

## Studies on Homalomeneae (Araceae) of Borneo III: The helophytic *Homalomena* of Sunda

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**ABSTRACT.** An account of the helophytic *Homalomena* in Sunda is presented. Two species are recognized: *H. expedita* A.Hay & Hersc. and *H. rostrata* Griff., neither novel. *Homalomena expedita* is so far endemic to Sarawak, where it is known from three widely separated sites. *Homalomena rostrata* is widespread from Sumatera through Peninsular Malaysia to Borneo, and onwards to Maluku (Pulau Ceram). Throughout its range *H. rostrata* is morphologically plastic, such that it has accrued a considerable synonymy, proposed here: *Homalomena beccariana* Engl., *H. ensiformis* Alderw., *H. miqueliana* Schott, *H. miqueliana* var. *truella* Alderw., *H. paludosa* Hook.f., *H. propinqua* Schott, *H. raapii* Engl., *H. sagittifolia* Jungh. ex Schott, *H. sagittifolia* var. *angustifolia* Furtado, *H. sagittifolia* var. *pontederiifolia* Ridl. (including homotypic *H. ridleyana* Engl.), *H. sagittifolia* var. *sumatrana* Alderw., *H. teysmannii* Engl., and *H. triangularis* Alderw. An overview of the occurrence of helophytism in Araceae, together with speculations on the evolution of helophytism in *Homalomena*, a key to the species, and illustrations of both species are presented.

**Keywords.** Araceae, helophyte, helophytism, *Homalomena*

### Introduction

*Homalomena* in Sarawak is presently the subject of study by a taxonomic and systematic consortium coordinated from the Universiti Malaysia Sarawak (UNIMAS) (see Boyce & Wong 2008; Boyce & Wong 2009; Boyce, Wong & Fasihuddin 2010; Ng et al., in prep.). One of the first priorities has been the application of previously published names, a task especially problematic in *Homalomena* due to the poor state of preservation of most of the historical types. Nonetheless, progress has been made, and the taxonomic status of most published Bornean *Homalomena* names is now resolved. Disturbingly, this process has resulted in just 13 'good' names for Borneo, plus about 10 as yet unresolved, and these virtually all from Kalimantan. Given the very high levels of local endemism that is a feature of *Homalomena*, and that Sarawak alone likely has in excess of 300 species, it can be confidently stated that nearly everything encountered in the field in Sarawak would be undescribed.

This paper is one in a continuing series that aims to bring a better understanding to this, the most speciose and complex genus of the Araceae of SE Asia. Of the species

dealt with here, *H. rostrata* Griff. is one of the very few widespread and also highly polymorphic species in a genus that is otherwise notable for an exceptionally high degree of localized endemism and low levels of morphological variation. The large amount of material of *H. rostrata* in regional herbaria has been almost universally misidentified, and in addition the two names most commonly applied to almost all cordate-leaved *Homalomena* seen in herbaria, *H. sagittifolia* Jungh. ex Schott and *H. propinqua* Schott, are both junior synonyms of *H. rostrata*. This paper aims to settle the taxonomic chaos that exists around this name.

*Homalomena expedita* A.Hay & Herc. is included in this paper as the only other colonially helophytic species of *Homalomena* and as such is important to include as it is potentially a source of taxonomic confusion. Furthermore, *H. rostrata* and *H. expedita* belong to phylogenetically widely separated parts of the genus and thus are certainly an example of independent evolution into the (for Araceae) rare ecology of colonial helophytism.

The overwhelming majority of *Homalomena* are terrestrial or lithophytic clumping mesophytic herbs occurring in shady perhumid or everwet forest. However, two species, *H. expedita* and *H. rostrata* are colonial, stoloniferous helophytes. Whereas the taxonomy of the recently described *H. expedita* poses no problems, and the species is remarkably stable in terms of gross morphology, perhaps as a result of its clonal colonial habit (see below), *H. rostrata* is exceedingly morphologically variable, as well as widespread, with the result that it has been redescribed no fewer than 15 times.

