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A new species of Pandanaceae from northern Madagascar, *Pandanus ankaranensis*

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Abstract

A new species, *Pandanus ankaranensis* Callm. & Laivao (Pandanaceae), is described from the karst region of Ankarana in northern Madagascar. It resembles *P. grallatus* B. C. Stone, another member of *Pandanus* sect. *Mammillares* H. St. John occurring in the area. The new taxon can be distinguished by its larger and wider leaves that are persistent on the branches, the stipe often lying on the rocks where plants grow, and its larger syncarps. *Pandanus ankaranensis* is classified as Vulnerable based on the IUCN Red List criteria.

Keywords

Madagascar; *Pandanus*; Pandanaceae; IUCN Red List

Madagascar is one of the centers of diversity of the genus *Pandanus* Parkinson, with c. 90 species, one third of which occur in the northern part of the island (Callmander et al., 2003). This region is one of the most biogeographically complex parts of the island (Battistini, 1965), and it is also one of the least explored. In order to address this gap in botanical knowledge, a coordinated set of inventory projects was conducted in northern Madagascar between 2003 and 2008 under the International Cooperative Biodiversity Group (ICBG) program (see Cao & Kingston, 2009), focusing on the drier parts of the region. A total of c. 3600 collections were gathered over the course of five years. The specimens resulting from such initiatives have proven to be very helpful when describing new Malagasy species of plants, e.g. *Bathiorhamnus capuronii* Callm., Phillipson & Buerki (Rhamnaceae, Callmander et al., 2008); *Ludia craggiata* Z.S. Rogers, Randrianasolo & J.S. Mill. (Flacourtiaceae, Rogers et al., 2006a); and *Olax antsiranensis* Z.S. Rogers, Malécot & Sikes (Olacaceae, Rogers et al., 2006b).

While most *Pandanus* species are known from the humid regions of Madagascar, several previously published members of the genus occur in dry areas in the northern part of the

island, including *P. analamerensis* Huynh, *P. coriaceus* Huynh, *P. flagellaris* B. C. Stone and *P. grallatus* B. C. Stone (Stone, 1975; Huynh, 2000). All of these species have been recorded from around Ambilobe and/or Daraina, and the first two are also known from farther north at Montagne des Français. Two additional species, *P. biceps* B. C. Stone & Guillaumet and *P. pristis* B. C. Stone, are currently known only from the Ankarana massif, a karstic plateau of c. 150 km² dating from the Jurassic (Rossi, 1980) that is home to many endemic plants, including the new species described here.

Pandanus ankaranensis Callm. & Laivao, sp. nov. TYPE: Madagascar. Prov. Antsiranana: Diana, Ambilobe, Marivorahona, forêt d'Ampondrabe, à 10 km E du village de Mahamasina, Ankarana, forêt sèche, 12°59'52"S, 49°11'16"E, 223 m, 8 Dec. 2007, *R. Randrianaivo*, *R. Rakotondrajaona*, *S. Randrianasolo*, *C. Claude*, *V. Benjara*, *M. Bezara* & *Bezandry 1515* (holotype, MO; isotypes, G, P, TAN). Figures 1–2.

Haec species inter congeneros madagascarienses *Pandano grallato* B.C. Stone simillima, sed a hoc foliis latioribus longioribusque atque infructescentia drupisque majoribus, ab omnibus habitu arboris caule saepe in saxa incumbente atque foliis ad ramos erectos persistentibus distinguitur.

