

Notes on the Genus *Amorphophallus* 12: Three New Species from Tropical Asia

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ABSTRACT

Three new species of *Amorphophallus* from Asia are described. Their morphological similarities to other species are discussed.

KEY WORDS

Araceae, *Amorphophallus operculatus*, *Amorphophallus sinuatus*, *Amorphophallus vogelianus*, Thailand, Vietnam.

INTRODUCTION

Ongoing fieldwork by Nguyen V.D. (Hanoi, Vietnam) and discoveries made in existing collections still result in the recognition of undescribed species of *Amorphophallus*. It is expected that with this rate of new discoveries the total number of species of *Amorphophallus* (presently at ca. 190) will definitely exceed 200.

SPECIES DESCRIPTIONS

1. *Amorphophallus operculatus* Hett. & Sizemore **sp. nov.**—Type: *Hettterscheid H.AM.994-T* (L, spiritcoll., holotype), THAILAND, Chumphon prov., Chumphon, coll. from a living plant in the Leiden Botanical Garden, 31 July 2003 (orig. coll. *M. Sizemore s.n.*). Figures 1–4.

Diagnosis—Ab *Amorphophallo saurus tubero multo tenuiore longioreque*, spadice spatha aequilonga, antheris inferioribus operculatis differt.

Tuber elongate, thin, vertically rhizomatous, branching, to 40 cm long, 1–4 cm in diam. at the top; petiole 10–65 cm long, 0.4–1.5 cm in diam., smooth, uniformly olive green to dark rich reddish green,

sometimes with a few small, dark spots near the base; lamina moderately or highly dissected, 20–70 cm in diam., rachises winged throughout; leaflets elongate ovate to ovate-lanceolate, top acute-acuminate, 2–14 cm long, 1–5 cm in diam., fleshy, upper surface a rich dark emerald green, margin reddish, lower surface dark greyish green, often flushed dark purple-violet, rachises on the lower side rich dark reddish purple. Peduncle 33–50 cm long, 6–8 mm in diam., smooth, dull reddish mauve with or without a few darker, irregular indistinct spots at the base. Spathe broadly triangular-elliptic, 8–12 cm in long., 6–11 cm in diam., margins concave, base and limb hardly separated, base convolute, ca. half the length of the spathe, not opening to the base during male anthesis, top acute, outside whitish changing to pale dirty greyish-white near the base, veins pale pinkish, upper half suffused with a pale pinkish-purplish hue, inside dirty whitish, top with a pinkish-purplish hue, base within densely clothed with mostly more or less globose verrucae, those on the dorsal side and close to the spadix base elongate and/or slightly rugate, the entire inner surface of the base covered with a wet film. Spadix sessile, longer than spathe, 10–14.5 cm long; female zone cylindrical, 0.8–1 cm long, 0.8–1.1 cm in diam., flowers congested; male zone elongate, slightly conical, base constricted, top slightly or more distinctly laterally compressed, 3.5–4.8 cm long, 0.8–1.4 cm in diam. at the base, 0.5–1.2 cm in diam. at the top, flowers congested; appendix elongate conical, thin-walled, 5–8.2 cm long, 0.9–1.5 cm in diam. at the base, terete or slightly laterally compressed, more distinctly near the base,



Fig. 1. *Amorphophallus operculatus*: leaf, detail.



Fig. 2. *Amorphophallus operculatus*: inflorescence.

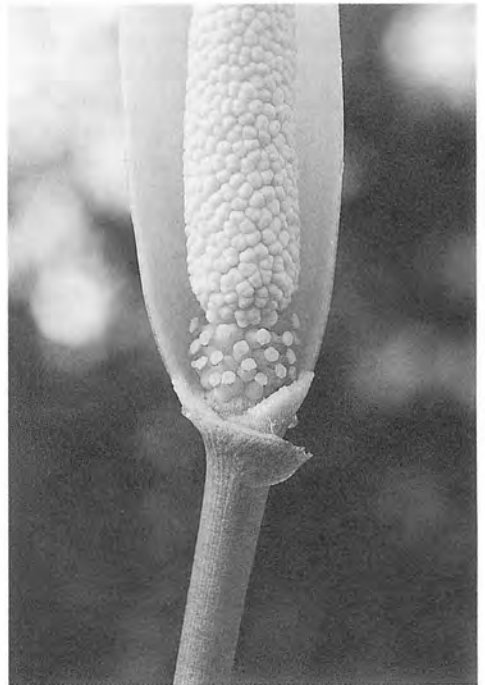


Fig. 3. *Amorphophallus operculatus*: spadix, detail.



