



Two new *Monophyllaea* (Gesneriaceae) species from Sarawak, Borneo

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Abstract

Two new species, *Monophyllaea grandifolia* Kiew & S.Julia and *Monophyllaea meriraiensis* Kiew & S.Julia are described from limestone hills in Ulu Merirai, Tatau District, Sarawak. Descriptions and photographs of the two species are provided.

Key words: limestone hills, Malaysia, *Monophyllaea* subgen. *Monophyllaea*

Introduction

Sarawak is the center of diversity of *Monophyllaea* R.Brown (1838: 121) being home to 16 of the 24 currently known species (Burt 1978, Weber 1998, Kiew 2002). In Sarawak the highest number of *Monophyllaea* are on limestone hills in the Kuching Division (8 species) and on the Melinau limestone (8 species) in Gunung Mulu National Park, with only the widespread *M. merrilliana* Kraenzlin (1913: 168) occurring in both areas. The remaining species is found on Bukit Sarang, an isolated limestone hill in the Tatau District.

Exploration of the Ulu Merirai limestone, also in the Tatau District (02° 46' 13.7" N, 113° 39' 02.9" E), resulted in the discovery of two new *Monophyllaea* species, as well as five new species of *Begonia* Linnaeus (1753: 1056), Begoniaceae (Kiew & Sang 2009) and a new species of *Amorphophallus* Blume ex Decaisne (1834: 366), Araceae (Boyce & Hettterscheid 2010), indicating that this is an important, though still little known, limestone area in Sarawak. The Ulu Merirai limestone is mostly comprised of cliff faces backed by steep earth slopes with most not reaching above the tree canopy and with the highest peak reaching only a maximum elevation of 430 m. Of the two new species, *Monophyllaea grandifolia* is widespread at its locality and in places is the dominant herb in the ground layer on limestone-derived soil or in swampy areas at the base of limestone cliffs. In contrast, *M. meriraiensis* grows on the vertical limestone and was found only below one cliff overhang.

Both these species, in having uniseriate hairs and pedicels distinctly longer than calyx are placed in *Monophyllaea* subgen. *Monophyllaea* Burt (1978: 1). While *M. grandiflora* displays most similarity to *M. hottae* Burt (1978: 50) in the Kuching Division, *M. meriraiensis* is most similar to *M. tenuis* Burt (1978: 41) from the Melinau limestone.

Taxonomic treatment

Monophyllaea grandifolia Kiew & S.Julia, *sp. nov.* (Figure 1)

It differs from *Monophyllaea hottae* in its shorter peduncle (ca. 14 cm not ca. 30 cm long), its strongly recurved flowering axis and its smaller flowers (ca. 9 mm not ca. 13 mm long) with strongly reflexed upper lobes.

Type:—MALAYSIA. Borneo, Sarawak, Tatau District: Ulu Merirai, Gua Tiang, 6 July 2005, *Julia et al.* S 94648 (holotype SAR!; isotypes KEP!, SAR!, SING!).

