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Alocasia lihengiae, a new species of Araceae from Southern Yunnan

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Abstract

Alocasia, a new species of Araceae from Jinuo Mountains, Yunnan, China is described and illustrated. The new species is similar to *A. odora* and *A. hypnosa* but differs from *A. odora* by purple-pink spathe and seasonally dormant habit, while differs from *A. hypnosa* by leaf blade with upwards basal lobes, milky yellow spadix and persistent purple-black stigma. The new species is terrestrial and grows in open roadside karst area.

Keywords: *Alocasia lihengiae, A. odora, A. hypnosa,* Xishuangbanna, New taxa

Introduction

Alocasia (Schott in Schott & Endlicher 1832: 18), as one of the largest genera in the family Araceae, is mainly distributed in tropical and subtropical Asia, with a natural range that extends from the subtropical eastern Himalayas throughout India, China, Japan, to the Malay Archipelago and Oceania (Nauheimer *et al.* 2012). It is a genus of herbaceous, laticiferous, diminutive geophytes to massive pachycaul arborescent terrestrial or epilithic mesophytes, rather rarely helophytes (Ly *et al.* 2017), usually robust herbs (Boyce 2008). They are often abundant in the understory and forest gaps (Hay 1998) and widely cultivated as ornamental plants (Long *et al*. 2017). *Alocasia* plants are often complex in vegetative and floral structure and some notes on their morphology (Hay 1998) can be used to aid identification. For instance, the shape of the posterior lobes of the leaf is of diagnostic importance sometimes (Boyce 2008). However, terms used to describe them are mostly self-explanatory, such as 'acute', 'obtuse' and so on. In some instances, such as the Scabriuscula Group, the shape of the piece of lamina on the inside of each posterior lobe may need to be used for identification purposes (Boyce 2008).

The genus *Alocasia* has been revised for New Guinea (Hay 1990), Australasia (Hay, 1991), West Malesia and Sulawesi (Hay, 1998), the Philippines (Hay 1999) while post main-treatment novelties have been described for New Guinea (Hay 1994), Borneo (Hay *et al.* 1997, Hay 2000, Boyce 2007), Sulawesi (Yuzammi *et al*. 1998), Thailand (Boyce 2008) and Peninsular Malaysia (Zulhazman *et al*. 2017). Though revised for much of its range, *Alocasia* remains poorly understood and new species are regularly being discovered (Hay 1994, Hay 2000, Hay *et al*. 1997, Yuzammi *et al*. 1998, Boyce 2007; Kurniawan *et al*. 2011; Wong *et al*. 2016, Zulhazman *et al*. 2017). The genus *Alocasia* currently comprises over 110 species, among which 32 were named in the past 20 years, and the discovery of new species continues (Kurniawan *et al*. 2011), while at least 27 more are awaiting description of flowering and fruiting material (Boyce 2008). This means there are more new taxa to be discovered and the discovery speed of new species is fast in recent years. However, the lack of a comprehensive taxonomic revision, the lack of information on the most important diagnostic characters such as the shape of blade, the shape of the posterior lobes of the leaf, whether it is dormant or not, as well as the existence of numerous closely related species make taxonomy and nomenclature in the genus *Alocasia* challenging (Boyce 2008). In China, eight species of *Alocasia* have been so far reported and mostly occur in its southwest (Li *et al.* 2010). Detailed botanical exploration of *Alocasia* in China and tropical Asia generally may increase the number of described species in the near future.

During our expeditions to Jinuo Mountains, Xishuangbanna, Yunnan, in 2018–2019, a plant of *Alocasia* similar to *A. odora* (Roxburgh 1854: 5) Spach (1846: 46) in leaf blade, and *A. hypnosa* Yin in Wang *et al*. (2005: 42) in purple

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spathe attracted our attentions. After further study, we come to the conclusion that it represents an undescribed species which is described and illustrated herein.

Materials and methods

Field explorations in the Jinuo Mountains (July 2018 and August 2019), and comparative study of herbarium collections at PE and KUN revealed an undescribed taxon in the genus *Alocasia*. Here we describe a new species of *Alocasia*. Color photographs of the vegetative and floral structures are presented in order to compare key features of the species that may be difficult to observe in herbarium specimens due to fragmentation. Morphological descriptions and infrageneric classification followed Hay (1998) and Boyce (2008).