Tree to 8 m, stem prickly, 7–10 cm diam., erect or decumbent on rocks, branches few; prop roots abundant. Leaves gradually attenuate in the distal part, those borne apically on the trunk as long as those on lateral branches, 55–95 × 3–5.5 cm; old leaves persistent on branch; dry leaves coriaceous; lacking auricles, longitudinal veins visible on both surfaces; marginal prickles borne from 4–8 cm above the blade base to the apex, antrorse, 4–5 mm in the lower third, 6–20 mm apart, strong, 2 mm in the mid third, 4–9 mm apart, to 1 mm in the distal third, 3(–6) mm apart; midrib armed, prickles less than 2 mm, randomly disposed (0.8–1.8 cm) and slightly prominent, antrorse in the distal half, then smaller (1 mm), regularly disposed, spaced (2–8 mm) apart and prominent; sheath 4–7 ×, 4.5 cm wide at apex, 5 cm at base. Flowers not seen; male flowers unknown. Infructescence terminal, the solitary syncarp erect on a straight peduncle; syncarp 13–14 cm diam., subspherical; peduncle 14–26 × 1.4–1.7 cm wide at apex, 0.8–0.9 cm in the middle, straight, trigonous, veins visible, bracts to as many as 10 on entire peduncle. Drupes 11 or 12, connate in the mature syncarp, 50–60 × 45–50 mm, 38–46 mm thick, 5(or 4) -angled; pileus convex, 1/2–1/3 superior portion free; stigmas 5 to 8, reniform, plane to oblique, gathered in the center of the pileus, 3–6 mm apart, slightly heightened (1–2 mm), apical sinuses 1–5 mm deep, alternating with the stigmas; endocarp 10–12 mm long in the center, 25 mm wide, 20 mm away from the stigmas; seed locule oblong, 11 × 5 mm, superior mesocarp compact; inferior mesocarp fibrous.

Observations

Pandanus ankaranensis is placed in *P.* subg. *Vinsonia* (Warb.) B. C. Stone following the infrageneric classification of Stone (1974) - a system that has “a practical value” and must “remain provisional and flexible” according to Stone (1975: 459). This subgenus certainly has “geographic unity” (Huynh, 1979: 474) and its evolutionary and phylogenetic unity will soon be tested as part of a molecular phylogenetic analysis now being conducted (by MWC

and other collaborators). It encompasses nearly all *Pandanus* species from Africa, Madagascar, the Mascarenes, the Comoros and the Seychelles with carpels either free or connate into phalanges, and bearing stigmas that vary greatly in form from reniform to spiniform (Stone, 1974). The new species is assigned to sect. *Mammillarises* H. St. John, described to accommodate taxa that bear multiple reniform stigmas that are grouped in the center of the upper part of the drupes (St. John, 1960; Laivao et al., 2003).

Our new species is very distinctive, although in general aspects of the syncarp morphology it resembles *P. grallatus*, which occurs in dry forests of northern Madagascar from north of Ambanja to Ambilobe (Stone, 1975) and Daraina. Both species differ from other members of sect. *Mammillares* in having sinuses in between the stigmas on the apex of the pileus, but *P. ankaranensis* differs from *P. grallatus* by its wider and longer leaves ($75\text{--}95 \times 4.5\text{--}5.5$ cm vs. $50\text{--}70 \times 2$ cm in *P. grallatus*), a larger infructescence ($13\text{--}14$ cm vs. c. $5\text{--}5.5$ cm in diam.), longer peduncles ($17\text{--}26$ vs. 10 cm), and larger drupes ($5\text{--}6 \times 4.5\text{--}5 \times 3.8\text{--}4.6$ cm vs. $2.2\text{--}2.7 \times 2\text{--}2.6 \times 1.8\text{--}2$ cm). Furthermore, the new species described here can be recognized easily, even when sterile, by its unique habit. It forms a tree with the base of the trunk often prostrate and decumbent on rocks (Fig. 2) and dead leaves that persist on the branches. In contrast, *P. grallatus* is a slender treelet with an erect trunk and numerous ramifications, and leaves that do not persist on the branches.

Distribution and habitat

Pandanus ankaranensis is only known from dry forests on eroded limestone in the Ankarana region of northern Madagascar. Three other *Pandanus* species are known from the karst plateau of Ankarana: two endemic to this locality (*P. biceps* and *P. pristis*) and *P. coriaceus*, also growing further north in dry forests on other substrates.

IUCN Red List category

Pandanus ankaranensis has an area of occurrence of 118 km^2 and an area of occupancy of 27 km^2 , and comprises three known sub-populations, two of which are located in a protected area (Ankarana). Using the methodology of Callmander et al. (2007) based on the IUCN Red List threat criteria (IUCN, 2001), we assign a preliminary status of Vulnerable (VU D2).