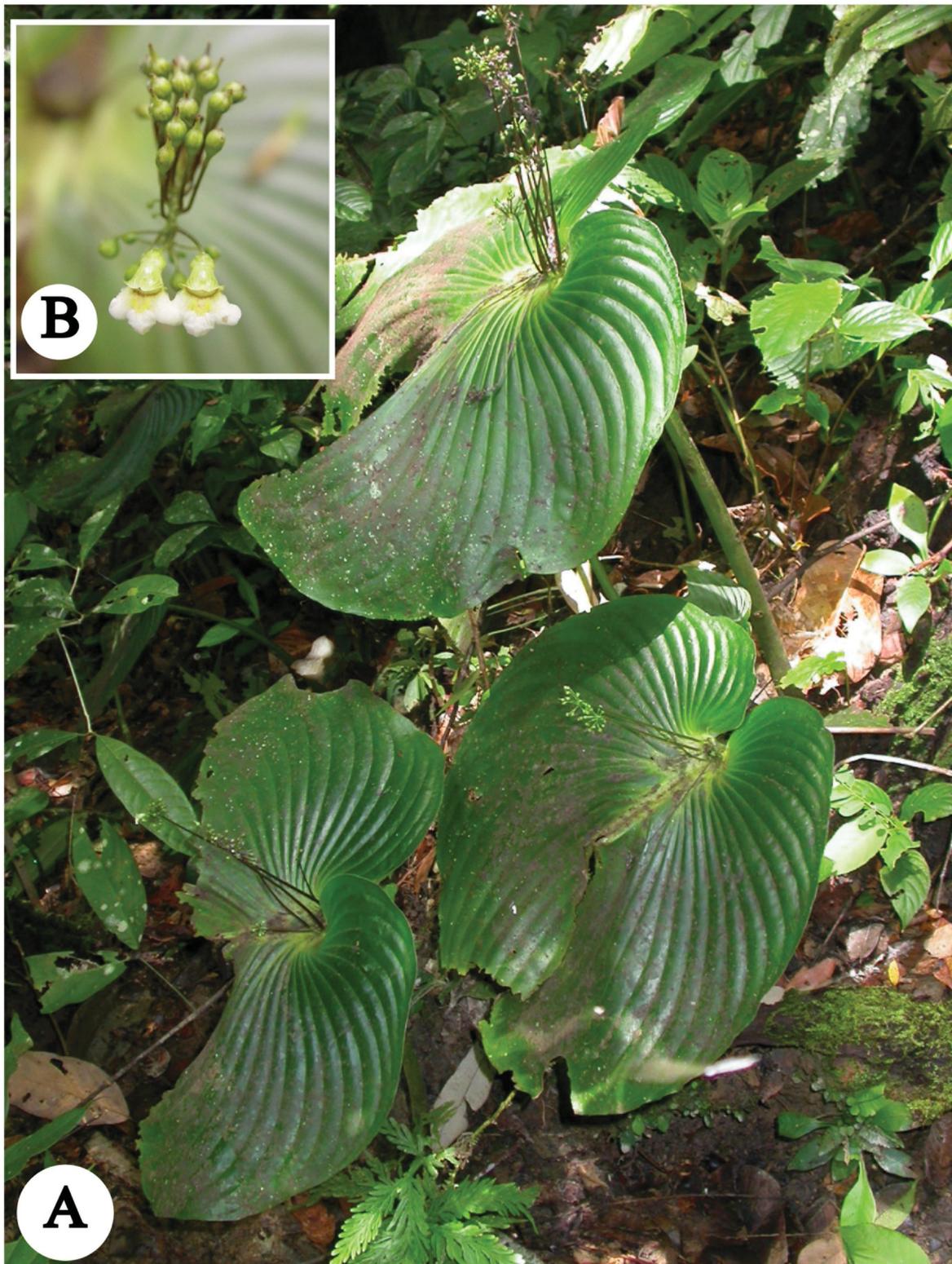


FIGURE 1. *Monophyllaea grandifolia* Kiew & S.Julia. A. habit; B. flowers and fruits (all photos from Julia *et al.* S 94648 by P.K.F. Leong).

Stems (hypocotyls) (40–)50–70(–98) cm long, stout, in life dark green and succulent, 2–4 cm diameter. Leaves broadly ovate, 40–67 × 37–72 cm, green and glossy above, when fresh thickly succulent, base deeply cordate, lobes to 6 cm long, upper surface with occasional uniseriate hairs ca. 0.5 mm long, beneath becoming glaucous and completely encrusted with crystalline chalk pustules; lateral veins 16–25 pairs, radiating from

