

## Lost Aroids: On the taxonomic importance of relocating poorly collected species

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*Aridarum montanum* Ridl. and *Piptospatha insignis* N.E.Br. (Araceae: Schismatoglottideae), aroids originating from Borneo that are each known from a single collection, are discussed and illustrated. The history of their discovery is reviewed, together with what is known or speculated of their ecology. The biological significance of the collection locality of *A. montanum* is highlighted. The species' individual importance to modern systematics is emphasized.

**Keywords.** Araceae, *Aridarum*, *Piptospatha*, Borneo, Malaysia, Sarawak, Santubong

### INTRODUCTION

'Lost' plant species – species tantalizingly only known from a single herbarium collection, or frustratingly from just an old illustration, hold an abiding fascination for plant enthusiasts, whether professional botanists or keen hobbyists. The ranks of these 'still lost' plant species are perhaps no better exemplified than by *Archivea kewensis* Christenson & Jenny (Fig. 1), a Brazilian species (indeed, a genus) known from a single 19th century watercolour deposited in the Herbarium & Archives of Kew Gardens, from whence the genus and species epithets are derived (Christenson & Jenny, 1996).

Aroids, perhaps by reason of their often originating from almost inaccessible tropical forests, are host to a remarkable number of such 'lost' species. Remarkable, too, is that quite some number of long-lost species has been re-found over the past 20 years. Of particular note [with the period "lost" in years] are: *Gearum brasiliense* N.E.Br. [150 years] (Mayo et al., 1994), *Mangonia tweediana* Schott [142 years] (Bogner & Marchesi, 2000), *Zomicarpella maculata* N.E.Br. [116 years] (Bogner, 2007, 2009), and *Ulearum sagittatum* Engl. [90 years] (Boyce, 1995; Bogner, 1997).

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However, many aroid species remain elusive. Two of these, from Borneo, are the subject of this short piece.



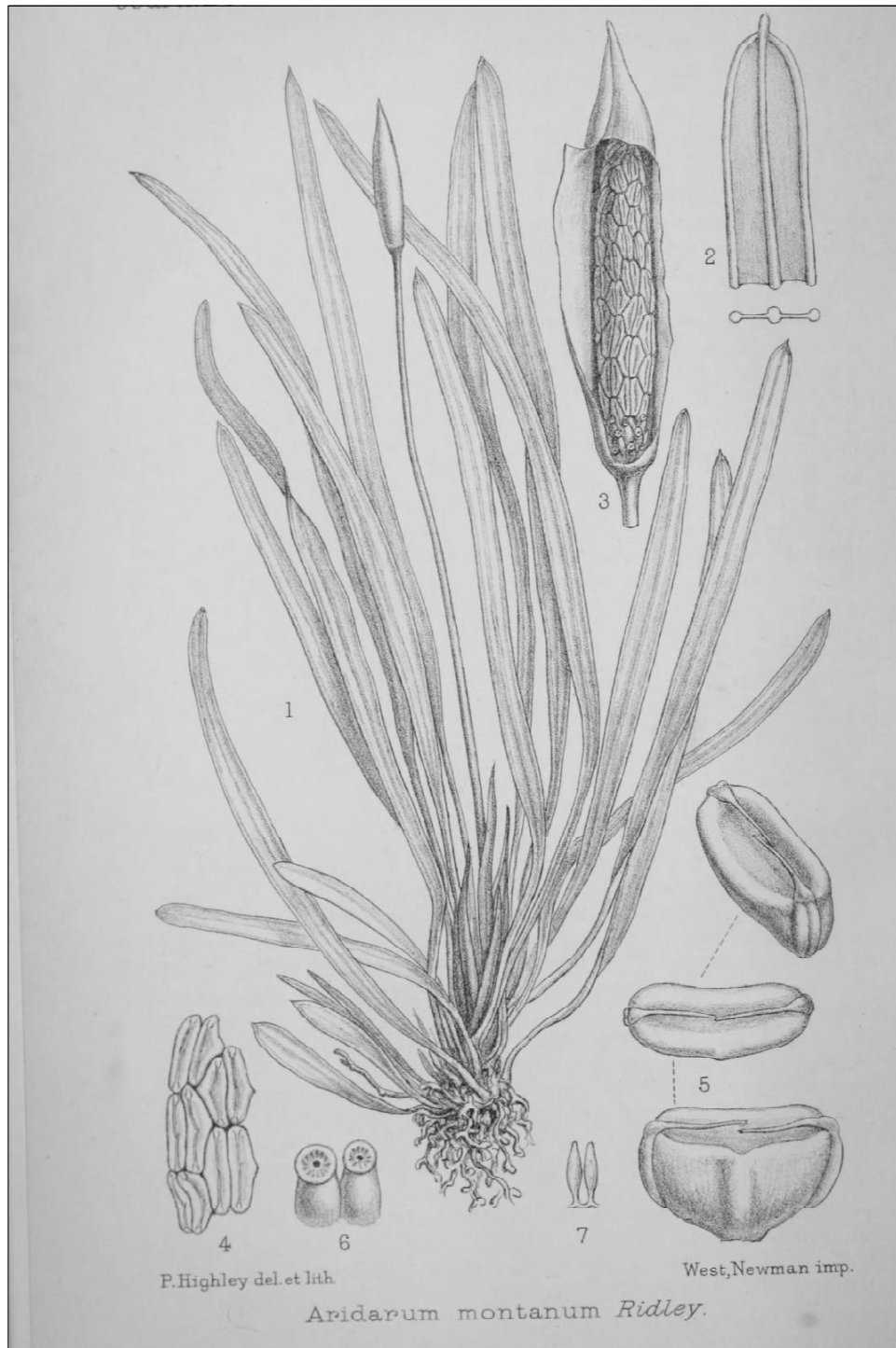
**Figure 1.** The orchid *Archivea kewensis*, nomenclaturally perhaps the “epitomic” missing species. © The Herbarium, Library, Art & Archives Directorate, Royal Botanic Gardens, Kew. Reproduced with permission.