Paratypes

MADAGASCAR. **Prov. Antsiranana:** Ambilobe, Ankarana, sur les rochers calcaire, 150 m, $12^{\circ}55'S$, $49^{\circ}06'E$, 30 Aug. 1997 (fr), *M. W. Callmander & A. Toly 49* (G, P, TAN).

Ankarana vers la forêt de Mahory (Sud de Diégo-Suarez), $[12^{\circ}49'S$, $49^{\circ}14'E]$, 14 Aug. 1973 (fr), *G. Cremers 2466* (KUL, MO, P, PH, TAN).

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Literature Cited

- Battistini R. Problèmes géomorphologiques de l'extrême nord de Madagascar. *Rev. Géo.* (Madagascar). 1965; 7:1–60.
- Callmander MW, Wohlhauser S, Gautier L. Notes biogéographiques sur les Pandanaceae du nord de Madagascar. *Candollea*. 2003; 58:351–367.
- Callmander MW, Schatz GE, Lowry PP II, Laivao MO, Raharimampionona J, Andriambololonera S, Raminosoa T, Consiglio T. Application of IUCN Red List criteria and assessment of Priority Areas for Plant Conservation in Madagascar: rare and threatened Pandanaceae indicate new sites in need of protection. *Oryx*. 2007; 41:168–176.
- Callmander MW, Phillipson PB, Buerki S. Révision du genre *Bathiorhamnus* Capuron (Rhamnaceae) endémique de Madagascar. *Adansonia sér.* 2008; 3(30):151–170.
- Cao S, Kingston DGI. Biodiversity conservation and drug discovery: Can they be combined? The Suriname and Madagascar experiences. *Pharm. Biol.* 2008; 47(8):809–823. [PubMed: 20161050]
- International Union for Conservation of Nature and Natural Resources (IUCN). Gland, Switzerland and Cambridge, United Kingdom: IUCN; 2001. IUCN Red List Categories and Criteria, Version 3.1. <http://www.iucn.org>
- Laivao MO, Callmander MW, Buerki S. Sur les *Pandanus* (Pandanaceae) à stigmates saillants de la Côte Est de Madagascar. *Adansonia sér.* 2006; 3(28):267–285.
- Huynh K-L. La morphologie microscopique de la feuille et la taxonomie du genre *Pandanus* VI. *P. subg. Vinsonia* et *P. subg. Martellidendron*. 2. Considérations sur *P. subg. Vinsonia*. *Bot. Jahrb. Syst.* 1979; 100:473–517.
- Huynh K-L. The genus *Pandanus* (Pandanaceae) in Madagascar (part 6). *Bot. Jahrb. Syst.* 2000; 122:201–224.
- Rogers ZS, Randrianasolo A, Miller JS. A new Species of *Ludia* (Salicaceae) from Madagascar's Eastern Littoral Forest. *Novon*. 2006a; 16:409–412.
- Rogers ZS, Malécot SV, Sikes KG. A synoptic revision of *Olax* L. (Olacaceae) in Madagascar and the Comoro Islands. *Adansonia sér.* 2006b; 3(28):71–100.
- Rossi, G. L'extrême-nord de Madagascar. *EdiSud*. France: Aix-en-Provence; 1980.
- Stone BC. Towards an improved infrageneric classification in *Pandanus* (Pandanaceae). *Bot. Jahrb. Syst.* 1974; 94(4):459–540.
- Stone BC. New and noteworthy *Pandanus* (Pandanaceae) from Madagascar collected by J.-L. Guillaumet and G. Cremers. *Adansonia, n.s.* 1975; 14:543–552.

