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Pandanus nusbaumeri Callm. & L. Gaut. (Pandanaceae), a new species from northern Madagascar

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Abstract

CALLMANDER, M. W., L. GAUTIER & S. M. TRIGUI (2009). Pandanus nusbaumeri Callm. & L. Gaut. (Pandanaceae), a new species from northern Madagascar. *Candollea* 64: 213-218. In English, English and French abstracts.

Pandanus nusbaumeri Callm. & L. Gaut. *(Pandanaceae),* a new species from the Montagne d'Ambre (northern Madagascar), is described and illustrated. It morphologically resembles three other species from Madagascar: *Pandanus insuetus* Huynh, *Pandanus perrieri* Martelli and *Pandanus sermolliana* Callm. & Buerki. It can, however, be easily distinguished from these three taxa on the basis of several morphological characters, including the dimensions of the syncarp and peduncle, the incompletely united drupes with the pileus divided by deep apical sinuses, forming acute pyramids equal in number to the carpels, each with a thick, slightly spinescent, subvertical, prominent stigma. This species appears to be endemic to the poorly-explored leeward, western slopes of the massif, which have tropophyllous semi-deciduous forests whereas the moist evergreen forest is found in most other parts of the Montagne d'Ambre.

Key-words

PANDANACEAE – Pandanus – Madagascar – Montagne d'Ambre – Taxonomy – IUCN Red List

Résumé

CALLMANDER, M. W., L. GAUTIER & S. M. TRIGUI (2009). Pandanus nusbaumeri Callm. & L. Gaut. (Pandanaceae), une nouvelle espèce du Nord de Madagascar. *Candollea* 64: 213-218. En anglais, résumés anglais et français.

Pandanus nusbaumeri Callm. & L. Gaut. *(Pandanaceae),* une nouvelle espèce de la Montagne d'Ambre (N Madagascar), est décrite et illustrée. Elle est proche morphologiquement de trois autres espèce à Madagascar: *Pandanus insuetus* Huynh, *Pandanus perrieri* Martelli and *Pandanus sermolliana* Callm. & Buerki. Elle peut en être cependant facilement différenciée morphologiquement par plusieurs caractères, comme la dimension du syncarpe et du pédoncule, ainsi que par les drupes incomplètement soudées possédant un pileus divisé par des sinus profonds formant des pyramides aigües en nombre égal à celui des carpelles, chacune étant surmontée d'un stigmate presque spinescent, épais, sub-vertical, proéminent. Cette espèce est probablement endémique du versant ouest du massif, moins visité des botanistes, peuplé de forêts tropophylles semi-décidues alors que la majeure partie de la Montagne d'Ambre est recouverte de forêt dense humide de montagne.

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Introduction

Madagascar is one of the major centres of diversity of the genus *Pandanus* Parkinson *(Pandanaceae)* with ca. 80 species (Callmander & al., 2007) of the ca. 600 to 700 known in the Paleotropics (Stone, 1974). In the process of preparing the volume on *Pandanaceae* for the "Flore de Madagascar et des Comores", and as part of a comprehensive revision of all Malagasy *Pandanus*, a series of taxonomic treatments and notes have been published on the family (Callmander, 2001; Callmander & Laivao, 2002; Callmander & al., 2001, 2003a, 2003b, 2008; Laivao & al., 2000, 2006, 2007). In this contribution, we describe a distinctive new species from Montagne d'Ambre in the far northern part of the island.

The Montagne d'Ambre is a vast volcanic massif with an oval form, covering 2840 km^2 (Saint Ours, 1960) and culminating at 1475 m (Fig. 1). The first volcanic activity dates back to the Late Cretaceous (ca. 90 mya) with a series of eruptions in the Late Tertiary and the Quaternary (2 to 6 mya) (Saint Ours, 1960), leading to the typical geomorphological shape of the massif we know today (Brenon, 1972). The Montagne d'Ambre is mainly covered with montane evergreen humid forest (at elevations > 1000 m) that is now geographically isolated from other areas with similar vegetation but might once have been linked to the more southern evergreen humid forest during the Quaternary (Nusbaumer & al., in press). The recent discovery in the Daraina region (NE Madagascar) of several forest species that were until now considered as endemic to the Montagne d'Ambre supports this hypothesis (Nusbaumer & al., in press). On the western, leeward side of the massif, a transition to trophophyllous forests is observed. These had not received much attention until the recent intensive botanical inventory led by a team from the Conservatoire et Jardin botaniques de la Ville de Genève (Switzerland) (CJB) in collaboration with the Département de Biologie et Ecologie Végétales of the Université d'Antananarivo (Madagascar) (DBEV).