## Taxonomic Part

### Key to helophytic *Homalomena* in Sunda

Leaves very broadly ovato-sagittate; spathe not constricted; spadix about 4.5 cm long, with a conspicuous warty interstice between the male and female flower zones, interpistillar staminodes absent ..... **1. *H. expedita***

Leaves sub-linear to broadly ovato-oblong; spathe conspicuously constricted; spadix up to 14 cm long, male and female flower zones contiguous, interpistillar staminodes present ..... **2. *H. rostrata***

**1. *Homalomena expedita*** A.Hay & Herc., Gard. Bull. Singapore 54: 174 (2002). TYPE: Cult. RBG Sydney Acc. No. 940562 ex Malaysia, Sarawak, Lundu, near bridge [over the Batang Kayang] on Kuching Road (orig. coll. Hay, Yahud, Saupe & Chan 9409), C. Herscovitch s.n. (holo NSW, iso SAR!). (Fig. 1 & 2)

Colony-forming stoloniferous strongly aromatic (terpenoids – anethol?) helophytic herbs to c. 75 cm tall. **Stem** an erect to creeping rhizome to c. 30 cm long, c. 4 cm thick, spongy, emitting cataphylliferous stolons to c. 40 cm long, 1 cm thick, these eventually upturned, becoming rhizomatous, leafy, and thence emitting further stolons from the base of the rhizomatous portion. **Leaves** clustered, up to c. 10 together; **petiole** to c. 45 cm long, spongy within, pale mid-green with broken darker green longitudinal



**Fig. 1.** *Homalomena expedita* A.Hay & Harsc. **A.** Plants in habitat at type locality, Batang Kayan. **B.** Detail of emerging shoots on margins of colony. **C.** Active leafy shoot with precursor stolon (to left of shoot) and developing new rhizome (to right). Photo credits: P.C. Boyce.

striations, sheathing in the lower  $\frac{1}{3}$ ; **petiolar sheath** margins mainly in-rolled except at the base, sheath thus closed; **lamina** mid-green on both sides, initially glossy, later becoming matt, very broadly ovato-sagittate, leathery, c. 15–20 cm long and wide, the apex broadly obtuse, very abruptly and shortly acuminate for c. 1 cm, finally stiffly apiculate for c. 3 mm, the base shallowly cordate to almost truncate, usually distinctly asymmetric, with widely spreading rounded to subtriangular posterior lobes 7–10 cm long; midrib adaxially flat, abaxially slightly prominent, with c. 5 adaxially impressed abaxially slightly prominent primary lateral veins on each side (plus a cluster of 2 or 3 on each side running to the posterior lobes), alternating with fainter interprimaries and diverging at c. 60°. **Inflorescence** solitary; **peduncle** 7–20 cm long, rather thick and spongy, c. 8 mm diam., erect. **Spathe** green, c. 5 cm long, 1.5 cm across and in bud slightly inflated at level of female zone, thence subcylindric-tapering, but not constricted, later very narrowly ovoid, apiculate for c. 4 mm. **Spadix** 4.5 cm long, stipitate; **stipe** c. 6 mm; **female flower zone** more-or-less cylindric, 0.8–1.2 cm long (irregular length around circumference of spadix), 1.2 cm wide; **pistils** subglobose, 1–2 mm diam.; stigmas sessile, discoid or very weakly lobed, slightly narrower than the ovary, papillate; infrapistillar staminodes absent, sterile interstice conspicuous, 1.5 cm long, naked, pale green and c. 6 mm diam. in the lower 1 cm, with more or less regular spirals of low domed warts c. 0.5 mm diam., the upper part (comprising the base of the male zone) 9 mm diam., ivory and clothed in irregular sterile stamens: **fertile male zone** elongate-bullet-shaped, 1.5 cm long, tapering to a blunt acute tip, ivory; **male flowers** irregular (1–)2–4-staminate; **stamens** truncate, irregular in size, 1–1.5 mm across, irregularly polygonal, slightly sinuous on the abaxial side, the thecae overtopped by a synconnective. **Fruit** unknown.

**Distribution:** Malesia: endemic to Sarawak; there known from the extensive type locality, a tiny relictual population along Jalan Steven Yong (Kuching/Bau border), and also sighted near Sibul along the main road to Miri.

**Habitat:** Forming large, probably clonal colonies in open swamps and ditches at low elevation, sometimes in tidal mud with *Cryptocoryne ciliata* (Roxb.) Fisch. ex Wydler, and mangroves.

**Other material seen:** SARAWAK. **Kuching Division:** Lundu, Kampung Stenggang Melaya Baru, just after the bridge across the Batang Kayang on the Lundu side of the river, 01°39'03.8"N 109°51'40.5"E, 3 Mar 2004, P.C. Boyce & Jeland ak Kisai AR-211(SAR); 10 Oct 2004, P.C.Boyce & Jipom ak Tisai AR-724 (SAR); 11 May 2008 P.C. Boyce AR-2357 (SAR).

