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## ***Schismatoglottideae* (Araceae) of Borneo XIX – *Piptospatha pileata*, a remarkable new species from Kalimantan Timur, Indonesian Borneo**

### **Abstract**

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*Piptospatha pileata*, a new species of the Araceae tribe *Schismatoglottideae* from Kalimantan Timur province, Indonesian Borneo, is described, comparatively illustrated and delimited from *P. burbidgei* and *P. elongata*, and included in a revised key to the species of the genus.

Additional key words: aroids, *Piptospatha burbidgei*, *Piptospatha elongata*, taxonomy, identification key

### **Introduction**

Working in herbaria with significant holdings of *Schismatoglottideae* (notably BO, L and SAR, herbarium abbreviations following Thiers 2008+) has revealed that specimens of obligate rheophytic species of this tribe are comparatively abundant, but also that significant problems exist with their taxonomic interpretation. To begin with, many display very close similarity in overall appearance owing to vegetative adaptations to habitat. Furthermore, specimens are frequently sterile, while fertile material is often collected post-anthesis or suffers post-preservation damage to critical floral features. In all cases this renders the specimen indeterminable. Even fertile, undamaged specimens suffer from the common neglect by the collector (usually a non-specialist) to prepare fresh inflorescences for examination by opening/removing the spathe to reveal the spadix before pressing; removing the spathe from a dried specimen without damaging the underlying, often adhering, spadix is almost impossible. It is also very seldom that alcohol-preserved inflorescences

are prepared, and almost never are these distributed with duplicates. Lastly, even more seldom is a set of useful photographs available to ‘enrich’ inadequate material. These comments apply as well to the most recent collections as they do to the historical.

One approach to reduce the taxonomic burden of unnamed (unnameable) material of likely novel species is to visit localities of the collections and attempt a match between plants on the ground and pre-existing collections. One such novel species is the subject of this paper.

*Piptospatha* N. E. Br. is a genus of 11 species, the majority confined to NW and C Borneo (Bogner & Hay 2000; Wong & al. 2009, 2011). All described species have a narrow to moderately restricted distribution, and are often confined to a particular geology. To date only two species have been described from NE Borneo: *P. burbidgei* (N. E. Br.) M. Hotta, and the enigmatic *P. insignis* N. E. Br. (Boyce & Wong 2011). During examination of the herbarium material at BO and L we encountered a collection (*J. A. McDonald & Ismail 3615*) originat-

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ing from the Indonesian Kalimantan Timur province and matching neither of the known NE Bornean species, but insufficient to enable description. As customary, a digital image of the duplicates was added to our rather considerable ‘sp. nov. caveat actor’ folder, and no further action was possible until the arrival of images taken in the field in Kalimantan Timur. These showed a clearly distinct *Piptospatha* and prompted re-examination of *J. A. McDonald & Ismail 3615*, convincing us that the images and the collection are the same, scientifically novel, species. It is here described.

## Results and Discussion

### *Piptospatha pileata* S. Y. Wong & P. C. Boyce, **sp. nov.**

Holotype: Indonesian Borneo, Kalimantan Timur, Pungangan, Kayan Mentarang Reserve, Puak River valley, N of “Batu Mayo”, c. 8 km NW of Puak valley, 2°40'N, 115°37'E, 25.7.1992, *J. A. McDonald & Ismail 3615* (L!; isotypes: BO!, GH).

*Piptospatha pileata* morphologically has the closest affinities to *P. burbidgei* (N. E. Br.) M. Hotta but is readily distinguished by the following features: the deep magenta-purple (not rose pink), strongly pileate spathe limb (the portion that is shed at staminate anthesis); the pinkish grey (not green) pistillate flowers; the narrowly elliptic, acute (not narrowly oblong, obtuse) leaf blades with adaxially impressed (not flush and almost invisible) primary lateral veins and a petiole strongly D-shaped in cross section with crispulate-hyaline dorsal margins (not subterete and lacking hyaline margins).