Taxonomy

Alocasia lihengiae C.L. Long & Q. Fang, *sp. nov.* (Table 1, Figure 1)

Similar to A. odora in leaf blade shape and primary lateral veins, but different in having a milky yellow appendix, and especially the purple-pink spathe. It differs from A. hypnosa by having triangular blade rather than triangular-sagittate blade, having fewer lateral veins but more conspicuous collecting veins, shorter petiole, more massive plant with more stolons, and purple-black stigma instead of pale green stigma.

Type:—CHINA. Yunnan: Xishuangbanna Dai Autonomous Prefecture, Jinghong City, Jinuoshan Township, 960 m a.s.l., 22º13'N, 100º53'E, 18 August 2018, Long 2018107 (flowering) (holotype KUN!; isotype KUN!).

Pachycaul herbs, terrestrial, massive, up to 2 m, seasonally dormant, with slightly milky latex. Stem erect, rhizome 10–15 cm long, 5–13 cm in diam; stolons multiple per plant, slender, pale green, 45–50 cm long, internodes cylindric, 3–5 cm long, to 1 cm in diam, normally no tubercle at the end of stolon. Leaves several to rather many together, clustered at tips of stems of larger plants; petiole 60–100 cm, 6 cm diam. at base, 1.2–2 cm diam. at top, light greenish, glossy; petiolar sheath convolute at base, sheath reaching middle of the petiole, membranous; lamina outline triangular, cordate-sagittate or cordate-ovate, 55–63 × 40–45 cm, margins undulate, apex shortly acuminate; primary lateral veins 6–8 on each side, bulge and conspicuous, interprimary veins forming well-defined interprimary collective veins, the secondary veins from the basal primary veins are conspicuous. Inflorescences 2 or 3 per leaf, subtended by membranous cataphylls; peduncle stout, bright green, cylindrical, 45–50 cm long, 1.5–1.8 cm in diam., exceeding cataphylls at anthesis; Spathe 20–30 cm, constricted ca. 1/6 of way from base; proximal part green, fusiform; Spadix 22–26 cm, shorter than spathe, shortly stipitate; tube part 9 cm long, eave part 20–24 cm, yellowish white at base and back, other parts are purple; female zone 1.2–1.5 × ca. 3–4 cm; pistil pale yellow, ca. 1.2–1.5 cm in diam.; stigma sessile, weakly 2-lobed, lobes blunt, yellow, sterile zone yellowish white at base, 4–5 cm in length, ca. 0.8–1.2 cm in diam.; male zone whitish, cylindric, 4 × ca. 2 cm; synandria rhombic-hexagonal, ca. 1.2–1.5 cm in diam.; appendix milky yellow, oblong conic, 12.5 cm; Fruiting spathe ca. 4–5 cm, 2–3 cm in diam. Fruit green white, globose, ca. 4 mm in diam. Stigma persistent, purple-black.

Distribution and habitat:—So far known only one population from Jinuo Mountains, Jinghong, Xishuangbanna, Yunnan, China. Growing on the limestone, in an open roadside habitat, as part of a larger area of karst landscape.

Phenology:—Flowering from June to August.

Etymology:—Named in honor of Prof. Li Heng, a Chinese aroider who has made significant contributions to our knowledge of the family Araceae.

Additional specimens examined (paratypes):—CHINA. Yunnan: Xishuangbanna Dai Autonomous Prefecture, Jinghong City, 960 m a.s.l., 22º13'N, 100º53'E, 19 July 2018, *C.L. Long 2018108-1, Long2018108-2, Long2018108-3*, *Long2018108-4*, *Long2018108-5*, *Long2018108-6, Long2018108-7* (fruiting) (KUN!). Specimens collected from the same location but different collections.

Notes:—With the inconvenient conservation of fresh specimens and the absence of extensive fieldwork, the descriptions of many newly discovered species are left inadequately described. While there is no standard form for infrageneric taxonomic classification (Boyce 2008), the genus is uniquely defined by characteristics such as milky

acrid sap, staminate flowers forming synandria, and fruits ripening to orange scarlet berries (Zulhazman *et al*. 2017), basal placentas, odorless fruit with bird dispersal syndromes (Boyce 2008).