the base, then parallel and (1–)2–3.3 cm apart, midrib sunken above, prominent beneath, tertiary veins reticulate, slightly prominent. Inflorescences arising from base of midrib, up to 15–26 in various stages of development, peduncle (6–)7–14 cm long, glabrous, flowering axis strongly recurved, slightly thickened, 1–2.5 cm long, rarely with two branches, flowers arranged in 2 diverging rows; pedicels ca. 8 mm long. Calyx divided nearly to the base, glabrous, lobes broadly oval, ca. 2.5 × 2 mm, apex rounded and entire. Corolla ca. 9 mm long, yellowish with yellow palate or greenish with a whitish yellow palate, lobes 5, tube ca. 3 × 4 mm, densely bearded with long hairs inside below filaments, palate with dense glandular hairs, upper lobes ca. 2.5 × 3.5 mm, strongly reflexed, lateral and median lobes connate for 2 mm, lateral lobes orbicular, ca. 2.25 × 2 mm, median lobes spatulate, ca. 4 × 4 mm. Stamens glabrous, filaments ca. 2 mm long, posterior converging, anterior strongly curved with a rhomboid tooth ca. 1 mm long, anthers globose, ca. 1 mm diameter. Ovary globose, ca. 1 mm diameter, greenish, style ca. 2 mm long, stigma greenish or purple. Fruits with pedicel to 12 mm, ascending at ca. 45°, capsule globose, ca. 2 mm diameter, style persistent and exerted from the calyx.

Distribution:—Endemic to Sarawak, Borneo; known only from the limestone areas in Ulu Merirai, Tatau district.

Habitat:—Quite widespread in the Ulu Merirai limestone area where it grows at the base of (but not on) the limestone rock face and is particularly common and can form drifts on damp slopes on limestone-derived soil or in swampy areas at the base of limestone cliffs, at 131–280 m elevation. It apparently flowers continuously because a single plant produces a series of inflorescences in all stages of development.

Other specimens examined:—MALAYSIA, Borneo, Sarawak: Tatau District, Ulu Merirai, Gua Aki Bukok, 10 July 2005, *Julia et al.* S 91196 (SAR); Path to Gua Bukit Linggong (2° 48' 34" N, 113° 40' 25" E), 14 July 2005, *Leong et al.* PL 331 (SAR, SING).

Notes:—It is most similar to *Monophyllaea hottae* which grows on the Melinau limestone in the Gunung Mulu National Park, in its large leaves which are densely encrusted beneath, inflorescences arising from the base of the midrib and its calyx divided almost to the base. It differs in the characters listed in Table 1. This new species is named for its large leaf. Two other *Monophyllaea* species produce large leaves: *M. hottae* has leaves up to 60 × 40 cm and *M. sarangica* Burt (1978: 43) has leaves up to 69 × 52 cm (Kiew *et al.* 2007) but none are as large as those of *M. grandifolia* that can grow to 67 × 72 cm (in spite of the apex rotting away) making them the widest in the genus. The plant is extremely succulent and has a stout fleshy stem that can grow to 98 cm long and ca. 4 cm thick.

TABLE 1. Differences between *M. grandifolia* and *M. hottae*.

Character	<i>M. grandifolia</i>	<i>M. hottae</i>
Stem length (cm)	40–98	ca. 10
Lamina texture	succulent	thin
Lamina shape	broadly ovate	oblong to ovate
Lamina width (cm)	37–72	25–40
Peduncle length (cm)	6–14	ca. 30
Flowering axis	strongly recurved	slightly recurved
Flowers	in two diverging rows	in spaced pairs
Corolla length (mm)	ca. 9	ca. 13
Upper corolla lobes	strongly reflexed	straight or porrect
Corolla lobes	median lobes larger than upper and lateral lobes	median lobes equal in sizes to upper and lateral lobes
Filament length (mm)	ca. 2	ca. 4
Filament tooth	rhomboid, ca. 1 mm long	blunt, very small
Style length (mm)	ca. 2	3.5–4
Fruits	globose	elongate

Monophyllaea meriraiensis Kiew & S.Julia, *sp. nov.* (Figure 2)

Differs from *Monophyllaea tenuis* in its larger, glabrous lamina twice as long as wide, its long, narrow corolla tube and ovoid ovary with a longer style.

