

## Studies on Schismatoglottideae (Araceae) of Borneo XXII: The enigmatic *Aridarum montanum* refound

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**ABSTRACT.** *Aridarum montanum* Ridl., a species known from a single herbarium specimen allegedly collected on Gunung (Mt) Santubong, Sarawak, Malaysian Borneo in 1909, has been refound on exposed shales in Sri Aman Division, and Sarikei Division, Sarawak, and subsequently flowered in cultivation. Morphological differences of the new collection compared with the original description and figure are catalogued and commented upon. An amended and expanded species description is provided, and the plant is illustrated in habitat, and from flowering cultivated material. Speculations on the probable location origin of Brooks' type material are proffered.

**Keywords.** Aroid, Mount Santubong, rare species, Sarawak, shales

### Introduction

*Aridarum montanum* Ridl., the type species of the genus, has not been recollected since Cecil Joslin Brooks gathered a single specimen, purportedly on Gunung (Mt) Santubong, and now deposited in the Natural History Museum, London (BM). Boyce & Wong (2011) outlined the few facts known pertaining to *A. montanum*, emphasizing that numerous surveys of the supposed type locality, a large sandstone mountain situated on a peninsula jutting into the South China Sea approximately 35 km north of Kuching, the state capital of Sarawak, had failed to locate the plant, although another quite different *Aridarum* (*A. nicolsonii* Bogner) is abundant there. Recollection of *A. montanum* from a two quite separate very wet shale-dominated sites, one in Sri Aman Division and the other in Sarikei Division, coupled with the persistent failure to locate plants of this species at the supposed type locality on much drier sandstone ecology, raises the probability that Brooks' label data are in error.

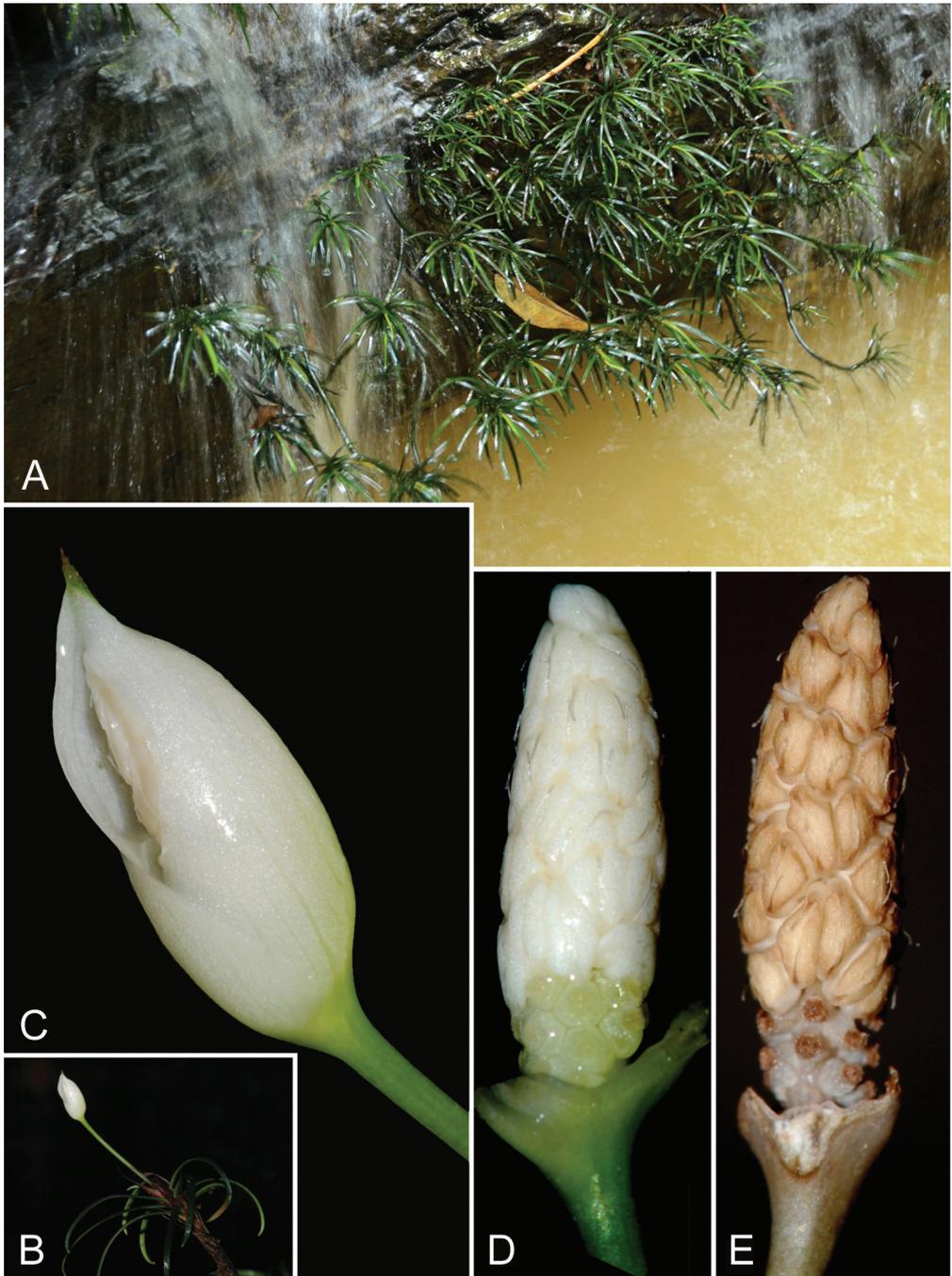
Brooks was in Sarawak during 1900–1910, employed as a metallurgical chemist by the gold-exploitation arm of the Borneo Co. Ltd. During this period he collected a wide range of wildlife, including plants, although mainly ferns. Data for Brooks' fieldwork are often incomplete, and there are doubts over the numbering of at least part

