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## A new threatened species of Pandanaceae from northwestern Madagascar, *Pandanus sermolliana*

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### Abstract

*Pandanus sermolliana* Callmander & Buerki (Pandanaceae) is described from humid forests in the Galoka mountain chain in northwestern Madagascar. The new species can be easily distinguished from the other members of the genus it most closely resembles, *P. insuetus* Huynh and *P. perrieri* Martelli, by several morphological characters including drupes that are incompletely fused, with each of the dome-like carpels separated from the base of the pileus, and stigmas that are sub-vertical or rarely sub-horizontal, slightly spinescent, and raised on an incompletely united base. This distinctive species is rare and is classified as Critically Endangered based on IUCN threat criteria.

### Keywords

Madagascar; *Pandanus*; Pandanaceae; IUCN Red List

### Introduction

The paleotropical genus *Pandanus* Parkinson comprises some 600 species of trees and shrubs divided in ten subgenera and 59 sections (Stone, 1974; Callmander & Laivao, 2003). Madagascar is one of the major centers of diversity of the genus with 90 species, all except one of which belong to subg. *Vinsonia* (Gaudich.) Warb. Only *P. perrieri* Martelli, described on the basis of fragmentary material, has been placed in subg. *Pandanus* sect. *Pandanus*.

Over the last 10 years, in preparation for a treatment of Pandanaceae for the *Flore de Madagascar and des Comores*, we have collected more than 200 specimens from all of Madagascar's phylogeographic regions as well as from the surrounding islands. We have also examined herbarium specimens from all of the major herbaria with significant holdings

of the genus from Madagascar, viz. those in Antananarivo (TAN, TEF), Florence (FI), Geneva (G), Neuchâtel (NEU), Paris (P) and St. Louis (MO), and have published a series of taxonomic revisions and notes on the group (Laivao et al., 2000, 2006, 2007; Callmander et al., 2001, 2003a,b,c; Callmander & Laivao, 2002). These studies provided the basis for assessing the conservation status of all Malagasy Pandanaceae following the IUCN Red List criteria (2001) and for identifying priority areas for conserving members of the family (Callmander et al., 2007).

During the last 3 years we have conducted an intensive botanical inventory of a poorly known portion of Madagascar's northern mountains, situated between the Marojejy and Tsaratanana massifs, aimed at improving our understanding of the region's biogeography and providing conservation recommendations of these biologically important, highly threatened forests (Guillaumet et al., in press). As part of this study, we visited the southern part of the Galoka massif, including the Kalabenono hills, a poorly explored mountain chain situated at the northern edge of the Sambirano region in northwestern Madagascar. Our field work in this area, which has thus far generated more than 500 collections, clearly indicates that the massif contains many new species, including taxa in the following families: Anacardiaceae (Randrianasolo & Lowry, in press), Araliaceae, Burseraceae, Euphorbiaceae and Lamiaceae. Among our many discoveries, we also collected a remarkable new species of Pandanaceae, which we describe here.

## Description

***Pandanus sermolliana*** Callmander & Buerki, sp. nov. TYPE: Madagascar. Prov. Antsiranana. Chaîne Galoka, Mont Galoka, Fokontany Anketrahe-Belinta, lisière de forêt dense humide, 13°35'3.3"S, 048°43'29.6"E, 820 m, 5 Feb. 2005, *M. W. Callmander, S. Buerki & S. Wohlhauser 367* (holotype, MO; isotypes, G, P, PH, TAN). Figure 1.

Haec species quoad drupas incomplete connatas ad *Pandanus perrieri* Martelli maxime accedit, sed ab eo druparum quoque carpello tholiformi ex pilei base separato atque stigmatibus subverticalibus (raro subhorizontalibus) parum spinescentibus super basem incomplete unitam elevatis distinguitur.