**Etymology:** The epithet means 'set free', or 'foot-loose', alluding to the departure from confinement to shaded conditions otherwise typical for the genus, and the invasive, stoloniferous habit.

**Notes:** *Homalomena expedita* is remarkable in this genus of predominantly mesophytic shade-loving terrestrial plants for its occupation of open swampy sites, even tidal mudflats, in full sun. The spadix of *Homalomena expedita* is unique in the genus, having a very conspicuous naked warty interstice above the female zone.



**Fig. 2.** *Homalomena expedita* A.Hay & Hersc. **A.** Active shoot with two post anthesis inflorescences (oldest to the right) and prophyll subtending reiterative axis of active shoot. **B.** Inflorescence at female anthesis. Note the numerous *Colocasiomyia* (Diptera, Drosophilidae). **C.** Inflorescence at onset of male anthesis with a solitary beetle (Chrysomelidae: *Dercetina?*). The damage to the male portion of the spadix is typical for chrysomelid visited inflorescences. **D.** Spadix at female anthesis with spathe artificially removed. Note the distinctive warty texture of much of the sterile interstice. **E.** Detail of the sterile interstice. The morphology of the warts and their transitional morphology through staminodes to functional male flowers suggest that they are aborted stamens. Photo credits: P.C. Boyce.

*Homalomena expedita* was described less than a decade ago, based on collections made in the 1994, although specimens in FI-B seen by the first author reveal that Odoardo Beccari twice collected this species, in a locality where it is probably now extinct, in the 1860s, but failed to recognize its novelty, as too did Engler when working up Beccari's collections in the 1870s (Boyce & Wong 2009).

*Homalomena expedita* appears to spread rapidly through the production of stolons. At Lundu it forms dense swards in shallow muddy ponds and from a distance rather resembles water hyacinth (*Eichhornia*: Pontederiaceae). It appears less vigorous, though nonetheless invasive and persistent in tidal brackish conditions at Sibuluan (Hay & Boyce, pers. obs.).

In relation to the rest of its genus, *Homalomena expedita* is rather analogous to the open swamp-dwelling, colony-forming *Aglaodorum*, contrasted with *Aglaonema* (both Aglaonemateae). Both *Homalomena expedita* and *Aglaodorum griffithii* Schott, besides their similar habitat preferences, and spongy rhizomes, petioles and peduncles, predominantly produce solitary inflorescences where their immediate forest-dwelling, non-proliferating relatives generally produce complex synflorescences (except in some of the most diminutive species). In addition to the reduced number of inflorescences, it seems, on the basis of limited observations of *H. expedita*, that there is other evidence pointing to depressed or suppressed sexual fertility; the papillae on the interstice appear to be abortive pistils; the staminal thecae contain some pollen, but are partially empty in most anthers; senescent male flowers appear not to have shed pollen, the ovaries however, are filled with ovules which appear normal in form.

Inflorescences of *H. expedita* attract numerous flies of the genus *Colocasiomyia* (Diptera, Drosophilidae) and also beetles of Chrysomelidae (probably a *Dercetina* sp). The latter also damage portions of the male flower zone (see Fig. 2 C). It is not yet known which, if either, is the effective pollinator.

*Homalomena expedita* is quite often seen in cultivation in Sarawak; it seems likely that other populations than those listed above exist and are the source of these cultivated plants. Intriguingly, it is also encountered for sale in markets in Bangkok, with the sellers consistently claiming that the plants originate from southern Thailand. Given the widespread range of other Asian helophytic aroids (e.g., *Homalomena rostrata*, *Cryptocoryne ciliata*, *Aglaodorum griffithii*) it is by no means impossible that *H. expedita* is much more widespread but simply overlooked; its close resemblance, at least at a distance, to weedy Pontederiaceae might in part explain this.

**2. *Homalomena rostrata*** Griff., Not. Pl. Asiat. 3: 154 (1851) [*'roshalum'* sphalm.]. TYPE: Malaysia, Malacca: *W. Griffith 5989* (K, holo!). (Fig. 3)

*Cyrtocladon sanguinolentum* Griff., Not. Pl. Asiat. 3: 147 (1851). – *Chamaecladon sanguinolentum* (Griff.) Schott, Prodr. Syst. Aroid.: 316 (1860). TYPE: Malaysia, Malacca, *W. Griffith 5990* (holo K!).

