

## Studies on Schismatoglottideae (Araceae) of Borneo XIV: *Piptospatha marginata* resurrected and observations on *Piptospatha*, notably for the Rejang drainages

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*Indagini sulle Schismatoglottideae (Araceae) del Borneo XIV: rivalutazione di Piptospatha marginata e osservazioni sul genere Piptospatha, in particolare delle aree argillose del Rejang* — *Piptospatha marginata* specie limitata agli affioramenti di argilla lungo il bacino del Rejang del Sarawak centrale, è qui considerata una specie ben distinta morfologicamente ed ecologicamente rispetto a *P. elongata* del Borneo nord-occidentale, rispetto alla quale era stata interpretata come conspecifica. Il riconoscere *P. marginata* come specie distinta porta a nove il numero delle specie appartenenti a questo genere, di cui 7 endemiche del Borneo. Viene proposta una descrizione dettagliata di *P. marginata*, oltre a una aggiornata chiave identificativa per l'intero genere.

**Key words:** Araceae, Borneo, *Piptospatha*, Rejang, Sarawak.

Bogner & Hay (2000) treated *Piptospatha elongata* (Engl.) N.E.Br. as a polymorphic species, with a widespread heterogeological distribution extending throughout north Borneo from Kalimantan Barat (Indonesian Borneo) in the west, to Mulu (Malaysian Borneo: Sarawak) in the east. In the wake of extensive fieldwork in Sarawak coupled with study of herbarium material, Wong et al. (2009) demonstrated *P. elongata* to be restricted to granite outcrops in western Sarawak and adjacent areas of Kalimantan. Further, they highlighted that *P. elongata* sensu Bogner & Hay (2000) comprised three morphologi-

cally, geographically, and geologically distinct species: *Piptospatha elongata* – restricted to the Gading–Pueh granites; *P. impolita* S.Y. Wong, P.C.Boyce & Bogner – occurring on very hard coastal sandstones near Lundu, Sarawak; and *P. viridistigma* S.Y. Wong, P.C. Boyce & Bogner almost exclusively restricted to limestones in the Serian & Padawan areas as far NW as the Sungai Tegora (SE flanks of the Bungo range) and the southernmost Bau limestones, SW Sarawak.

An outcome of redefining *P. elongata* is the need to investigate two geographically disjunct species included in its synonymy by Bogner & Hay (2000) - *Pipto-*

*spatha marginata* (Engl.) N.E.Br. (based on *Beccari P.B.* 3838, from Sarawak: Kapit, Balleh; holo FI-B) and *Piptospatha angustifolia* Engl. ex Alderw., (from Indonesia, Kalimantan ('Borneo'), *H.Hallier* 614; holo BO).

*Piptospatha angustifolia* appears never to have been recollected. Bogner & Hay (2000) provisionally assigned it to the synonymy of *P. elongata* but given that the type (BO) sheets are functionally sterile (all flowers degraded), and further provide no field information aside 'Borneo', *P. angustifolia* is better for the time being treated as a taxon of dubious status.

The holotype of *P. marginata* (FI-B), while preserved rather late in anthesis is, typically for Beccari material, in an excellent state of preservation enabling detailed examination of the staminate flowers. These proved to be pubescent, a character otherwise occurring in only one other, morphologically highly distinct species of Bornean *Piptospatha* (*P. manduensis* Bogner & A.Hay - see key below). The pubescent nature of the staminate flowers in *P. marginata* was not reported by Engler (1879, 1881, 1912).

Critical examination of herbarium specimens in Munich (M) revealed a more recent, and well-preserved specimen of a *Piptospatha* (*Burt B.12976*), that had also been determined and cited by Bogner & Hay (2000) as *P. elongata*. Examination revealed the staminate flowers to be conspicuously pubescent. Burt's collecting site is only 35km west of the type locality of *P. marginata*, and the areas are ecologically very similar, comprising lowland perhumid moist forest on exposed shales. We are in no doubt that *Burt B.12976* and *Beccari P.B.* 3838 represent the same distinct species: *P. marginata*.

Despite recent published work *Piptospatha* in Borneo is still in need of extensive field-based research. The herbaria at Leiden (L) and Bogor (BO) contain much material that is unmatched with any of the currently described species. As knowledge on the genus increases it is becoming apparent that, in common with many other rheophytic and mesophytic aroid genera, *Piptospatha* exhibits in Borneo a great deal of highly localized endemism, much of it associated with specific geologies. In *Piptospatha* to date most endemism has been found in association with often isolated mountain blocks. The delimitation of what appears to be a locally restricted species in the topographically comparatively unexciting Rejang drainages raises interesting questions pertaining to taxogenesis events in subtle microhabitats.

