
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 subvertical or rarely subhorizontal, slightly spinescent, and raised on an incompletely united base. This distinctive species is rare and is classified as Critically Endangered based on IUCN Red List criteria.

RESUME. Une nouvelle espèce *Pandanus sermolliana* Callmander & Buerki (Pandanaceae) est décrite provenant des montagnes du Galoka dans les forêts denses humides du Nord Ouest de Madagascar. La nouvelle espèce peut être facilement différenciée des espèces affines, *P. insuetus* Huynh et *P. perrieri* Martelli, par ses caractères morphologiques incluant ses drupes à carpelles incomplètement soudés dès la base du piléus en forme de dôme et ses stigmates subverticaux, rarement sub-horizontaux, légèrement spinescents, surélevés sur une base incomplètement soudée. Cette espèce rare et unique est sérieusement menacée. Elle est considérée comme Critiquement en Danger selon les Critères de l'IUCN.

Key words: IUCN Red List, Madagascar, Pandanaceae, *Pandanus*.

The Paleotropical genus *Pandanus* Parkinson comprises some 600 species of trees and shrubs divided in 10 subgenera and 59 sections (Stone, 1974;

Callmander & Laivao, 2003). Madagascar is one of the major centers of diversity of the genus with ca. 90 species, all except one of which belong to subgenus *Vinsonia* (Warburg) B. C. Stone. Only *P. perrieri* Martelli, described on the basis of fragmentary material, has been placed in subgenus *Pandanus* sect. *Pandanus*.

Over the past 10 years, in preparation for a treatment of Pandanaceae for the *Flore de Madagascar et 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 (IUCN, 2001) and for identifying priority areas for conserving members of the family (Callmander et al., 2007).

During the past three 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 (Guillaumet et al., 2008) and providing conservation recommendations of these biologically important, highly threatened forests. 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 fieldwork 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), Annonaceae, Burseraceae, Euphorbiaceae, Malvaceae, Oleaceae, and Violaceae. Among our many discoveries, we also collected a remarkable new species of Pandanaceae, which we describe here.

Pandanus sermolliana Callmänder & Buerki, sp. nov. TYPE: Madagascar. Prov. Antsiranana: Chaîne Galoka, Mont Galoka, Fokontany Anke-trabe-Belinta, lisière de forêt dense humide, 13°35'3.3"S, 048°43'29.6"E, 820 m, 5 Feb. 2005, M. W. Callmänder, 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, ca. 4 mm in the lower 1/3, 3–8 mm apart, strong, to 2 mm in the middle 1/3, 12–18 mm apart, to 1 mm in the distal 1/3, 3(–6) mm apart; midrib armed, prickles small (< 0.5 mm), randomly disposed (2–7 cm apart) and slightly prominent, antrorse in the upper 1/2, 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. Inflorescence terminal, the solitary syncarp erect on a straight peduncle; syncarp 15–16 × 13–14 cm, subspherical; core ca. 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 ca. 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(to 5)-angled; pileus convex, distal 1/3(–1/2) 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, subvertical, rarely subhorizontal, 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, ca. 10 mm away from the stigmas; seed locule oblong, ca. 15 × 7 mm, superior mesocarp narrow and compact; inferior mesocarp thick and fibrous. Male flowers unknown.

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.

IUCN Red List category. *Pandanus sermolliana* has an area of occupancy of 18 km², and comprises two known subpopulations, neither of which is located in a protected area. Using the methodology of Callmänder et al. (2007) based on the IUCN Red List criteria (2001), we therefore assigned a preliminary status of Critically Endangered (CR A3c; C2a(i); D).

Etymology. This species is named in honor 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 (Martelli & Pichi-Sermolli, 1951). Several decades later, Stone (1975) published *Pandanus 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*.

