Zeitschrift: Bulletin de la Société Neuchâteloise des Sciences Naturelles
Herausgeber: Société Neuchâteloise des Sciences Naturelles
Band: 124 (2001)

Artikel: The genus Pandanus (Pandanaceae) in Madagascar (Part 7)
Autor: Huynh, Kim-Lang
DOI: https://doi.org/10.5169/seals-89552

THE GENUS PANDANUS (PANDANACEAE) IN MADAGASCAR (PART 7)

KIM-LANG HUYNH

Phanerogamy Division, Botanical Institute, University of Neuchâtel, P.O. Box 2, CH-2007 Neuchâtel, Switzerland.

Mots-clés: Afrique, Madagascar, *Pandanus*, Pandanacées, Taxonomie

Key-Words: Africa, Madagascar, *Pandanus*, Pandanaceae, Taxonomy

Résumé

Deux espèces nouvelles de *Pandanus* de Madagascar sont décrites (*P. manamboloensis*, *P. toliarensis*). Des données nouvelles sur *P. pristis* B. C. Stone et *P. tsaratananensis* Martelli sont aussi décrites.

Summary

Two new species of *Pandanus* from Madagascar are described (*P. manamboloensis*, *P. toliarensis*). New data on *P. pristis* B. C. Stone and *P. tsaratananensis* Martelli are also described.

Zusammenfassung

Zwei neue *Pandanus*-Arten aus Madagaskar werden beschrieben (*P. manamboloensis*, *P. toliarensis*). Neue Merkmale bei *P. pristis* B. C. Stone und *P. tsaratananensis* Martelli werden auch beschrieben.

INTRODUCTION

The present paper describes other unknown species of *Pandanus* sect. *Souleyetia* recently found in Madagascar as a complement to a previous paper (HUYNH, 1999) in which other species of the section were described. In order to facilitate the recognition of the new species, a key to the species of the section known up to now in Madagascar will be tentatively proposed, amending the key proposed in HUYNH (1999: 148). On the other hand, new data were obtained on *P. pristis* and *P. tsaratananensis*, also of the section, and they will also be described below.

OBSERVATIONS

1. Tentative key to the species of sect. ***Souleyetia*** *in Madagascar*

1. Syncarps solitary 2

1a. Syncarps spicate 21

2. Leaves up to 4 cm wide; marginal prickles exceptionally stout, up to 8-10 mm long
..... ***P. pristis*** B. C. Stone

2a. Leaves 0.7-2.5 cm wide; marginal prickles at most 4-5 mm long 3

3. Stigmas exceptionally large, up to 8 mm wide ..... ***P. latistigmaticus*** Huynh

3a. Stigmas at most 4 mm wide, generally 1-2 mm 4

4. Syncarp with 6-25 drupes 5

4a. Syncarp with 40 or more drupes 12

5. Transverse ambitus of the drupes at lower 1/3 or lower
..... ***P. oligocarpus*** Martelli

5a. Transverse ambitus of the drupes at middle or higher 6

6. Transverse ambitus of the drupes at the base of the free part. Syncarp with 6 drupes, or 18-25 drupes 7

6a. Transverse ambitus of the drupes above the base of the free part. Syncarp with 12 drupes 11

7. Syncarp with 6 drupes
..... ***P. subglobosus*** St. John

7a. Syncarp with 18-25 drupes 8

8. Leaves 25-30 cm long, chartaceous, subamplexicaul ..... ***P. stellatus*** Martelli

8a. Leaves 52-100 cm long, coriaceous, amplexicaul 9

9. Syncarp compressed along its axis, clearly bilaterosymmetric; core almost nil. Drupes 30-32 mm long
..... ***P. toliarensis*** Huynh

9a. Syncarp not compressed along its axis, ± radiosymmetric; core distinct and normally thick. Drupes 17-18 mm long ... 10

10. Leaves 52-57 cm long; sheath 1-1.5 cm long. Drupes with transverse ambitus above middle
..... ***P. flagellibracteatus*** Huynh

10a. Leaves 90-100 cm long; sheath 4-5 cm long. Drupes with transverse ambitus at middle ..... ***P. arenicola*** Huynh