Tree to 5–6 m tall, stem prickly, 7–8 cm diam., erect, branched; prop roots present. Leaves gradually attenuate in the distal part, 210–240 × 4.5–5 cm in the middle, 5.5–6 cm near the sheath, apex attenuate; leaves coriaceous when dry; auricles lacking, blade densely alveolate on abaxial surface, longitudinal and transverse veins visible on both surfaces; prickles brownish; marginal prickles beginning at 15–17 cm above the base and extending to the apex, antrorse, 4 mm in the lower third, 3–8 mm apart, strong, to 2 mm in the mid third, 12–18 mm apart, to 1 mm in the distal third, 3–(6) mm apart; midrib armed, prickles small (< 0.5 mm), randomly disposed (2–7 cm apart) and slightly prominent, antrorse in the upper half, then larger (0.5–1 mm), regularly disposed, spaced (3–6 mm apart) and prominent; sheath 16–17 cm long, 6 cm wide at apex, 8–9 cm at base. Infructescence terminal, the solitary syncarp erect on a straight peduncle; syncarp 15–16 × 13–14 cm, sub-spherical; core 3 × 2 cm; peduncle 17–21 cm long, 2–2.5 cm wide at apex, 1.5–1.8 cm in the middle, straight, trigonous, veins visible, first bract borne 7 cm from the base of syncarp, 6 to 7

bracts on entire peduncle. Drupes 12 to 18, connate in the mature syncarp, 60–75 mm high, 50–70 mm wide, 35–55 mm thick, 4–(5) angled; pileus convex, distal (1/2–)1/3 free; carpels (1 to)5(to 7), incompletely united, each carpel with a dome-like apex; apical sinuses 2–5 mm deep, V-shaped; stigmas (1 to)5(to 7), 3–4 mm high; somewhat spinescent, sub-vertical, rarely sub-horizontal, raised on an incompletely united base, laterally disposed on the margin of a slightly concave plateau; endocarp 20–25 mm long in the center, shortened on both sides, 40–65 mm wide, 10 mm away from the stigmas; seed locule oblong, 15 × 7 mm, superior mesocarp narrow and compact; inferior mesocarp thick and fibrous. Male flowers unknown.

### Observations

*Pandanus sermolliana* is remarkable in having an infructescence and drupes that are among the largest known on Madagascar, comparable only with those of *P. insuetus* and *P. perrieri*. Our new species can, however, be geographically separated from *P. insuetus*, which is endemic to lowland forests of the Masoala peninsula (ca. 280 km to the east). *Pandanus sermolliana* also differs morphologically from *P. insuetus* in having no prominent auricles at the base of its leaves (vs. large auricle 17 × 14 cm in *P. insuetus*), stigmas laterally disposed on the margin of a slightly concave plateau on each carpels of the drupe (vs. gathered in a circle at the apex of the drupe 6–10 mm apart from another in *P. insuetus*) (Laivao et al., 2006).

Morphologically, *P. sermolliana* closely resembles *P. perrieri*, with which it shares incompletely fused drupes and leaves that lack large auricles. Our new species can, however, be distinguished from *P. perrieri* by having drupes that are incompletely fused, with each of the dome-like carpels separated from the base of the pileus (vs. flat and fused in the distal 1/3 of the pileus in *P. perrieri*) and stigmas that are sub-vertical or rarely sub-horizontal, only slightly spinescent, and raised on an incompletely merged base (vs. sub-horizontal or rarely sub-vertical, flat to deltoid, and not raised in *P. perrieri*).

### Distribution and habitat

Our new species is only known from the Kalabenono-Galoka massif in northwestern Madagascar, in montane forest at an elevation of ca. 500–800 m.

### Etymology

This species is named in honour of Rodolfo E. G. Pichi-Sermolli (1912–2005), who published many works on tropical African phytogeography and taxonomy, and made an important contribution to our understanding of Malagasy Pandanaceae. When one of the most influential specialists of the family, Ugolino Martelli, died in 1934, he left behind a manuscript based on the collections made by Henri Perrier de la Bâthie in Madagascar, which Pichi-Sermolli brought to completion and published in 1951. Several decades later, Stone (1975) published *P. pichi-sermollii* B. C. Stone in his honor, but that species was recently placed in synonymy under *P. guillaumetii* B. C. Stone (Laivao et al., 2007). Here we once again honor Pichi-Sermolli by describing *P. sermolliana*.

## Conservation status

*Pandanus sermolliana* has an area of occupancy of 18 km<sup>2</sup>, and comprises 2 known sub-populations, neither of which is located in a protected area. Using the methodology of Callmander et al. (2007) based on the IUCN's Red List threat criteria (2001), we therefore assigned a preliminary status of Critically Endangered (CR A3c; C2a(i); D).

## Paratypes

MADAGASCAR. Prov. Antsiranana. Ambilobe, Beramanja, Anketrabe, forêt de Kalabenono, haut de crête, sol profond, 690 m, 13°38'36"S, 48°40'25"E, 25 Nov. 2006. *M. W. Callmander, Jo Vasaha and Malaza 596* (G, MO, P, US, TAN).