Type:—MALAYSIA. Borneo, Sarawak: Tatau District, Ulu Merirai, Path to Gua Bukit Linggong (2° 48'34" N, 113° 40' 25" E), 14 July 2005, *Leong et al. PL 330* (holotype SAR!; isotypes K!, L!, SAR!, SING!).

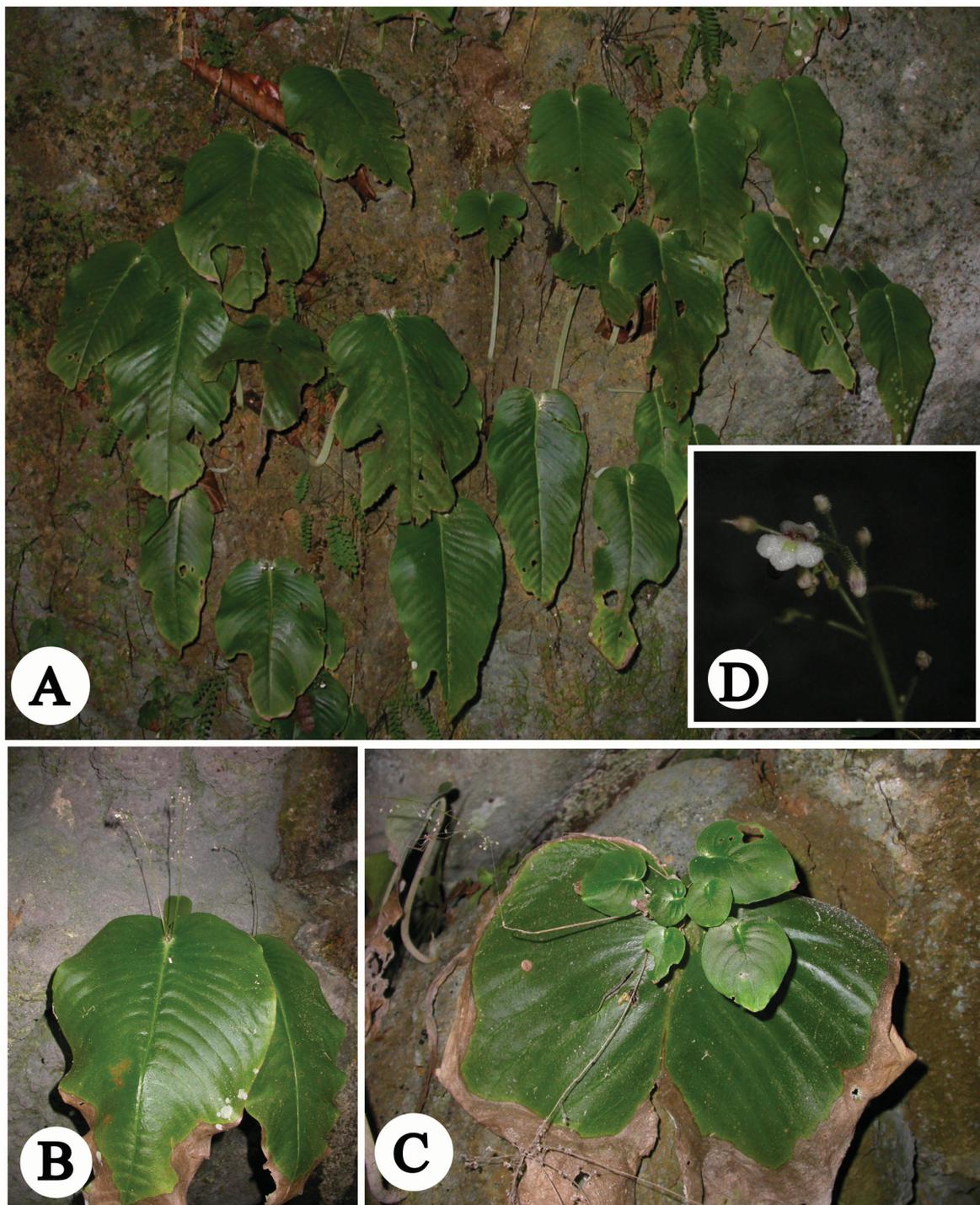


FIGURE 2. *Monophyllaea meriraiensis* Kiew & S.Julia. A. habit; B. leaf with inflorescences; C. newly developed leaves; D. flowers (all photos from PL 330 by P.K.F. Leong).