***Piptospatha marginata*** (Engl.) N.E.Br., Curtis's Bot. Mag. 51 (1895), in descr. ad tab. 7410; Engl., Pflanzenr. 55 (IV.23Da): 125 (1912); Alderw., Bull. Jard. Bot. Buitenzorg 3(4): 194 (1922).

Bas.: *Schismatoglottis marginata* Engl., Bull. Soc. Tosc. Ort. 4: 298 (1879).

(=) *Rhynchosyple marginata* (Engl.) Engl., Bot. Jahrb. Syst. 1: 184 (1880) & in Becc., Malesia 1: 288, pl. 23, Figs 1-2 (1882) – TYPE: Malaysian Borneo, Sarawak, Bahagian Kapit, Rejang, Balleh, 1867, *O.Beccari P.B.* 3838 (holo, FI!; iso B†).

**DESCRIPTION** – Clumping rheophytic herb to 25 cm tall. **Roots** strong, c. 2 mm in diameter. **Stem** short, to 6 mm in diameter. **Leaves** several together, forming a rosette; petiole bases clasping stem; *petiole* 5-10cm long, up to 2mm in diam., weakly canaliculate; *petiolar sheath* with free ligular portion, 5-6cm long, marcescent and ultimately deciduous; persistent part of ligular sheath with hyaline margin, somewhat reddish brown in dry material; leaf laminae narrow elliptic, 12-20 cm long x 2.5-3.8 cm wide; base cuneate, apex acute with short stout tubule, c. 1.2-2 mm long, matte and drying rusty brown adaxially, somewhat paler abaxially with venation slightly darker; primary lateral veins 7-10, parallel pinnate; interprimary lateral veins weaker than primary laterals although still conspicuous, interprimary veins joining a submarginal collecting vein, these somewhat raised and reaching the leaf tip; primary lateral and interprimary veins very slightly raised abaxially and adaxially; midrib raised, at base 1.5mm in diameter and getting thinner towards apex; all other venation very obscure. **Inflorescence** solitary or up to three together, erect; peduncle 20-21 cm long, c. 2 mm in diameter. **Spathe** initially erect, 3.5-4 cm long, not constricted, pink and greenish at base; spathe limb inflated and shed during anthesis, c. 3cm long, apex c. 4 mm. **Spadix** c. 2 cm long x 0.5-0.6 cm in diameter, obliquely adnate at base at the female part; flowers unisexual, naked; pistillate flower zone fertile to the base, cylindrical, c. 0.9 cm long x c. 0.5 cm in diameter, pistil cylindrical, truncate, congested, c. 0.8 mm diameter, as wide as ovary; stigma with a slight central depression; pistillate and staminate zone separated by single row of sterile structure at the base of the staminate flower, interstice sterile structure resembling staminate flowers but drying in somewhat darker; staminate wider than the female zone, male zone c. 0.7 cm long x 0.6

cm in diameter, slightly tapering, apex blunt; staminate flowers congested, somewhat irregularly oblong or weakly butterfly shaped, c. 0.7 mm in diameter x c. 1 mm long, truncate and minutely papillate; thecae are lateral, c. 0.3 mm, ellipsoid. **Fruiting spathe** becoming funnel-form, 2.5 cm long and wide. **Seeds** not observed.

**ECOLOGY** – Rocky streams in lowland perhumid moist closed canopy forest on exposed shales, 160-220m asl.

**DISTRIBUTION** – Malaysian Borneo: Sarawak, Kapit, so far seemingly restricted to the Rejang above Kapit town eastwards to the Sungai Gaat at Batang Balleh.

*Other material seen:* Sarawak, Bahagian Kapit, ('7<sup>th</sup> Division'), Daerah Kapit, Sungai Bena area, 1°56'N 113°8'E, 25<sup>th</sup> April 1980, *B.L. Burt*, *B.12976* (E, M!).

**NOTES** – In discussing two Teijsmann collections included by Engler in the original description of *Schismatoglottis marginata* Engl. (16705 - Pulau Lingga, Sungai Banda, and 11540 - Kalimantan Barat, Pontianak, Sungai Landak), Alderwerelt (1922) noted that these specimens do not agree with the description of *P. marginata*. We fully concur with Alderwerelt, but are unable to further determine to which species these specimens are referable. The Pulau Lingga specimen in particular is interesting since it appears not to be either of the Peninsular Malaysian species [*P. ridleyi* N.E.Br. ex Hook.f. or *P. perakensis* (Engl.) Ridl.], which its geographical locality might imply. Further collections are required.

