

ORCHIDANTHA SARAWAKENSIS SP. NOV. (ZINGIBERALES: LOWIACEAE), A NEW SPECIES ENDEMIC TO EAST MALAYSIA, BORNEO

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Lowiaceae is one of the eight families in Zingiberales and comprises a single genus, *Orchidantha*. This genus is restricted to South-East Asia and poorly known among Zingiberales. Currently, there are 25 species including a new species from Sarikei, Sarawak, *O. sarawakensis* Syauqina & Meekiong which is described and illustrated in this paper. *Orchidantha sarawakensis* is compared with species described in South-East Asia and also species described in Borneo. The comparison shows that *O. sarawakensis* is closely related to *O. megalantha* Škorničk. & AD Poulsen and *O. holttumii* K Larsen. The features that delineate *O. sarawakensis* as a new species is that its labellum possesses a prominent extended midrib throughout the apex with spiral-like structure, curved upwards and a Y-shaped secretion tissue called viscidium. A key of *Orchidantha* to all Malaysian species is presented.

Keywords: *Orchidantha holttumii*, *O. megalantha*, spiral-like, Sarawak

INTRODUCTION

Lowiaceae (Zingiberales) comprises the single genus *Orchidantha* Brown. The first species (*Orchidantha borneensis*) was described by Brown (1886) from a specimen collected in Borneo (Nagamasu & Sakai 1999). Thereafter, another two species, *O. longiflora* Ridl. and *O. maxillarioides* K. Schum. were described (Keng 1969). All three species were found in Sarawak or Peninsular Malaysia. Several more species were discovered and described in Sarawak, Sabah and Peninsular Malaysia (Larsen 1996, Nagamasu & Sakai 1999, Pedersen 2001, Leong-Škorničková 2014, Syauqina et al. 2016). To date, the total number of *Orchidantha* species only found in Malaysia is 16 (including the present new species).

The genus name *Orchidantha* was proposed by Brown (1886) due to the physical shape of the flower which resembles an orchid flower. The history of the family Lowiaceae was discussed by Syauqina et al. (2016). *Orchidantha* is restricted to South-East Asia with total of 25 species recorded. In Malaysia, the genus is usually found in mixed dipterocarp forest, kerangas forest, and seldom in limestone forest. It prefers a moist habitat, e.g. near streams in shady areas (Carlquist & Schneider 1988).

In the field, sterile *Orchidantha* plants can be easily be mistaken for *Hanguana* Blume, *Tupistra* Ker Gawl. or any other monocot with a robust herb habit (Leong-Škorničková 2014). Since their plant habits do not show any glaring differences, flowers play an important part in distinguishing the species. There are three crucial flower parts in *Orchidantha* that give distinct characteristics to the species, namely, labellum, petal and stigma (Leong-Škorničková 2014). Labellum is the showiest and attractive flower part in *Orchidantha* flower. The size of labellum could be bigger or the same length as the sepals. Every species has a different shape, size and colour of labellum, which are important keys in differentiating the species. The newly described species and two other closely-related species were examined thoroughly by their flower structure and morphology.

MATERIALS AND METHODS

The present new species was collected in Sarikei, Sarawak. It was found in open forest area at 100 m altitude near a stream in Sebangkoi Recreational Park. After evaluating all 15 species of *Orchidantha* known in Malaysia,

O. sarawakensis was found nearly similar to *O. megalantha* Škorničk. & A.D. Poulsen and to *O. holttumii* K. Larsen in their habit and flower appearance. Description of vegetative and reproductive characters was based on living plants and herbarium specimens, which allowed detailed measurements.

RESULTS

The new species—*Orchidantha sarawakensis* Syauqina & Meekiong sp. nov.

