New Species of Arisaema from China (Araceae: Arisaemateae)

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New species of *Arisaema* from China (*Araceae*: *Arisaemateae*)

LI HENG[1]

Summary. Five new species: *Arisaema cochleatum, A. xuanweiense, A. wumengense, A. zhui* and *A. echinoides* are described from China. Their relationships and distinguishing characters are discussed.

INTRODUCTION

During my study of Chinese *Araceae* for the English language revision of the *Flora of China* the following new *Arisaema* species were discovered. The species are described here to make the names available for the forthcoming volume 23 of the *Flora of China.*

1. Arisaema cochleatum *Stapf ex H. Li,* **sp. nov.** *A. asperato* N. E. Br. similis, sed planta glabra, folii segmento intermedio obovato, spadicis lamina spathulata 10 cm longa, 5 cm lata, basi 2.5 – 3 cm lata, spatha cochleata differt. Typus: China, Shanxi Province, Mt Taibeishan, shady thickets in side valleys, 3000 – 3300 m, Aug. 1910, *Purdom* 24789 (holotypus K!).

Dioecious herb. Tuber subglobose, 3 – 4 cm diam. Cataphylls not seen. Leaf solitary; petiole to 50 cm long with lower 7 cm sheathing; leaf blade trifoliolate; leaflets subsessile, margins subcrenulate, undulate; terminal leaflet obovate, c. 11 × 12 – 13 cm, apex subtruncate, base cuneate; lateral veins 11 per side, connective vein 2 – 3 mm remote from margin; lateral leaflets oblique, rhombiform, c. 15 × 15 cm, apex acute to acuminate, base cuneate. Peduncle to 36 cm long. Spathe nearly erect, c. 15 cm long; tube cylindric, c. 5 × 1.5 cm diam., dull yellow with whitish stripes, throat margins obliquely truncate, slightly recurved, not auriculate; limb spathulate, incurved, c. 10 cm long, upper part 5 cm wide, dark brown, without stripes, base constricted, 2.5 – 3 cm wide, brown with white stripes, apex abruptly narrowed and acute. Spadix unisexual. Male: fertile portion cylindric, 2.5 cm long; flowers lax, stipitate, anthers 2 – 5, dehiscing by horseshoe-shaped slits; appendix cylindric, c. 7 cm long in total, distal portion curved, lower 2 – 3 cm suberect, c. 3 mm thick, abruptly swollen towards base into a truncate, cap-shaped, stipitate base 4 – 5 mm in diam; stipe c. 7 mm long. Fl. Aug. Fr. Oct. Fig. 1.

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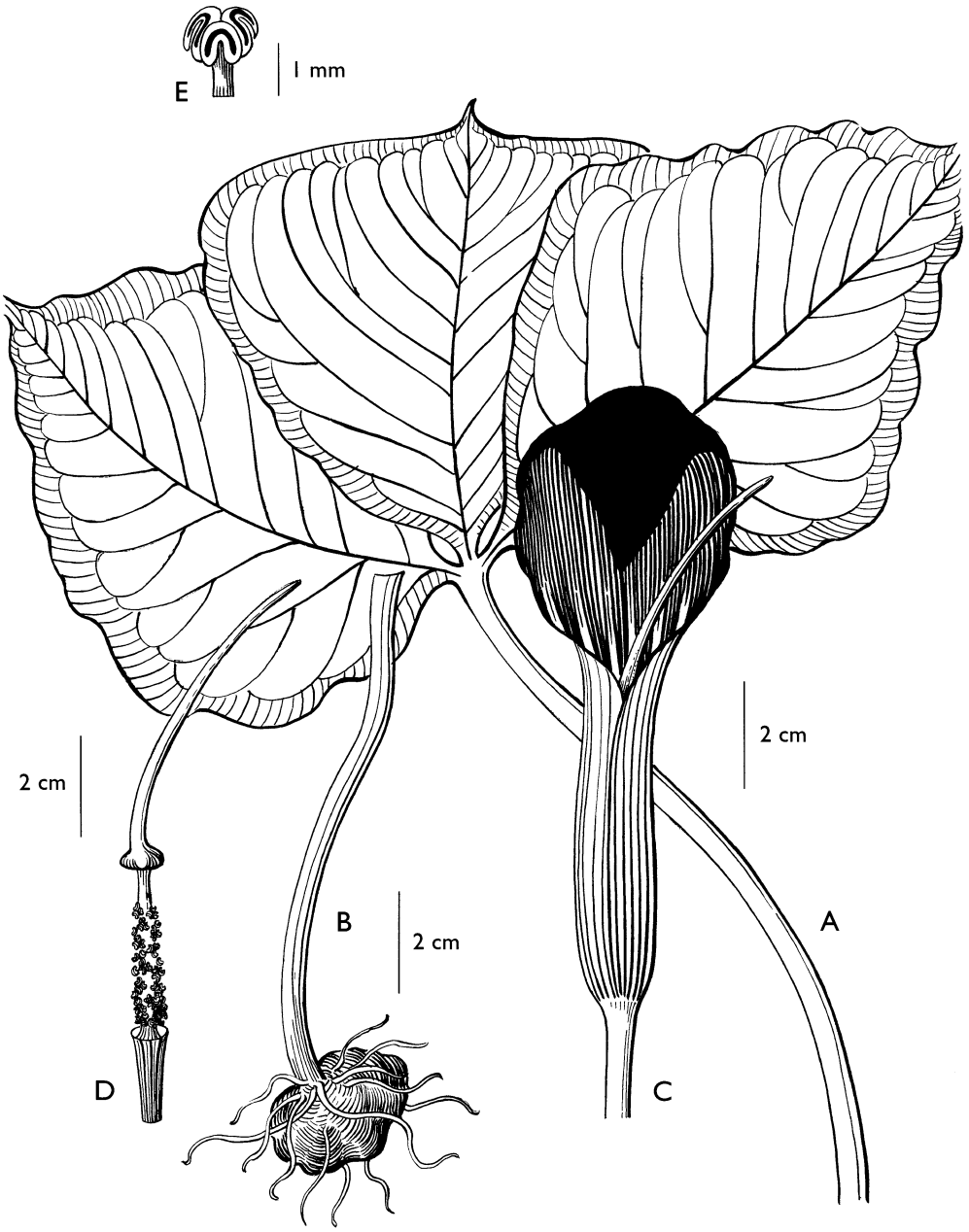