11. Supraambital part of the drupes always wider than long. Leaves revolute in a short basal part. Peduncle 1.6-2 cm long
..... ***P. membranaceus*** Huynh

11a. Supraambital part of the drupes longer than wide, sometimes as wide as long but never wider than long. Leaves revolute from above the sheath to the apex. Peduncle 3.5-4 cm long
..... ***P. bemarahensis*** Huynh

12. Leaves 40-60 x 0.7-0.9 cm
..... ***P. dyckioides*** Baker

12a. Leaves wider 13

13. Leaves abruptly attenuate in the apical part, subcuspidate 14

13a. Leaves gradually attenuate in the apical part, not subcuspidate 15

14. Syncarp with 120-130 drupes. Peduncle ca 14 cm long
..... ***P. punctulatus*** Martelli

14a. Syncarp with 50-60 drupes. Peduncle almost nil ..... ***P. microcephalus*** Baker

15. Syncarp globose/subglobose 16

15a. Syncarp oblong/ovoid 19

16. Drupes 12 mm long; upper mesocarp ± nil. Syncarp 3.5 cm long
..... ***P. longipes*** Perrier ex Martelli

16a. Drupes 28-38 mm long; upper mesocarp distinct. Syncarp 7-8 cm long 17

17. Drupes 35-38 mm long; stigma 3 mm stipitate ..... ***P. manongarivensis*** Huynh

17a. Drupes 28 mm long; stigma sessile .. 18

18. Pileus half as high as the free part of the drupes. Leaves 2 cm caudate; pleats armed; sheath unveined longitudinally at the abaxial face. Peduncle 15 cm long
..... ***P. majungensis*** Huynh

18a. Pileus as high as the free part of the drupes. Leaves 8-9 cm flagellate; pleats unarmed; sheath veined longitudinally at the abaxial face. Peduncle 7-8 cm long
..... ***P. manamboloensis*** Huynh

19. Leaves densely alveolate at the adaxial face in the basal part (along ca 13 cm above the base) ..... ***P. tsaratananensis*** Martelli

19a. Leaves not alveolate at the adaxial face 20

20. Syncarp with 600-700 drupes. Drupes 17 x 5 mm, free by 1/4; seed locule with centre clearly inframedian. Leaf marginal prickles to 0.9 cm apart
..... ***P. isalicus*** Huynh

20a. Syncarp with ca 40 drupes. Drupes 27 x 17 mm, free by 1/2; seed locule with centre median. Leaf marginal prickles to 4 cm apart
..... ***P. ambohitantelensis*** Huynh

21. Drupes 6 mm long. Infructescence with 7-9 syncarps
..... ***P. freycinetioides*** (Gaudich.) Kurz

21a. Drupes 13 mm long or longer. Infructescence with at most 4 syncarps 22

22. Syncarps with 20-30 drupes. Drupes 13 mm long ..... ***P. oligocephalus*** Baker

22a. Syncarps with 50-80 drupes. Drupes 17 mm long or longer 23

23. Leaves gradually attenuate in the apical part 24

23a. Leaves abruptly attenuate in the apical part, subcuspidate 26

24. Leaves 115-130 x 2.5-2.8 cm. Pileus with faces convex
.....***P. neoleptopodus*** Pic. Serm.

24a. Leaves 80-110 x 1-1.8 cm. Pileus with faces concave 25

25. Upper mesocarp nil laterally. Leaves 80-110 x 1.5-1.8 cm
..... ***P. leptopodus*** Martelli

25a. Upper mesocarp distinct laterally. Leaves 80-85 x 1-1.4 cm
..... ***P. cuneatus*** Huynh

26. Endocarpic apical walls of the seed locule 5 mm high in axis. Seed locule with apex at 4/10 of the drupes, base at 9/10, and centre clearly inframedian. Leaf pleats unarmed ..... ***P. tolanarensis*** Huynh

26a. Endocarpic apical walls of the seed locule 2 mm high in axis. Seed locule with

apex at 2/10 of the drupes, base at 6/10, and centre slightly supramedian. Leaf pleats armed ..... ***P. tubulatus*** Huynh