Type: MALAYSIA, Sarawak; Sebangkoi, Sarikei. Sebangkoi Recreational Park. 24 September 2017, Syauqina MY, Meekiong K, Aimi Syazana S, Zahid ZA & Ivy GNM SS0074 (holotype: SAR, isotype: HUMS)

Diagnosis: Similar to *O. megalantha* and *O. holttumii* but differing in flower size, whereby *O. megalantha* and *O. holttumii* have flowers twice as big as *O. sarawakensis*. The labellum shape is different at the apex (acuminate in *O. holttumii* and *O. megalantha* while aristate with prominent extended midrib throughout the apex with spiral-like structure and curving upwards in *O. sarawakensis*). *Orchidantha sarawakensis* possesses dark purple stigma and Y-shaped viscidium which is distinctly different from *O. holttumii* (purple stigma with broadly V-shaped viscidium) and *O. megalantha* (cream white with purple tinge stigma and V-shaped viscidium).

Description: **Perennial** herb with ca. 11 distichous erect leaves, up to 1.5 m tall, from vertical brown rootstock, with many fibrous roots. **Roots** sometimes with nodule. **Leaves** up to 90 cm long; **petiole** green, yellowish green towards the base, canaliculate, 41–81 cm long, 1.8–2.0 cm in diameter; **sheath** clasping, wing, 38.5–41 cm long width 0.9–1.1 cm in diameter; **lamina** elliptic to narrowly elliptic 72.3–86.5 × 12.4–15.6 cm, green both adaxial and abaxial, glabrous, base attenuate, margin entire, apex acute, midvein impressed above. **Inflorescences** several, basal, few-flowered, panicles, ca. 25.5–30 cm long; **bracts** imbricate, lanceolate, apex aristate, yellowish green; peduncle 10–12 cm long, yellowish brown. **Flower bud** tubular, ca. 5.5 cm long, pale yellow and red at tip; pedicel ca. 6 cm long, yellowish brown; floral bract lanceolate, boat-shaped, ca. 5 cm long × 15 mm, pale yellow and purplish pink at apex. **Flower**

sepals 3, approximately of the same length but of different width; dorsal sepal elliptic, ca. 6.2 cm × 1.6 cm, yellowish green and dark yellowish brown at apex; lateral sepals 2, equally long, overlapping, elliptic, 6.2–6.3 cm × 1–1.1 cm, apex acute to mucronate (0.3 cm long), yellowish green and dark yellowish brown at apex. **Labellum** elliptic, 5.6 cm × 1.2 cm, with parallel and convergent veins, apex aristate, spiralling, 2.6 cm long, dark purple. **Petals** 2, linear, 1.8–1.9 cm × 6 mm, margin entire, apex apiculate, 2.6 cm long dark purple but white at base, glabrous, fused at base. **Stamens** 5, elongated, 5.9 cm × 0.6 mm, dark purple; style robust, dark purple. **Stigma** 3-fid, 7.4 mm long, 2.8 mm in diameter, margin crenate and dentate, apex like a fish fin, purple; **viscidium** Y-shaped, white. **Ovary**, glabrous, 3 mm diameter, milky white. **Fruit** not seen.

Habitat, ecology, etymology, and conservation status

This new species is considered as a hyper-endemic species, as is currently recorded only from a single locality in Sarawak. The second author, discovered this plant in Sebangkoi Recreational Park (01° 57' 47" N, 111° 25' 55" E) near a stream in a dry shaded area of a Kerangas forest. The plants grew in a clump consisting of five individuals. Each clump was 5 to 10 m from each other. The specific epithet was named after the locality where the species was found, i.e. the state of Sarawak. The population is expected to suffer a decline as the growing number of plants was very low (20–35 individuals) and localised to that particular area. According to the IUCN Red List categories and criteria (Chadburn 2018), this genus has a very small extent of occurrence and is declining in the habitat due to logging and road building. We suggest it should be categorised as 'Endangered' (EN B1ab(iii)+2ab(iii)).

