





https://doi.org/10.11646/phytotaxa.358.3.7

Arisaema longitubum (Araceae), a new species from northwestern Yunnan, China

ZHENG-XU MA

The High School Affiliated to Renmin University of China Chaoyang School (Shaoyaoju), Beijing 100028, Beijing, China; email: adammzx@126.com

Abstract

Arisaema longitubum (Araceae), belonging to *Arisaema* sect. *Odorata*, is described and illustrated as a new species. The new species is closely related to *Arisaema yunnanense*, *A. bathycoleum*, and *A. lidaense* but differs in a suite of morphological characters useful in species distinction provided in this article.

Keywords: Arisaema sect. Odorata, Arisaema yunnanense, Arisaema bathycoleum, Arisaema lidaense, Lijiang

Introduction

Hitherto, the genus *Arisaema* Martius (1831: 459) (Araceae) contains approximately 198 species (Ma & Li 2017), distributed from East to South Asia (it also has been recorded in South Arabian Peninsula), East Africa and North America. In China, the center of its diversity and distribution is located in the Himalayas-Hengduan region (Li 1980) of which 81 species and two varieties have been reported (Ma & Li 2017).

On an expedition to Lijiang in July 2015, a population of an unusual *Arisaema* was encountered growing along the roadside in the understory of secondary forest dominated by *Alnus* Miller (1754: [43]) sp. (Betulaceae). For the next two years, the author has monitored the *in-situ* population, as well as plants established in *ex-situ* collections, and meticulously examined and documented flowering episodes of the species. The unusual *Arisaema* sp. was compared with closely allied species and sufficient evidence gathered revealed that it is a species new to science. The unusual *Arisaema* sp. belongs to *Arisaema* sect. *Odorata* Murata [(2011), nom. nud. descr. jap.] ex Murata in Murata *et al.* (2013: 43) in having a tuberous subterranean stem, a quincuncial phyllotaxy and a sessile spadix appendix.

The morphological characteristics of *A. longitubum* are consistent with *Arisaema* sect. *Odorata*, a section recognised in 2013 (Murata 2011, Murata *et al.*, 2013). This section comprises of eight species and one variety, namely *A. aridum* Li (1977:107), *A. bathycoleum* Handel-Mazzetti (1925: 123), *A. lidaense* J. Murata & S.K. Wu (2003: 81), *A. mairei* Leiveillei (1915: 10), *A. odoratum* Murata & Wu (1994: 153), *A. prazeri* Hooker (1894: 501), *A. saxatile* Buchet (1911: 124), *A. yunnanense* Buchet (1911: 367) var. *yunnanense* and *A. yunnanense* Buchet var. *quinquelobatum* Z.X. Ma & H. Li (2017: 75) (Murata 2011, Murata *et al.* 2013, Ma & Li 2017), the majority of which inhabit dry rocky slopes along river valleys in the Hengduan Mountains (especially from NW Yunnan to SW Sichuan). The novelty described here rises the number species in sect. *Odorata* to nine and makes the diversity of *Arisaema* in Yunnan better understood.

Taxonomy

Arisaema longitubum Z.X. Ma, sp. nov. (Figs. 1, 2)

This species is closely related to *Arisaema yunnanense* Buchet and *A. lidaense* J. Murata & S.K. Wu, but differs from both in having a broadly ovate or subrhombic central leaf blade, pure olive-green spathe, a long cylindric spathe tube, a light green to transluscent and auriculate throat with olive-green reticulations, laxly arranged pistils and a suberect-inward spadix-appendix.

Type:—CHINA. Yunnan Province: Lijiang City, Yulong County, Jin'an Township, Dangniuluo, ca. 2,630 m, 28 July 2015, *Zhengxu Ma 003* (holotype PE!, isotypes, HUH!, PE!);