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 ca. 17 × 14 cm in *P. insuetus*) and stigmas laterally disposed on the margin of a slightly concave plateau on each carpel 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*

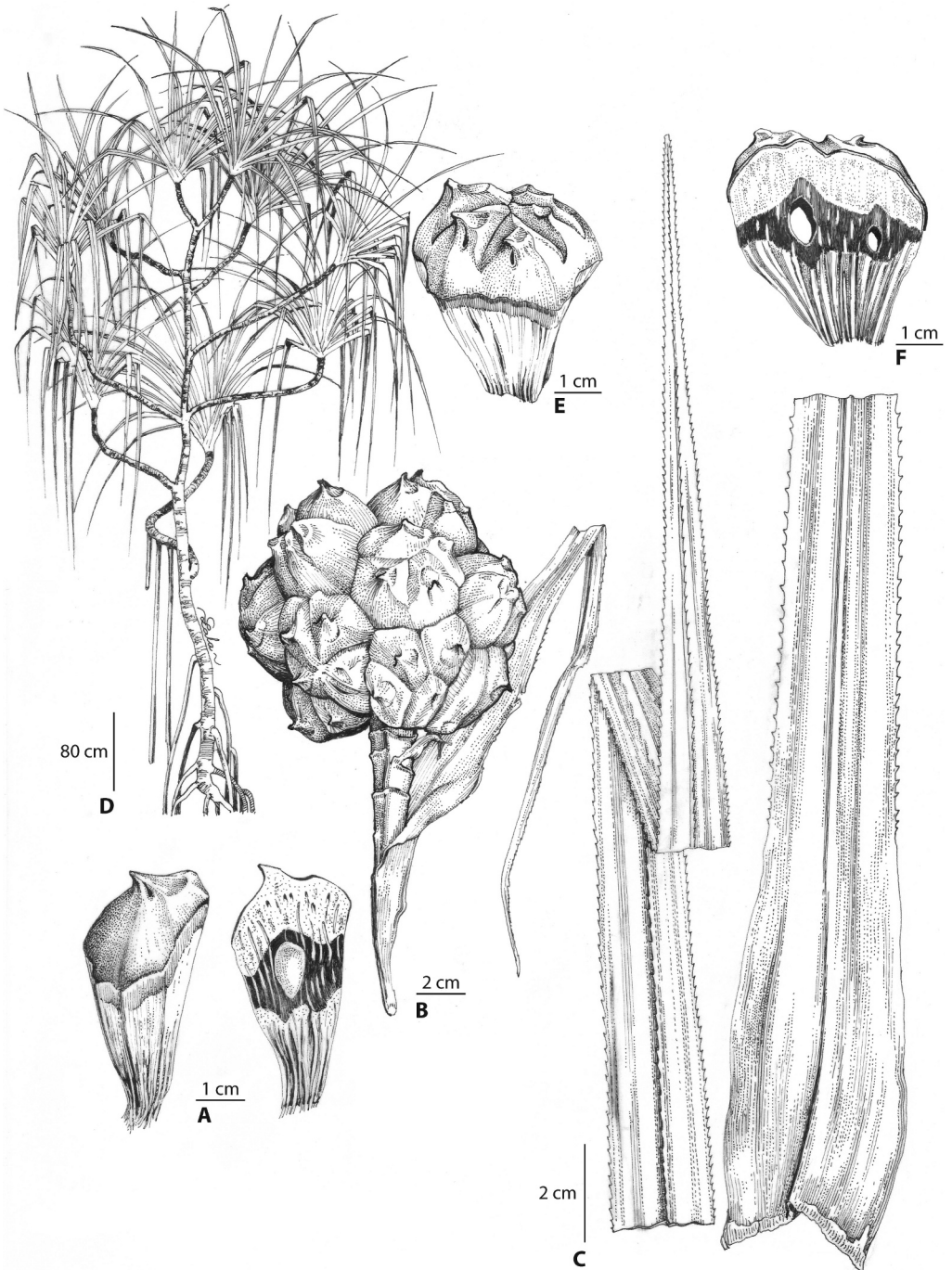


Figure 1. *Pandanus sermolliana* Callmander & Buerki. —A. Lateral view and longitudinal section of a monolucate drupe. —B. Syncarp. —C. Apex and base of a leaf. —D. Habit. —E. Lateral view of a plurilocellate drupe showing the stigmas. —F. Longitudinal section of a plurilocellate drupe. Drawn from the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

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 subvertical or rarely subhor-

izantal, only slightly spinescent, and raised on an incompletely merged base (vs. subhorizontal or rarely subvertical, flat to deltoid, and not raised in *P. perrieri*).

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 & Malaza 596 (G, MO, P, TAN); Ambilobe, Beramanja, Anketrabe, versant Nord-ouest du Kalabenono, 520 m, 13°38'38"S, 48°40'07"E, 26 Nov. 2007, C. Rakotovoao, M. W. Callmander, Jo Vasaha & Torze 3803 (G, K, MO, P, TAN).

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