DISCUSSION

From the comparison of *Orchidantha* species in South-East Asia based on species morphological description, protologues and types of specimens, it was found that *O. sarawakensis* has similar stigma structure with *O. virosa* Škorničk. & Q.B. Nguyen (Leong-Škorničková et al. 2014) and *O. foetida* H.Đ. Trần & Škorničk. (Jenjittikul & Larsen 2003). *Orchidantha virosa* share the same

purple stigma colour and Y-shaped viscidium with *O. sarawakensis*. However, the stigma margin is different; *O. virosa* has minutely fimbriate stigma margin while *O. sarawakensis* has crenate and dentate stigma margin (Figure 1). The only similarity between *O. foetida* and *O. sarawakensis* is the stigma structure. Stigma colour (greenish white), stigma margin (finely fimbriate) and also shape of viscidium (cordate decurrent along the style) of *O. foetida* are clearly different from *O. sarawakensis*.

Orchidantha species is endemic to Borneo (Poulsen & Leong-Škorničková 2017) and from 10 previously found species, only *O. holttumii* and *O. megalantha* are very closely related to *O. sarawakensis*. The size of both *O. holttumii* and *O. megalantha* were twice bigger

than *O. sarawakensis*. These three species show differences in three critical flower parts, i.e. labellum, petal and stigma.

The three species discussed above possess a claw-like labellum, but are different in apex shape. The labellum of *O. megalantha* is crenulate-undulate towards the apex and folding upwards distally with a prominent, thick, straight midvein extension at the acuminate apex. *Orchidantha holttumii* has a crenulate-undulate, incurved acuminate apex with a thick midvein that rises upwards. The labellum of *O. sarawakensis* on the other hand has an extended twisted midvein (2.6 cm long), prominently thick and curved upwards; this extended twisted labellum apex separates it from all other species in *Orchidantha* (Figure 2).

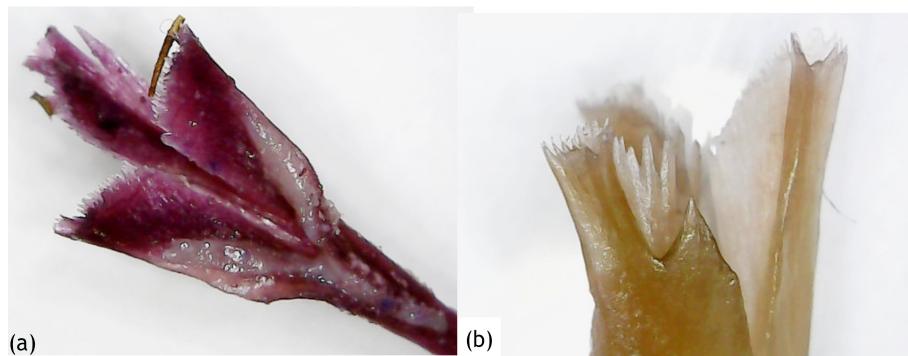


Figure 1 Stigma of *Orchidantha sarawakensis*, (a) whitish purple Y-shaped viscidium and (b) crenate and dentate stigma margin



Figure 2 *Orchidantha sarawakensis* sp. nov., (a) plant habit, (b) stigma with stamen, (c) petal, (d) flower, (e) sepal and (f) labellum

Further differences between the three species are in the stigma structure. *Orchidantha* has a specialised secretion tissue called viscidium that develops basally and ventrally on the stigma (Glinos & Cocucci 2011) and is the most important part in the stigma to be observed. Each species has a distinct viscidium shape, and the species can be identified by observing the stigma alone (Pedersen & Johansen 2004). *Orchidantha megalantha* has a V-shaped viscidium, *O. holttumii* a broadly V-shaped viscidium, and *O. sarawakensis* a Y-shaped viscidium.

