-239 (1967).

Referred by its author to Sect. *Hombronina*, to which it does not belong.

3. **Pandanus macrocarpus** (Brongn.) Solms

Linnaea 42 : 44 (1878).

BRONGNIART (Ann. Sci. Nat. 6, 1 : 279) cites "*Pandanus macrocarpus*? Vieillard, Pl. ut. N.-Caled. p. 24" as a synonym. If VIEILLARD's publication of the name is valid, it should take precedence over the name as cited above, providing the two are in fact the same; BRONGNIART seems doubtful. This problem must be looked into.

4. **Pandanus vieillardii** Martelli

Soc. Bot. Ital. Bull. : 300 (1904); Cf. VIEILLARD, Ann. Sci. Nat., ser. 4, 16 : 51 (1861).

In addition there appear to be or perhaps two undescribed species of this affinity among the specimens in the ORSTOM Herbarium at Noumea.

GAUDICHAUD's concept "*Barrotia*" included *B. monodon*, *B. diodon*, and *B. tetradon*. The first is an invalid name for an Indochinese species, the second is a species of Sect. *Rykia* akin to *P. furcatus* Roxb., while the last is a synonym of *P. compressus* Martelli, a species very near (or the same as) *P. dubius* Spreng. None of these occur in New Caledonia, and none are really closely related to any New Caledonian species. Thus, although BRONGNIART credits GAUDICHAUD, adding "partim" to the credit, it is really a case of creating a completely different taxon. In addition none of the GAUDICHAUD names, *Barrotia* or its species, are validly published, so it is better in every way to ascribe the name to BRONGNIART and limit it to New Caledonian species. Even so, some of the species included by BRONGNIART are better accommodated elsewhere, as is evident from the arrangement presented here.

3. Sect. **BRONGNIARTIA** B. C. Stone, *sect. nov.*

Drupae compressae, clavatae, pauciloculares; stigmata plerumque 2-5, uni-vel biserialiter disposita, sursum spectantia, plusminusve congestis, ovata vel cordata erecta parvae vel mediocres.

Types species: *Pandanus balansae*.

Subsect. **BRONGNIARTIA**

1. ***Pandanus balansae*** (Brongn.) Solms

Linnaea 42 : 45 (1878).

— *Barrotia balansae* BRONGN., Ann. Sci. Nat., ser. 6, 1 : 281 (1875).

2. ***Pandanus pancheri*** (Brongn.) Solms

Linnaea 42 : 46 (1878).

— *Barrotia pancheri* BRONGN., Ann. Sci. Nat., ser. 6, 1 : 283 (1875).

Subsect. **FRUTICOSI** B. C. Stone, *subsect. nov.*

Frutices. Phalanges et cephaliaquam eos subsect. typici minores; cephalia usque ad 7-9 cm longa; phalanges usque ad 2-3 cm longae.

Type species: *Pandanus reticulatus*.

3. ***Pandanus reticulatus*** Vieill.

Ann. Sci. Nat., ser. 4, 16 : 52 (1861).

— *Barrotia decumbens* BRONGN., Ann. Sci. Nat., ser. 6, 1 : 283 (1875).

— *Pandanus decumbens* (BRONGN.) SOLMS, Linnaea 42 : 47 (1878).

— *Pandanus schlechteri* WARB., Bot. Jahrb. 39 : 17 (1906).

4. *Pandanus neo-caledonicus* Martelli

Webbia 4 (1) : 416 (1913); 4 (2) : tab. 22, fig. 21-24 (1914).

There are some undescribed taxa of this section, all pertaining to the typical subsection, in the herbarium ORSTOM-Noumea, with MS names of St. JOHN. The variation appears to be more or less restricted to the dimensions of the phalanges. At present it seems difficult to discriminate distinct species, though it may be necessary to recognize further taxa when a much wider range of material is available for study.

4. Sect. VEILLONIA B. C. Stone, *sect. nov.*

Arbores, cephalis pendulis oblongis; phalangibus pluriloculatis; Vertex phalangii planus, stigmatibus plerumque 5-10, horizontalibus ovatis, sulcis intercardiorum nullis vel inconspicuis. Superficies phalangii laeve non-sulcati.