Perennial herb, seasonally dormant, paradioecious. Subterranean stem tuberous, subglobose, 2.0–3.0 cm in height, 2.0–5.0 cm in diam. Cataphylls 2, reddish brown to maroon, membranous, to 20.0 cm in length. Leaf solitary; petiole reddish brown to maroon or olive-green, smooth, 25.0–32.0 cm in length, 0.5–0.7 cm in diam., forming a pseudostem proximally; leaf blade dull green, hastate when juvenile, trifoliolate or sometimes coalesce at base when mature, subleathery; veins abaxially raised, lateral numerous; central leaflet broadly ovate or subrhombic, $10.0-11.0 \times 7.5-10.0$ cm, base sessile, apex nearly acuminate; lateral leaflets obliquely ovate, $9.5-11.0 \times 6.4-8.0$ cm, base sessile, apex nearly acuminate; lateral leaflets obliquely ovate, $9.5-11.0 \times 6.4-8.0$ cm, base sessile, apex nearly acuminate; lateral leaflets obliquely ovate, $9.5-11.0 \times 6.4-8.0$ cm, base sessile, apex nearly acuminate. Peduncle olive-green or reddish brown to maroon, smooth, to 40.0 cm in length. Inflorescence solitary, slightly higher than leaf. Spathe olive-green, unicolor, glaucous, smooth; tube cylindric, 5.5-8.0 cm in length, 1.0-1.5 cm in diam.; mouth light green to translucent, with obvious olive-green reticulations, membranous, widening and slightly revolute; limb olive-green, flat, base light green, expanding, $(3.2-)4.5-6.0 \times (1.5-)2.4-2.7$ cm, apex acuminate. Spadix unisexual. Female zone cylindric, $2.3-3.0 \times 0.4-0.6$ cm; pistils lax arranged; ovary green, barrel-shaped; style white, cylindric, ca. 1.2 mm in length; stigma white, circular, pilose. Male zone cylindric, ca. 2.6 $\times 0.2$ cm; synandria laxly arranged, pale yellow, stipitate, comprising 4 thecaes of each; thecae globose, dehiscing by an apical pore. Appendix green, sometimes dark purplish at apex, slender-cylindric, proximally sessile, distally slightly attenuate, incurved, $3.2-4.5 \times 0.1-0.3$ cm, slightly protruding the spathe mouth.



FIGURE 1. Arisaema longitubum Z.X. Ma. A. inflorescence. B. individuals in the habitat. C. female spadix. D. male spadix. Images © Zheng-Xu Ma; plants are from the population of the holotype.



FIGURE 2. *Arisaema longitubum* Z. X. Ma. A. mature individual, B. juvenile leaf blade, C. spathe, D. male spadix, E. synandria, F. female spadix, G. pistil. Drawn by Yi-Fan Li: A & F from paratype, B & G from isotypes, C–E from holotype.

Phenology:—Flowering in July to August. Fruiting unknown.

Eponymy:—The epithet of this species, *longitubum*, refers to its obviously long cylindric spathe tube. Therefore, the author recommends the Chinese name of this new species as "長筒南星".

Distribution and habitat:—*Arisaema longitubum* is so far known only from two separate populations in Yulong county and Eryuan county. It grows as an understory herb in the secondary forest dominated by *Alnus* sp., along roadsides and edges of grasslands at the boundary of the Jinshajiang dry-hot river valley. Habitats of this species are severely affected by human activities, especially land reclamation and laboring.

Discussion:—The morphological characteristics of *Arisaema longitubum* is consistent with characters identified for *Arisaema* sect. *Odorata* in having, (i) a tuberous subterranean stem producing numerous annularly arranged raised accessory buds; (ii) trifoliolate leaf blades; (iii) a slender cylindrical and slightly incurved spadix-appendix without the presence of neuter flowers; and (iv) barrel-shaped pistils.

Arisaema longitubum is closely related to *A. yunnanense* but differs in having (i) sub-leathery and subrhombic to broadly ovate central leaf blade; (ii) olive-green spathe—pale colored and narrow at basal portion becoming reticulate and widening towards the mouth; (iii) mouth margin slightly revolute; (iv) laxly arranged barrel-shaped pistils; (v) pale-yellow synandria; and (vi) a slender cylindrical spadix-appendix that slightly incurves distally.

Besides, *A. longitubum* differs from *A. bathycoleum* as the latter has (i) linear, unifoliolate or trifoliolate leaf blades; (ii) densely arranged spindle-shaped pistils; and (iii) a filiform and pendulous spadix-appendix occasionally twining distally.

In addition, *A. longitubum* is also similar to *A. lidaense* but distinct based on observations on the reproductive biology conducted in the field. Sexual reproductive phase of the former interchanges between male phase and female phase from one year to another, in contrast to the latter that only changes between male phase and monoecious phase. Apart from that, the white patch on the spathe-throat is also a diagnostic characteristic of the latter. From a biogeographical perspective, *A. longitubum* inhabits a relatively drier and cooler region, usually along the margin of the dry-hot river valley at higher elevation in northwestern Yunnan. Meanwhile, *A. lidaense* only grows in the limestone region, developing evergreen broad-leaf forest, in southeastern Yunnan to northeastern Vietnam (Nguyen *et al.* 2016) where precipitation is considerably higher. More specific comparisons are listed below in Table 1.

