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A new *Amorphophallus* species (*Araceae*) from Madagascar**Abstract**

Bogner, J.: A new *Amorphophallus* species (*Araceae*) from Madagascar. – Willdenowia 33: 299-303. – ISSN 0511-9618; © 2003 BGBM Berlin-Dahlem.

Amorphophallus mangelsdorffii is described as a species new to science and illustrated. It is closely related to *A. antsingyensis* as indicated by the spiny (echinate) pollen exine, and both are more closely related to each other than to the other three endemic species of Madagascar. *A. mangelsdorffii* differs from *A. antsingyensis* mainly by the small stigma, much shorter pollen exine spinulae, a reflexed and twisted spathe lamina, a much less dissected leaf blade with relatively large leaflets and, in contrast to all other Malagasy species, its flowering simultaneous with the leaf at the end of the rainy season. A key to all Malagasy species of *Amorphophallus* is provided.

When Mr Ralph Mangelsdorff visited a remote area in western Madagascar in March 2001 searching for succulents, ascleps, orchids and aroids, he discovered an unusual species of *Amorphophallus* in the Tsingy du Maintirano near the village Tsimaloto, flowering simultaneously with its single leaf at the end of the rainy season, while all other Malagasy species of this genus flower leafless at the end of the dry or at the beginning of the rainy season.

Mr Mangelsdorff's trip to the Tsingy du Maintirano ("tsingy" is a highly eroded limestone formation and "maintirano" means "black water") in the rainy season became a wearing adventure, with long walks, a broken leg, rescue and three days traversing an undeveloped area on a two-wheel ox cart (Mangelsdorff 2001). His *Amorphophallus* gathering proved to be a new species, which is described here.

***Amorphophallus mangelsdorffii* Bogner, sp. nova** – Fig. 1-2

Holotypus: Madagascar, Tsingy du Maintirano, 8 km east of the village Tsimaloto and c. 80 km southeast of Tambohorano, c. 300 m, flowering with leaf, 18.3.2001, *R. Mangelsdorff RMM 550* (M; isotypi: FR, K [pickled inflorescence]).

Differt a *Amorphophallo antsingyense* stigmathe parvo, spinulis pollinis brevioribus et laxioribus dispositis, lamina spathae recurvata et torta, lamina folii minus dissecta foliolis pro rata magnis, inflorescentia cum folio ad finem temporis pluvialis oriens.