Type species: *Pandanus lacuum* St. John. (Cf. Veillon 2073).

A monotypic section. The single species, endemic to New Caledonia and known only from the Plaine des Lacs in the south-east, has the appearance of a member of Sect. *Pandanus* and also (in the fruits) resembles the species of Sect. *Australibrassia* St. John. Nonetheless it is not a member of either of these sections nor does it have particularly close relationships. It is a case of convergence, in that the plurilocular phalanges with smooth sides, the flat vertex bearing an array of rather closely spaced stigmas (mostly 5-10), without lateral sulci and without, or with extremely narrow and shallow apical sulci, and the shortly oblong cephalia, recall similar features in the two sections mentioned. There is also a resemblance to some of the Philippines species. Nonetheless I am inclined to think that this species is more related to its New Caledonian congeners than to outside species, despite these superficial similarities in fruit structure.

The section is named for J. M. VELLON, botanist with ORSTOM, collector of this and many other plants in New Caledonia.

5. Sect. BERNADIA B. C. Stone, *sect. nov.*

Arbores minores, cephalis subglobosis pendulis solitariis; phalangibus obovatois multisulcatis, sulcis longitudinalibus conspicuis ad 1,5 mm profundis, densis; stigmatibus plerumque 6-9(12), plerumque sursum spectantibus vel oppositis, plerumque biserialim dispositis.

Type species : *Pandanus bernardii* St. John (*L. bernardi*, G).

This monotypic section is limited to New Caledonia. The single species, *P. bernardii*, is remarkable for the numerous, closely parallel, comparatively deep sulci which run longitudinally from base to apex of every phalange. There is no other species in the entire genus which shows this extraordinary feature. Nevertheless from the disposition and form of

the stigmas it seems evident that this species is an offshoot of a peculiarly New Caledonian group, and its ancestry must be sought among species such as those of the present Sect. *Brongniartia* and Sect. *Barrotia*. The stigmas, deflected forward and slightly toothed, are much alike in all three of these sections.

A collection which almost surely represents this species is *McKee 21289*, from a male tree. The construction of the male flowers resembles that shown for *Pandanus macrocarpus*, by BRONGNIART, that is the apex of the staminal column of each staminal phalange is expanded into a discoid, peltate or umbrella-like surface, underneath which the very short-filamented stamens are borne, crowded and pointing outward and downward.

6. Sect. PANDANUS

1. *Pandanus pedunculatus* R. Br.

Prodr. : 34 (1810).

— *Pandanus fragrans* sensu BRONGN., Ann. Sci. Nat., ser. 6, 1 : 274 (1875), not of GAUDICHAUD.

— *P. tectorius* var. *fragrans* MARTELLI, Webbia 4 (2) : 411 (1914).

— *P. odoratissimus* L. var. (*innominatus*) BRONGN., loc. cit. : 272, excl. syn.

— *P. tectorius* var. *novo-caledonicus* MARTELLI, Webbia 4 (1) : 34, 412, tab. 1, fig. 1-2 (1913).

2. *Pandanus tectorius* var. *microcephalus* Martelli

Webbia 4 (1) : 34, 412, tab. 27, fig. 1-2 (1913).

3. *Pandanus tectorius* var. *brongniartii* Martelli

Webbia 4 (1) : 34, 410, tab. 12, fig. 6-7 (1913).

It is doubtful that *P. tectorius* and *P. pedunculatus* are distinct species but since the nomenclatural aspect of the problem is still controversial I list them separately. The two varieties, *brongniartii* and *microcephalus* are probably mere local forms of the same species.

SPECIES INCOMPLETELY KNOWN

— *Pandanus bullii* Warb., Pflanzenr. 3 (IV. 9) : 89 (1900).

— *P. decorus* Hort., Wochenschr. 13 : 166 (1870).

— *P. desmetiana* ex Guillaumin, Flore Syn. Anal. N. Caled. : 18 (1948).

— *P. fara* ex Guillaumin, Flore Syn. Anal. N. Caled. : 18 (1948).

Of these last two names I know only GUILLAUMIN'S mention—they are undoubtedly horticulturists' names without nomenclatural validity.

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