

Studies on Schismatoglottideae (Araceae) of Borneo X. *Pichinia*, a New Genus from Sarawak, Malaysian Borneo

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Abstract

Pichinia S.Y. Wong & P.C. Boyce is described as a new genus from Sarawak, Malaysian Borneo with one species, *Pichinia disticha* S.Y. Wong & P.C. Boyce. This genus is, so far, known only from the type locality, Pichin, Serian, Bahagian Kuching, Sarawak. The genus is illustrated and a key to the Schismatoglottideae is presented.

Introduction

Tribe Schismatoglottideae comprises *Schismatoglottis* Zoll. & Moritzi (with probably in excess of 150 species), and six mono- to oligospecific 'satellite' genera: *Aridarum* Ridl., *Bakoa* P.C. Boyce & S.Y. Wong, *Bucephalandra* Schott, *Phymatarum* M.Hotta, *Piptospatha* N.E. Br. and *Schottarum* P.C. Boyce & S.Y. Wong (Bogner and Hay, 2000; Boyce and Wong, 2008). The overwhelming majority of *Schismatoglottis* species, and all the satellite genera except *Piptospatha*, are endemic to Borneo. Initially, the new species described here was tentatively placed as a *sp. nov.* in *Schismatoglottis*, although the unique shoot architecture and basal placentation are anomalous. However, subsequently molecular analyses based on two plastid markers by the first author (Wong *et al.*, in review) revealed that the species to be well-supported as a taxon distinct from *Schismatoglottis sensu* Hay & Yuzammi, the latter being a grossly polyphyletic assemblage. We are here describing this taxon as a new genus, *Pichinia* S.Y. Wong & P.C. Boyce, basal to *Schismatoglottis*, plus the satellite genera with the exception of *Schottarum* P.C. Boyce & S.Y. Wong.

Key to genera of Schismatoglottideae and their principle subgeneric divisions in Borneo, Jawa and Nusa Tenggara

1. Wings of petiolar sheath fully or almost fully attached to the petiole; seeds never with a micropylar appendage 2
1. Wings of petiolar sheath extended into a free ligular portion; seeds sometimes with micropylar appendage 3
2. Inflorescences on very slender peduncles, nodding at anthesis, peduncle at spathe insertion flexing 180° from vertical axis. Infructescences narrowly campanulate, nodding. Plants of podsols **Hestia**
2. Inflorescences erect to nodding at anthesis, if nodding, then either peduncle massive, and peduncle at spathe insertion at most 45° from vertical axis. Infructescences fusiform with a constricted orifice, if campanulate, then thick-walled and erect, never nodding. Plants of various substrates but never on podsols 4
3. Modules monoephyllous, congested in a distichous arrangement; ligular sheath persistent **Pichinia**
3. Modules polyephyllous and leaves never distichous; ligular sheath when present marcescent 5
4. Spathe limb persistent into fruiting. Petiolar sheath usually fully deciduous; spadix interstice always present, invariably at least partly naked **Apoballis**
4. Spathe limb deciduous during anthesis, or marcescent. Petiolar sheath persistent or marcescent; interstice where present always fully clothed with sterile flowers 12 **Schismatoglottis**
5. Spathe not constricted 6
5. Spathe constricted 11
6. Thecae of anther never with horn- or needle-like projections 7
6. Thecae of anther each with a horn- or needle-like projection, although these sometimes visible only after female anthesis 8
7. Spadix almost completely adnate to spathe; male flowers mostly sterile with a narrow zone of fertile flowers exposed by the spathe opening; peduncle declinate during fruit maturation but twisting to become semi-erect at fruit maturity; spathe persistent into fruiting, and then at fruit maturity swiftly drying, reflexing and opening basally by tearing at

- peduncle insertion to expose fruits but remaining distally convolute and while in this situation clasping the spadix. Seeds with blunt micropyle
 **Bakoa**
7. Spadix either entirely free or only part of the female flower zone which is adnate to spathe; male flowers all fertile; peduncle erect (and then spathe limb caducous) or declinate (and spathe persistent) throughout the fruit dispersal; spathe limb either caducous early in anthesis or persistent until fruit maturity and then falling, still fresh to reveal entire spadix and ripe fruits. Seeds with a pronounced, hooked, micropylar appendage
 **Piptospatha**
8. Thecae with needle-like projection extending only after female anthesis; projection tipped with a weakly peltate ovate-triangular flap. Appendix composed of pistillodes **Schottarum**
8. Thecae with a horn- or needle-like projection present prior to female anthesis; with the projection pointed and never associated with a terminal flap. Appendix, where present, composed of staminodes 9
9. Sterile interstice of spadix with flattened scale-like staminodes; anthers not excavated **Bucephalandra**
9. Sterile interstice absent or with truncate staminodes; anthers nearly always with the top excavated (except *A. incavatum*) 10
10. Thecae at each end of the anther (seen from above)
 **Aridarum** Sect. **Aridarum**
10. Thecae adjacent on one side of the anther (seen from above)
 **Aridarum** Sect. **Caulescentia**
11. Thecae of anther without horn- or needle-like projections; ovules on parietal placenta; seeds without a micropylar appendage
 **Schismatoglottis Multiflora Group**
11. Thecae of anther, each with horn- or needle-like projections; ovules on basal placenta; seeds with a long, hooked micropylar appendage
 **Phymatarum**
12. Stem pleionanthic 13
12. Stem hapaxanthic **Schismatoglottis Calyptrata Group**
13. Petiole sheathing only at extreme base; each foliage leaf alternating with a cataphyll **Schismatoglottis Tecturata Group**
13. Petiole usually sheathing for at least a third of its length (rarely less); foliage leaves not alternating with cataphylls 14