*Homalomena sagittifolia* Jungh. ex Schott, Prodr. Syst. Aroid.: 311 (1860), **syn. nov.** TYPE: Malaysia, Sabah, Labuan, *Motley* (holo K!); epitype designated here: Indonesia, Java, *F.F.W. Junghuhn s.n. W†*; Schott Ic., no. 2111 (W!). – Fiche no. 44: a4 in the microfiche edition. See Notes on typifications, below.

*Homalomena miqueliana* Schott, Ann. Mus. Bot. Lugduno-Batavi 1: 126 (1863). TYPE: Indonesia, Borneo, Kalimantan, *P.W. Korthals s.n.* (holo L!).

*Homalomena propinqua* Schott, Ann. Mus. Bot. Lugduno-Batavi 1: 280 (1864), **syn. nov.** TYPE: Indonesia, Kalimantan, Kalimantan Selatan, Mt. Gintang, *P.W. Korthals s.n.* (holo L!).

*Homalomena beccariana* Engl., Bull. Soc. Tosc.ortic. 4: 296 (1879), **syn. nov.** TYPE: Malaysia, Sarawak, Kuching, Jul 1865, *O. Beccari P.B. 260* (holo FI-B!).

*Homalomena paludosa* Hook.f., Fl. Brit. India 6: 531 (1893). LECTOTYPE selected here: Malaysia, Perak, Larut, *H.H. Kunstler (Dr King's Collector) 3082* (lecto K! isolecto CAL, SING!). See Notes on typifications, below.

*Homalomena sagittifolia* var. *pontederiifolia* Ridl., J Straits Branch Roy. Asiat. Soc. 44: 172 (1905) – *Homalomena ridleyana* Engl., Bot. Jahrb. Syst. 37: 123 (1905). TYPE: Malaysia, Borneo, Sarawak, Kuching, *E.J. Bartlett & G.D. Haviland 3134* (holo SING!).

*Homalomena teysmannii* Engl., Pflanzenr., IV, 23Da: 68 (1912). TYPE: Indonesia, Sumatera, Bangka Island, *J.E. Teijsmann 3227* (holo B! iso BO!).

*Homalomena raapii* Engl. Pflanzenr., IV, 23Da: 73(1912), **syn. nov.** LECTOTYPE selected here: Indonesia, Sumatera, *H. Raap 235* (lecto BO!). See Notes on typifications, below.

*Homalomena triangularis* Alderw., Bull. Jard. Bot. Buitenzorg, III, 4: 181 (1922), **syn. nov.** TYPE: Indonesia, Sumatera, Deli, *J.A. Lörzing 4071*, 27 Jul 1915 (holo BO!).

*Homalomena sagittifolia* var. *sumatrana* Alderw., Bull. Jard. Bot. Buitenzorg, III, 4: 192 (1922), **syn. nov.** LECTOTYPE selected here: Indonesia, Sumatera, Ophir, Taloe, 10 Jul 1917 *H.A.B. Bunnemeijer 129*, (lecto BO!).

*Homalomena ensiformis* Alderw., Bull. Jard. Bot. Buitenzorg, III, 4: 335 (1922). TYPE: Indonesia, Kalimantan, *J.G. Hallier 1465* (holo BO! iso L!).

*Homalomena miqueliana* var. *truella* Alderw., Bull. Jard. Bot. Buitenzorg, III, 4: 336 (1922), **syn. nov.** TYPE: Indonesia, Sumatera, Riau Archipelago, Ampoelai, Pulau Bintang, 14 Jun 1919, *H.A.B. Bunnemeijer 6200* (holo BO; iso L!).

*Homalomena sagittifolia* var. *angustifolia* Furtado, Gard. Bull. Straits Settlem. 10: 228 (1939), **syn. nov.** LECTOTYPE selected here: Malaysia, Johore, Mt Austin, *H.N. Ridley 12018* (lecto SING! isolecto K!). See Notes on typifications, below.