Pandanus nusbaumeri Callm. & L. Gaut., **spec. nova** (Fig. 2)

Typus: Madagascar. Prov. Antsiranana: Montagne d'Ambre, versants ouest, 12°35'00"S 49°08'22"E, 1170 m, 13.XI. 2007, fr., *Gautier, L. & al. 5217* (holo-: G!; iso-: MO!, P!, TAN!).

Haec species P. insuetus Huynh, P. perrieri Martelli et P. sermolliana Callm. & Buerki similis, sed ab eis syncarpii pedunculique dimensionibus atque drupis incomplete connatis, pileo sinibus apicalibus profundis fisso, pyramides acutas carpellorum numerum aequantes quamque in stigma crassum leniter spinescens subverticalia prominens desinentem formantibus facile distinguitur.

Tree to 8 m tall, stem prickly, 12 cm diam. *Leaves* gradually attenuate in the apical part, 100-110 cm long, 4.5-5 cm wide in the median part, 5.5-6 cm wide near the sheath; dry leaves coriaceous; auricles lacking, leaf blade densely alveolate on the abaxial face, longitudinal and transverse veins visible on both surfaces; prickles brownish; marginal prickles beginning at 12-13 cm from the base and extending to the apex, antrorse, 2-3 mm in the lower third, 2-4(-6) mm apart, strong, to 2 mm in the mid third, (5-)8-10(-14) mm apart, to 1 mm in the distal third, 2-3 mm apart; midrib armed, prickles small (< 1 mm), randomly disposed (2-20 mm apart) and slightly prominent in the basal half, then regularly disposed, spaced (2-4 mm apart) and prominent in the apical half; sheath 11-12 cm long, 6 cm wide at apex, 8-9 cm at base. *Infrutescence* terminal, the solitary syncarp erect on a straight peduncle; syncarp 11-12 × 14-15 cm, sub-spherical; peduncle 17-18 cm long, 3-3.5 cm wide at apex, 1.8-2 cm in the middle, straight, trigonous, veins visible, first bract borne 5 cm from the base of syncarp, 8 to 9 bracts on entire peduncle. *Drupes* 12-15, 35-45 mm high, (3.5-)5-6(-9) cm wide, 3.5-5.5 mm thick, (3-)4(-6) angled; carpels (3-)5-8(-14), incompletely united, free in the apical third, tapering to the base, pileus divided by apical sinuses 7-10 mm deep into acute pyramids as many as there are carpels; stigmas (3-)5-8(-14) per drupe, 3-5 mm high, thick, slightly spinescent, sub-vertical, prolonged by a sinus 0.4-0.8 mm long towards the centre of the carpel, prominent at its centre; endocarp 15-25 mm long in the centre, shortened on both sides, 30-60 mm wide, 15-20 mm away from the stigmas; seed locule oblong, 10-12 × 6-7 mm, superior and inferior mesocarp thick and fibrous. Male *flowers* unknown.

Etymology. – The species is named in honour of Louis Nusbaumer, who was a member of the team that collected the type and has always demonstrated great enthusiasm for documenting difficult groups, such as *Pandanaceae*, thereby making an important contribution to a better understanding of diversity and distribution of the family in Madagascar, especially in the complex northern part of the island.

Distribution and ecology. – Pandanus nusbaumeri is only known from a single collection on the western slopes of the Montagne d'Ambre in tropophyllous semi-deciduous forest (Fig. 1).

Conservation status. – With only 1 collection known, an AOO of 9 km^2 (calculated following Callmander & al., 2007) and only 1 subpopulation situated within the protected area of Montagne d'Ambre, *P. nusbaumeri* is assigned a preliminary status of "Vulnerable" (VU D2) (IUCN, 2008).

Notes. – Pandanus nusbaumeri is morphologically similar to three other members of the genus occurring in Madagascar: *P. insuetus* Huynh, *P. sermolliana* Callm. & Buerki and *P. perrieri* Martelli (Table 1). These four species all have in common a large infructescence and incompletely united drupes with each