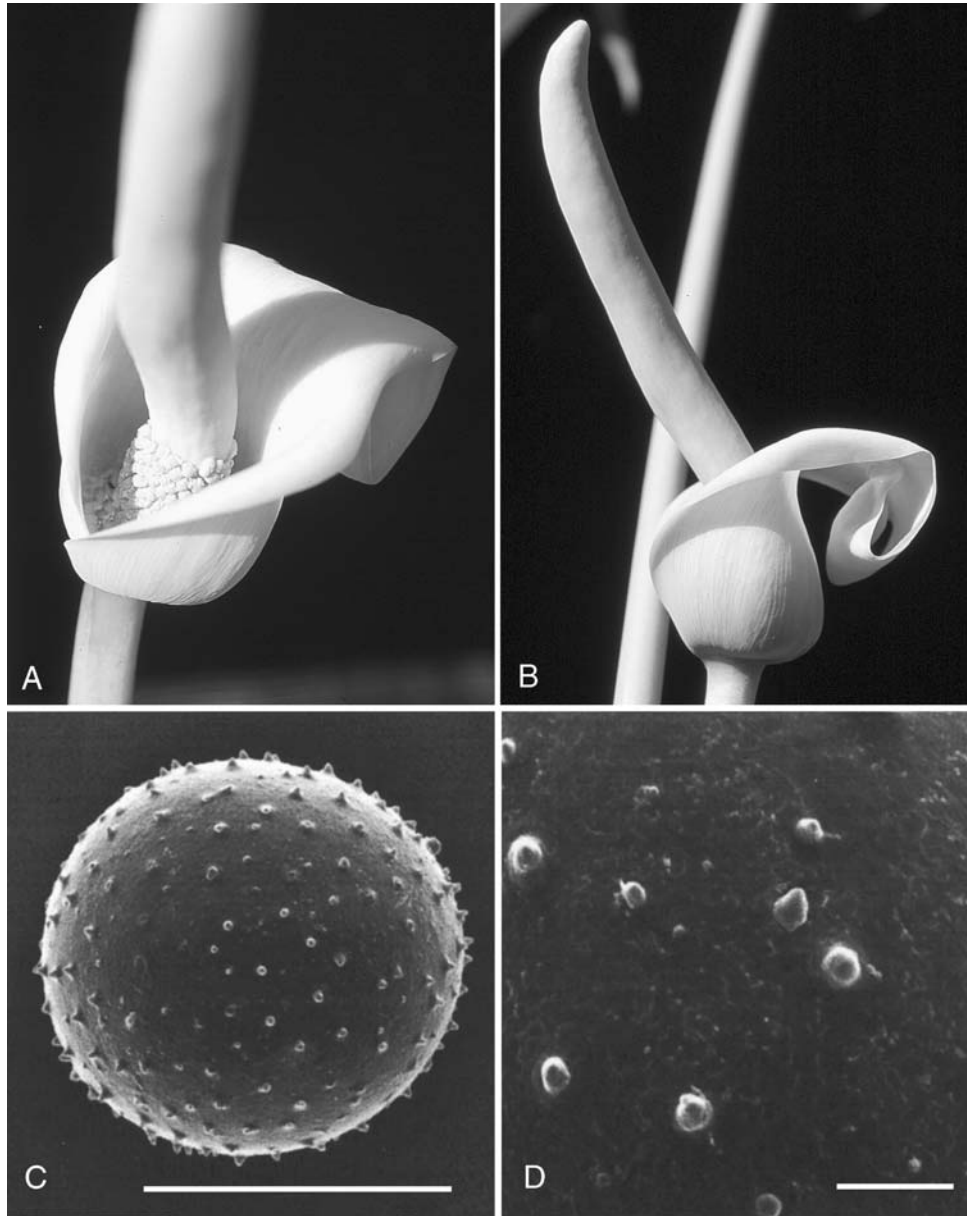


Fig. 1. *Amorphophallus mangelsdorffii* – A-B: inflorescence, fertile part of spadix (A), lateral view showing posture of spathe (B); C-D: pollen, overview (C) and detail of echinate exine (D). – A-B by R. Mangelsdorff, locus typicus, March 2001; C-D from the holotype, SEM micrographs by M. Hesse.

Tuber depressed-globular, 4.5-6 × c. 3 cm, somewhat sunken in the centre, smooth, dark brown outside, yellow inside. *Petiole* 32-48 cm long, at the base c. 0.8 cm and apically 0.4-0.6 cm in diam., light green, sheath c. 14 cm long (from there the peduncle emerging). *Leaf blade* dissected in three main parts only, each either ± bifid and arising directly from the apex of the petiole, or



Fig. 2. *Amorphophallus mangelsdorffii* – Leaf from a cultivated plant originating from the locus typicus. – Scale bar = 2 cm; photograph by R. Mangelsdorff.

once more divided and each leaflet with a petiolule 3 cm long and 0.3-0.4 cm in diam.; *leaflets* 9-14 × 2.5-4 cm, narrowly elliptic to lanceolate, decurrent, green on the upper and lighter green on the lower surface, base mostly somewhat oblique, apex acuminate; venation reticulate, 9-12 primary lateral veins on each side of the strong middle vein, second order lateral veins thinner than the primary ones, inner collecting vein 1.5-2 mm from the margin of the leaflet, one or two thinner collecting veins very close to the margin. *Peduncle* 17-27 cm long and 0.4-0.8 cm in diam., light green as the petiole and never spotted. *Spathe* 7-9 cm long, c. 3.5 cm wide (at broadest point), only very slightly constricted or nearly so, initially upright, later limb reflexed and twisted, convolute at base and forming a subglobular tube of 1.5-2 cm diam., spathe outside light green at base and then becoming greenish yellow, inside at base of the tube greenish and smooth with somewhat prominent veins, then becoming greenish yellow to ± cream, apex acute. *Spadix* clearly longer than spathe, 10-12 cm long, sessile; *pistillate portion* short, c. 0.5 cm long and 1.1 cm in diam., flowers in up to four spiral rows; *staminate portion* c. 1.7 cm long and 1.3 cm in diam., yellow to somewhat beige; pistillate and staminate flowers contiguous; *appendix* elongate-conoid to subcylindric, 8.5-9.5 cm long, at base for some distance cylindric and there c. 1.3 cm in diam., becoming narrower towards the blunt apex, greenish yellowish on the whole length. *Staminate flowers* densely arranged; stamen subrectangular in view from above, 1.3-1.4 mm long and 0.7-0.9 mm wide, 1.5-1.6 mm high; connective broad, 1.2-1.4 mm long and 0.6-0.7 mm wide, rounded apically, somewhat higher than the thecae, greenish yellowish; thecae lateral, golden yellow, c. 0.2 mm below the connective, c. 1 mm long and c. 0.6 mm wide, opening by an apical slit of 0.5-0.6 mm length; *pollen* inaperturate, globular, 38-42 µm in diam., exine echinate, spinulae small, 1.2-1.3 µm long and lax. *Pistillate flowers* densely arranged; ovary ovoid, 1.8-1.9 mm long and c. 1.5 mm in diam., light green, whitish at base, unilocular, with one anatropous ovule, this roundish and with a very short funicle, with short, papillose and densely arranged trichomes on the placenta (visible in fresh material only); stigma small, subhemispheric, sessile, 0.6-0.7 mm in diam., whitish, papillose. *Infructescence* unknown. *Odour* at anthesis like fermenting fruits and somewhat spicy.