By close observation of the stigma, differences in the margins between the three species can be

seen—*O. megalantha* has a minutely laciniate margin, *O. holttumii* a minutely fimbriate margin, and *O. sarawakensis*, a crenate and dentate margin. Also, the colours of the stigma of the three species are different—purple in *Orchidantha megalantha*, white-cream in *O. holttumii* and dark purple in *O. sarawakensis*. An illustration of the new species is given in Plate 1. The differences between three species are summarised in Table 1.

Based on morphological vegetative and reproductive character within this study, a key of *Orchidantha* genus in Malaysia was produced as follows:

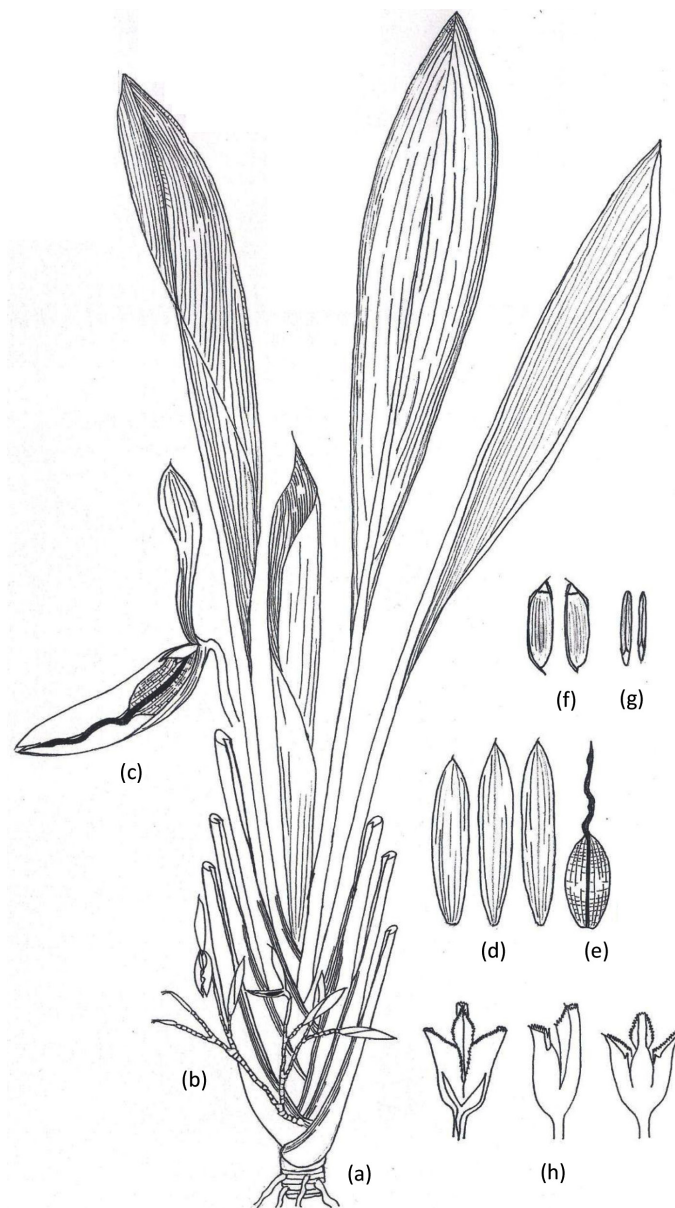


Plate 1 Botanical illustration of *Orchidantha sarawakensis* Syauqina & Meekiong, (a) plant habit, (b) inflorescence, (c) flower, (d) sepals, (e) labellum, (f) petals, (g) stamen and (h) stigma; illustration by Syauqina MY