Fig. 4. *Amorphophallus operculatus*: tubers.

top acute, surface slightly and shallowly rugose, off-white. Ovaries subglobose, 2 mm in diam., 1.8–2 mm long, pale green, unilocular; style elongate conical, 0.8–1.1 mm long, 0.8 mm in diam. at the base, 0.5 mm at the top, pale purple or pale green flushed pale purple; stigma depressed, 1–1.2 mm in diam., ca. 0.5 mm high, with a shallow irregular central depression, surface verruculate, off-white. Male flowers having mostly 4–5 stamens, the lower flowers with only 1–2 stamens; stamens 1–1.2 mm long, 0.8–1 mm in diam.; filaments ca. 0.5 mm long, connate, whitish; anthers 0.5–0.7 mm long, truncate, pores apical, slightly elongate, those of the more isolated lower anthers lunate to entirely ring-like around the upper rim of the anther, the anther then seemingly operculate.

Etymology—The species epithet refers to the peculiar shape of the pores of (some of) the lower male flowers.

Notes—*Amorphophallus operculatus* belongs to a small group of (thus far) ex-

clusively Thai species, characterized by elongate, branching tubers, very dark velvety green leaves with thin purplish-red margins and whitish spathes with concave margins. The other members of this group are *A. saururus* Hett., *A. pygmaeus* Hett., *A. sizemoreae* Hett. and *A. vogelianus* Hett. & Sizemore sp. nov. (this publication). From all these species, *A. operculatus* differs in the very long, thin tuber, which in the other species is short and thick and the operculate nature of (some of) the lower male flowers, which is also not found in any of the other four species.

2. *Amorphophallus sinuatus* Hett. & Nguyen V.D., **sp. nov.**—Type: *Hetterscheid H.AM.1154-T* (L, spiritcoll., holotype), VIETNAM, Quang Binh province, Bo Trach distr., Son Trach commune, Phong Nga (coll. from a living plant cultivated in the Leiden Botanical Garden, 25 April 2003, orig. coll. *Nguyen V.D.* 185 p.p. as for the tuber sent to the Leiden Bot. Garden, coll. on 31 March 1997, “at the foot of a limestone mountain, in forest shade, alt. ca. 50–100 m). Figures 5–7.

Diagnosis—Ab *Amorphophallo subpedato appendicis diametro eo zonae masculae aequali, stigmatate distincte maiore ovarium fere tegenti, folio non subpedato differt.*

Tuber elongate, to 20 cm long, 2–3 cm in diam. at the top, tapering to the base, not branching. Petiole 17 cm long, 4 mm in diam., uniformly pale green; lamina 45 cm in diam., rachises unwinged; leaflets elongate elliptic, 19 cm long, 7 cm in diam., acuminate, upper surface dull green, lower surface glossy green. Peduncle smooth, pale green all over, 10 cm long, 0.5 cm in diam., almost entirely hidden by longest cataphyll. Spathe broadly triangular, 3 cm long, 3.5 cm in diam., limb and base not differentiated, top obtuse, outside uniformly pale green, veins slightly darker, inside as outside, slightly paler, base slightly darker, base within with scattered, shallow, whitish-greenish, punctiform warts. Spadix sessile, distinctly longer



Fig. 5. *Amorphoballus sinuatus*: inflorescence.



Fig. 6. *Amorphobopballus sinuatus*: spadix.

than spathe, male part reaching well beyond the spathe, 11 cm long; female zone cylindrical, 1 cm long, 0.8 cm in diam., flowers congested or slightly distant; male zone cylindrical, 4 cm long, 0.7 cm in diam., flowers congested, the lower ones slightly distant, sometimes adjacent flowers in the same spiral fused, in the upper regions of the zone individual flowers hardly recognizable, only as individual stamens; appendix elongate cylindrical-conical, 6 cm long, 0.8 cm in diam at the base, 0.4 cm in diam. near the top, tapering, slightly dorsiventrally compressed, smooth, very pale green, top more or less obtuse, emitting a powerful stench of oligomethyl-oligosulphides. Ovaries obconical, top strongly truncated, the base sunken in the spadix-axis, 2 mm in diam., 1 mm high, bright pale green, unilocular; style thick, short, 0.2–0.4 mm long, 0.8 mm in diam., pale green; stigma large, depressed, shallowly three-lobed, 1.5 mm in diam, 0.8 mm high, lobes broadly obtuse, surface scabrate, white. Male flowers consisting of



Fig. 7. *Amorphobopballus sinuatus*: spadix, detail.



Fig. 8. *Amorphophallus vogelianus*: leaf, detail.



Fig. 9. *Amorphophallus vogelianus*: inflorescence.

3–6 stamens (excl. laterally fused flowers); stamens 1 mm high, 0.8–1.2 mm in diam., rectangular or irregularly angulate in upper view, truncated; filaments 0.5 mm long, fused, off-white; anthers 0.5 mm long, off-white, pores of the thecae opening to one central pore at anthesis, rupturing the connective, connective produced, short conical.

