

## *Arisaema chauvanminhii* (Araceae), a new species from Vietnam

Hong Truong Luu<sup>1,\*</sup>, Quoc Dat Nguyen<sup>1</sup>, Ngoc Long Vu<sup>1</sup>, Duc Hoa Vuong<sup>2</sup>,  
Dinh Thap Kieu<sup>2</sup> & Huy Sang Vo<sup>2</sup>

<sup>1)</sup> Southern Institute of Ecology, Vietnam Academy of Science and Technology, 1 Mac Dinh Chi, District 1, Ho Chi Minh City, Vietnam (\*corresponding author's e-mail: hongtruongluu@gmail.com)

<sup>2)</sup> Bu Gia Map National Park, Bu Gia Map District, Binh Phuoc Province, Vietnam

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*Arisaema chauvanminhii* Luu, Q.D. Nguyen & N.L. Vu (sect. *Fimbriata*, Araceae) is described and illustrated as a new species from Bu Gia Map National Park in southern Vietnam. A combination of floral characters distinguishes this species from others in the section: spathe limb stained dark brown dorsally and ventrally, white-spotted at base and, above all, dark brown reticulations on the widely recurved spathe mouth.

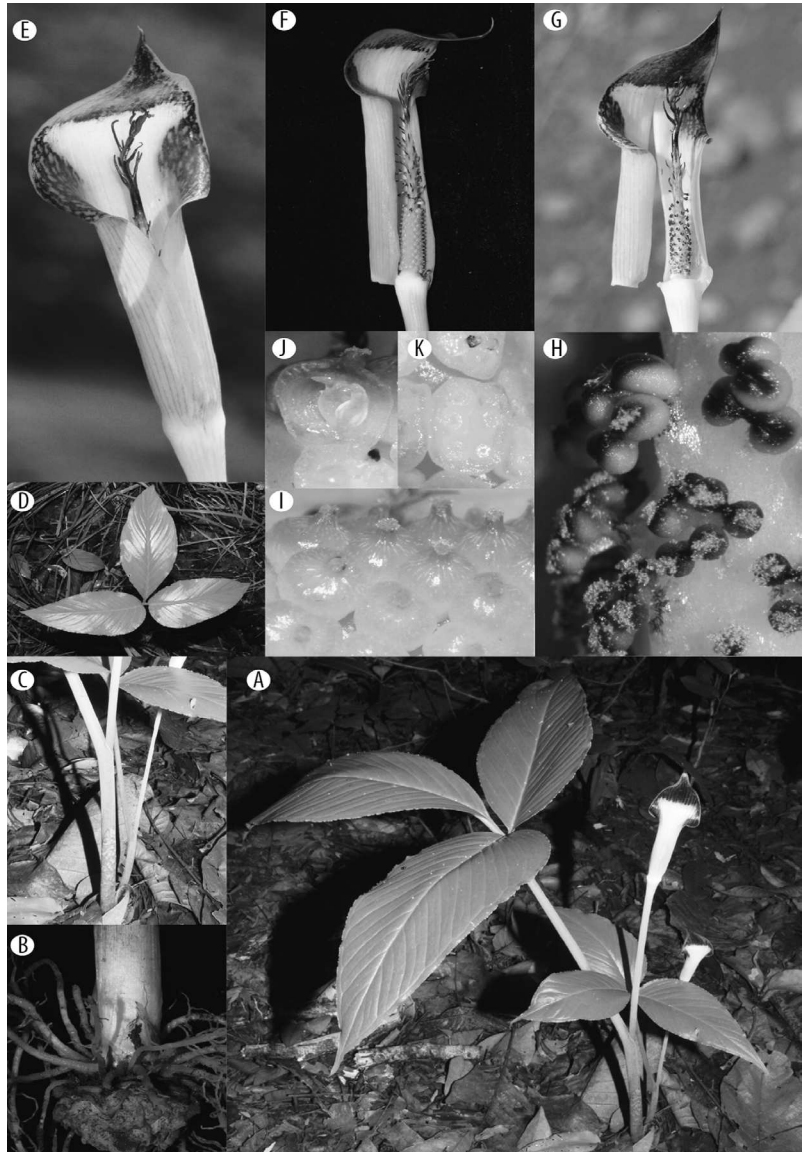
In June 2011 the Southern Institute of Ecology (SIE), Vietnam Academy of Science and Technology, conducted a field trip to the Bu Gia Map National Park in southwestern Vietnam near the Vietnamese–Cambodian Border. During the trip the team encountered a flowering population of a distinctive *Arisaema* species of the sect. *Fimbriata* (Gusman & Gusman 2006). The species had spathe limbs with dorsal and ventral dark brown staining and widely recurved spathe mouth margins with dark brown reticulations. At that time only male plants were observed and collected. Again in May 2012 an intensive search yielded only male specimens, but in May 2013 the SIE field team discovered and collected both female and male specimens of the species. The floral morphological attributes indicated that the species differed from all known species in sect. *Fimbriata* (Gusman & Gusman 2006) and it is thus described here as a new species.