Distribution and ecology. – Western Madagascar, Tsingy du Maintirano; only known from the type locality near the village Tsimaloto. *Amorphophallus mangelsdorffii* is a geophyte that grows in leaf-litter filled holes and crevices on limestone in tropical deciduous forest, together with *Pachypodium* cf. *sofiense* (Poiss.) H. Perr., *Disperis erucifera* H. Perr., *Habenaria* sp. and *Dracaena reflexa* Lam. The limestone formation of the Tsingy du Maintirano overlies an old sandstone plateau.

Etymology. – The new species is dedicated to Mr Ralph Mangelsdorff, opera singer, student of botany and collector of this remarkable species.

Illustrations. – Mangelsdorff (2001: 116) as *Amorphophallus* sp. nov.; Bogner (2003: 26) as *A. mangelsdorffii*.

Relationships. – *Amorphophallus mangelsdorffii* is closely related to another recently described species from Madagascar, *A. antsingyensis* Bogner, Hett. & Ittenbach; both have a spiny pollen exine while in the other three endemic Malagasy species the exine is psilate to fossulate. *A. mangelsdorffii* and *A. antsingyensis* form a separate group while the other three, *A. hildebrandtii* (Engl.) Engl. & Gehrm., *A. taurostigma* Ittenbach, Hett. & Bogner and *A. ankarana* Hett., Ittenbach & Bogner, are more closely related to East African species, such as *A. gallaensis* (Engl.) N. E. Br. and *A. gomboczianus* Pich. Serm. A new *Amorphophallus* systematic is in preparation by W. L. A. Hetterscheid and we have to wait where the Malagasy species will be finally placed. It is interesting to note that all Malagasy species are distributed only in deciduous forests in western Madagascar and none are found in the evergreen rain forests of the eastern coast, while in tropical Africa and Asia the genus is well represented in rain forests.

Key to the Malagasy species of *Amorphophallus*

1. Peduncle much shorter than the spathe, appendix rounded or conoid; petiole rough; tuber with distinct, raised, annulate rootscars; cultivated and sometimes naturalized *A. paeoniifolius* [= *A. campanulatus*]
- Peduncle as long as or longer than the spathe, appendix narrowly elongate; petiole smooth; tuber smooth 2
2. Spadix distinctly shorter than the spathe or more or less equal 3
- Spadix distinctly longer than the spathe 4
3. Appendix narrowly elongate, largely terete; ovaries nearly all bilocular, style absent; spathe entirely light green; tuber depressed-globular, offsets rhizomatous; pollen exine spiny (echinate) *A. antsingyensis*
- Appendix fusiform-conical; ovaries unilocular, style present and distinct; spathe maculate; tuber unknown; pollen exine fossulate *A. hildebrandtii*
4. Flowering simultaneous with the leaf, inflorescence appearing at the end of the rainy season (March); leaf blade not much dissected, the few leaflets relatively large (up to 14 cm long); spathe limb reflexed at anthesis, greenish yellow to very light green; pollen exine spiny (echinate) *A. mangelsdorffii*
- Flowering preceding the leaf, inflorescence appearing at the end of the dry or at the beginning of the rainy season (late September, October or early November); leaf blade much dissected (usually 2 or 3 times), leaflets medium sized or small; spathe limb upright at anthesis, inside white or red-brown to purplish; pollen exine never spiny (\pm psilate [smooth] to fossulate) 5
5. Style nearly absent, indistinct, stigma entire or with flattened lobes; spathe limb inside pure white (or sometimes somewhat purplish); tuber depressed-globular, offsets globular *A. ankarana*
- Style present, distinct, stigma deeply 2- to 3-lobed, lobes broadly to narrowly conical, acute to obtuse; spathe limb inside red-brown to purplish, usually distinctly twisted; tuber depressed-globular to subglobular, offsets rhizomatous *A. taurostigma*

Acknowledgements

Special thanks are due to Mr R. Mangelsdorff (Frankfurt am Main) for his gathering and photographs, to Professor M. Hesse (Wien) for the SEM micrographs of the pollen grains, to Dr H. Roessler (München) for providing the Latin diagnosis and to Mr P. C. Boyce (Souvigné, France) for comments on a draft of this paper.

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