14. Inflorescence erect; spathe limb irregularly crumbling and breaking away at or after male anthesis; small to medium plants
 **Schismatoglottis Asperata Group**
14. Inflorescence nodding; spathe limb clasping the spadix and more or less marcescent after anthesis, finally falling with spent parts of spadix; massive pachycauls **Schismatoglottis Corneri Group**

Pichinia S.Y. Wong & P.C. Boyce, *gen. nov.*

Herba lithophytica, caulis porrecto vel decumbens. Folia plura, in modulis monophyllorum distichis congestis, petioli vagina long persistens. Inflorescentia 1, erecta sub anthesis; pedunculus quam petiolo valde brevior; spatha erecta leniter constricta ad medium; spadix ad spatham basaliter adnatus, parte femina densiflora, parte mascula densiflora, staminodia ad basim et apicem habens, baccae carnosae densiter dispositae in spathae fructiferorum anguste-campanulatum persistens; flores masculi 2-andricis; flores feminei ovarium ovoideum, 2-loculare, ovulum plura ad basim loculi insertum. – Typus: Pichinia disticha S.Y. Wong & P.C. Boyce, sp. nov.

Lithophytic mesophytes. **Stem** creeping to erect. **Leaves** many together, distichously arranged, each module with prophyll, cataphyll (both long persistent, as long as petiolar sheath) and single foliage leaf; petiole D-shaped, puberulent, petiolar sheath with a long-persistent free ligular portion; lamina oblanceolate, orthotropic to petiole, basally cuneate, apex acuminate with tubular mucro, this short, and soon marcescent and brown, softly chartaceous, adaxially matter pale olive-green, abaxially glaucous; primary lateral veins prominent, pinnate, adaxially sunken, abaxially prominent, secondary venation pinnate, running parallel to primary veins, tertiary venation obscure. **Inflorescence** solitary, erect; peduncle terete, shorter than petiole; **spathe** up to 8 cm long; lower spathe ellipsoid, strongly oblique at insertion of spadix/peduncle, sometimes with a ventral triangular gap formed during female anthesis and then closed prior to male anthesis, inflating at female anthesis but remaining constricted at top, lower spathe orifice gaping slightly at male anthesis once spathe limb shed; constriction between upper and lower spathe weakly defined; spathe limb caducous in a single piece; **spadix** often slightly exceeding spathe at anthesis, or at least equalling, conico-cylindric; **female flower zone** cylindrical, attenuate distally; pistils ellipsoid-cylindrical, white; stigma overtopping ovary, translucent white; ovary incompletely 2-locular, placenta basal, ovules several, micropylar appendage absent; interpistillar staminodes absent; interstice present, wider than female flower zone, with pistillodes proximally, these smaller than pistil, and staminodes distally, these very similar to stamens; **male flower zone** short; stamens irregular,

crowded, whitish yellow; anthers 2 per flower, oblong to somewhat irregular in shape; pores apical, pollen extruded in strings; *appendix* present, conic, distally, staminodes crowded, irregular. **Infructescence** with lower spathe, narrowly campanulate, persistent; **fruits** berry, crowded, oblongo-globose; **seeds** ellipsoid, weakly longitudinally striate.

Distribution: Malaysia, Sarawak, Samarahan, Serian, Pichin.

Habitat: Perhumid evergreen forest on limestone, 100-250 m asl.

Notes: The shoot architecture of *P. disticha* is unique in the Schismatoglottideae. Although plants are polyphyllous, the individual modules are monoephyllous, comprising a prophyll, a cataphyll, both long-persistent, and a foliage leaf (euphyll). This basic model is similar to the module architecture of *Schismatoglottis tectorata* (*Schismatoglottis* Tectorata Group). However, unlike the Tectorata Group, the petiolar sheath in *Pichinia* is elongated in the form of a greatly lengthened persistent ligule, which would seem to have some protective role associated with the emerging shoots (as compared with the Tectorata Group where the petiolar sheath is greatly reduced to a minute ridge at the petiole base and the protective role of the sheath is homeotically taken by the cataphylls).

