

## Studies on Homalomeneae (Araceae) of Borneo V: A new species, and new supergroup record, of *Homalomena* from Sabah, Malaysian Borneo

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**Abstract:** *Homalomena galbana* Baharuddin S. & P.C.Boyce is described from the Maliau Basin Conservation Area, Sabah, representing the first species of the Homalomena Supergroup to be recorded from Sabah, and the first mesophytic species of the Supergroup to be described from Borneo. The species is illustrated and a brief discussion on the pollination role of interpistillar staminodes is presented.

### INTRODUCTION

The genus *Homalomena* in Borneo comprises at least 300 species, the overwhelming majority yet to receive a formal scientific name, with the island as a whole having fewer than 20 described taxa (Boyce & Wong, in prep.). Studies to date indicate that the Cyrtocladon Supergroup (sensu Boyce & Wong, 2008) is by far the most speciose Bornean morphotaxon (a morphologically cohesive but phylogenetically untested assemblage), accounting for perhaps 90% of the total *Homalomena* flora of the island. This is in marked contrast to continental tropical Asia where the Homalomena Supergroup predominates.

To date only one species of the Homalomena Supergroup has been found on Borneo, the recently described *H. expedita* A. Hay & Hershovitch, a colonial helophyte restricted to a few localities in Sarawak (Hay & Hershovitch, 2002; Boyce & Wong, 2009; Wong, Boyce & Fasihuddin, in press). Hitherto, no forest-

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dwelling mesophytic species, exemplifying the Homalomena Supergroup, have been found in Borneo.

Fieldwork by the first author in 2000 in the Maliau Basin Conservation Area, Sandakan Division, Sabah resulted in the collection of an unknown *Homalomena* species from close to Camp Ginseng. As so often is the case, plants were only encountered sterile in habitat and it was necessary to take plants into cultivation and grow them on to flowering before it was possible to attempt identification. These plants have recently flowered in cultivation in the research greenhouses of the School of Biological Sciences, Universiti Sains Malaysia, Pinang, and much to our surprise represent a mesophytic species of the Homalomena Supergroup, and furthermore a novel taxon, which we here describe. This is the first occurrence of the Homalomena Supergroup in Sabah, and furthermore the first record of a mesophytic taxon from the Supergroup from Borneo.

## TAXONOMIC PART

**Homalomena galbana** Baharuddin S. & P.C.Boyce, *sp. nov.* ab alii specibus Homalomeneae borneensibus spatha non constricta >3 cm longo, staminodiis interpistilodiis pistillis excedens differt. **Typus:** Malaysia, Sabah, Sandakan Division, Maliau Basin Conservation Area, environs of Camp Ginseng, 2005, *Baharuddin* 11076 (holo Universiti Sains Malaysia). **Plate 1.**

Moderate, solitary evergreen, aromatic (reminiscent of  $\alpha$ -terpinolene – mango resin) mesophytic herbs to 55 cm tall. *Stem* epigeal, erect, leafy, rooting from the nodes and from through the petiole bases. *Leaves* ca. 8 per module, ca. 12-16 together; modules subtended by a conspicuous *prophyll* up to 12 cm long, this conspicuously 2-keeled, somewhat translucent reddish green, the keels darker green; *petioles* up to 45 cm long, sheathing for ca.  $\frac{1}{3}$  their length, ascending to slightly spreading, flexing either upwards or downwards at the 2–3 cm long pulvinus occurring ca.  $\frac{2}{3}$  along the petiole length, with  $\frac{1}{3}$  of the petiole lying distal to the pulvinus, petiole above the petiolar sheath terete in cross section, with the distal-most ca. 5 cm shallowly dorsally grooved, the dorsal edges bluntly rounded, matte pale to mid-green, or somewhat yellowish green, weakly pink-suffused basally, the whole petiole with obscure darker, broken longitudinal striae, especially basally, and scattered patches of darker cloudy shading; *petiolar sheath* conspicuous, persistent, margins incurved except for the distal 2 cm where margins flaring and very slightly auriculate, sheath somewhat paler than petiole, often rather yellowish, or tinged pale red, margins minutely hyaline; *lamina* 12–24 × 8–20 cm; ovate to ovate-lanceolate or ovate-elliptic, posterior lobes spreading, triangular to rounded triangular, sinus acute, apex acute rounded, then stiffly tubular-mucronate for ca. 2 mm, semi-glossy pale to medium or rather yellowish green adaxially, matte sub-glaucous pale green with inconspicuous darker pellucid striate interprimary venation especially near the lamina margin, and more conspicuous on younger leaves, lamina somewhat quilted-bullate between the primary veins; *midrib* moderately conspicuous, flush