2. ***Pandanus toliarensis*** *Huynh, sp. nova (sect.* ***Souleyetia****)*

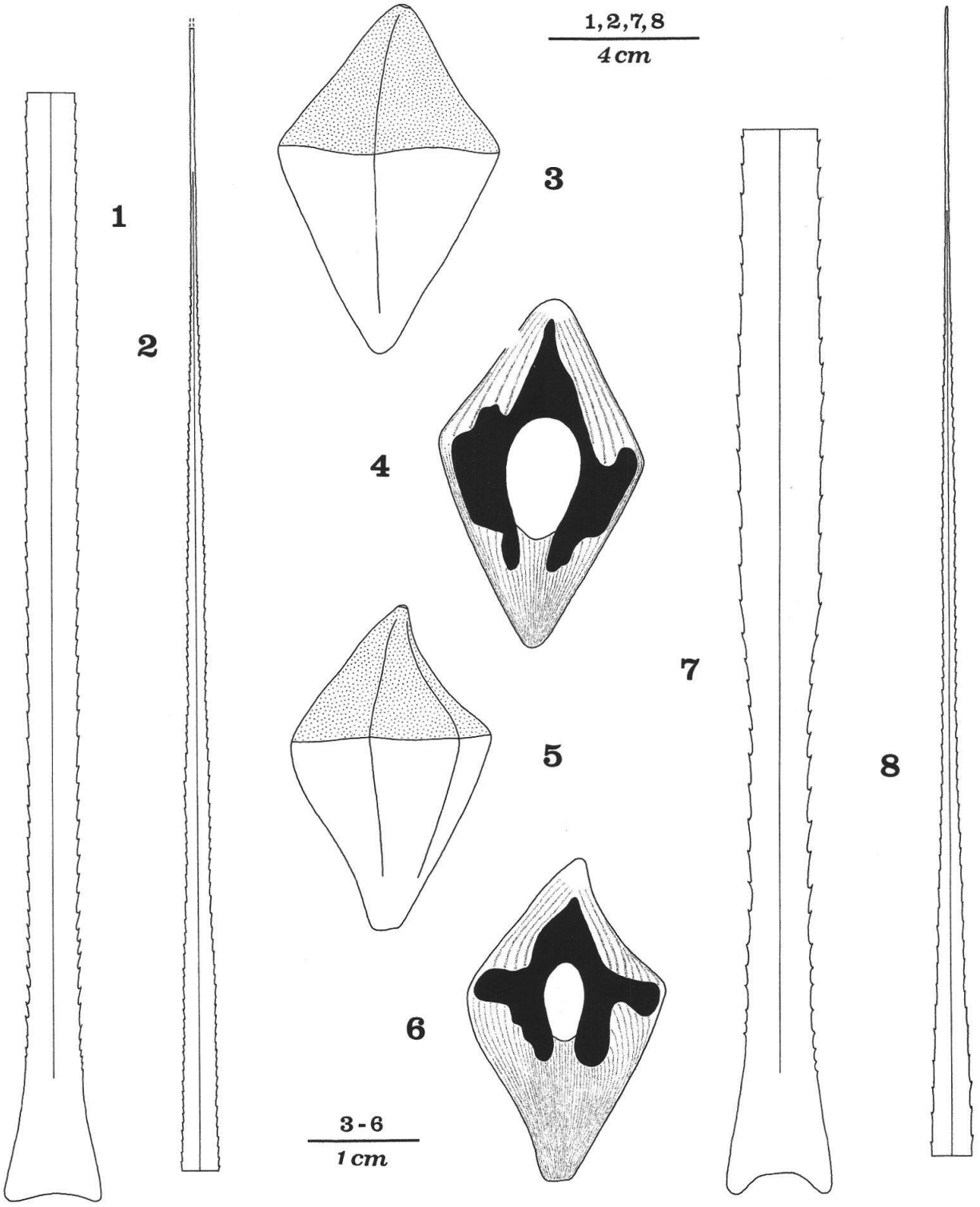
Arbor gracilis, radicibus gralliformibus suffulta. Folia infra infructescentiam 65-70 cm longa, 1.1-1.3 cm lata e medio ad supra vaginam, e circiter medio ad apicem sensim attenuata, 7-8 cm vel plus flagellata, in basi amplexicaulia; lamina in sicco coriacea, e vagina fere ad basim flagelli revoluta; plicis inermibus, visibilibus; venis longitudinalibus densis, utrinque distinctis sed transversalibus invisibilibus; denticulis marginalibus e 3.5-4 cm supra basim ad apicem praesentibus, antrorsis, inferne interdum perpendicularibus raro retrorsis, plerumque 4-9 mm inter se separatis, prope basim usque ad 1 mm longis sursum versus brevioribus; denticulis costalibus praesentibus in circiter 2/3 superis, plerumque paulo brevioribus et ± tam separatis quam marginalibus proximis; vagina 3-3.5 cm longa, 2.5-2.8 cm lata, utrinque, non alveolata, longitudinaliter nervata et non nitida prope margines, nitida et non nervata prope costam mediam. Infructescentia monosyncarpica; syncarpio globoso in aspectu laterali sed valde compresso in apicali, 7 cm longo, 7 cm lato, 5-5.5 cm crasso, 23-25 drupis praedito, nucleo complanatissimo, inferne tenuissimo vix distincto, superne nullo; pedunculo 9 cm longo, 7 mm crasso in apice deorsum versus attenuato, recto, acute trigono. Drupae (2.6-) 3 (-3.2) cm longae, (1.8-) 2 (-2.4) cm latae, 1.5-1.8 cm crassae, in 4/9 superis liberae; stigmatibus unicis, interdum 2 et aggregatis, 1.5 x 1 mm, reniformibus, horizontalibus, sessilibus; pileo pyramidali vel late pyramidali, 1.3 cm alto, subtiliter longitudinaliter striato inter angulos, basi in apice partis connatae vel paulo supra locata, angulis indistinctis interdum partim distinctis; endocarpio 22 mm alto in axe, apice prope basim stigmatis, basi ad 7 mm supra basim drupae, parte supra loculum seminalem 8-9 mm alta, solida, deltoidea; loculo seminali ellipsoideo, 11 x 6-7 mm, apice ad 9 mm infra basim stigmatis, basi 9-10 mm supra basim drupae, centro mediano; mesocarpio supero subnullo in apice sed perspicuo in partibus lateralibus, fibroso, copiose medulloso; mesocarpio infero copiose fibroso medullosoque. Fig. 1-4 & 9-11.