Clump or colony-forming stoloniferous very strongly aromatic (terpenoids – ocimene or carene?) usually helophytic herbs to c. 1 m tall. **Stem** an erect to creeping rhizome to c. 20 cm long, c. 2 cm thick, somewhat spongy, emitting cataphylliferous stolons to c. 25 cm long, 1 cm thick, these eventually upturned, becoming rhizomatous, leafy,

and thence emitting further stolons from the base of the rhizomatous portion. **Leaves** clustered, up to c. 20 together; **petiole** 10–50 cm long, distally weakly to rather strongly D-shaped in cross-section, rather spongy within, deep-green to dark red or brown, especially for the basal half, with conspicuous broken dark green to brown longitudinal striations, sheathing in the lower  $\frac{1}{3}$  to half; **petiolar sheath** broadly winged, the wings spreading and somewhat fleshy, sheath open, the petiole essentially canaliculate in cross-section; **lamina** deep green to deep brown, glossy, very variable in overall shape, ranging from sub-linear to broadly ovato-oblong, leathery, c. 10–50 cm long, 3–25 cm wide, the apex ranging from acuminate to broadly obtuse, abruptly and shortly acuminate for c. 1 cm, finally stiffly apiculate for c. 10 mm, base decurrent-cuneate to truncate, shallowly cordate to sagittate or hastate, usually distinctly asymmetric, posterior lobes where present straight to rather widely divergent, up to 12 cm long, somewhat acutely rounded; midrib adaxially flat, abaxially prominent, with c. 5–7 adaxially impressed abaxially rather prominent primary lateral veins on each side, posterior lobes where present with 2 or 3 clustered veins running into them, primary lateral veins alternating with somewhat fainter interprimaries and diverging all at c. 60° from the mid-rib. **Inflorescences** 2–3 together, the synflorescence subtended by a conspicuous prophyll; **peduncle** 8–15 cm long, 5–10 mm diam., robust and somewhat spongy, medium green to reddish or brown, especially near the base, exceptionally glossy bright red. **Spathe** externally green, flushed red, or more rarely deep red, rather glossy, internally somewhat pale, rather variable in size, 5–15 cm long, conspicuously constricted at a point corresponding to the top of the female flower zone; opening by inflation of the lower spathe and loosening of the spathe limb (female anthesis), and then spreading of the spathe limb (male anthesis); post anthesis spathe closing and tightly clasping the spadix; **lower spathe** oblongo-ovate to ovato-globose, c.  $\frac{1}{3}$  spathe length, up to 5 cm long, 2 cm wide, externally with conspicuous glands (extrafloral nectaries?); **spathe limb** narrowly to somewhat broadly triangular, c.  $\frac{2}{3}$  spathe length, up to 7 cm long, 3 cm wide, rostrate-apiculate for c. 10 mm. **Spadix** subequalling the spathe, up to 14 cm long; shortly stipitate; **stipe** c. 6 mm; **female flower zone** weakly to rather strongly fusiform, up to  $5 \times 1.5$  cm; **pistils** subglobose, 1–2 mm diam., green to red depending on the overall colour of the spathe, red pistils associated mainly with red or red-flushed spathes; **stigmas** subsessile, discoid to rather well-lobed, slightly wider than the ovary, occasionally remarkably robust, papillate at anthesis; **interpistillar staminodes** weakly to very strongly clavate, subequalling the associated pistil, waxy white; **male flower zone** tapering-cylindrical, up to 10 cm long, 1 cm wide, tapering to an acute tip, ivory to very pale yellow; **male flowers** irregular 3–4-staminate; **stamens** truncate, rather regular in size, 1–2 mm across, polygonal, slightly sinuous on the abaxial side, the thecae overtopped by a pronounced synconnective. **Infructescences** declinate by flexing of the peduncle; spathe persistent, turning deep red; at fruit maturity spathe shed by the abscising of the lower spathe at the insertion on the peduncle. **Fruit** oblong-globose, dull red, smelling strongly of butyric acid. **Seeds** elongate-ellipsoid, c.  $1 \times 0.3$  mm, very finely longitudinally striate, pale brown.

**Distribution:** Malesia: S Peninsular Thailand (Narathiwat), Sumatera, Peninsular Malaysia, Borneo, Maluku (Pulau Ceram).





**Fig. 3.** *Homalomena rostrata* Griff. **A & B.** Plants in habitat showing variation in leaf lamina shape. **C.** Sub-mature infructescence. **D.** Mature infructescence with spathe artificially removed. Note the glands on the lower spathe exterior. Images: **A:** AR-1416; **B:** AR-1372; **C:** AR-2600; Photo credits: P.C. Boyce. **D:** S. Lee 319. Courtesy of Singapore Botanic Gardens, used with permission.

*Habitat:* Swampy areas in lowland forest, forest margins, in freshwater or peatswamp, or wet facies of *kerangas*, or *kerapah*, often, but not exclusively, in full sun. 3–90 m elevation.