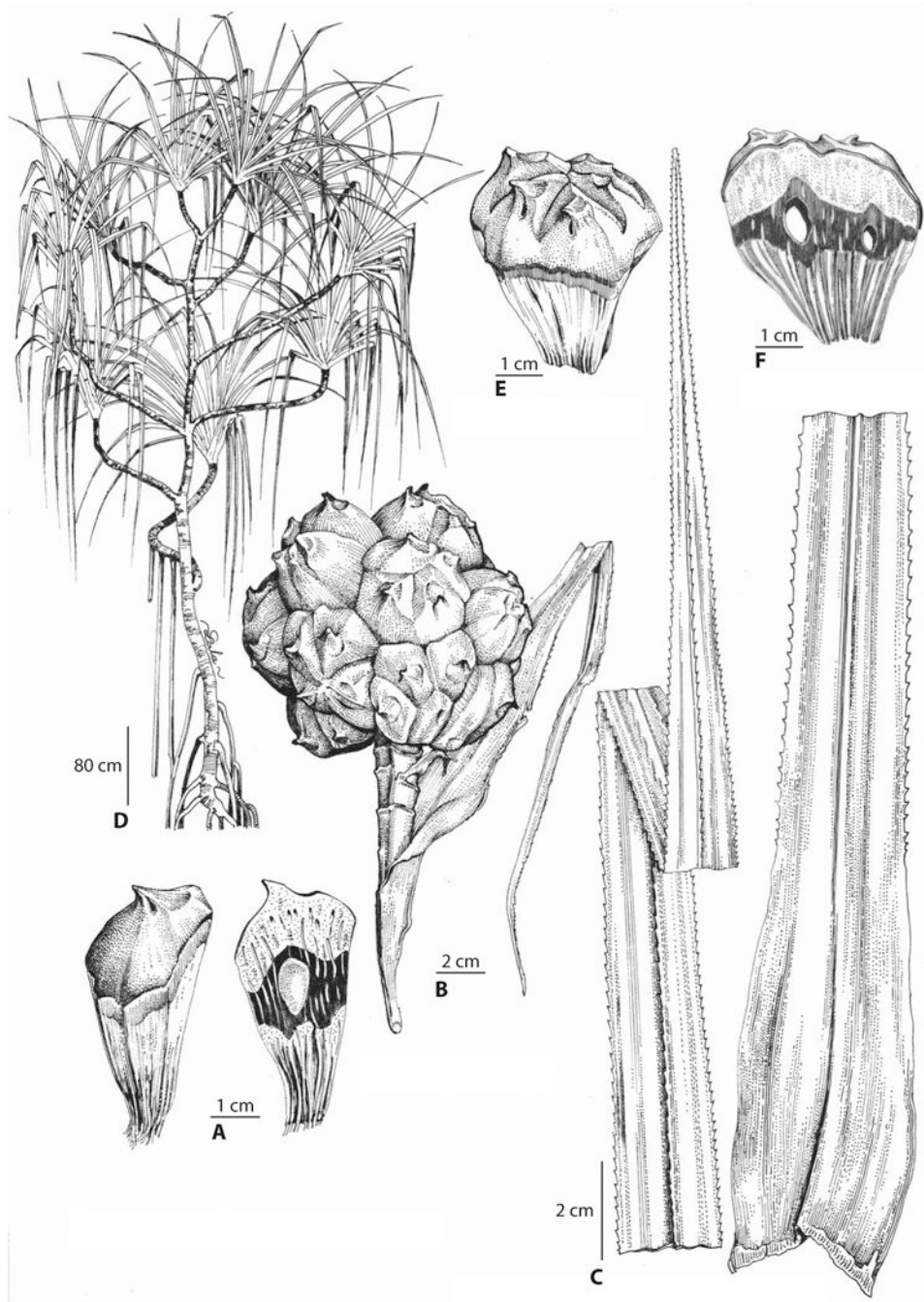
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**Figure 1.** *Pandanus sermolliana* Callmander & Buerki. —A. Lateral view and longitudinal section of a monolocate drupe. —B. Syncarp. —C. Apex and base of a leaf. —D. Habit. —E. Lateral view of a pluricarpellate drupe showing the stigmas. —F. Longitudinal section of a pluriloculate drupe. Drawn from the holotype, *Callmander et al.* 367 (MO).