Clumping rheophytic herb to 20 cm tall. *Roots* strong, c. 2 mm in diameter. *Stem* short, to 10 mm in diameter, but obscured by leaf bases. *Leaves* many together, arching, forming a dense rosette; petiole bases clasping stem; *petiole* 5–8 cm long, up to 2 mm in diameter, strongly D-shaped in cross section with the dorsal margins crispulate-hyaline, entire petiole minutely but distinctly scabrous, reddish dark green; *petiolar sheath* with free ligular portion, 2–4 cm long, marcescent and ultimately deciduous, persistent part of ligular sheath with hyaline margin, somewhat dark reddish brown; *leaf blades* narrowly elliptic, 8–10 cm long × 2–3.5 cm wide, base cuneate, somewhat obtuse, apex acute with stout tubule, c. 5 mm long, in life deep glossy green adaxially, much paler abaxially, drying dull reddish brown with abaxial venation slightly darker; *midrib* bluntly raised adaxially, rounded-raised and minutely scabrous abaxially; *primary lateral veins* c. 6 per side, parallel pinnate, impressed adaxially, very slightly raised abaxially; *interprimary lateral veins* weaker than primary laterals although still conspicuous, irregularly visible as semitranslucent broken lines running parallel to the primary laterals and joining a weakly defined submarginal collecting vein.

*Inflorescence* solitary, erect; *peduncle* 8–11 cm long at anthesis and c. 16 cm at fruiting, c. 2.5–3 mm in diameter, minutely but distinctly scabrous, reddish brown. *Spathe* initially erect, later held at c. 90° to peduncle, during fruiting once again erect, not constricted, dark pink in bud, opening with spathe limb dark magenta-purple pink shading to medium pink and then reddish brown basally; *spathe limb* inflated-pileate at anthesis, shedding during staminate anthesis, c. 4 cm long, the base c. 1.5 cm wide, midway inflated to c. 2 cm, then ventrally constricted and terminating in a tubule c. 4 mm long. *Spadix* 2–2.5 cm long × c. 0.5 mm in diameter, base slightly obliquely inserted onto the very short stipe; *pistillate flower zone* fertile to the base or with one or two rhomboidal pink staminodes inserted basally, cylindrical, base rather abruptly obtuse and overhanging the stipe, c. 5.5 mm long × c. 5 mm in diameter, pistils cylindrical, truncate, very congested, c. 0.6 mm diameter; stigma with a slight central depression, papillate, as wide as ovary, pinkish grey; *zone of paired staminodes* of circa four whorls separating pistillate and staminate zone; staminodes rhomboidal-polygonal, upper sides tapering basally, white; *staminate zone* equalling the pistillate zone in width, c. 15 mm long × 5 mm in diameter, slightly tapering, apex blunt, pale cream; staminate flowers congested, comprised of paired stamens, irregularly oblong and weakly butterfly shaped in plan view, c. 0.5 mm wide × c. 1 mm long, truncate, glabrous; thecae lateral, c. 0.3 mm, ellipsoid with a wide rim, the opposite stamens linked by a transverse sulcus. *Fruiting spathe* funnel-shaped, 1 cm long × 1.5 cm wide. *Fruits* in a semiglobose head with a central depression resulting from shedding of the spent parts of the spadix, individual berries very tightly appressed, very pale yellow with minute reddish speckles, stigma reddish brown. *Seeds* not observed. – Fig. 1A–E.

*Ecology* — Obligate rheophyte in waterfalls and river boulders on very hard shales under extremely wet upper hill forest; at altitude of c. 700–1000 m.

*Distribution* — Indonesian Borneo, Kalimantan Timur, known from two localities c. 30 km distant.

*Etymology* — Greek pileos [via Latin pileus, pileatus (masc. pileata)], “capped”, referring to the spathe limb at anthesis.

*Additional specimen seen* — INDONESIA: KALIMATAN TIMUR: Malinau, Malinau Selatan, Sembakung, 70 km SW of Malinau 80 km SW of Long Loreh Coalmine Village, Marthin Billa Waterfall, c. 2°47'N, 115°50'E, 17.5.2012, *K. Nakamoto AR-3923* (images only).

*Discussion* — *Piptospatha pileata* is most similar to *P. burbidgei* by the presence of a well-defined zone of staminodes separating the pistillate and staminate flower

