

A new species of *Arisaema* (Araceae) from Vietnam

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Arisaema langbiangense (Araceae) is described and illustrated as a new species from Langbiang Mountain, Bidoup-Nui Ba National Park, Lac Duong District, Lam Dong Province, Vietnam. A morphological comparison between the new species and its closest congeners and a key to all known species of *Arisaema* sect. *Anomala* in Vietnam are given.

Introduction

Arisaema Martius (1831: 459) of the Araceae is a genus of around 200 species occurring primarily in temperate regions of Asia, but with species also in the Asian tropics, East Africa, and North America (Li, 1981; Mayo *et al.*, 1997; Renner *et al.*, 2004; Gusman & Gusman, 2006; Boyce *et al.*, 2012). In Vietnam, 21 species of *Arisaema* have been recorded (Bruggeman *et al.*, 2013; Gagnepain, 1941 & 1942; Gusman & Gusman, 2006; Hoang *et al.*, 2015; Luu *et al.*, 2013 & 2014; Nguyen, 1998, 2000, 2002, 2005 & 2007; Nguyen & Boyce, 2005; Pham-hoang, 2000).

Section *Anomala* Gusman & Gusman (2003: 40), one of the 15 sections of *Arisaema*, comprises 29 species (Gusman & Gusman, 2006; Bruggeman *et al.*, 2013). According to Nguyen & Vu (2009), in Vietnam the section was known to include eight species: *A. balansae* Engler (1920: 163), *A. garrettii* Gagnepain (1941: 125), *A. omkoiense* Gusman (2001: 3), *A. petelotii* Krause (1932: 332), *A. petiolulatum* Hooker (1893: 6), *A. pingbianense* H.Li (1988: 99), *A. rostratum* V.D.Nguyen & P.C.Boyce (2005: 37), and *A. victoriae* V.D.Nguyen (2000: 38). More recently, *A. claviforme* Bruggeman (Bruggeman *et al.*, 2013: 558) was described from Vietnam as new to science and *A. lihengianum* Murata (2003: 83) was recorded as new to the flora of Vietnam (Hoang *et al.*, 2015). Therefore, prior to this paper, the total number of known species *Arisaema* sect. *Anomala* in Vietnam was ten.

In January 2014, we conducted a field trip to the Langbiang Mountain in Bidoup-Nui Ba National Park, Lam Dong Province and encountered a flowering population of a distinctive *Arisaema* species of section *Anomala*. Our careful examination of its morphological attributes indicated that the species differed from all the earlier described species in section *Anomala* and it is thus proposed here as a new species.

Taxonomy

Arisaema langbiangense Luu, Nguyen-phi & H.T.Van, *sp. nov.* (Fig. 1)

Allied to *A. bannaense*, *A. claviforme*, *A. garrettii* and *A. petiolulatum* but different in having green flesh of rhizome, long pseudostem, forwards bent spadix appendix and 5(6)-lobed obovoid ovaries.

Type:—VIETNAM. Lam Dong Province, Lac Duong District, Bidoup-Nui Ba National Park, Langbiang Mountain, about 108°26'58"E, 120°29'N, 1702 m in elevation, 18 January 2014, *Van Hong Thien* H.T.Van 06 (holotype SGN!, isotypes SGN! & PHH!).