Teijsmann's Landan collection is, by the wide persistent fruiting spathe and rather diminutive habit, reminiscent of *P. viridistigma*. However, the material is too far into fruiting to retain any taxonomically unambiguous morphologies.

#### Key to *Piptospatha*

- |   |                        |
|---|------------------------|
| 1a. Sterile interstice between female and male flower zones well-defined. NE Borneo .....   | <i>P. burbridgei</i>   |
| 1b. Sterile interstice absent or not well-defined .....   | 2                      |
| 2a. Connective extended into a pronounced elongate beak; Sabah .....  | <i>P. insignis</i>     |
| 2b. Connective not raised above the thecae or shortly elevated and obtuse .....   | 3                      |
| 3a. Anthers pubescent .....   | 4                      |
| 3b. Anthers glabrous .....  | 7                      |
| 4a. Connective swollen. Peninsular Malaysia .....   | <i>P. ridleyi</i>      |
| 4b. Connective not swollen .....  | 5                      |
| 5a. Spathe white; anthers in closely appressed regularly arranged pairs; Malay Peninsula and southern peninsular Thailand .....   | <i>P. perakensis</i>   |
| 5b. Spathe pink; anthers irregularly arranged; Borneo .....   | 6                      |
| 6a. Robust plants to 25 cm tall with short, erect stems; leaves forming a rosette; leaf blade very narrowly oblong-elliptic, 12-20cm long, all veins parallel pinnate; spadix c. 2 cm long; pistillate flower zone fertile to the base; fruiting spathe 2.5 cm long and wide. Plants of exposed shales .....  | <i>P. marginata</i>    |
| 6b. Diminutive plants up to 14 cm tall with decumbent-creeping stems; leaves clustered or distributed along the stem; leaf blade elliptic, 4-6cm long, tertiary venation abaxially forming a very faint tessellate reticulum; spadix 0.8-1.2 cm long, pistillate flower zone with 3-5 oblique whorls of staminodes at the base; fruiting spathe up 1 cm long and wide. Plants of travertine. ....   | <i>P. manduensis</i>   |
| 7a. Spadix bullet-shaped, the male portion tapering towards the apex; lower part of male zone comprised of larger flowers, that may be sterile, intermixed adjacent to the pistils with white staminodes; thecae broadly excavated, the excavations of adjacent anthers forming a butterfly-shaped depression; stigmas bright green; spathe at anthesis shading proximally to distally from deep olive-green through very pale pink to medium pink, the interior of the spathe tip rostrum with 5-7 conspicuous keels; persistent fruiting spathe wide-flared; plants frequently limestone associated ..... | <i>P. viridistigma</i> |
| 7b. Spadix cylindrical; male flowers uniform throughout zone; thecae longitudinally sulcate with the pores ventral and dorsal to the sulcae; stigmas pink or dirty whitish. Spathe at anthesis shading proximally to  |                        |

- distally from deep plum purple through medium pink to deep pink, the interior of the spathe tip rostrum with 2-3 conspicuous keels or keels absent. Persistent fruiting spathe narrowly obconic; plants of sandstone or granite ..... 8
- 8a. Stigmas mid-deep pink; anthers with connective flat; spathe tip rostrum almost straight or only weakly reflexed (*ca* 45°) relative to spathe axis at anthesis, inside with 2-3 conspicuous longitudinal keels; plants exclusively of granite ..... *P. elongata*
- 8b. Stigmas dirty whitish; anthers with a short acute-triangular connective on each side, spathe tip rostrum strongly reflexed (*ca* 130°) relative to spathe axis at anthesis, inside without keels or these only very vaguely defined; plants exclusively of sandstone ..... *P. impolita*

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**Summary:** *Piptospatha marginata* is shown to be a morphologically and ecologically distinct species restricted to exposed shales along the Rejang drainages of central Sarawak, and not a synonym of NW Bornean, granite-obligated *P. elongata*, with which it has been considered conspecific. Recognition of *P. marginata* as distinct takes to nine the number of recognized *Piptospatha* species, of which seven are endemic to Borneo. An expanded description of *P. marginata* is presented and an updated key to the genus is provided.