to very slightly raised adaxially, rounded-raised abaxially, notably basally; primary lateral veins up to 8 per side, the lower 3 arising simultaneously and associated with the posterior lobes, impressed adaxially, raised abaxially; *interprimary veins* of two types, one type alternating with primaries and only slightly less conspicuous, the second type comprising conspicuous pellucid darker veins, these very numerous and sometimes branching just after they exit the midrib; secondary and tertiary venation  $\pm$  invisible. *Inflorescences* up to 6 together, produced sequentially in a simple synflorescence, smelling of *Eugenia* at anthesis; *peduncle* rather stout, up to 12.5 cm  $\times$  3 mm, and up to 5 mm diam. at the insertion of the spathe, medium green, tinged pinkish in the lower third, erect to weakly arching, inflorescence slightly nodding and spathe opening ventrally relative to the peduncle; *spathe* broadly fornicate at pistillate anthesis, broadly ovate-ellipsoid, not constricted, ca 5  $\times$  3  $\times$  2 cm deep at anthesis, tipped with a rostrate mucro 5 mm long, margins reflexing during anthesis, medium green in bud, soon turning yellow-green at anthesis with the rostrum red below, tipped yellow, exterior semi-glossy, interior very pale green, slightly glossy with very faint longitudinal lines and minute pale glands. *Spadix* ca under  $\frac{2}{3}$  length of the spathe, ca 3 cm long including the stipe, obliquely inserted on the peduncle; *stipe* oblique and partially dorsally adnate to the spathe/peduncle insertion, ca 5 mm long on its longest side, ca 3 mm diam., pale green with scattered paler longitudinal glands; *pistillate flower zone* ca  $\frac{1}{3}$  the length of the spadix, ca 0.8  $\times$  1 cm; *pistils* somewhat loosely arranged, globose, ca 1  $\times$  0.6 mm, very pale yellow; *style* very short, conspicuously narrower than the ovary; *stigma* wider than the style, umbonate-capitate, greyish white, producing a conspicuous stigmatic droplet at pistillate anthesis; *interpistillar staminodes* clavate, ca. exceeding the height of the associated pistil, ivory-white, all staminodes directly slightly downwards, the lowermost reflexing markedly against the stipe; *staminate flower zone* contiguous with the pistillate flower zone, with a single incomplete row of staminodes intercalated between the first row of pistillate flowers, ca 1.7  $\times$  1.1  $\times$  0.8 cm, bluntly oblong-ovoid, ivory; *staminate flowers* 4-staminate, stamens each with two anthers, rarely 3; stamens elongate-globose, connective minutely prominent, and not forming a synconnective; thecae opening by a conspicuous lateral slit. *Infructescence* declinate by flexing of the thickened peduncle, spathe fully persistent and turning deep green, ellipsoid, ca 5.5  $\times$  2 cm; *fruit* and *seeds* not observed.

**Ecology:** Perhumid evergreen upper hill forest on mudstone, along small streams, ca. 700m a.s.l.

**Distribution:** Sabah, Sandakan Division, Maliau Basin Conservation Area, known only from the type collection.

**Etymology:** From Latin *galbanus*, the greenish yellow of gum galbanum [resin obtained from *Ferula gummosa* (Apiaceae)], which is exactly the spathe exterior colour at anthesis.

**Notes:** *Homalomena galbana* is immediately distinguishable from all other described Bornean species by the combination of its mesophytic habit and comparatively large spathe lacking a constriction between the lower spathe and limb. The only described species in Borneo with a similar spathe is *H. expedita*, but this is a colonial helophyte, has markedly different spadix morphology, and has yet to be recorded from Sabah. Among mesophytic species some larger expressions of *H. griffithii* (Schott) Hook.f. [Chamaecladon Supergroup] are vaguely similar in appearance to *H. galbana* but differ by the smaller spathes (less than 2 cm long), the interpistillar staminodes much shorter than the associated pistils, and smaller infructescences.

The spathe becoming yellow at anthesis is highly distinctive and represents a novel morphology for *Homalomena*; furthermore yellow is a rare spathe colour among terrestrial mesophytic aroids in general.

Although there are no field observations of *H. galbana* in flower, based on research into pollination strategies in *Homalomena* (Kumano & Yamaoka, 2006; Kumano-Nomura & Yamaoka, 2009; Tung, Wong & Boyce, in press) it is virtually certain that the conspicuous interpistillar staminodes are sacrificial structures functioning as a reward associated with beetle pollination. The role of staminodes as beetle rewards is well-documented in other angiosperms, notably basal dicots (see Armstrong & Irvine, 1990; Endress, 1984a,b) but understanding their role in aroids is of rather recent realization. It is notable that *Homalomena* inflorescences with interpistillar staminodes undergo distinctive changes in colour when preserved in ethanol, with the pistils staining dark brown while the staminodes remain white. Although yet to be confirmed, we suspect that the ovaries are provided with distasteful chemicals, perhaps tannins, to discourage herbivory, explaining the different reaction in ethanol.

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**Figure 1 : *Homalomena galbana* Baharuddin S. & P.C.Boyce.** **A.** Leaf. Note the distinct quilting of the lamina between the primary lateral veins. **B.** Detail of synflorescence. The inflorescence in the foreground is in the early stage of fruiting, that to the left is at post anthesis, and beginning to become declinate. The open inflorescence is at pistillate anthesis, the one directly behind will be open in three or four days. Just visible is a newly emerging inflorescence, with the rostrum already conspicuously bicoloured. **C.** Spathe. Note that it is deeply fornicate, and that the margins are recurved. **D.** Inflorescence at pistillate anthesis with spathe artificially removed. Note that the interstaminate staminodes exceed the associate pistil. Note, too, that the staminodes are directed downwards, and that the lowermost ones are appressed to the stipe. **E.** Detail of staminate zone. The clusters of 4 stamens per flower are easily seen. All images © Baharuddin Sulaiman