TABLE 1. Morphological co	omparision amang Arisaema bat	thycoleum, A. lidaense, A. longitibu	um and A. yunnanense.	
Trait	A. bathycoleum	A. lidaense	A. longitubum	A. yunnanense
sexual states of spadix	male and female	male and monoecious	male and female	male and female
dividing-form of leaf blade	unifoliolate or trifoliolate	trifoliolate	trifoliolate	trifoliolate
central leaflet	linear	narrowly elliptic	broadly ovate or subrhombic	elliptic, sometimes ovate
spathe tube, shape and color	narrowly cylindric; entirely green	narrowly cylindric; green, with a white area at base	narrowly cylindric; entirely olive- green	funnel-shaped; green with white longitudinal stripes and a white area at base
spathe mouth, shape and color	coloration consists with spathe tube; lightly widening	green with a white patch at back; oblique, and slightly revolute	light-colored, with olive-green reticulation; widening and slightly revolute	coloration consists with spathe tube; obliquely truncate, non-auriculate
arrangement of pistils	dense	dense	lax	dense
ovary shape	spindle-shaped	barrel-shaped	barrel-shaped	barrel-shaped
appendix	filiform and pendulous, sometimes twining distally	subulate, distally slightly incurved and attenuate	slender cylindric and slightly incurved	thick cylindric and intensively incurved

Mombological comparision among Arisgon pathwolaum A lidgonso A longitihum and A run

Additional specimen examined (paratype):—CHINA. Yunnan Province: Dali Prefecture, E of Eryuan County, ca. 2570–2640 m, 31 August 2015, *Bjørnar Olsen s.n.*, prepared from cult. (L!).

Acknowledgements

The author is tremendously grateful to Mr. Pascal Bruggeman for having critically reviewed the manuscript and to Mr. Bjørnar Olsen for his collection of the paratypes. The author is also thankful to Mr. Yi-fan Li for his fine illustration of the new species, as well as to Dr. Bing Liu (Institute of Botany, Chinese Academy of Sciences) for assistance provided for this work.

References

- Buchet, S. (1911) Nouvelles espelces d'Arisaema Mart. (Sect. I: Folia trisecta). In: Lecomte, H. (Ed.) Notulae Systematica. Herbier du Muséum de Paris. Phanérogramie 1. J. Dumoulin, Paris. pp. 366–375.
- Handel-Mazzetti, H. (1925) Plantae novae sinensis, diagnosibus brevibus descriptae a Dre. Heinr. Handel-Mazzetti. *Anzeiger der Akademie der Wissenschaften in Wien. Mathematische-naturwissenchaftliche Klasse* 61: 123.
- Hooker, J.D. (1894) Araceae-Arisaema. In: Hooker, J.D. (Ed.) Flora of British India. Vol. 6. L. Reeve & CO., London. 501 pp.
- Leiveillei, H. (1915) Catalogue des plantes de Yun-nan, avec renvoi aux diagnoses originales, observations et descriptions d'espelces nouvelles. Chez L'Auteur, Le Mans. 10 pp.
- Li, H, Shiao, Y & Tseng, S.L. (1977) Claves diagnosticae et taxa nova aracearum sinicarum. Acta Phytotaxa Sinica 15: 87-109.

Li, H. (1980) Himalayas–Hengduan Mountains—the center of distribution and differentiation of the genus Arisaema,—to discuss the problems about the origin and migration of the genus Arisaema. Acta Botanica Yunnanica 2: 402–416. https://doi.org/10.3732/ajb.91.6.881

- Ma, Z.X. & Li, H. (2017) The genus Arisaema (Araceae: Aroideae: Arisaemateae) in China—a taxonomic revision and annotated list of species. Aroideana 40 (3): 49–134.
- Martius, C.F.P. von. (1831) Über die Art der Befruchtung bei einigen Aroideen und über die Charakteristik mehrerer Gattungen dieser Familie. *Flora* 14: 449–460.
- Miller, P. (1754) The gardeners dictionary : containing the methods of cultivating and improving all sorts of trees, plants, and flowers, for the kitchen, fruit, and pleasure gardens, as also those which are used in medicine : with directions for the culture of vineyards, and making of wine in England : In which likewise are included the practical parts of husbandry. The fourth edition, corrected and enlarged. Vol. 1. Printed for the author and sold by John and James Rivington, London, 512 pp.
- Murata, J., Wu, S. & Yang, Y. (1994) Arisaema odoratum J. Murata et S. K. Wu (Araceae), a new species from Yunnan, China. Journal of Japanese Botany 69: 153–156.
- Murata, J. & Wu, S.G. (2003) Two new species of Arisaema (Araceae) from China. Journal of Japanese Botany 78: 81-85.
- Murata, J. (2011) The picture book of plant systematics in color, Arisaema in Japan. Hokuryukan, Tokyo, pp. 58–59.
- Murata, J., Nagamasu, H. & Ohashi, H. (2013) A nomenclatural review on the infrageneric classifications of *Arisaema* (Araceae). *Journal of Japanese Botany* 88: 36–45.
- Nguyen, V.D., Vu, T.C. & Bui, H.Q. (2016) Arisaema lidaense J.Murata & S.L. Wu (Araceae): a new record for the flora of Vietnam. Aroideana 39 (1): 20–25.