Typus: *Bernardi 11399* (holo-, P!; iso-, G!); Madagascar, «per viam Tulear-Ihosy ad km 44 in fruticetis torridis et aridis», alt. 250-300 m, 12 November 1967.

The collecting site, at 44 km from Tulear (now Toliara) on the route Tulear-Ihosy as field-noted above, may be located at about 23°15'S 44°01'E.

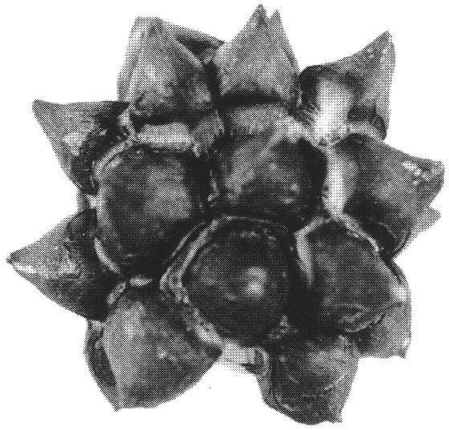
Apparently two infructescences only have been collected, one now in P!, the other in G! Both syncarps are compressed (fig. 10), distinctly bilaterosymmetric, with the core almost nil (fig. 11), one comprising 25 drupes, the other 23 drupes. Such syncarps do not seem to have been observed in any other known *Pandanus* species in Madagascar. They may therefore facilitate the recognition of *P. toliarensis*, especially as they comprise only 23-25 drupes, a feature not frequently observed in this island.