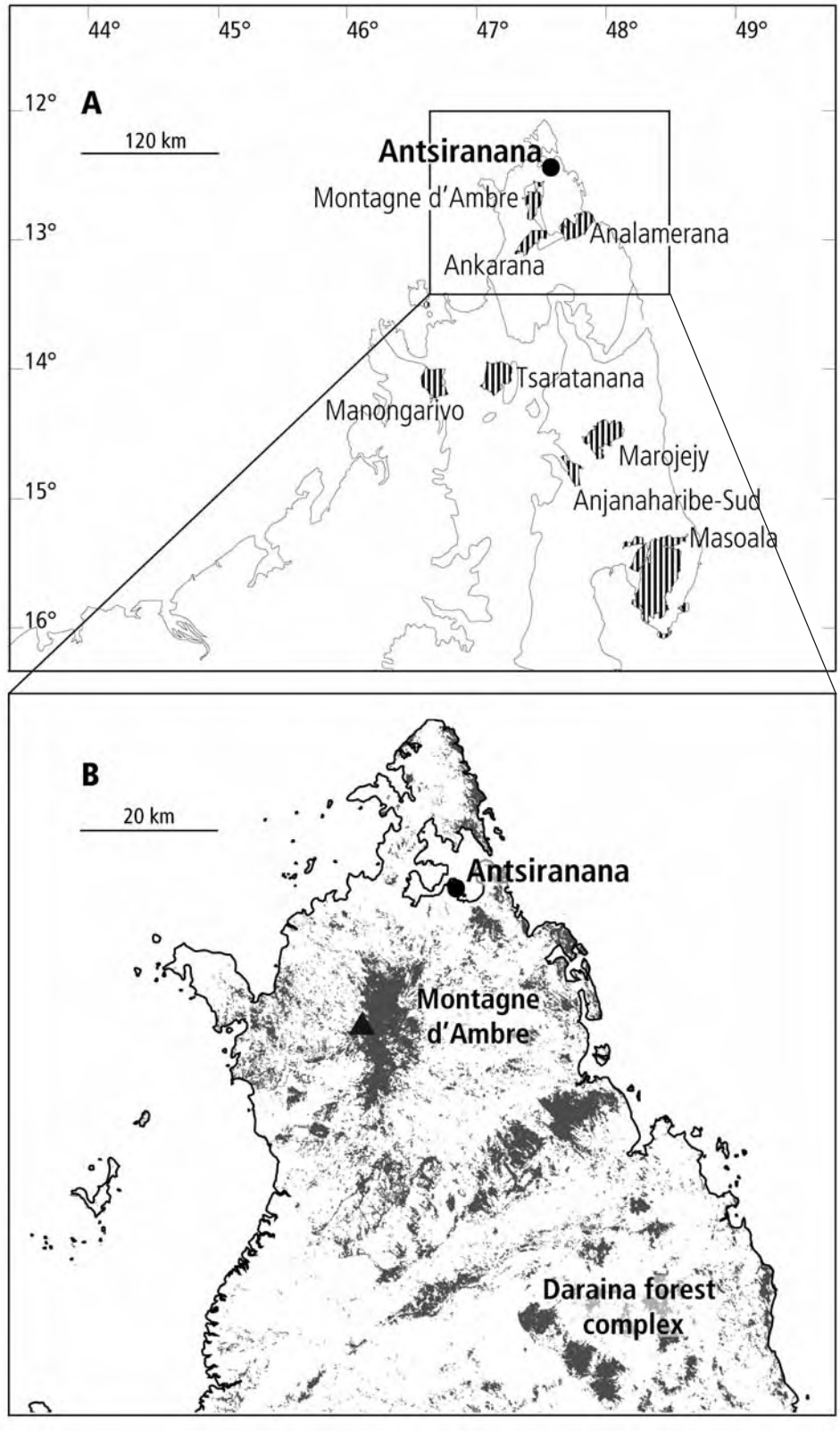

Fig. 1. – Map of Northern Madagascar. **A.** Current Protected Areas in Northern Madagascar (hatched) and frame (enlarged in B) ; **B.** Site at which the type collection was made in the Montagne d'Ambre area, with remaining primary forest in grey.