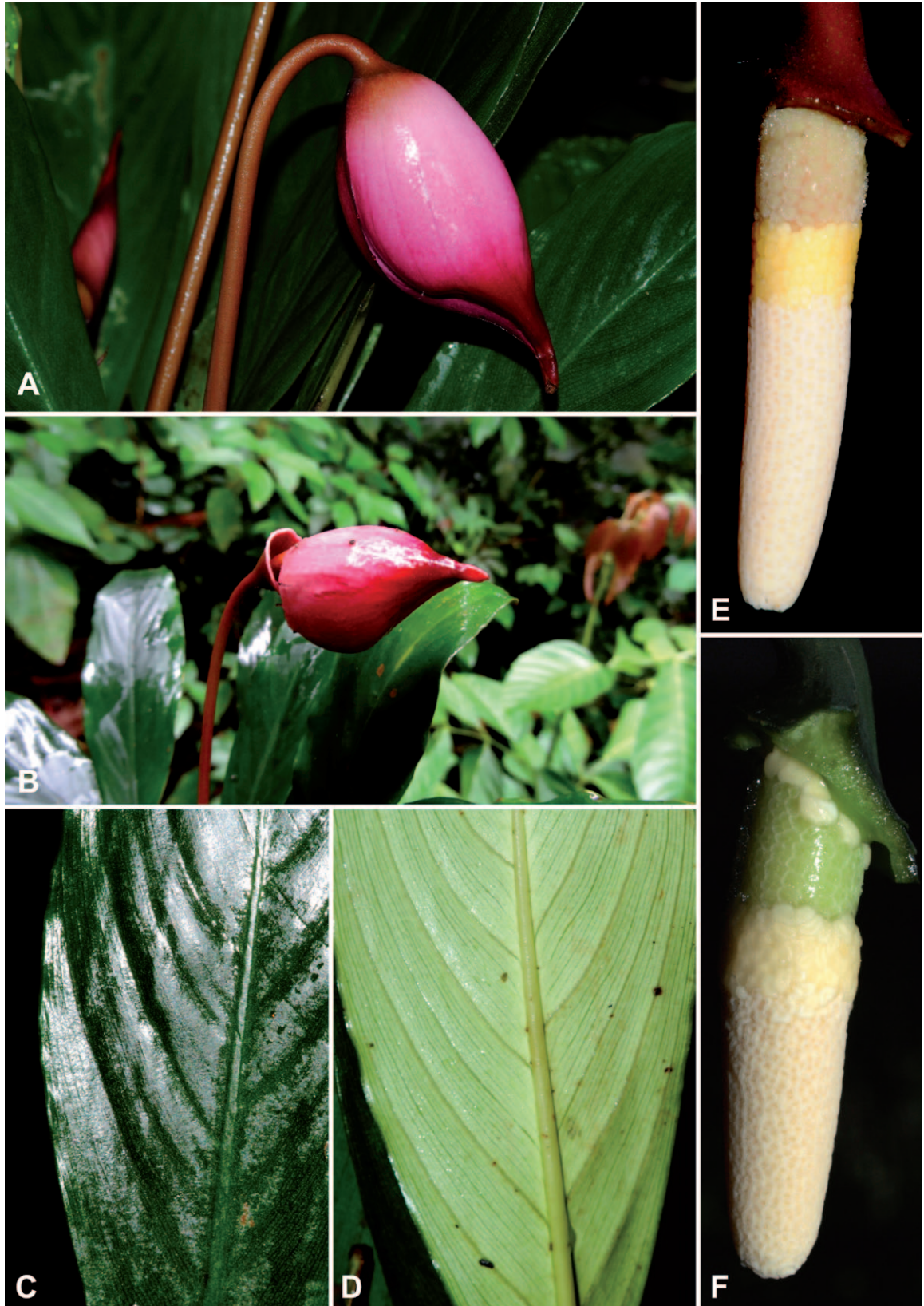


Fig. 1. A–E: *Piptospatha pileata* – A–B: flowering plant in habitat, on shales, Air Terjun Marthin Billa, Kalimantan Timur; inflorescence at pistillate anthesis (A); inflorescence at staminate anthesis, with the pileate spathe limb already shed (B); C: leaf blade, adaxial view, note the impressed primary lateral veins; D: leaf blade abaxial view, note that the interprimary veins are irregularly visible as semi-translucent broken lines running parallel to the primary lateral veins; E: spadix (spathe artificially removed) at pistillate anthesis. – F: *P. burbidgei* spadix (spathe artificially removed) at pistillate anthesis to provide comparison with E. – Photographs A–E from K. Nakamoto AR-3923, F from P. C. Boyce & al. AR-1973; A, C–F taken by P. C. Boyce, B by K. Nakamoto.





Fig. 2. *Piptospatha burbidgei* – A: flowering plant in habitat, on shales, Mulu N. P., N. Sarawak; B: inflorescence at pistillate anthesis; C: inflorescence at onset of staminate anthesis. Note that the spathe limb has begun to senesce and has partly separated from the lower, persistent spathe; D: inflorescence towards end of staminate anthesis; E: spadix (spathe artificially removed) at pistillate anthesis. – Photographs from *P. C. Boyce & al. AR-1973* by P. C. Boyce.