No species appear very closely related to *P. toliarensis*. This latter may be compared with *P. arenicola*, its closest species in distribution (at about 22°55'S 44°32'E) and which also has a syncarp with a low number of drupes (18 drupes). *P. arenicola* differs from *P. toliarensis* essentially in that: its drupes do not exceed 18 mm in length; its seed locules are subspheric and with a clearly inframedian centre; in particular, its syncarp is not compressed (HUYNH, 1999: 151).



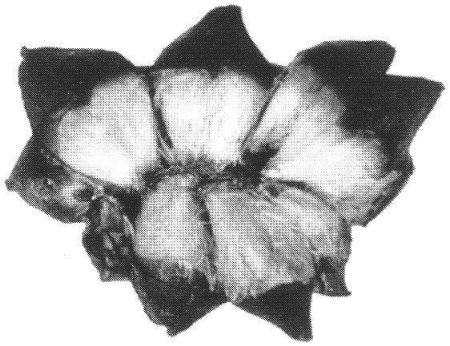
Figures 1-8: *Pandanus toliarensis* Huynh (1-4: *Bernardi 11399*, holotype) and *P. manamboloensis* Huynh (5-8: *Jongkind et al. 3564*, holotype): - **1**, **7**: Lower part of leaves flattened horizontally, viewed by the adaxial face. - **2**, **8**: Upper part of leaves flattened horizontally, viewed by the adaxial face. - 3, 5: Drupes in lateral view (dotted: pileus and free part). - **4**, **6**: Same drupes in axial section (black: endocarp).

9



10

11



Figures 9-11: *Pandanus toliarensis* Huynh (*Bernardi 11399*, holotype): - **9**: Syncarp in larger lateral view (apex at top). - **10**: Same syncarp in smaller lateral view (apex on right). - **11**: Transversal half of the same syncarp, showing the core almost nil (apex on right). - **Note**: All three figures same magnification; scale bar = 2 cm.

3. ***Pandanus manamboloensis*** *Huynh, sp. nova (sect.* ***Souleyetia****)*

Frutex ca 1.5 m altus. Folia infra infructescentiam 2-2.2 cm lata in tertia infera 1.6-1.7 cm prope basim, ut videtur 80-90 cm longa, e tertia infera ad apicem sensim attenuata, 8-9 cm flagellata, in basi amplexicaulia; lamina in sicco subcoriacea, dense striata in pagina adaxiali, partim tessellata in abaxiali; plicis fere indistinctis, inermibus; venis longitudinalibus distinctis in pagina abaxiali, invisibilibus in adaxiali; venis transversalibus indistinctis in pagina adaxiali, in abaxiali visibilibus in partibus tessellatis; denticulis marginalibus e 3-6 cm supra basim ad apicem praesentibus, prope basim in brevi spatio perpendicularibus, sursum versus antrorsis, in dimidio infero usque ad 1 (-1.5) mm longis 10-15 mm inter se separatis, interdum abortivis vel carentibus, in supero brevioribus creberrimis; denticulis costalibus praesentibus in circiter 2/3 superis, plerumque brevioribus quam marginalibus proximis sed varie separatis; vagina 3-3.5 cm longa, 3 cm lata, in pagina abaxiali non nitida et omnino longitudinaliter nervata igitur partis basalis laminae simili in aspectu, in adaxiali subnitida et omnino sed leviter longitudinaliter nervata. Infructescentia monosyncarpica; syncarpio (non viso) subgloboso, ca 8 cm diametienti (fide collectoris); pedunculo 7-8 cm longo, 5 mm crasso in apice deorsum versus attenuato, recto, trigono. Drupae (2.3-) 2.8 cm longae, (1.3-) 1.6 cm latae, (1.1-) 1.3 cm crassae, in ca 4/10 superis liberae; stigmatibus unicis, interdum 2 et aggregatis, reniformibus, horizontalibus, sessilibus, interdum subsessilibus, 2.3 x 1.5 mm; pileo 1.2 cm alto, pyramidali interdum late pyramidali, subtiliter longitudinaliter striato inter angulos, angulis superne acute prominentibus inferne minus sed distinctis; endocarpio 15 mm alto in axe, apice prope basim stigmatis, basi ad 10

mm supra basim drupae, parte supra loculum seminalem 6 mm alta, solida, deltoidea; loculo seminali ellipsoideo, 7 x 4 mm, apice ad 8 mm infra basim stigmatis, basi 11 mm supra basim drupae, centro prope medium; mesocarpio supero subnullo in apice sed distincto in partibus lateralibus, abundanter medulloso fibrosoque; mesocarpio infero copiose medulloso fibrosoque. Fig. 5-8.