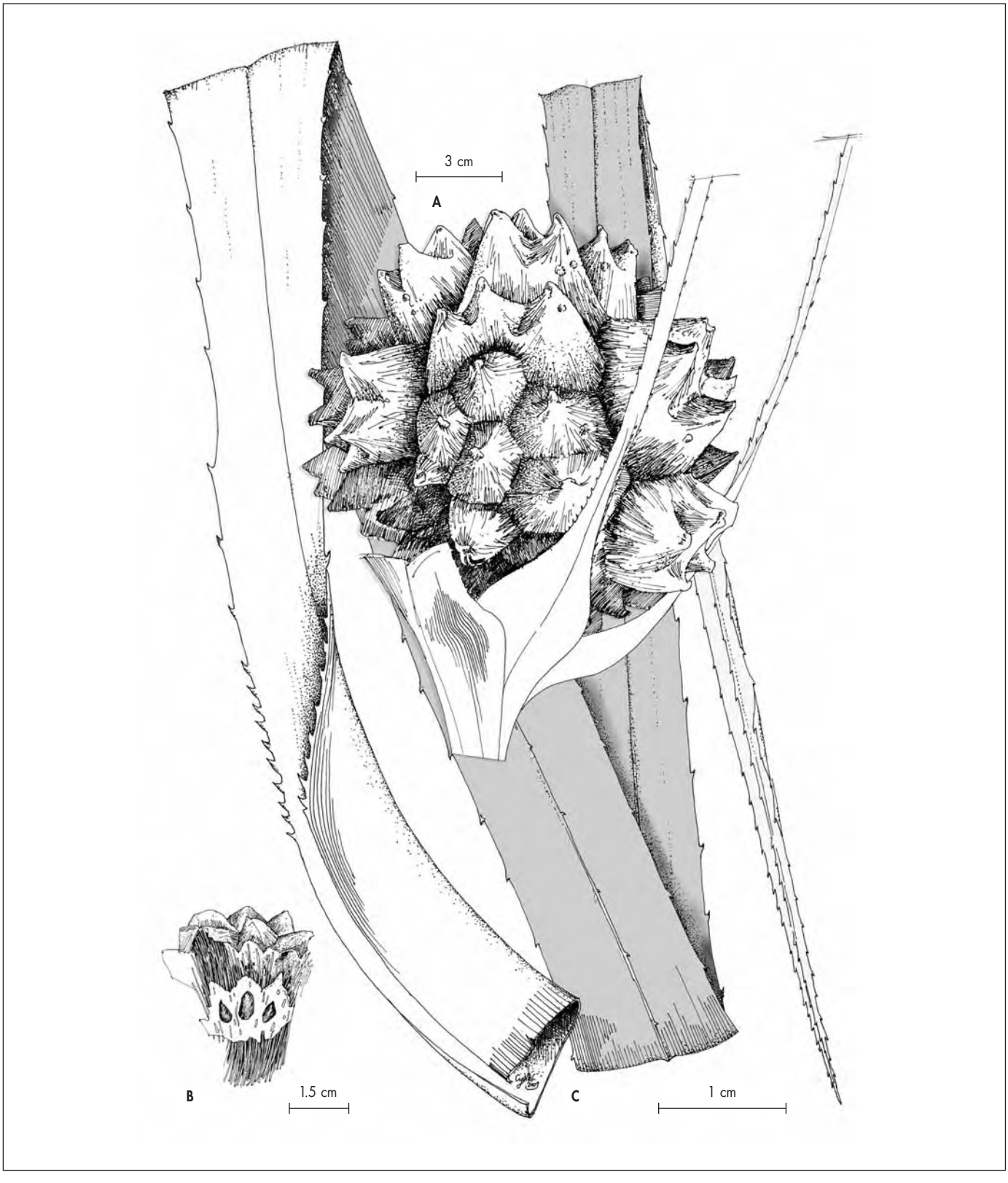

Fig. 2. – *Pandanus nusbaumeri* Callm. & L. Gaut. **A.** Syncarp; **B.** Longitudinal section of a pluriloculate drupe; **C.** Leaf.
[**A-C:** *Gautier, L. & al. 5217*, G] [Drawing: C. Chatelain]

Table 1. – Principal morphological characters differentiating the new species, *Pandanus nusbaumeri* Callm. & L. Gaut., from *P. insuetus* Huynh, *P. perrieri* Martelli and *P. sermolliana* Callm. & Buerki.

	Leaf length [cm]	Syncarp dimension [cm]	Peduncle length [cm]	Apex of the drupe	Stigma (shape and place)
Pandanus nusbaumeri Callm. & L. Gaut.	100-110	14-15 × 11-12	17-18	apex divided into acute pyramids	slightly spinescent, sub-vertical, prominent at the center of each acute pyramids
Pandanus insuetus Huynh	170(-250)	18-20 in diam.	ca. 40	centre part of the apex with dense short ridges in longitudinal rows	deltoid, sub-vertical, gathered in a circle at the apex of the drupe 6-10 mm apart from another
Pandanus perrieri Martelli	175-250	18-20 in diam.	20-25	incompletely united with flat carpels apex	flat to deltoid, sub-horizontal or rarely sub-vertical and not raised
Pandanus sermolliana Callm. & Buerki	210-240	15-16 × 13-14	17-21	incompletely united with dome-like carpels apex	sub-vertical or rarely sub-horizontal, only slightly spinescent, and raised on an incompletely merged base