Stems (hypocotyls) ca. 11 cm long, fleshy, erect, slightly downy white, glabrous, ca. 4 mm diameter when dried, glaucous. Leaves pendent, narrowly ovate, ca. 34.5 × 16 cm, glabrous, thin, brittle, mid green in life, base deeply cordate, lobes to 2 cm long, apex attenuate, beneath encrusted with crystalline chalk pustules,

lateral veins 14–24 pairs, 0.5–1.6 cm apart, midrib sunken above with many conspicuous subcutaneous pustules, prominent beneath, tertiary veins prominent, finely reticulate. Inflorescences erect, arising from base of midrib, 1–2 per leaf, more or less even-aged, peduncle ca. 8.5 cm long, hairs simple, sparse, flowering axis ca. 2.5 cm long, flowers arranged in 2 pairs but 1 flower not developing so flowers appear to be arranged in threes, lowest ca. 4 cm apart, upper much closer, pedicels to 10 mm long, glabrous, very slender. Calyx divided nearly to the base, minutely pilose outside, lobes oval, ca. 2 × 1 mm, apex erose. Corolla ca. 6.5 mm long, cream with white lobes, tube narrow, ca. 4 × 1.5 mm, mouth bearded with long hairs, upper lobes orbicular, ca. 1.5 × 1.5 mm, at 45° to the tube, lateral and median lobes connate, lateral lobes oval, ca. 2.5 × 1.5 mm, median lobes smaller, orbicular, ca. 1.5 × 1.5 mm. Stamens glabrous, filaments more or less straight, posterior ca. 1 mm long, anterior ca. 1.5 mm long, apex broadened and geniculate, anthers globose, ca. 0.5 mm diameter. Disc ca. 0.3 mm high, prominent. Ovary ovoid, ca. 0.75 × 0.5 mm, style ca. 1.5 mm long. Fruit not known.

Distribution:—Endemic to Sarawak, Borneo; known only from the type locality at a limestone area in Ulu Merirai, Tatau district.

Habitat:—On a deeply shaded limestone cliff overhang, at an elevation of 131 m. Presumably rare because only one population was encountered. Its flowering appears to be seasonal because all plants in the population had flowers at the same stage (young buds with a few flowers opened). However, it is not an annual because there are remnants of old peduncles on the large plants.

Notes:—In its thin, relatively narrow leaves and slender erect inflorescences with fine pedicels, this species most resembles *Monophyllaea tenuis* from the Padawan limestone in the Kuching Division. Interestingly, *M. tenuis* occupies a similar habitat also being found on sheltered limestone rock faces. However, *M. meriraiensis* differs from *M. tenuis* in many lamina and flower characters (Burt 1978; Table 2). A few of the larger plants had produced a second or several laminas at the base of the midrib (Figure 2C). Unlike most monophyllaeas, the lamina apex was intact and had not rotted away, perhaps suggesting that this is not a long-lived plant.

TABLE 2. Differences between *Monophyllaea meriraiensis* and *M. tenuis*.

Character	<i>M. meriraiensis</i>	<i>M. tenuis</i>
Lamina size (cm)	34.5 × 16	15–30 × 10–25
Lamina width:length	2:1	1:2–1:5
Lamina margin	glabrous	ciliate
Flowers	in 2 pairs	in 1 pair
Calyx	minutely pilose	glabrous
Calyx lobe apex	erose	entire
Corolla tube (mm)	ca. 4 × 1.5	ca. 3 × 3
Ovary	ovoid	globose
Style length (mm)	ca. 1.5	ca. 0.5

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