***Aridarum montanum* Ridl.** – Fig. 2 & 3

In 1909 Cecil Joslin Brooks, a metallurgical chemist and competent amateur botanist in the employ of the gold-mining division of the Borneo Co. Ltd in Sarawak, collected a diminutive aroid at an unspecified locality on Gunung (Mt) Santubong, 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. Brooks' solitary pressed specimen was subsequently sent to the British Museum (now the Natural History Museum, London), where it was worked up by Henry Nicholas Ridley, with technical assistance from Kew's Nicholas Edward Brown. Ridley (1913) published Brooks' collection as the type of a new species in a new genus: *Aridarum montanum* Ridl., contriving the generic name from Latin *aridus* (dry) + *arum*. This, however, is likely a misnomer based on Ridley's belief, presumably derived from the narrow leathery leaf blades being adapted for arid conditions and because he noted that "The plant is obviously xerophytic...". Indeed, Ridley noted that the summit of Santubong (which he knew passably well) was distinctly arid (he used the term 'xerophytic') and from this it may be concluded that Ridley believed Brooks' plant to have originated from the summit area; the specific epithet, *montanum*, also implies this. However, there is no supporting evidence for a summit-origin of Brooks' plant, and furthermore all other *Aridarum* species are rheophytes, to which narrow leaf blades are also eminently adapted. It is of more than passing interest to note that Ridley's handwritten notes on the herbarium specimen indicate that he had originally intended to name Brooks' plant *Siccarum borneense* (Latin, *siccus* – dry + *arum*).

*Aridarum montanum* is distinct from any other aroid species. However, the genus for which it is the typical taxon has, under combined molecular and morphological scrutiny, recently been shown to be polyphyletic because it comprises species belonging to three not closely-related evolutionary lineages (Low et al., unpublished data). However, without re-finding living plants, *A. montanum* cannot be included in the molecular analysis; attempts to recover DNA from the herbarium specimen have failed. Thus, although dismembering the genus *Aridarum* into three distinct taxa is convincingly supported, a question mark remains over the nomenclature of these nascent taxa: which of the three lineages must carry the name *Aridarum* is the one to which *A. montanum* belongs. Thus aside from being a fascinating and attractive plant to re-find, the recollection of *A. montanum* remains critical to circumscribing the genus *Aridarum*.