The distichous arrangement appears to favour litter-trapping ability, the plants growing horizontally out from vertical or near-vertical rock surfaces. The leaf posture is typically with the lamina orthotropic to the petiole in nature. Similar gross morphology and associated ecology is found in some *Homalomena* species, notably *H. geniculata* M. Hotta and *H. crassinervia* Ridl.

Occasionally the spathe has a triangular-shaped opening ventrally during female anthesis and which closes prior to the onset of male anthesis; it is not observed elsewhere in the tribe. Nothing is currently known about the pollination ecology of *Pichinia*.

Etymology: This genus is named after the type location, Pichin, Serian, Samarahan, Sarawak, Malaysia. This place is remarkable for the forested limestones that have been well preserved by the local community.

Pichinia disticha S.Y. Wong & P.C. Boyce, *sp. nov.*

Ab alii Schismatoglottidorum folii plura in modulis monophyllii distichus congestis et petioli vagina long persistens differt. Ad generis ceteris Schismatogottideae (speciebus Schismatoglottii et Hestii excludens) spatha erecta leniter constricta ad medium baccae carnosae densiter dispositae in spathe erecta anguste-campanulatus persistens, seminae sine appendice

microphyllum et ovulum plura ad basim loculi distinguitur. – **Typus:** Malaysia, Sarawak, Samarahan, Serian, Pichin, Gunung Kedadum, Sugun Karang, 01° 06' 17.6"; 110° 29' 04.5", 29 Jun 2006. *P.C. Boyce, Simon Kutuh ak Paru & Wong Sin Yeng AR-1860* (holotypus, SAR, + spirit). **Fig. 1.**

Mesophytic lithophyte up to 40 cm tall. **Stem** creeping to erect, up to 10 × 2 cm diam. **Leaves** many, distichously arranged, each module with prophyll, a cataphyll (both long persistent), up to 7 cm long, and a single foliage leaf; petiole D-shaped, puberulent, up to 12 × 1 cm diam., petiolar sheath with a long persistent free ligular portion up to 7 cm long; lamina oblanceolate, up to 25 × 9 cm, softly chartaceous, base ovate to cuneate, apex acuminate, with a short tubular mucro, up to 2 mm long, this soon marcescent, brown; lamina matte pale olive-green, abaxially greyish glaucous; primary lateral venation pinnate, up to 11 per side, prominent abaxially, sunken adaxially, interprimary venation barely distinguished from primaries; secondary venation pinnate, running parallel with primary veins, tertiary venation obscure. **Inflorescence** solitary, erect, smelling weakly esteric at anthesis; peduncle terete, pale green, up to 8 cm long; **spathe** up to 8 cm long; lower spathe mid green with darker longitudinal veins, ca 3 cm long, strongly oblique at insertion, with a ventral triangular gap sometimes forming during female anthesis and closing prior to male anthesis, barely constricted in between upper and lower spathe, spathe limb broadly triangular, ca 5 × 3 cm, white, caducous in a single piece, in interior surface at first shiny, then degrading into raised scales prior to falling; spadix exceeding or at least equalling spathe, ca 7 cm × 8 mm, conoid-cylindrical; **female flower zone** cylindrical, attenuate distally, ca 3 cm long; ovary ellipsoid-cylindrical, pale green; stigma overtopping ovary, translucent white; interpistillodes absent; *interstice* present, wider than female flower zone, with pistillodes proximally, these smaller than pistil, light orange, and staminodes distally, these similar to stamens, whitish yellow; **male flower zone** short, ca 1 cm long; stamens irregular, crowded, whitish yellow, ca 2 mm diam., pores apical, pollen extruded in strings; appendix ca 1.5 cm long, tapering-conic, appendiccal staminodes crowded, irregular, pale whitish yellow.

Distribution: Known only from the type locality and nearby forested limestone hills.

Habitat: Lithophytic mesophytes on exposed limestone or earth banks in perhumid limestone forest, 100-250 m alt.

Etymology: The specific epithet is for the distichous arrangement of the leaf.