of his collections. Brooks' Borneo fieldwork was concentrated almost exclusively in west Sarawak. He made collections on Gunung (G.) Santubong (c. 1° 44' N 110°20'E), G. Pueh (c. 1°48'N 109°41'E), G. Kapor (c. 1°23'N 110°7'E), G. Singai (c. 1°30'18.28"N 110°10'21.36"E), the Banjaran Bungo (c. 1°16'N 110°9'E), Bau (c. 1°25'N 110°9'E), Bidi (c. 1°23'N 110°8'E), and Tringgus (c. 1°14'N 110°5'E). With the exception of Banjaran Bungo, none of the above areas has exposed shales. Gunung Santubong, G. Singai, and Tringgus are predominantly sandstone; G. Kapor and Bidi are forested karst limestone, while G. Pueh is granite. Our new collections coupled with high levels of "geological endemism" present among aroids strongly favours *A. montanum* being a shale-obligate.

Brooks' only documented excursion away from this general area was in 1908 when he ventured to the source of the true right tributary of the Sungai Sarawak, afterwards continuing to the headwaters of the Sungai Sambas where it rises in the Bengkayang (Bengkayang) Mountains (G. Niyut and G. Bentuang) NE of Pontianak, in modern Kalimantan Barat, Indonesian Borneo. Brooks returned to Sarawak from this expedition by way of Siluas and G. Penrissen (Brooks 1911). These areas do have exposed shales, and furthermore there are floristic links with Banjaran Bungo and via the Klingkang range to the border areas of Lubok Antu, close to one of the new collections of *A. montanum*. The Sarawak Banjaran Bungo is botanically reasonably well sampled and to date *A. montanum* has never been located there. On balance it seems most likely that Brooks' collection was made during the trip to the headwaters of the Sungai Sambas.

*Aridarum montanum* Ridl., J. Bot. 51: 201(–202), pl. 527 (1913); Bogner & Hay, Telopea 9(1): 186 (2000); Boyce & Wong, Malayan Nat. J. 63(4): 613–618, Figs. 2 & 3 (2011). TYPE: *C.J. Brooks* 1035, Malaysian Borneo, Sarawak, Kuching Division, Santubong (but see above), Oct 1909 (holo BM!). (Fig. 1)

Trailing-pendent or tufted obligate rheophyte to c. 25 cm. **Stem** initially condensed, later elongating and often branching from the base, trailing portions to c. 35 cm (or more?), very slender, 3–4 mm diam., all except the oldest portions clothed with tightly fitting red-brown netted fibres derived from the prophylls and cataphylls, and slender adhering sinuous green roots. **Leaves** numerous, carried in dense tufts at the tips of the stems, often two or three leaf tufts basal to these stems; **petiole** 0.2–3 cm long, c. 1 mm diam., sheathing at the very base, the wings extended into a narrowly triangular ligular portion 2.5–3 cm long, drying red-brown; **blade** linear-lanceolate, stiffly coriaceous, deep green, 2–10 cm long × 3.5–4.5 mm wide, base very narrowly cuneate, apex very narrowly acute and apiculate for 0.5–1 mm; midrib abaxially very prominent, adaxially more or less flush with the lamina; primary lateral veins not differentiated; secondary venation more or less obscure, running into a relatively thick marginal vein; tertiary venation very obscure. **Inflorescence** solitary; peduncle much exceeding the petioles, 9–10 cm long, c. 0.8 mm diam, green. **Spathe** narrowly ovate, apically acute, unstricted, 1.5–2 cm long, initially green, late in development (1–2 days prior to opening) turning entirely white; spathe limb gaping at pistillate anthesis, the