carpel bearing a sub-vertical stigma. The new species can, however, be easily distinguished from the three others by several significant morphological features, as summarized in Table 1. The new species differs from *P. insuetus* and *P. perrieri* by the size of the syncarp (14-15 × 11-12 cm) and peduncle (17-18 cm long) (vs. ca. 18-20 cm in diam. and peduncle ca. 40 cm long in *P. insuetus;* ca. 18-20 cm in diam. and peduncle 20-25 cm long in *P. perrieri*), drupes incompletely united, free in the upper third, pileus divided by apical sinuses 7-10 mm deep into acute pyramids equal in number to the carpels (Fig. 3A, B) (vs. drupes united except for the centre part of the apex that has dense short ridges in longitudinal rows (LAIVAO & al., 2006: 269, Fig. 1B) in *P. insuetus*; incompletely united but with a flat apex in *P. perrieri*), stigmas slightly spinescent, sub-vertical, prominent at the centre of each acute pyramids (vs. gathered in a circle at the apex of the drupe 6-10 mm apart one another in *P. insuetus;* sub-horizontal or rarely sub-vertical, flat or not raised in *P. perrieri*) (HUYNH, 2000; LAIVAO & al., 2006). *Pandanus nusbaumeri* closely resembles *P. sermolliana*, endemic to the Galoka-Kalabenono massifs (CALLMANDER & al., 2008) ca. 130 km south of Montagne d'Ambre. The new species shares the subspherical shape and size of syncarps (ca. 15-16 × 13-14 cm in *P. sermolliana*) and leaves that lack large auricles. However, *P. nusbaumeri* can be distinguished from *P. sermolliana* by its smaller leaves (100-110 cm long with a 11-12 cm sheath vs. leaves 210-240 cm with a 16-17 cm sheath in *P. sermolliana*), drupes with an apex divided into acute pyramids (vs. drupes with dome-like pileus in *P. sermolliana*), stigmas (3-)5-8(-14) per drupe, proeminent at the apex of an acute pyramid (vs. (1-)5(-7) per drupe, laterally disposed on the margin of a slightly concave plateau in *P. sermolliana*).

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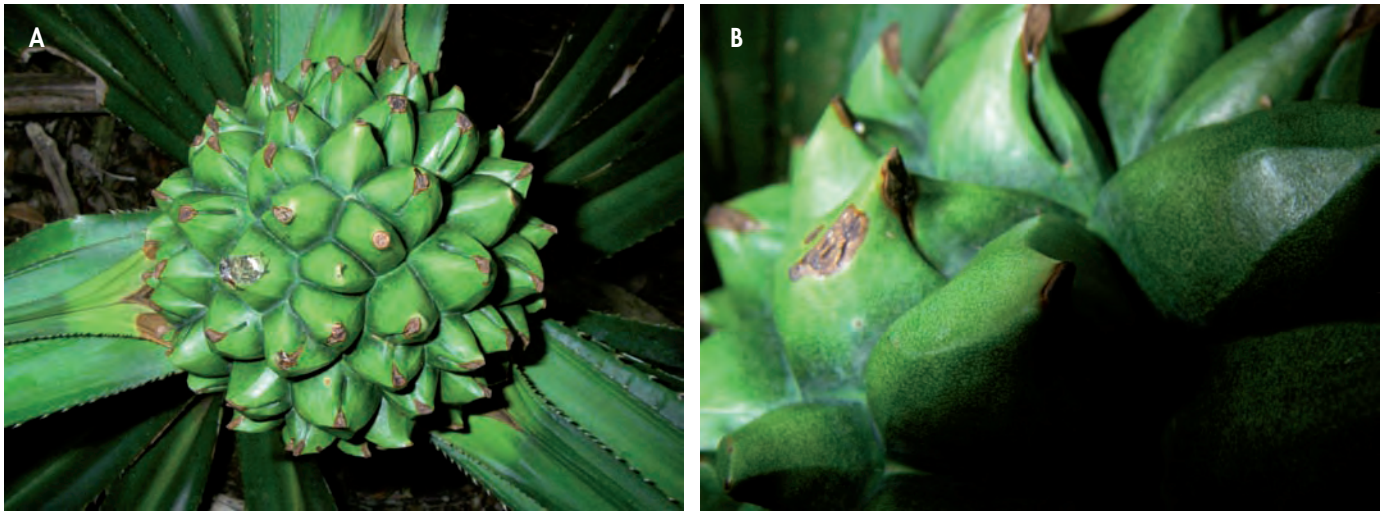

Fig. 3. – *Pandanus nusbaumeri* Callm. & L. Gaut. **A.** Infrutescence ; **B.** Detail of the stigmas.
[**A-B:** *Gautier, L. & al. 5217*, G] [Photos : L. Gautier]

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