Recommended Vietnamese name:—Nam tinh Langbiang

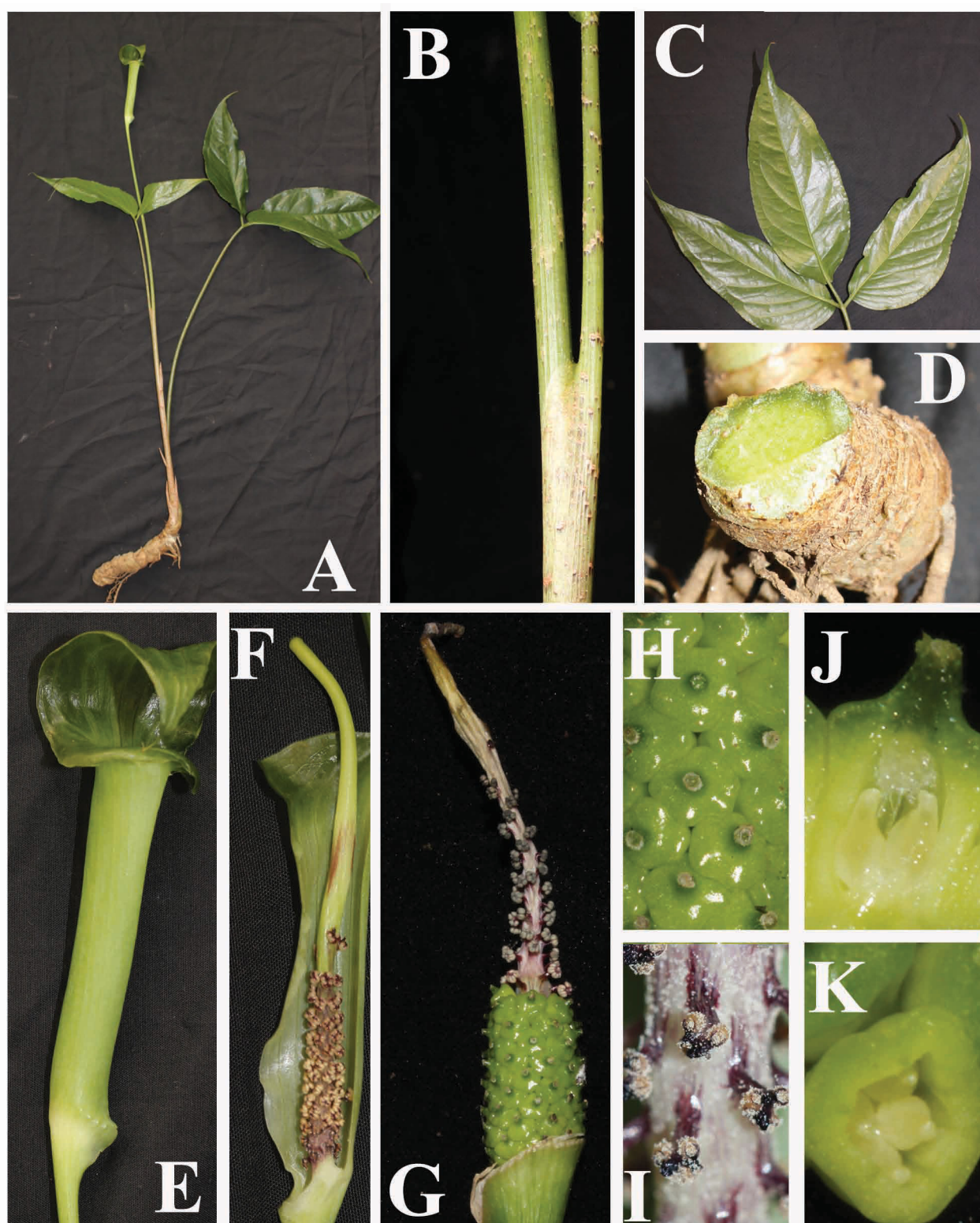


FIGURE 1. *Arisaema langbianense*. A. Habit. B. Pseudostem. C. Leaf blade. D. Rhizome section. E. Spathe. F. Male spadix. G. Bisexual spadix. H. Ovaries. I. Synandria. J. Longitudinal section of ovary. K. Cross section of ovary.

Herb evergreen, 30–55 cm high. Stem a subterranean cylindrical rhizome, 5–9 cm long, 1.5–2 cm wide, white-grey outside, green inside. Cataphylls 2–4, greenish brown, reddish brown mottled, 20–22 cm long. *Leaf*: 1 to 3; the last petiole and peduncle sheathing into pseudostem (*sensu* Gusman & Gusman, 2006) at lower part, free above; pseudostem 22–26 cm long, greenish brown, reddish brown mottled; free part of the petiole 9–11 cm long, brownish green with sparse reddish brown mottling. *Leaf blade* trifoliate, *leaflets* equal in size, 14–16 cm long, 7–10 cm wide, dark green above, pale green under side, apex acuminate with up to 2 cm, caudate tip, midrib impressed adaxially and

prominent abaxially, lateral veins diverging from the midrib and collective vein at ca. 0.3 cm from margin, *central leaflet* ovate, with base rounded, petiolule ca. 2 cm long, *lateral leaflets* asymmetrical, with base rounded, petiolule ca. 0.8 cm long. *Inflorescence* solitary; free part of the peduncle 18–20 cm long, ca. 1 cm in diameter, green, with sparse reddish brown mottling; *spathe tube* cylindrical, green, 7–9 cm long, ca. 1 cm in diameter; *spathe limb* ovate, curved over mouth, 4–5 cm long, 2.5–3 cm wide, green, translucent, ending in a ca. 1 cm caudate tip. *Male spadix* 6–7 cm long; *appendix* slightly exerted from tube mouth, 3.5–4 cm long, naked, ca. 0.4 cm in diameter at base, ca. 0.2 cm in diameter at apex, green, cylindrical, apex round and smooth; *male zone* 2.5–3 cm long, synandrium of 2 or seldom 3 stamens, loosely arranged, on a ca. 2 mm long stipe; thecae purple or cream with purple top and dehiscent by dark purple round pore at anthesis. *Bisexual spadix* 5.5–6.0 cm long; *appendix* slightly exerted from tube mouth, 1–1.5 cm long, naked, ca. 0.4 cm in diameter at base, ca. 0.2 cm in diameter at apex, cylindrical, apex round and smooth; *female zone* ca. 1.5 cm long, 0.5–1 cm in diameter, ovaries obovoid, green, 5(6)-lobed, ca. 2 mm in diameter, 1-locular, with 3–4 bottle-shaped ovules, densely arranged; stigma born on a thick 1 mm long style; *male zone* ca. 2 cm long, synandrium of 2 or seldom 3 stamens, loosely arranged, on a 1–2 mm long stipe; thecae horseshoe-shaped, cream with purple top and dehiscent by dark purple round pore at anthesis.