***Arisaema chauvanminhii* Luu, Q.D. Nguyen & N.L. Vu, *sp. nova* (Fig. 1)**

TYPE: Vietnam. Binh Phuoc Province: Bu Gia Map District, Bu Gia Map National Park, approximate coordinates 107°11'18"E, 12°16'23"N, at ca. 320 m a.s.l., 25 May 2013 *Luu Hong Truong & Vo Huy Sang*, *Luu 1040* (holotype SGN!, female), *Luu 1041* to *Luu 1045* (paratypes SGN!, VNM! & HN!, all male).

ETYMOLOGY. Named to honor Prof. Dr. Chau Van Minh, President of the Vietnam Academy of Science and Technology (VAST), for his support to botanical research at the Southern Institute of Ecology (SIE).

Herb, deciduous, 20–50 cm high. Subterranean, sub-globose tuberous stem about 1–2 cm in diameter and 1–1.5 cm high, with thick roots. Cataphylls 2–3, brown or pink, pink or carmine mottled and up to 16 cm long. Leaves 1 or 2; petioles sheathing into pale green pseudostem at lower part, free above; pseudostem 10–22 cm long, 1–2 cm in diameter at base, pale green; free



**Fig. 1.** *Arisaema chauvanminhii* (type material). — **A:** The species in its habitat. — **B:** Tuber. — **C:** Cataphylls, pseudostem and petiole. — **D:** Leaf blade. — **E:** Spathe. — **F:** Male spadix. — **G:** Synandria. — **H:** Female spadix. — **I:** Ovaries. — **J:** Longitudinal section of ovary. — **K:** Cross section of ovary.

petiole 15–30 cm long, 5–11 mm in diameter at base and 2–4 mm in diameter at apex, pale green or similar in colour to pseudostem; leaf blade trifoliate, leaflets 9–20 cm long, 4–9 cm wide, thin, glabrous, pale green adaxially, paler abaxially, margin undulate, apex acuminate with up to 1 cm long, caudate tip, midrib impressed adaxially and prominent abaxially, lateral veins 9–12, prominent abaxially, collective vein at 1–3 mm from margin, central leaflet rhombic-elliptic, with base cuneate, petiolule 7–10 mm long, lateral leaflets asymmetrical, with base obtuse, petiolule

2–3 mm long. Inflorescence emerging from pseudostem; peduncle longer (or sometimes shorter) than petiole, 8–22 cm long, ca. 2–4 mm in diameter, pale green; spathe tube cylindrical, slender, 4.5–6 cm long, ca. 1 cm in diameter, slightly expanded at spathe mouth, green on both surfaces, with green longitudinal veins; mouth margins with dark brown reticulations and widely recurved; spathe limb curved over mouth, ca. 5 cm long, 3 cm wide, ovate, shiny green, stained dark brown on both surfaces, spathe tip acute, ending in a ca. 5 mm long thread; male spadix

appendix ca. 1.5 cm exerted from tube mouth, 5–5.5 cm long, 1–2 mm in diameter, green with brown staining, apical 2/5 part covered with 2–4 mm long brown or green neuters, middle 1/5 part naked and lower 2/5 part with 1–3 mm long green or brown neuters scattered; male part ca. 1.5–1.7 mm long, green; synandrium of 2–3 stamens, loosely arranged, on 0.3 mm stipe; anthers subsessile; thecae purple or cream with purple top and dehiscent by dark purple, elongated pore; female spadix appendix ca. 1.5 cm exerted from tube mouth, ca. 5 cm long, 2–3 mm in diameter, green or brown, apical part covered with 3–6 mm long brown or green neuters and lower part wholly with 2–3 mm long green or brown neuters; female part ca. 2 cm long, ca. 5 mm across at base and 0.3 cm at top; pistils densely arranged; ovaries ovoid and green; stigma penicillate and born on a short style.

*Arisaema chauvanminhii* is assigned to sect. *Fimbriata* (*sensu* Gusman & Gusman 2006, but recently recommended by Murata (2013) to be included in sect. *Attenuata*) as this species has a deciduous habit; sub-globose, tuberous, subterranean stem; rooting around the central shoot only; 1–2 bilaterally symmetrical leaves with a trifoliolate leaf blade; a sessile, subulate and slender spadix appendage; and sterile flowers (neuters) above the fertile region (at least in female spadices). Prior to the publication of this paper sect. *Fimbriata* comprised a total of 21 species worldwide, with five species recorded in Vietnam: *A. averyanovii*, *A. condaoense*, *A. honbaense*, *A. ramulosum* and *A. roxburghii* (Engler 1920, Li 1977, Murata 1984, Mayo *et al.* 1997, Nguyen 2000, Pham-hoang 2000, Nguyen & Boyce 2005, Gusman & Gusman 2006, Nguyen 2007, Hu *et al.* 2012, Luu *et al.* 2013). The recent addition of *A. siamicum* to the Vietnamese flora (Bruggeman *et al.* 2013) was a misidentification, and this plant was described as a new species *A. honbaense* by Luu *et al.* (2013).