As was implied earlier, Santubong is easily accessible from Kuching and has long been an attraction to naturalists. Among those who have collected aroids there are Odoardo Beccari who explored the more accessible parts of Santubong in 1866 & 1867. Beccari's aroid collections were worked up principally by Engler (e.g., Engler 1879a,b). What is perhaps remarkable is that despite being a field botanist of very considerable ability, as well as having a more passing interest in aroids, Beccari 'missed' sampling much of the aroid flora that he must have encountered. Inexplicably, considering that several of his Bornean aroid collections indicate he certainly collected in appropriate habitats, he failed to collect either of



**Figure 2.** *Aridarum montanum* Ridl. Plate accompanying Ridley's 1913 description in *The Journal of Botany* 51: 201-202. Note the remarkably long needle-like horns on each staminate flower, and the very narrow leaf blades.



**Figure 3.** *Aridarum montanum* Ridl. Cecil Joslin Brooks' collection (now in the Natural History Museum, London – BM) that forms the basis for Ridley's description, and which serves as the type of *Aridarum*. This is the only known collection, there being no duplicate specimens and no other known collections.

the two *Aridarum* species recorded for Santubong (the other is *A. nicolsonii* Bogner, Fig. 4), nor the one endemic to Matang (*A. borneense* (M.Hotta) Bogner & A.Hay). This serves well to highlight that many aroids are highly localized, a fact not lost on Burbidge (1880: 341-342).

Henry Nicholas Ridley made at least one excursion to Santubong when he visited Sarawak six times between 1893 and 1915; However, as with Beccari before him, and again in spite of a particular interest in aroids Ridley also failed to gather either of the Santubong *Aridarum*.

More recently Santubong has been botanically investigated by Peter S. Ashton, who in 1965 set up two 1.5 acre plots (Ashton, pers comm); and James Aidan Robb Anderson, (1960s through to the early 1980s), as well aroid specialists such as Josef Bogner (several visits in the 1970s and 1980s, and again in 2004), and Marc Gibernau (pollinator-related work in 2004).