TABLE 1. Morphological comparison of *Alocasia odora, A. hypnosa* and *A. lihengiae.*

Structure/other	Character/other	*A. odora*	*A. hypnosa*	*A. lihengiae*
Habitat	forest type	humid, dense (and regrowth)	humid, regrowth	humid, roadside
	exposure	forest edge/gap	forest edge/gap	open
	substrate	terrestrial, diverse	terrestrial or lithophytic, limestone	terrestrial or lithophytic, limestone
	altitude	200–1100 m	800–1000m	960 m
Life form		Evergreen	Seasonally dormant	Seasonally dormant
Stem	type	pachycaul	not pachycaul	pachycaul
	mass	massive	not massive	massive
	height (cm)	10–100	10	10–15
	diameter (cm)	5–18	13.5	5–13
Vegetative reproduction	stolons	none (or few) short with cormlet at tip	few, pale green, (to 110 cm) horizontal or spreading tipped with tubercles terminally	5–6, pale green, (to 100 cm) normally without (single) tubercle terminally
	new stems direct from lateral buds	yes	no	no
	side-corms	none	none	none
Leaf	petiole length (cm)	60–160	104	60–100
	sheath edge	membranous	membranous	membranous
	sheath height	to middle of petiole	to middle of petiole	to middle of petiole
	blade shape	peltate, cordate-sagittate or cordate-ovate	not peltate, triangular-sagittate	not peltate, triangular, basal lobes upwards
	blade size (cm)	130*100	82*64	55–63*40–45
	blade edge	base margins undulate	leaf margins corrugated	leaf margins corrugated
	primary lateral veins	9–12 pairs	8–9 pairs	6–7 pairs
	Collecting veins	Well-defined	Feeble	Conspicuous
Inflorescence	Spathe	Greenish-white	Purple	Purple-pink
	Spathe length (cm)	13–25	28	35–45
	Stigma	sessile, weakly 3-lobed, lobes blunt	3 or 4-lobed	sessile, weakly 3-lobed, persistent
		pale green	pale green	purple-black

After examining herbarium specimens, we believe that *Alocasia lihengiae* is similar to *A. odora* and *A. hypnosa.* However, *A. lihengiae* can be distinguished easily from *A. odora* by the purple-pink spathe lamina and seasonally dormant habit. It is also different from *A. hypnosa* in upwards basal lobes, conspicuous lateral veins, milky yellow appendix, with more slender stolons, normally without tubercle at the end of stolon and especially persistent purple-black stigma. A detailed comparison is presented in Table 1. A key to species of *Alocasia* occurring in China is provided.