In the section *Fimbriata* the darkly stained spathe limb with a white spot at the base of *A. chauvanminhii* recalls that of *A. averyanovii*. However, the former differs from the latter in having a spathe mouth with widely recurved margins, a plain green spathe tube, long neuters on the spadix appendage, and loose anthers. Other similar species in the section include *A.*

*album*, *A. guangxiense*, *A. laminatum* and *A. penicillatum* (syn. *A. matsudai*) (Brown 1881, Blume 1835, Hayata 1920, Gusman & Gusman 2006, Hu *et al.* 2012), but there are several differences, also from the somewhat similar *A. ramulosum* (cf. van Alderwerelt van Rosenburgh 1992 and Appendix).

The most striking characters of *A. chauvanminhii* are its dark brown stained spathe limb (adaxially and abaxially), spotted white at base; spathe mouth margins reticulated in dark brown and widely recurved. These features make *A. chauvanminhii* unique in sect. *Fimbriata*. In sect. *Arisaema*, however, white and green reticulations are found on the spathe mouth of some species, such as *A. dahaiense* and *A. griffithii* (Schott 1856, Li 1977, Gusman & Gusman 2006).

*Arisaema chauvanminhii* is found on wet, feralit soil under deciduous forest dominated by *Lagerstroemia calyculata* in the Bu Gia Map National Park in southern Vietnam on the Vietnamese–Cambodian border. Flowers were seen in May and June.

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**Table 1.** Comparison of *Arisaema chauvanminhii* with its morphologically close species.

Characters	<i>A. chauvanminhii</i>	<i>A. album</i>	<i>A. averyanovii</i>	<i>A. guangxiense</i>	<i>A. laminatum</i>	<i>A. penicillatum</i>	<i>A. ramulosum</i>
Offsets on tuber	no	yes	yes	no	no	no	no
Pseudostem	pale green, without mottling	pale green, without mottling	light brown or green, without mottling	purple, with snake-skin mottling	green, purple mottling	dark purple green, purple mottling	green to grey green, dark mottling, with dark red dots
Petiole	pale green, without mottling	pale green, without mottling	light brown or green, without mottling	purple, with snake-skin mottling	green, purple mottling	pale green, white and brown mottling	green to grey green, dark mottling
Peduncle	green or purple, without mottling	green, without mottling	light brown or green, with brown longitudinal dots	greenish, with purple longitudinal dots	white green, mottling	pale green, mottling, with purple longitudinal stripes	green to grey green, dark mottling, with longitudinal dark-purple stripes
Spathe tube	pale green	pale green	dark purple in the middle, upper and lower white	greenish, with purple longitudinal dots, base white	white green with purple longitudinal dots	pale green with few purple longitudinal stripes	white or dark-purple, mottling, with longitudinal purple stripes
Spathe mouth	green, with dark brown reticulations and widely recurved margin	green, straight to hardly recurved	white, straight	green, straight	green, straight	green, hardly recurved	green, straight
Spathe limb	ovate, almost as long as spathe tube, stained dark brown on both surfaces, with green margin	oblong, almost as long as spathe tube, green or stained brown on both surfaces	ovate, shorter than spathe tube, stained dark brown on both surfaces, with green margin	ovate, green, as long as the spathe tube, stained brown on both surfaces	oblong, almost as long as spathe tube, green, with dark cross-band at base	ovate, much shorter than spathe tube, externally green and internally deep green	lanceolate, outside dull, green, with dark longitudinal stripes, dark-purple cross-band at base
Thecae	purple or cream with purple top, dehiscent by elongated pore	cream, dehiscent by elongated pore	purple, dehiscent by elongated pore	whitish with purple top, dehiscent by rounded pore	pink/purple, dehiscent by rounded pore	purple, dehiscent by elongated pore	purple, dehiscent by elongated pore
Male spadix appendage	apical part with brown or green neuters, middle naked and lower part with green or brown neuters	wholly with short green tinged purple neuters	apical part naked, lower part with a few short neuters	apical part with yellow green neuters, lower part with dark purple neuters	apical part naked, lower part with few scattered neuters	apical part with yellow neuters, lower part naked	apical part with dark-purple neuters, middle naked and lower part with purple neuters
Female spadix appendage	covered wholly with green or brown neuters	covered wholly with neuters	n/a	apical part with yellow green neuters, lower part with dark purple neuters	apical part naked, lower part with few short neuters	apical part with yellow neuters, middle part naked and lower part with purple neuters	apical part with dark-purple neuters, middle naked and lower part with purple neuters
Elevation (m a.s.l.)	320	750–1300	500–550	300–720	200–1800	200–700	300–1400