**Fig. 1.** *Aridarum montanum* Ridl. **A.** Plants in habitat on shale waterfall. Note the long, almost naked stems. **B.** Flowering shoot. Note the very narrow leaf blades, the conspicuous ligules, and the netted fibre covering the naked stem **C.** Inflorescence at pistillate anthesis, with the spathe gaping. **D.** Spadix, with the spathe artificially removed. Note the convex connective and very long setiform terminus to the thecae. **E.** Alcohol-preserved spadix. All from *P.C.Boyce et al. AR-3728*. (Photos: A, Mike Lo; B–E, Peter C. Boyce)

upper 2/3 caducous at staminate anthesis, at which time the lower persistent 1/3 flares into an obconic cup. **Spadix** 1.4–1.5 cm long, c. 3 mm diam., subcylindric, distally tapering to an acute apex; **pistillate flower zone** 2–3 mm long, about three irregular whorls of subglobose-oblong pistils c. 0.5 mm diam.; stigma sessile, button-like, narrower than the pistils, c. 0.4 mm diam., papillate, centrally impressed; **staminate flower zone** contiguous with pistillate zone, c. 1.2 cm long, c. 2.5 mm diam., fertile to the acute apex; stamens crowded, arranged in pairs, more or less ellipsoid and the pairs rhombohexagonal from above, longitudinally aligned (with respect to spadix axis), c. 1.2–1.5 mm × 0.3–0.4 mm, convex in nature, drying with a deep longitudinal excavation; thecae on the distal and proximal (with respect to spadix axis) sides of the anther, base triangular, the remainder a long straight very slender horn c. 7 mm long, these folded in horizontally across the top of and meeting in the middle of the anther, elevating somewhat at staminate anthesis. **Fruiting spathe** broadly obconic, white. *Fruit* unknown.

*Other specimens examined:* MALAYSIAN BORNEO. **Sarawak.** Sri Aman, Lubok Antu, Batang Lemanak, 01°09'N 111°39'E, *P.C.Boyce et al. AR-3728* (SAR); Sarikei, Ulu Sarikei, Air Terjun Ruan, 01°55'02.0"N 111°29'10.7"E, *P.C.Boyce & S.Y.Wong AR-4100* (SAR).

*Distribution.* Known with certainty only the two localities reported here.

*Ecology.* Shale cascades and small waterfalls under very wet lowland forest; 25–60 m asl.

*Notes.* Recollection of *A. montanum* has revealed critical inaccuracies in the original description and figure (Ridley 1913), and also interpretative misconceptions in the description provided by Bogner & Hay (2000).

Inaccuracies in Ridley's description and figure are the excavation of the stamen connective, and the supposed presence of triangular-based, setiform sterile flowers at the 'base' of each stamen. The connective excavation is an artefact resulting from shrinkage during drying for preservation. In nature the stamen connective is markedly convex, forming a pronounced dome between the thecae horns (Fig. 1D). It remains so in alcohol, although the stamen pairs, which are appressed when fresh, shrink laterally when spirit-preserved, revealing deep sutures between each pair of stamens (Fig. 1E). Ridley's sterile flowers attached to each stamen are, in fact, the thecae, one on each end of the stamen, and comprising a triangular somewhat gibbous basal portion (the actual theca) and a long, setiform terminus through which the pollen is released.

Bogner & Hay's description contains the following statement: "interpistillar staminodes few at the base of the female zone, shortly stipitate, spindle-shaped, narrower and shorter than the pistils (interpistillar staminodes fide Ridley (loc. cit. [i.e., Ridley 1913]); absent from the Holotype in our observation)". Ridley (1913) makes no mention of 'interpistillar staminodes'. He does make comparison of the 'sterile flowers' he believed present at the base of each *stamen* (discussed above) with

the club-shaped sterile stamens (Ridley says “flowers”) associated with the pistils in most *Homalomena*. To Ridley this was pertinent because he supposed his *Aridarum* to be related to *Homalomena* sect. *Chamaecladon*. However, nowhere does Ridley use the term ‘interpistillar staminodes’ or mention such structures to be basal to the female zone. What Ridley does say, in the protologue (here translated from the original Latin), is: “sterile flowers basal to [i.e., at the base of the stamens]. . .”

Apart for correcting morphological descriptive inaccuracies, access to comprehensive material, coupled with field observations, has established that uniquely for the genus the stems of *A. montanum* are much elongated and somewhat branched, forming pendent masses hanging in the water flow (Fig. 1A). It may be assumed that Brooks’ original collection comprised a single tuft of leaves taken from the base of one of these stem complexes. Why Brooks failed to collect more representative material is unclear. Other minor differences between the new collection and the type are that our plants have very short petioles, less than 3 mm long. The type plant has petioles up to 3 cm long, although most are much less than this, and some very short, but none as short as here recorded.

### ***Circumscription of Aridarum***

The morphologies noted above raise issues with the circumscription of *Aridarum* sensu Bogner & Hay (2000), not least the absence of an excavated stamen connective that is one of the defining morphologies for the genus *Aridarum*. However, pending publication of an on-going molecular study, including placement of the type species, *Aridarum* sensu Bogner & Hay (2000) is here retained, but with caution.

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