*Other material seen:* PENINSULAR MALAYSIA. **Johor:** Kota Tinggi, 20 Jun 1934, *E.J.H. Corner SFN28612* (SING 0057465); Sungai Berassau, 8 Apr 1935, *E.J.H. Corner SFN29360* (SING 0031964; SING 0057453); Kota Tinggi, 9 Jul 1939, *E.J.H. Corner SFN36965* (SING 0031943; SING 0057466); Kota Tinggi, 30 May 1937, *E.J.H. Corner s.n.* (SING 0057467); Pontian, 28 Sep 1939, *I. Ngadiman SFN36652 & SFN36652a & SFN36652b* (SING 0057468; SING 0057470; SING 0057471; SING 0031965; SING 0057469; SING 0057452); Kota Tinggi, 24 Jul 1939, *I. Ngadiman* (SING 0057462); Kota Tinggi, 28 Jul 1961, *D.H. Nicolson 1223* (SING 0057475); Johor, 1894, *H.N. Ridley 6310* (SING 0057601); Tanjong Kupang, 1892, *H.N. Ridley s.n.* (SING 0031913); Mt Austin, 1904, *H.N. Ridley 12018* (SING 0031914); Casthwood, *H.N. Ridley s.n.* (SING 0031963); Kukub, 1909, *H.N. Ridley s.n.* (SING 0057587); Johore, 17 May 1962, *J. Sinclair 10690* (SING 0057463); Kota Tinggi-Mersing road, 2 May 1966, *J. Sinclair 10895* (SING 0031944; SING 0057464). **Pahang:** Sungai Lembing, 1 Jun 1964, *H. Singh 1* (SING 0031946); Temerloh, 18 Mar 1923, *M.R. Henderson 10527* (SING 0057449); Pahang, 6 Aug 1929, *M.R. Henderson SFN22504* (SING 0057448); Pahang, 26 Jun 1891, *H.N. Ridley s.n.* (SING 0057450). **Melaka:** Batang, Malaka, 2 May 1918 *I.H. Burkill 3193* (SING 0057461; SING 0057474; SING 0057476); Bukit Bruang, May 1901, *C. Curtis s.n.* (SING 0031862; SING 0031863; SING 0031864); Melaka, 9 Apr 1891, *P.J. Holmberg 743* (SING 0057472); Melaka, Aug 1892, *H.N. Ridley 3529* (SING 0057473). **Negeri Sembilan:** Jelebu, Pasoh F.R., 3 Jun 1987, *J.V. LaFrankie LJV2271* (KEP); Tampin, 28 Jul 1915, *Mohd Nur 1317* (SING 0031945). **Selangor:** Kuala Langat, 4 May 1919, *I.H. Burkill SFN4101* (SING 0057454); Telok F.R., 12 Jun 1921, *I.H. Burkill SFN6521* (SING 0057459); Selangor, 10 Jun 1913, *A.M. Burn-Murdoch SFN155* (SING 0057447); Selangor, Klang 3 Oct 1937, *Mohd Nur SFN33992* (SING 0057455; SING 0057457; SING 0057458); Telok F.R., 18 Jul 1961, *D.H. Nicolson 1159* (SING 0031948); Telok F.R., 18 Jul 1961, *D.H. Nicolson 1160* (SING 0057456); Batang Berjuntai, May 1895, *H.N. Ridley 1662* (SING 0031947). **Kuala Lumpur:** Kuala Lumpur, 27 Jul 1889, *H.N. Ridley s.n.* (SING 0057460). **Terengganu:** Kuala Berang, 14 May 1925, *R.E. Holttum SFN15327* (SING 0057451). **Perak:** Batang Malacca, *I.H. Burkill SFN3192* (SING 0031860); Taiping, Larut, Jun 1882, *H.H. Kunstler (Dr King's collector) 3082* (KEP, SING 0031910); Perak, 24 Jun 1961, *D.H. Nicolson 1079* (K, SING 0057600, US); Sungai Krian Estate, 21 Jun 1938, *G.H. Spare SF34592* (SING 0032091); Taiping, Jun 1888, *L. Wray 2096* (SING 0031967). **Penang:** Province Wellesley, 15 Sep 1921, *I.H. Burkill s.n.* (SING 0057602).