KEY TO THE MALAYSIAN SPECIES OF *ORCHIDANTHA*

1a	Petiole sheath with wide wing, continuous in the leaf blade base.....	2
1b	Petiole sheath with wing, distantly separate from leaf blade base.....	3
2a	Petal white with purple tip, stigma white, viscidium V-shaped.....	<i>O. sabahensis</i>
2b	Petal dark purple, stigma white purple tinge, viscidium heart-shaped.....	<i>O. suratii</i>
3a	Lateral sepal overlapping supporting the labellum.....	4
3b	Lateral sepal wide spreading, leaving the labellum free.....	8
4a	Labellum clawed.....	5
4b	Labellum boat-like/spatula-like.....	7
5a	Labellum raised with twisted long aristate apex ca. 2.6 cm.....	<i>O. sarawakensis</i>
5b	Labellum raised with acuminate apex.....	6
6a	Stigma size ca. 17.0 cm × 11.0 mm with minutely laciniate margin.....	<i>O. megalantha</i>
6b	Stigma size ca. 9.1 cm × 7.2 mm with minutely fimbriate margin.....	<i>O. holttumii</i>
7a	Stigma unbranched, labellum elliptic, plain rusty brown.....	<i>O. micrantha</i>
7b	Stigma branched, labellum broadly lanceolate, with four colours.....	<i>O. quadricolor</i>
8a	Labellum boat-like.....	9
8b	Labellum spatula-like.....	14
9a	Petal dark colour (violet/maroon).....	10
9b	Petal light colour (creamy/translucent white).....	13
10a	Stigma size, ca. 12.1 mm × 9.2 mm, yellow green.....	<i>O. grandiflora</i>
10b	Stigma size less than ca. 7 mm × 4 mm violet/maroon.....	11
11a	Stigma with fimbriate crest margin.....	<i>O. borneensis</i>
11b	Stigma with toothed margin.....	12
12a	Viscidium narrowly V-shaped with purple colour.....	<i>O. maxillarioides</i>
12b	Viscidium broadly U-shaped with light yellow colour.....	<i>O. lengguanii</i>
13a	Stigma with undulate margin, viscidium sharp V-shaped.....	<i>O. ranchanensis</i>
13b	Stigma crenate and minutely fimbriate, viscidium broadly V-shaped.....	<i>O. inouei</i>
14a	Petal lanceolate with maroon colour.....	<i>O. siamensis</i>
14b	Petal linear with cream/white colour.....	15
15a	Stigma size ca. 2.5 mm × 0.4 mm, long toothed margin, translucent white.....	<i>O. fimbriata</i>
15b	Stigma size ca. 4.4 mm × 0.5 mm, with bristal filiform margin, maroon.....	<i>O. longiflora</i>

Table 1 Comparison of characters of *Orchidantha sarawakensis* sp. nov., *O. megalantha* and *O. holttumii*

Character	<i>O. sarawakensis</i>	<i>O. holttumii</i>	<i>O. megalantha</i>
Leafy shoots (m)	1.5 m	1–1.5 m	1 m
Petiole (cm)	ca. 41–81	ca. 30–70	ca. 55
Leaf (cm)	ca. 72.3 × 12.4	ca. 30 × 7	ca. 75.0 × 15.5
Sepals (cm)	ca. 6.2 × 1.2, oblanceolate, yellowish green	ca. 12.6 × 0.6, linear to narrowly lanceolate, fresh green	ca. 14.0 × 3.9, narrowly elliptic, yellowish green with slightly rusty towards apex
Petal (cm)	ca. 1.8 × 0.8, elliptic, dark purple	ca. 3.0 × 1.0, oblanceolate, dark purple	ca. 4.1 × 1.1, irregular elliptic, dark purple
Labellum	Size (cm)	ca. 5.6 × 1.2	ca. 12.2 × 3.2
	Shape and colour	Widely elliptic, dark violet	Broadly lanceolate, dark purple
	Apex	Aristate with extended prominent spiral-like margin (2.6 cm)	Acuminate
Stigma	Size (cm)	ca. 7.4 × 2.8	ca. 9.1 × 7.2
	Margin and colour	Crenate and dentate, dark purple	Minutely fimbriate, purple
Viscidium shape	Y	V	V

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