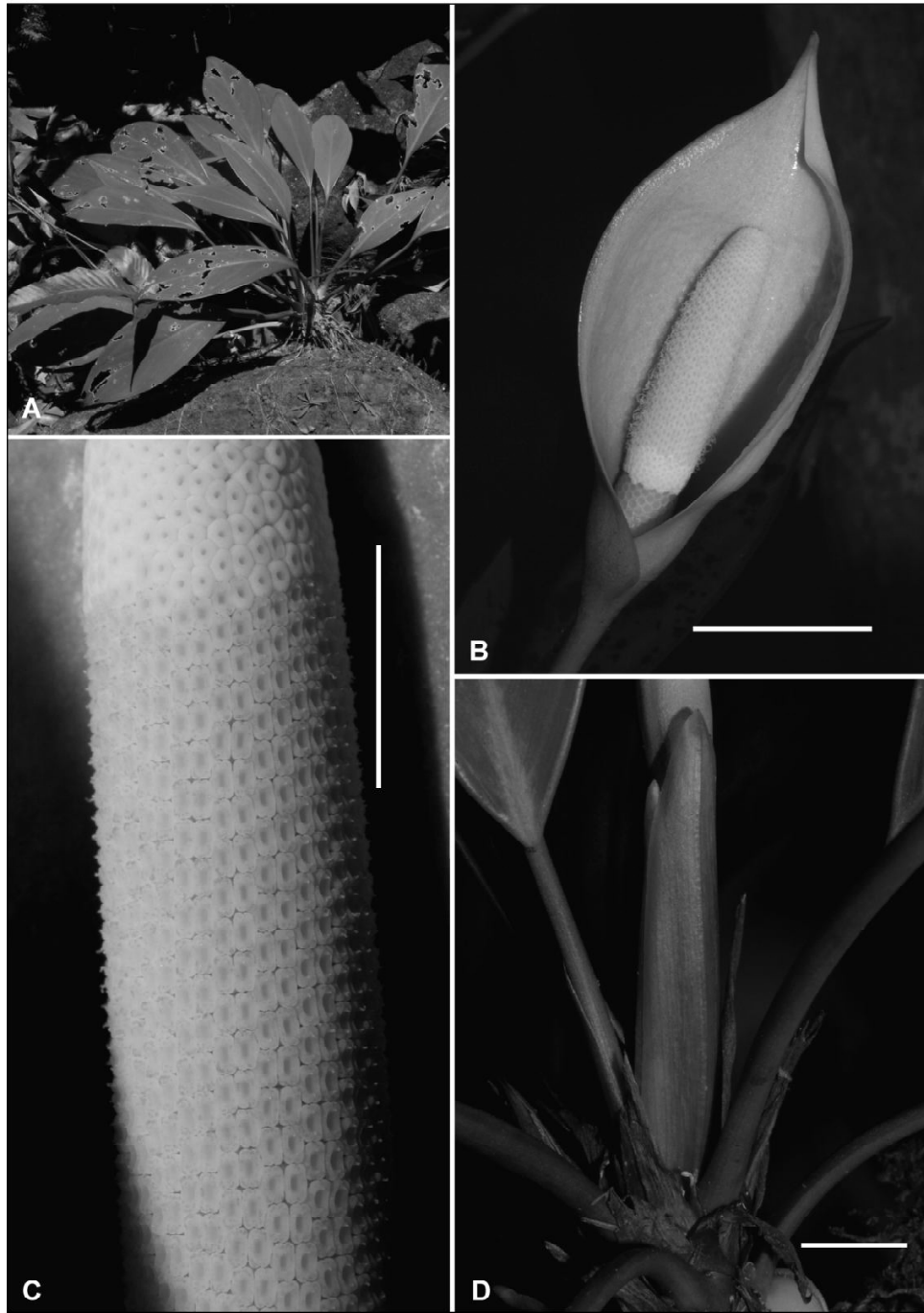
Inevitably the lowland forests surrounding Santubong are much changed from Brooks' time, but the mountain itself remains heavily forested and, away from the two permanent trails, much of it is as inaccessible now as it was then. The authors and their students are frequent visitors to Santubong, with several projects active on the mountain. All, so far, have failed to re-find *Aridarum montanum*, despite searches concentrating along suitable water courses where rheophytic aroids may be expected to occur.

#### ***Piptospatha insignis* N.E.Br. – Fig. 5 & 6**

The second 'lost' Bornean aroid is *Piptospatha insignis*, collected by Frederick William Thomas Burbidge, somewhere in "North Borneo" between 1877 and 1878. During this period Burbidge was employed by Messrs Veitch & Sons, the London and Exeter-based nursery, as an explorer for ornamental plants. Burbidge's travels and adventures, and details of his more notable plant introductions for Veitch, which included *Nepenthes rajah*, are entertainingly chronicled in '*The Gardens of the Sun*' (Burbidge, 1880).

Based on Burbidge's collection, Brown (1879) described *Piptospatha insignis* as a new species in new genus. By some degree *P. insignis* is more enigmatic than is *Aridarum montanum*, not least because it was imported (presumably in commercially viable quantities), and came to Brown's hands from Veitch's nursery in 1878. It can probably be assumed that *P. insignis* proved sufficiently easy to cultivate in "stove" glasshouses of Victorian England since there are duplicate herbarium specimens in several European herbaria, all prepared at, and distributed from, Kew, with most sheets consisting of multiple plants. From this it may be inferred that Kew had been supplied a considerable quantity of living plants sufficiently amenable to cultivation to permit preparation of multiple herbarium vouchers. Interestingly Brown (1910) noted that *Gamogyne* [*Piptospatha*] *burbidgei*, another Burbidge introduction sent living to Kew at approximately the same time as *P. insignis*, was by 1910 'well known in tropical collections'.