Habitat:—*Arisaema langbiangense* grows on humus and wet places under tropical evergreen forest at elevations of around 1,700 m.

Eponymy:—The new species is named after its type location, Langbiang Mountain.

Distribution:—*Arisaema langbiangense* is only known from the type location.

Taxonomic discussion:—*Arisaema langbiangense* obviously belongs to section *Anomala* and it is most closely relative to *A. bannaense* H.Li (1988: 101), *A. claviforme*, *A. garrettii* and *A. petiolulatum*, in having: evergreen habit, subterranean rhizomatous stem, trifoliolate leaf and fleshy spadix appendix with naked apex slightly exerted from the tube mouth. However, it is distinct in having green flesh of its rhizome - an attribute first reported for the genus, long pseudostem, forwards bent spadix appendix and 5(rarely 6)-lobed obovoid ovaries (Table 1). In addition, it can be distinguished from *A. bannaense* and *A. garrettii* in having ovate spathe limb without strong constriction at base and more slender spadix appendix. It is different from *A. claviforme* as the latter has an obviously club-shaped spadix appendix, inconspicuous pseudostem and 3 to 4-androus synandria. *Arisaema petiolulatum* differs from the proposed new species in having one leaf with elliptic central leaflet, unmottled petiole, spathe limb with strong constriction at base and thecae opened by an apical slit (Pham-hoang, 2000; Gusman & Gusman 2006; Li *et al.*, 2010). All the other species of the section known from Vietnam are readily distinguishable from the new species as they have filiform bristles on the spadix appendix.

TABLE 1. Comparison of *Arisaema langbiangense* with its morphologically close species.

Characteristics	<i>A. langbiangense</i>	<i>A. bannaense</i>	<i>A. claviforme</i>	<i>A. garrettii</i>	<i>A. petiolulatum</i>
Flesh of rhizome	green	purplish	violet	purplish white	violet
Pseudostem	present	absent or very short	absent or inconspicuous	absent or very short	absent
Spathe tube	cylindrical, whole green	subcylindrical, pale green	subcylindrical, pale green	subcylindrical, pale green	subcylindrical, greenish white
Spathe limb	ovate, without constriction at base	obovate, with strong constriction at base	ovate, without constriction at base	obovate, with strong constriction at base	ovate-lanceolate, with strong constriction at base
Dehiscence of thecae	by dark purple round pore	by apical united slit	by elongated pore	by oblong pore	by apical slit
Spadix appendage	lower half conical, upper half cylindrical, with round apex, bent forwards	cylindrical, with subclavate apex, erect	cylindrical, with club-shaped apex, erect	cylindrical, with clavate apex, erect	narrowly cylindrical, with round apex, erect
Ovaries	obovoid, 5(rarely 6)-lobed	ovoid, not lobed	ovoid, not lobed	ovoid, not lobed	oblong, not lobed

Key to the species of *Arisaema* from Vietnam

Based on the available literature (Pham-hoang, 2000; Gusman & Gusman 2006; Li *et al.*, 2010; Boyce *et al.*, 2012; Bruggeman *et al.*, 2013; Hoang *et al.*, 2015) and the authors' field observations, the known Vietnamese species of *Arisaema* sect. *Anomala* can be distinguished by the following key:

1	Flesh of rhizome green	<i>A. langbianense</i>
-	Flesh of rhizome purplish or violet	2
2	Spadix appendix naked at apex	3
-	Spadix appendix with few or many filiform bristles at apex	5
3	Spadix appendix club-shaped	<i>A. claviforme</i>
-	Spadix appendix cylindrical	4
4	Spathe limb ovate	<i>A. petiolulatum</i>
-	Spathe limb obovate	<i>A. garrettii</i>
5	Pseudostem present, long	6
-	Pseudostem absent or inconspicuous	7
6	Limb plain green	<i>A. petelotii</i>
-	Limb with white zone at base	<i>A. victoriae</i>
7	Spathe limb plain green	8
-	Spathe limb with white zone at base	9
8	Spadix appendix 3.5 cm long, peduncle shorter than petiole	<i>A. omkoiense</i>
-	Spadix appendix 9–10 cm long, peduncle longer than petiole	<i>A. balansae</i>
9	Spadix appendix entirely covered with numerous filiform bristles	<i>A. lihengianum</i>
-	Spadix appendix with few filiform bristles at apical centimetre only	<i>A. pingbianense</i>

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