SINGAPORE. Chua Chu Kang, 1905, *H.N. Ridley s.n.* (SING 0003668); Ang Mo Kio, 1894, *H.N. Ridley s.n.* (SING 0003671); Bukit Mandai, 1899, *H.N. Ridley s.n.* (SING 0003683); Singapore, 29 Jul 1934, *Z. Teruya 2530* (KEP 38212).

BORNEO. SARAWAK: **Kuching Division:** Kuching, 19 May 1893 *E.J. Bartlett s.n.* (SING 0003758; 0003759); Bau, Kampung, Segong, 01°32'00.9"N 110°08'58.8"E, 10 Aug 2005, *P.C. Boyce et al. AR-1333* (SAR); Lundu, Jalan Lundu, Kampung Perang, 01°37'18.9"N 109°53'05.7"E, 11 Sep 2005, *P.C. Boyce & Jipom ak Tisai AR-1355* (SAR); Lundu, Jalan Lundu, Stunggang Ulu 01°36'21.2"N 109°53'46.3"E, 21 Sep 2005, *P.C. Boyce et al. AR-1372* (SAR); Lundu Sempadi, Gunung Papan, 19 Jun 2006,

*P.C. Boyce & Jipom ak Tisai AR-1835, AR-1836* (SAR); Kuching, 15 Mar 1893, *G.D. Haviland 3134* (SING 0003767). **Samarahan Division:** Serian, Mongkos, Kampung Kawan, 30 Nov 2005, *P.C. Boyce & Simon Kutuh ak Paru AR-1535* (SAR). **Sri Aman Division:** Sri Aman, Tempat Perkelahan Tapang Rumpit, 23 Aug 2009 *P.C. Boyce & Wong Sin Yeng AR-2593* (SAR). **Mukah Division:** Pulau Bruit, Sungai Kelepu, 7 May 1957, *J.A.R. Anderson 8012* (SING 0008587). **Miri Division:** Niah Suai, Niah National Park, Trail to Great Cave, 03°49'21.7"N 113°45'44.7"E, 13 Oct 2005, *P.C. Boyce, Jeland ak Kisai & Jipom ak Tisai AR-1416* (SAR). **Limbang Division:** Nanga Medamit, Mulu N.P., trail from Kuala Likut to Camp 5, 04°07'02.3"N 114°49'26.9"E, 28 Sep 2007, *P.C. Boyce et al. AR-2223* (SAR); Nanga Medamit, Mulu N.P., trail from Camp 5 to Kuala Terikan, 04°12'58.0"N 114°53'20.1"E, 29 Sep 2007 *P.C. Boyce et al. AR-2225* (SAR); Nanga Medamit, Mulu N.P. trail from Kuala Terikan to Camp 5 04°12'58.0"N 114°53'20.1"E, 3 Oct 2007 *P.C. Boyce et al. AR-2325* (SAR).

*Etymology:* Latin *rostratus* meaning beaked, curved, hooked, with a crooked point, in referring to tip of the spathe limb prior to anthesis.

*Notes on typifications:* In publishing *Homalomena sagittifolia* Schott (1860) attributed the trivial epithet to *Junghuhn in schedula*, implying that the name was appropriated from a Junghuhn-annotated specimen in Bogor ("Java, Herb. Lugd. Bat."). However, Schott then went on to cite a *Motley* Borneo collection he had evidently seen as a living plant presumably in Schoenbrunn ("v. v. – *vide vivum*") and as a herbarium specimen in Kew ("et s. in Herb. Hooker"). The *Motley* collection at Kew is fertile but in poor condition, while the *Junghuhn* specimen appears to be no longer extant; evidently the bulk of the description was prepared from the non-longer extant living plant. The epitypification above is based on the only image in Schott's *Icones* (W) to bear both a Junghuhn and a Schott annotation of '*Homalomena sagittifolia*' and is most likely therefore to be the *Junghuhn* collection cited by Schott.

The two syntypes of *Homalomena paludosa* cited by Hooker (1893) are incontrovertibly conspecific. The collection chosen here to serve as the lectotype is in better condition, and has more distributed duplicates, and is thus the more suitable choice.

Engler's *Homalomena raapii* was published with two syntypes, of which only the *H. Raap* collection cited above appears to be extant; it is assumed that the other collections were destroyed during the bombing of Berlin herbarium during the Second World War.

Alderwerelt's *Homalomena sagittifolia* var. *sumatrana* is based on two specimens, neither now in the best state of preservation. The specimen chosen is the less degraded of the two.

Furtado's *Homalomena sagittifolia* var. *angustifolia* is based on two syntypes. Both extant. the collection chosen more closely matches the protologue and description, and is in a better state of preservation.