Etymology—The species epithet refers to the sinuate shape of the stigmas.

Additional material—*Hetterschied H.A.M. 1320* (L, spiritcoll.), VIETNAM, Quang Binh province, Bo Trach distr., Son Trach commune, Phong Nha Natl. Park (from a plant cultivated in the Leiden Botanical Garden, orig. coll.: *Nguyen V.D. & Le Nhat 231*).

Notes—This species is obviously close to *Amorphophallus subpedatus* Nguyen V.D. & Hett. (in press) with which it shares many features in general inflorescence morphology, the pollen release mecha-

nism, the very short spathe etc. It differs however in having an almost cylindrical spadix and distinctly larger stigmas. Also the leaf of *A. sinuatus* does not have the distinct subpedate architecture of *A. subpedatus*. The inflorescence of *A. sinuatus* also resembles that of *A. dzui* Hett. but lacks the staminodial zone.

3. *Amorphophallus vogelianus* Hett. & H. Billensteiner **sp. nov.**—Type: *Hetterschied H.A.M.1173-T* (L, spiritcoll., holotype), N. THAILAND, Chiang Dao, in rocks (coll. from a living plant cultivated in the Leiden Botanical Garden, 20 May 2003, orig. coll. *H. Billensteiner s.n.*). Figures 8–11.

Diagnosis—*Amorphophallo sizemoreae* similis, pistillis remote positis, stylo conico, foliolis obovatis differt.

Tuber elongate, strongly branched, 12 cm long, 4 cm in diam. at the top, individual branches to 3 cm in diam., pale brown, producing one or a few leaves. Petiole dull



Fig. 10. *Amorphoballus vogelianus*: spadix, detail.



Fig. 11. *Amorphoballus vogelianus*: tuber.

reddish brown with few scattered, blackish short or long stripes, smooth, 23–40 cm long, 0.7–1 cm in diam.; lamina 40–60 cm in diam., open, relatively few and large leaflets, rachises winged throughout; leaflets elliptic-obovate to obovate, 5–18 cm long, 2.5–9 cm in diam., base of outer leaflets broadly decurrent, top short acuminate, upper surface velvety deep green, margin very thinly lined reddish. Inflorescence long peduncled; peduncle thin, 30 cm long, 5 mm in diam., smooth, uniformly pinkish brown with a few scattered blackish thin, short striations, upwards paler; Spathe elliptical, erect, 7.5 cm long, 5 cm in diam., base and limb hardly separated but by a very faint constriction on the dorsal side, base very short convolute, outside pale whitish green, inside smooth with very faint depressions, pale green; limb acute, top fornicate, margins concavely involute, outside creamish, inside creamish. Spadix sessile, slightly longer than spathe, 8 cm long; female part cylindrical, 0.8 cm long, 0.6 cm in diam. (excl.

styles), flowers distant and sunk into the spadix axis, axis pale bluish green; male zone cylindrical, 1.7 cm long, 0.9 cm in diam., flowers congested; appendix elongate conical, 5.5 cm long, 1 cm in diam. (close to the base), base constricted, top obtuse, surface smooth, dull pale greenish with a creamish flush at the base. Ovaries disciform, sunk into the spadix axis, oval in cross-section, 3 mm in diam. (long axis) \times 2 mm (short axis), 1.5 mm high, top truncated, tapering to the base, bilocular, pale green; style short, 0.3 mm long, 0.5 mm in diam. cylindrical, pale green; stigma conical, distinctly bilobed-sinuate, 0.8 mm in diam., 0.8 mm high, white, verruculose. Male flowers consisting of 2–4 stamens; stamens 2 mm long; filaments thick, 1 mm long, 1.8 mm in diam., off white; anthers truncated, 1 mm long, 1 mm in diam., off white; pores apical, slit-like.

Etymology—The species is named after Mr. Art Vogel, greenhouse manager of the Leiden Botanical Garden, for his friend-

ship with the author and his fine skills in growing *Amorphoballus*. He also collected many *Amorphoballus* species on his expeditions with staff of the National Herbarium, Leiden Branch, The Netherlands, adding valuable information for the author's taxonomic revision of the genus.

Note—*Amorphoballus vogelianus* is a member of group of rather ornamental species around *A. saururus*, with which it shares the branching elongate tuber, the velvety green leaflets with reddish margin, whitish spathe and the involute spathe

margin. In general appearance of leaves and inflorescence, *A. vogelianus* most resembles *A. sizemoreae* (Thailand) but differs in the tuber being vertical in all its parts, the leaflets being obovate, the appendix being more or less obtuse, the ovaries being sunk in the spadix axis, the stigmas being conical and the pistils being distantly placed.

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