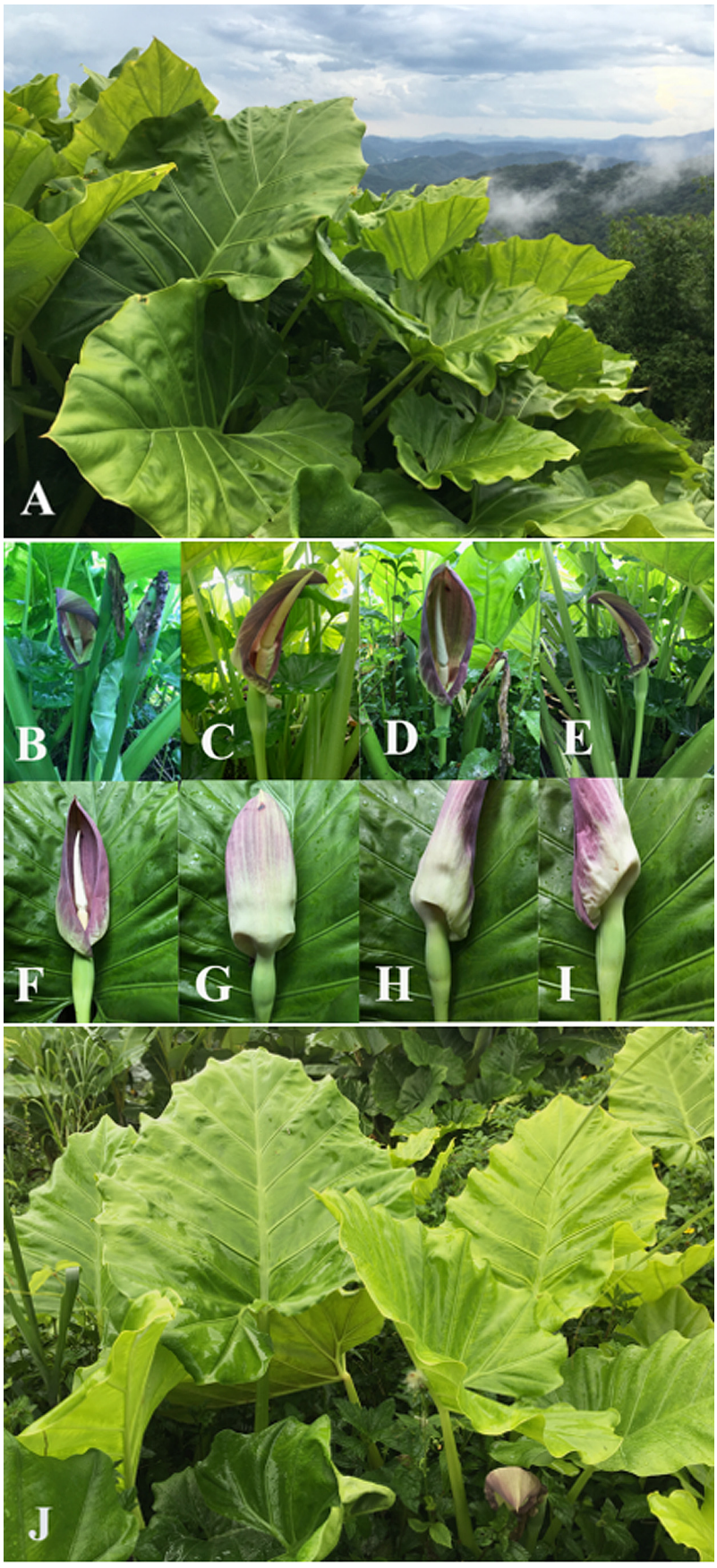

FIGURE 1. A. Habitat of *Alocasia lihengiae.* B. Inflorescences 2 or 3 together. C–E. Spathe at anthesis from different angle. F–I. Spathe from different angle with lamina as background. J. Triangular leaf blade. Photos by C. L. Long.

FIGURE 2. A. Fruits of *Alocasia lihengiae* with immature green berries. B-E. Spathe at anthesis. Photos by C. L. Long.

FIGURE 3. Rhizomes of *Alocasia lihengiae* with multiple slender stolons. Photos by Q. Fang.

Morphologically, *A. lihengiae* is similar to *A. odora* and *A. hypnosa*, it shows mixed traits of each but not both. While it seems a hybrid of *A. odora* and *A. hypnosa*, distribution of *A. hypnosa* has not been seen in the Jinuo Mountains so far, and there is no observation of pollinators yet. In addition, there is only one population of *A. lihengiae*, thus hybridity is unlikely to happen. However, some level of sterility is observed (Figure 2A), suggesting a limited self-pollination and an absence of pollinators. This may explain its so far isolated occurrence.

Key to species of *Alocasia* occurring in China

1. Plants massive, pachycaul, at least 1 m tall 2
– Plants not as above, or if taller than 1 m then never massive 5
2(1). Sinus between posterior leaves naked ..... *A. macrorrhizos* (Linnaeus 1753: 965) Don (1839: 631)
– Sinus between posterior leaves peltate 3
3(2). Plants lacking stolons; spathe deep yellow ..... *A. navicularis* Koch & Bouché (1855: 2)
– Plants with short stolons at base of main stems, these stolons with tubercles at tips; spathe greenish white 4
4(3). Petiole to 150 cm; leaf blade ca. 130 × 100 cm; appendix conic, 3.0–5.5 × 1–2 cm ..... *A. odora*
– Petiole 28–30 cm; leaf blade ca. 25 × 13 cm; appendix narrowly conic, ca. 1.1 × 0.3–0.4 cm ..... *A. hainanica* Brown (1903: 183)
5(1). Plants always seasonally dormant; petiole green; stolons long; spathe purple-pink, not constricted 6
– Plants rarely seasonally dormant, if so then petiole mottled; never with long stolons; spathe white, constricted 7
6(5). Leaf blade triangular-sagittate; lateral veins feeble; stolons tipped with tubercles; appendix white, elongate-conic; stigma pale green ..... *A. hypnosa*
– Leaf blade not peltate; lateral veins conspicuous; stolons without tubercle terminally; appendix milky-yellow, oblong-conic; stigma purple-black ..... *A. ligengiae*
7(5). Stems stoutly erect and basally much branched; leaf blade broadly ovate; only known from areas of human disturbance ..... *A. cucullata* Schott in Schott & Endlicher (1854: 410)
– Stems weakly erect to decumbent, not branching basally; leaf blade various but never broadly ovate; plants of natural forest 8
8(7). Petiole purple-brown to pink to green, strikingly obliquely mottled chocolate-brown; leaf blade pendent; stigmas conspicuously lobed ..... *A. longiloba* Miquel (1855: 207)
– Petiole green; leaf blade spreading; stigmas not conspicuously lobed ..... *A. acuminata* (Persoon 1807: 575) Schott in Schott & Endlicher (1832: 18).

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