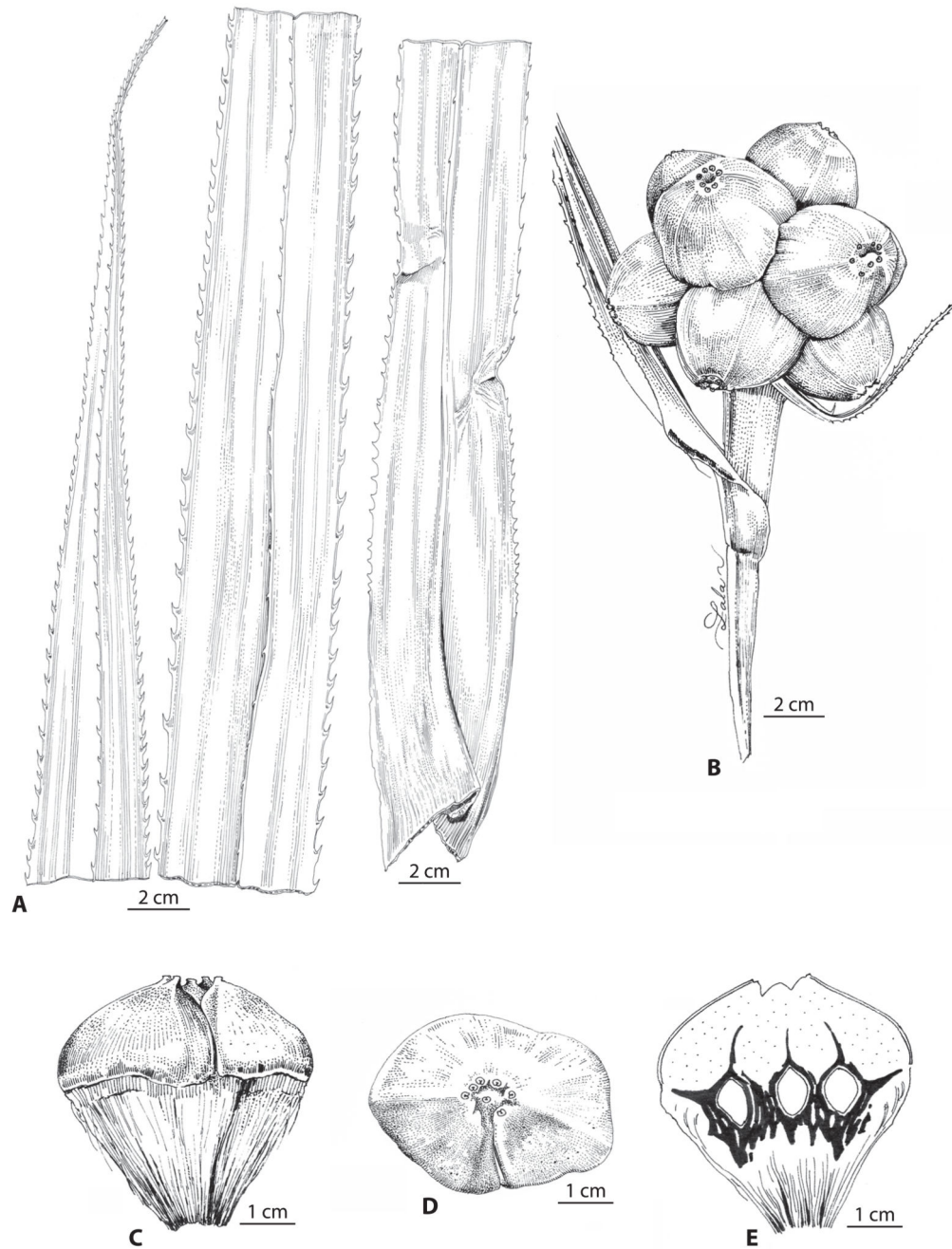


Figure 1.

Pandanus ankaranensis Callm. & Laivao. – A. Apex, mid-section and base of a leaf. – B. Syncarp. – C. Lateral view of a drupe. – D. Apical view of a drupe showing the stigmas. – E. Longitudinal section of a drupe. Drawn from the holo- and isotype *Randrianaivo et al. 1515* (MO, TAN) and paratype *Callmander & Toly 49* (TAN).



Figure 2.

Pandanus ankaranensis Callm. & Laivao. – A. Habit showing leaves persistent on the branches. – B. Base of decumbent trunk with prop roots. Photos by M.W. Callmander from the paratype collection *Callmander & Toly 49*.