Typus: *Jongkind et al. 3564* (holo-, WAG!); Madagascar, Tsingy of Bemaraha, south of Manambolo river, 19°09'S 44°49'E, alt. 50 m, 16 December 1996.

This specimen as investigated in the present study comprises no entire syncarps but separate drupes, for which reason the number of drupes in the syncarp is not known. However, comparison with other species that have similar syncarps and drupes suggests that the syncarp of *P. manamboloensis* comprises 50-60 drupes. In *P. majungensis* for example, a species of sect. *Souleyetia* that has a syncarp about 7.5 cm in diameter and drupes about 2.8 cm long 1.5-2 cm wide 1-1.5 cm thick, the syncarp comprises about 55 drupes (HUYNH, 1999: 154).

P. manamboloensis is the third species of sect. *Souleyetia* observed in the Tsingy of Bemaraha area, the other two species being *P. bemarahensis* and *P. membranaceus* (HUYNH, 1999: 147). However, it has no close relationship with these two species, but appears closest to *P. majungensis* (see under "Tentative key to the species of sect. *Souleyetia* in Madagascar"). This latter species differs from *P. manamboloensis* essentially in that: its pileus is half as high as the free part of the drupe; its peduncle is 15 cm long; its leaves are 2 cm caudate and armed on the pleats; in particular, its leaf sheath is unveined longitudinally at the abaxial face, and is therefore quite dissimilar from the blade base above it (see HUYNH, 1999: 154).

4. Further notes on ***Pandanus pristis*** *B. C. Stone (sect.* ***Souleyetia)***

P. pristis is endemic to the Ankarana massif (central position at ca 12°54'S 49°07'E). It is the Madagascan species that has leaves with marginal prickles exceptionally stout, up to 8-10 mm long (STONE, 1971: 320). This feature in particular explains why STONE (1971) readily described *P. pristis* using its staminate plant (*Bogner 351*) for type, and tentatively placed it in sect. *Mammillarisia*. Later, the pistillate plant (*Cremers 2467*) was found, whose drupes indicated that *P. pristis* belonged to sect. *Souleyetia* (STONE, 1975: 546).

Another unusual feature of *P. pristis* was recently observed on its type plant (*Bogner 351*). As seen on a fresh specimen supplied by J. Bogner from this plant, which is still being cultivated in Munich, the feature consists in a sort of striped pattern (fig. 12) on the leaf blade, especially at the lower part of the abaxial face. This pattern seems unique among the *Pandanus* species in Madagascar. It appears as being formed of short green streaks alternating with short whitish streaks. By using transverse sections of leaf blade, it was established that the green streaks corresponded to the transverse veins that had very dense chloroplasts. In the pistillate specimen *Cremers 2467* (PH!), collected on 14 August 1973, and the sterile specimen *Guillaumet 2177* (PH!), collected on 3 August 1968, the green streaks are fading away with the chloroplasts but they are still visible, after three decades. The presence of a striped pattern on the leaves of these two specimens indicates that they belong to *P. pristis*, and corroborates STONE (1971, 1975) who attributed them to this species. *Bogner 351*, *Cremers 2467*, and *Guillaumet 2177* are to date the only known collections of *P. pristis*.

Figure 12: *Pandanus pristis* B. C. Stone *(Bogner 351)*: - Type plant cultivated in Munich, showing leaves with striped pattern and stout marginal prickles; ca x 1. Photo J. Bogner.