Fig. 3. *Piptospatha elongata* – A: flowering plant in habitat on granite, Gunung Gading N. P., NW Sarawak; B: inflorescence at onset of pistillate anthesis; C: spadix at staminate anthesis with spathe artificially removed, note the absence of a zone of staminodes between the pistillate and staminate zones and the conspicuous zone of staminodes below the pistillate zone. – Photographs A from P. C. Boyce & al. AR-2052, B–C from P. C. Boyce & al. AR-3601, all by P. C. Boyce.



zones (Fig. 1E, F, 2E). Both species also have petioles less than half as long the leaf blade.

In addition to the features given in the diagnosis above, *P. pileata* differs from *P. burbidgei* also in the rich green (not olive green) colour of the leaf blades, which is a conspicuous field marker but lost in dried material.

Vegetatively and in spathe colour (Fig. 3A, B) *Piptospatha pileata* rather resembles *P. elongata* (Engl.) N. E. Br. but the latter species is readily distinguishable in lacking a zone of staminodes between the pistillate and staminate zones, and in possessing a conspicuous zone of staminodes below the pistillate zone (Fig. 3C).

### Key to the species of *Piptospatha*

1. Sterile interstice between pistillate and staminate flower zones well-defined ..... 2
- Sterile interstice absent or at best ill-defined ... 4
2. Stem long, repent. N Kalimantan Tengah .....  
..... *P. repens* H. Okada & Tsukaya
- Stem short, erect. NE Borneo ..... 3
3. Leaf blade narrowly oblong, obtuse, adaxially smooth with primary venation not visible; spathe at pistillate anthesis oblong-globose with a short, abrupt terminal rostrum, pale rose pink, shading to green towards the base; pistillate flowers green. NE Sarawak (Miri, Limbang), Brunei, W Sabah .....  
..... *P. burbidgei* (N. E. Br.) M. Hotta
- Leaf blade narrowly elliptic, acute, adaxially with the primary veins impressed; spathe limb at pistillate anthesis strongly pileate, deep magenta-purple, paler in the lower part; pistillate flowers pinkish grey. N Kalimantan Timur .....  
..... *P. pileata* S. Y. Wong & P. C. Boyce
4. Connective extended into a pronounced elongate beak. ?Limbang (Sarawak) ... *P. insignis* N. E. Br.
- Connective not raised above the thecae or shortly elevated and obtuse ..... 5
5. Staminate flowers pubescent ..... 6
- Staminate flowers glabrous ..... 9
6. Connective of stamen swollen (dome-shaped). Peninsular Malaysia .... *P. ridleyi* N. E. Br. ex Hook. f.
- Connective not swollen ..... 7
7. Spathe white at anthesis; stamens in closely appressed, regularly arranged pairs; leaf blades abaxially with conspicuously tessellate 2-order veins. Malay Peninsula and southern peninsular Thailand .....  
..... *P. perakensis* Ridl.
- Spathe pink; stamens irregularly arranged; leaf blades abaxially with 2-order veins not tessellate or only very faintly so. Borneo ..... 8
8. Diminutive plants up to 14 cm tall with decumbent-creeping stems; leaves clustered or distributed along the stem; leaf blade elliptic, 4–6 cm 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. Kalimantan Timur (Sangkulirang) .....  
..... *P. manduensis* A. Hay & Bogner
- Robust plants to 25 cm tall with short, erect stems; leaves forming a rosette; leaf blade very narrowly oblong-elliptic, 12–20 cm 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. Sarawak (Kapit) .....  
..... *P. marginata* N. E. Br.
9. Spadix bullet-shaped; staminate portion tapering towards the apex; lower part of staminate zone comprised of larger flowers, some 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; frequently limestone associated. SW Sarawak, N Kalimantan Barat .....  
..... *P. viridistigma* S. Y. Wong & al.
- Spadix cylindrical; staminate 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; sandstone or granite. NW Sarawak ..... 10
10. Stigmas mid-deep pink; anthers with connective flat; spathe tip rostrum almost straight or only weakly reflexed (c. 45°) relative to spathe axis at anthesis, inside with 2–3 conspicuous longitudinal keels; plants exclusively of granite. NW Sarawak .....  
..... *P. elongata* N. E. Br.
- Stigmas dirty whitish; anthers with a short acute-triangular connective on each side, spathe tip rostrum strongly reflexed (c. 130°) relative to spathe axis at anthesis, inside without keels or these only very vaguely defined; plants exclusively of sandstone. NW Sarawak ..... *P. impolita* S. Y. Wong & al.

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