The geographical imprecision of Burbidge's collecting site is an impediment. However, the task of narrowing down the possible search area can be gleaned from



**Figure 4.** *Aridarum nicolsonii* Bogner, is endemic to and abundant on Santubong (A) and near-by Bako. It differs from *A. montanum* by, among other characters: (B) the much larger inflorescences; (C) the much shorter thecae horns; and (D) by the considerably broader leaf blades, and proportionately longer petioles. Overall *A. nicolsonii* is also a much larger and more robust plant than *A. montanum*. Scale bars: B=2cm; C=5mm; D=2cm. Images © Peter C. Boyce.

the literature and herbarium specimen data. In the Appendix to “*The Gardens of the Sun*” Burbidge (1880) writes “Of the new genera discovered two have very pretty spathes, and if they can be successfully cultivated will prove very interesting and ornamental stove plants. *Piptospatha insignis* N.E.Br., a pretty little “rock arad, (*sic*)” found on sandstone boulders in the beds of mountain streams, has a tuft of lance-shaped leaves and dainty white spathes tipped with pink.” He then in the same paragraph discusses *Gamogyne burbidgei*. Interestingly, while the collection of the latter is detailed (in Chapter 8) as part of the narrative of the ascent of Bukit Sagan on the Sarawak-Brunei border, no further mention of *P. insignis* is ever made.

Burbidge collected *P. insignis* under his number ‘95’. Assuming Burbidge’s collection numbering to be in chronological order, the implication is that *P. insignis* was collected relatively early in his time in Borneo, although it has to be admitted that he was decidedly sporadic in recording collecting numbers and no collections exists that are ‘near’ to ‘95’, enabling a more precise locality to be guessed at. From Burbidge’s (1880) travelogue, it is known that he arrived in August 1877 at Labuan Island, in modern Malaysia. By September of the same year Burbidge was collecting near the head of the Lawas and Meropok rivers, before returning to Labuan. On the Thursday 29 November 1877, Burbidge and Peter Veitch started out for Kinabalu by way of the Tawaran River, and Kalawat Peak, ascending to over 2700 m (ca 9000 feet). They then returned to Labuan, and in January 1878 made a boat journey up the Limbang and Pandarowan rivers as far as Bukit Sagan. It was from Sagan that Burbidge collected *Gamogyne burbidgei*. Sadly, this collection is unnumbered, and thus it is impossible to ascertain if it was gathered before or after *P. insignis*. However, it is known, based Brown’s notes accompanying his description of *P. insignis*, that he at the time had another Burbidge collection to hand representing another probable new genus (i.e., the Sagan *Gamogyne burbidgei*), and that *this* was received in Kew on 21 February 1878 (date noted on the type specimen of *G. (P.) burbidgei*). By 1878 plants of *P. insignis* cultivated at Kew had grown well enough to enable a fine plate (Fig. 5) to be prepared in time for Brown to publish the new name on 1<sup>st</sup> February 1879. User plants remained in fine enough health to be used to produce the watercolour (prepared in July 1881) that accompanies Hooker’s *Curtis’s Botanical Magazine* article published 1<sup>st</sup> December 1881 (Hooker, 1881, Fig. 6). There is no surviving record of when Kew ‘lost’ the last living plant of *P. insignis*.

On balance, it seems most likely that *P. insignis* was collected during the same trip that Burbidge gathered *P. burbidgei* and that Limbang is the area on which to concentrate the search. While *P. burbidgei* is rather widespread, occurring from Miri Division (notably Mulu N.P.), through Brunei into NW Sabah as far the Crocker range, and is frequently locally abundant (as, e.g., at Kuala Belalong, Temburong, Brunei), *P. insignis* is in all probability very locally endemic; this is the case with many other species of *Piptospatha*, e.g., *P. marginata* (Engl.) N.E.Br. (Wong et al., 2011).