5. Further notes on ***Pandanus tsaratananensis*** *Martelli (sect.* ***Souleyetia)***

Martelli (in MARTELLI & PICHI-SERMOLLI, 1951: 81) described the leaves of *P. tsaratananensis* as being 35-40 cm long, using the collections *Perrier 11892* and *11893*. Recently the present author had the opportunity of investigating these two collections, and found that the leaves of this species might be longer, up to 50-55 cm long.

As seen in Paris, these collections were both made in September 1912. The collection *Perrier 11892* consists of a staminate sheet, with leaves 35-40 cm long and 14-15 mm wide. Thus, Martelli (in MARTELLI & PICHI-SERMOLLI, 1951: 81) used these leaves in his description of *P. tsaratananensis*. The collection *Perrier 11893* is composed of three sheets. The first sheet comprises the upper part of a branch with leaves and a monosyncarpic infructescence; the peduncle is 5-6 cm long and 5 mm thick; the syncarp was young and partly preserved, the remnant suggesting that the syncarp comprised at least 40-50 drupes; the drupes are 6 mm long, 4 mm wide, 3.5 mm thick, and the endocarp is not yet formed; the stigmas are single, reniform and horizontal, about 3 x 2 mm, sessile, and closely applied to the pileus. The sheet was designated as

lectotype in 1964 by Harold St. John. The second sheet consists of the upper part of a branch with leaves and a staminate inflorescence. The third sheet comprises the upper part of a branch with leaves only. All three sheets show the same leaves, which are 50-55 cm long.

Since the pistillate sheet of *Perrier 11893* has been designated as lectotype for *P. tsaratananensis*, it appears of interest to describe its leaves in detail for this species to be properly recognized. These leaves are 50-55 cm long and 14-15 mm wide, from the upper third gradually attenuate to the apex, subulate, not caudate, not flagellate, imbricating and amplexicaul at the base. The blade is brown and subcoriaceous; it is distinctly alveolate along 6-7 cm above the sheath at the adaxial face; the pleats are unarmed; the longitudinal veins are distinct at both faces, but the transverse veins partially visible. The prickles are brown with a dark brown tip. The margins are armed from about 5 cm above the base to the apex; the prickles are antrorse, some of the lowermost are perpendicular; in the lower part they are up to 3 mm long and 7 mm apart, in the middle part up to 1 mm long and 6 mm apart, in the upper part up to 0.7 mm long and 5 mm apart, in the apex up to 0.5 mm long and 1-2 mm apart. The midrib is armed in the upper part along a little more than one half, with prickles generally shorter and closer than the marginal prickles at the same levels. The sheath is 5-6 cm long and 2.5-3 cm wide; the adaxial face is densely alveolate with deep alveoles up to 0.3 mm wide, and is partially veined longitudinally; the abaxial face is partially alveolate with shallow and much narrower alveoles, and is veined in the lower third.

ACKNOWLEDGEMENTS

The author expresses his thanks to the Laboratoire de Phanérogamie, Muséum National d'Histoire Naturelle Paris (P!), Herbarium Vadense (WAG!) Wageningen, Conservatoire et Jardin botaniques Genève (G!), and Academy of Natural Sciences Philadelphia (PH!), for the loan of materials; and to Mr. Josef Bogner (M!) for the fresh specimen of *P. pristis* used in the present study, and leaf samples of various species of *Pandanus* and *Freycinetia* for molecular study.

REFERENCES

HUYNH, K.-L. 1999. The Genus *Pandanus* (Pandanaceae) in Madagascar (part 3). *Candollea* 54: 145-170.

MARTELLI, U. & PICHI-SERMOLLI, R. 1951. Les Pandanacées récoltées par Henri Perrier de la Bâthie à Madagascar. *Mém. Inst. Sci. Madagascar, Sér. B, Biol. Vég.* 3 (1): 1-174.

STONE, B. C. 1971. Another calciphilous *Pandanus* from the Massif de l'Ankarana, North Madagascar (Pandanaceae). *Bull. Mus. Nat. Hist. Nat., B, Adansonia* 11: 319-323.

STONE, B. C. 1975. New and noteworthy *Pandanus* species from Madagascar collected by J.-L. Guillaumet and G. Cremers. *Bull. Mus. Nat. Hist. Nat., B, Adansonia* 14: 543-552.