*Other notes:* *Homalomena rostrata* is highly polymorphic in terms of leaf lamina shape, and overall plant size, even within a single population, and has attracted a considerable synonymy as a result. Flowering size plants range in height from barely 20 cm to over 1 m, with the largest plants generally occurring in areas of abundant nutrient availability, for example along the margins of freshwater swampforest, while smaller plants are

generally confined to nutrient-poor soils, especially on white sand and peat *kerangas*, or along oligotrophic stream systems. Smaller plants tend to have sagittate leaves.

Leaf lamina morphology varies in two distinct manners: leaf width to length ratio, with leaves ranging from sub-linear to oblong; and posterior lobe development, with the leaf bases ranging from decurrent-cuneate through truncate to sagittate or hastate. These morphologies are almost wholly mutually independent, and thus the base of a sub-linear leaf lamina can range from decurrent-cuneate to hastate, while that of an oblong leaf can range from truncate to sagittate or hastate. In extensive populations, e.g., at Niah, all variations in plant size, and leaf lamina morphology, are represented.

Inflorescence morphology is far less variable, with any differences cited by the authors of the synonyms readily encompassed by the variation in inflorescence morphology acceptable in other far less narrowly defined species. In particular, abundance or lack of flowers on the spadix and their relative disposition - congested or lax - and to a great extent overall inflorescence size, is closely correlated to the size and vigour of the plant producing the inflorescence.

Names now considered synonymous with *H. rostrata* can be assigned to the following morphs:

- The robust, oblong-truncate leaf lamina morph includes the types of *H. rostrata* Griff., *H. miqueliana* Schott, and *H. miqueliana* var. *truella* Alderw.
- The medium to robust, sub-linear leaf lamina morph includes the types of *H. beccariana* Engl., *H. ensiformis*, and *H. teysmannii* Engl.
- The robust oblong, sagittate to hastate leaf morph includes the types of *H. sagittifolia* Jungh. ex Schott, *H. sagittifolia* var. *pontederiifolia* Ridl. (including the homotypic *H. ridleyana* Engl.), *H. sagittifolia* var. *angustifolia* Furtado, and *H. triangularis* Alderw.
- The small growing, sagittate leaf morph is typified by *H. propinqua* Schott, *H. paludosa* Hook.f., and *H. sagittifolia* var. *sumatrana* Alderw.

### Helophytism in Araceae

Helophytism in Araceae is generally held to be a plesiomorphic condition, with the greatest number of helophytic species occurring in subfamilies and tribes well supported as being basal in the family: Orontioideae (three genera; eight species), Lasioideae (seven of 10 genera; 26 of 36 species), Monsteroideae: Spathiphyllaeae (one of two genera; many of the c. 60 species), and Calloideae (monospecific). Helophytism in Aroideae is considered to be secondarily derived, with helophytic taxa occurring scattered through most tribes: Spathicarpeae (*Dieffenbachia* Schott—virtually all); Philodendreae (*Philodendron* Schott—several species, notably in subgen. *Meconostigma*); Schismatoglottideae (arguably *Phymatarum* M.Hotta); Cryptocoryneae (*Cryptocoryne ciliata*); Caladieae (*Caladium* Vent.—a few species); Aglaonemateae (*Aglaodorum* Schott—monospecific); Montrichardieae (all species); Zantedeschieae (all species); Peltandreae (all species); Areae (*Typhonium flagelliforme* (Lodd.) Blume); and Colocasieae (*Colocasia* Schott—a few, notably *C. esculenta* (L.) Schott; *Alocasia* (Schott) G.Don—a few, notably *A. alba* Schott and *A. sarawakensis* M.Hotta).

The occurrence of helophytism in *Homalomena* is thus unsurprising, although it is interesting that the two species exhibiting this ecology are not considered closely related. *Homalomena expedita* falls uncontroversially into the *Homalomena*

Supergroup (sensu Boyce & Wong 2008), while *H. rostrata* belongs in the Cyrtocladon Supergroup (sensu Boyce & Wong 2008). Recently, chemical assaying has indicated that the principal components of *H. expedita* are significantly different to those of species in the Cyrtocladon Supergroup (Ng et al., in prep.); it is fully expected that ongoing molecular work (Ng, et al., in prep.) will reinforce the recognition of two distinct monophyletic lineages, and that helophytism is twice derived in Sundaic *Homalomena*.

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