Thus, we have a horticulturally desirable and probably amenable species that



was at least for three years successfully in cultivation, but originating from a wild collection recorded as a decidedly vague 'North Borneo' that now persists only as dried specimens and two illustrations. As with *Aridarum montanum* the re-collection of *P. insignis* is scientifically important as it is the type species for the genus. Additionally, the staminate flower structure of *P. insignis* is quite unlike that of any other known species and this raises interesting questions about the likelihood that despite recent revisions *Piptospatha* is still not yet fully resolved (Wong & Boyce, 2010; Wong et al., 2010).



**Figure 5.** *Piptospatha insignis* N.E.Br. Plate from *The Gardeners' chronicle*, n.s. 11, 138-139, Fig.20 (1879).



**Figure 6.** *Piptospatha insignis* N.E.Br. Reproduced from *Curtis's Botanical Magazine* 107 [ser.3, v.37], t.6598 (1881).

## CONCLUSIONS

The two examples detailed here illustrate a problem for systematics that no amount of modern technology can solve. Access to living plants still is the key factor to comprehensive understanding of biological processes. The species serve also to illustrate that there is much to be gained from studying the history of collecting, and in gaining familiarity with the nuances of the information available from a variety of sources, including herbarium labels and popular accounts of collectors' experiences.

## REFERENCES

- Bogner, J. and Marchesi, E. 2000. *Mangonia tweedieana* Schott (Araceae). *Aroideana* 23: 8–18.
- Bogner, J. 1997. New taxa of Araceae. *Sendtnera* 4: 5–11.
- Bogner, J. 2007. *Zomicarpella maculata* (Araceae) rediscovered, with notes on the tribe *Zomicarpeae*. *Willdenowia* 37: 523–534.
- Bogner, J. 2009. The Genus *Zomicarpella* N.E.Br. (Araceae). *Aroideana* 32: 8–18
- Boyce, P.C. 1995. *Ulearum sagittatum*. *Kew Magazine* 12: 135–137, pl. 273.
- Brown, N.E. 1879. New Garden Plants – *Piptospatha insignis* N.E.Br. *Gardens Chronical n.s.* 11: 138–139, Fig.20.
- Burbidge, F.W. 1880. *The Gardens of the Sun*. London: John Murray.
- Christenson, E.A. & Jenny, R. 1996. *Archivea* Christenson & Jenny, um gênero perdido do Brasil. *Revista Orquidário* 10: 37–40.
- Engler, A. 1879a . Araceae specialmente Borneensi e Papuane raccolte da O. Beccari. *Bullettino della Reale Società Toscana di Orticultura* 4: 265–271.
- Engler, A. 1879b. Araceae specialmente Borneensi e Papuane raccolte da O. Beccari. *Bullettino della Reale Società Toscana di Orticultura* 4: 295–302.
- Hooker, J.D. 1881. *Piptospatha insignis* N.E.Br. *Curtis's Botanical Magazine* 107 [ser.3, v.37], t.6598
- Mayo, S.J., Bogner, J. and Boyce, P.C. 1994. *Gearum* rediscovered. *Kew Bulletin* 49: 784–789.
- Ridley, H.N. 1913. Some Bornean Aroideae. *Journal of Botany* 51: 201–202.
- Wong S.Y., Bogner, J. and Boyce, P.C. 2011. Studies on Schismatoglottideae (Araceae) of Borneo XIV: *Piptospatha marginata* resurrected and observations on *Piptospatha*, notably for the Rejang drainages *Webbia* 66: 29-32
- Wong S.Y. & Boyce, P.C. 2010. Studies on Schismatoglottideae (Araceae) of Borneo XI: *Ooia*, a new genus and a new generic delimitation of *Piptospatha*. *Botanical Studies (Taipei)* 51: 543–552.
- Wong S.Y., Boyce, P.C., Sofiman Othman A., Leaw C.P. 2010. Molecular phylogeny of tribe Schismatoglottideae based on two plastid markers and recognition of a new tribe, Philonotieae, from the neotropics. *Taxon* 59: 117–124.