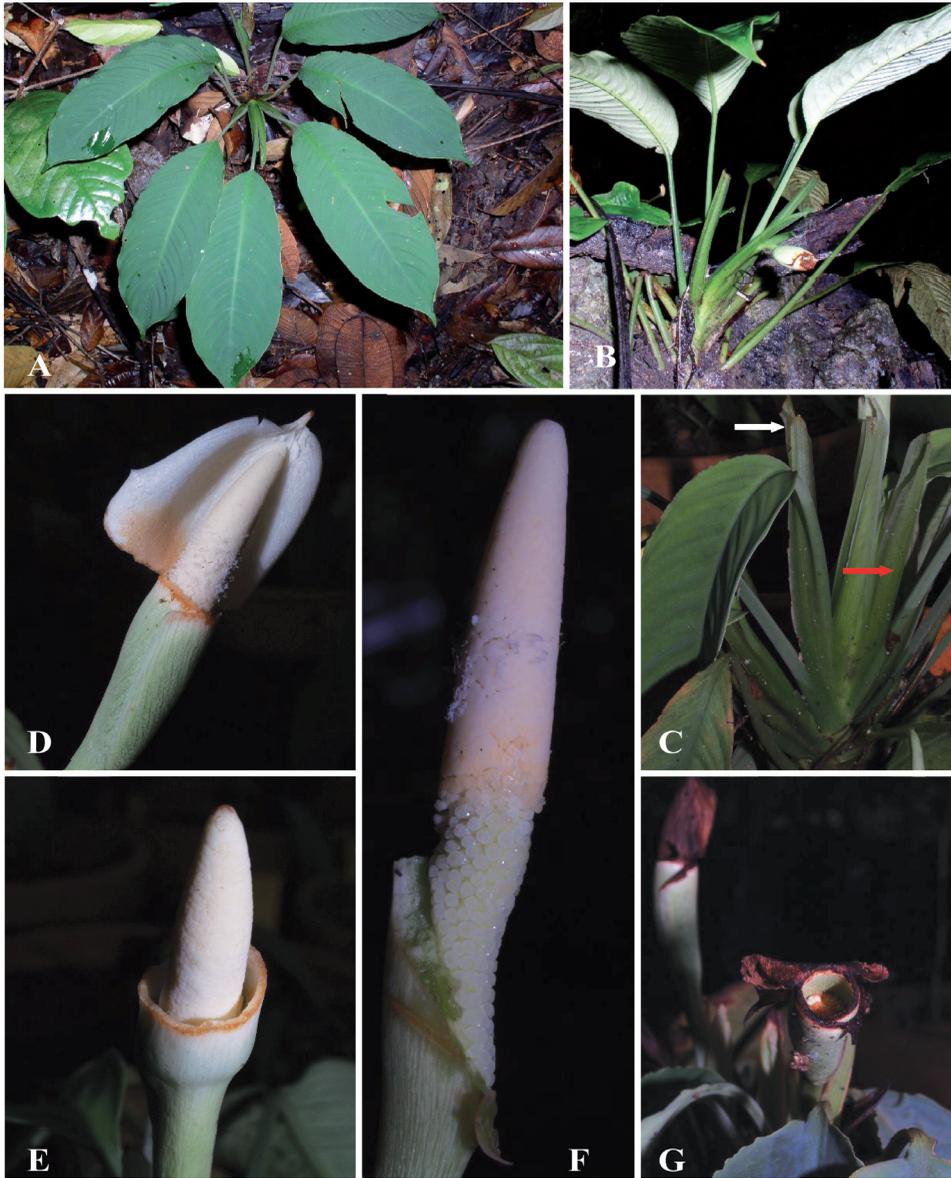


Figure 1. *Pichinia disticha* S.Y.Wong & P.C.Boyce. A. Plant in habitat, note the distichous leaf arrangement; B. Plant in habitat showing the leaf lamina glaucous abaxially and persistent free-ligular petiolar sheaths; C. Cultivated plant showing detail of the leaf arrangement. The white arrow indicates a petiolar sheath; the red arrow indicates a prophyll; D. Inflorescence at onset of male anthesis, note the spathe limb caducous in a single piece and the pollen extruding in strings; E. Inflorescence very late female anthesis, note gaping orifice to the lower spathe; F. Spadix at early male anthesis with spathe artificially removed; G. Young infructescences showing the open orifice to the persistent lower spathe; the spathes limbs in both examples have failed to fall after being shed due to dry air. All photos based on P.C.Boyce et al. AR-1860 (SAR).

Other specimens seen: MALAYSIA. Sarawak, Samarahan Divison: Serian, Pichin, Tubih, Tahang Sipukam, 01° 07' 16.6"; 110° 26' 51.2", 26 Jul 2005, P.C. Boyce *et al.* AR-1402 (SAR); Pichin, Sugun Serabu, 10 Oct 2005, P.C. Boyce & Simon Kutuh *ak Paru* AR 1476, (SAR); Pichin, Gunung Kedadum, Sugun Karang, 01° 06' 17.6"; 110° 29' 04.5", 7 Apr 2006, P.C. Boyce, Simon Kutuh *ak Paru* & Wong Sin Yeng AR-1761 (SAR).

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