FIG. 1. *Arisaema cochleatum*. **A** leaf; **B** tuber; **C** inflorescence; **D** male spadix; **E** male flower. All from *W. Purdom* 24789. Drawn by Wang Ling.

SPECIMENS EXAMINED. CHINA, Shanxi Province: Mt Taibeishan, shady thickets in side valleys, 3000 – 3300 m, Aug. 1910, *Purdom* 24789 (holotype K!); Mt Taibeishan, grassy slope, Sept. 10, 1956, *Seed collection group* 249 (KUN!); Chang-an xian, shady slope, *Chang-ning group* 0053 (KUN!).

DISTRIBUTION. Endemic to Shanxi Province, China.

NOTES. *Arisaema cochleatum* Stapf ex H. Li belongs to section *Trisecta* Schott (Schott 1860). It is similar to *A. asperatum* N. E. Br., but can be distinguished by its smooth petiole and peduncle, dull yellow spathe with whitish longitudinal lines in the tube, and spathulate limb 10 cm long, 5 cm wide in the upper part and 2.5 – 3 cm wide at the base. It is also similar to *A. elephas* Buchet, but differs in its shorter and thinner appendix, 7 cm long and 3 mm thick, with a truncate and stipitate base.

Purdom 24789 (K) consists of two sheets. Stapf described these specimens as *A. cochleatum* in manuscript in the Kew herbarium, but did not publish the name. Engler (1920) did not mention these specimens. Murata (1987, in sched.) determined them as *A. asperatum.* As stated above, *A. cochleatum* is quite different from *A. asperatum* in having a smooth petiole and spathulate spathe limb. In Chinese herbaria specimens of *A. cochleatum* from Mt Taibaishan have been included in *A. asperatum,* as in *Flora Tsinlingensis* (North-western Institute of Botany 1970) and in *Flora Reipublicae Popularis Sinicae* (Li Heng 1979); sometimes specimens of *A. cochleatum* have been named as *A. elephas* (in *Flora Tsinlingensis* 1: 280, fig. 248, *pro parte*).

2. Arisaema xuanweiense *H. Li,* **sp. nov.** *A. lobato* Engl. affinis, sed rhizomate verticali longiuscula 3 – 5 cm longo, 7 – 10 mm crasso, folii segmento intermedio sessili differt. Typus: China, Yunnan Province: Xuanwei xian, 2200 m, May 2, 1993. *Liu Xian-zhang* 93023 (holotypus KUN!).

Dioecious herb. Rhizome vertical, 3 – 5 cm long, 7 – 10 mm thick. Cataphylls 2 – 3, 3 – 8 cm long, membranous, whitish green, acuminate at apex. Leaves 1 – 2; petiole 15 – 18 cm long, greenish; leaf blade trifoliolate, green above, pale green beneath; leaflets sessile, serrate; terminal leaflet suborbicular, 8.8 – 11 × 6 – 8.5 cm, apex acute, base obtuse; lateral veins 5 per side, parallel, connective vein 2 – 3 mm remote from margin; lateral leaflets obliquely ovate, 8.5 – 10.8 × 5.8 – 8.2 cm, apex acuminate, base rounded. Peduncle, terete, to 18 cm long, greenish. Spathe nearly erect, c. 9.5 cm long , tube cylindric, 4 × 1.5 cm, green, basal 1 cm white, throat obliquely truncate, straight or slightly recurved; limb ovate, incurved, 5.5 × 4 cm, green with whitish stripes, dorsal side with a large (1 cm long) oblong white area, apex acuminate with an 8 cm tail. Spadix unisexual. Female: fertile portion subconic, c. 15 mm long; flowers dense; ovary green, stigma sessile; appendix cylindric, erect, c. 35 × 3.5 mm in total, whitish green, base subtruncate, 5 mm diam., stipitate; stipe 3 × 2 mm. Fl. April. Fig. 2.

SPECIMEN EXAMINED. CHINA, Yunnan Province: Xuanwei xian, 2200 m, May 2, 1993. *Liu Xian-zhang* 93023 (holotype KUN!).

DISTRIBUTION. Endemic to Yunnan Province (Xuanwei xian), China; only known from the type locality.

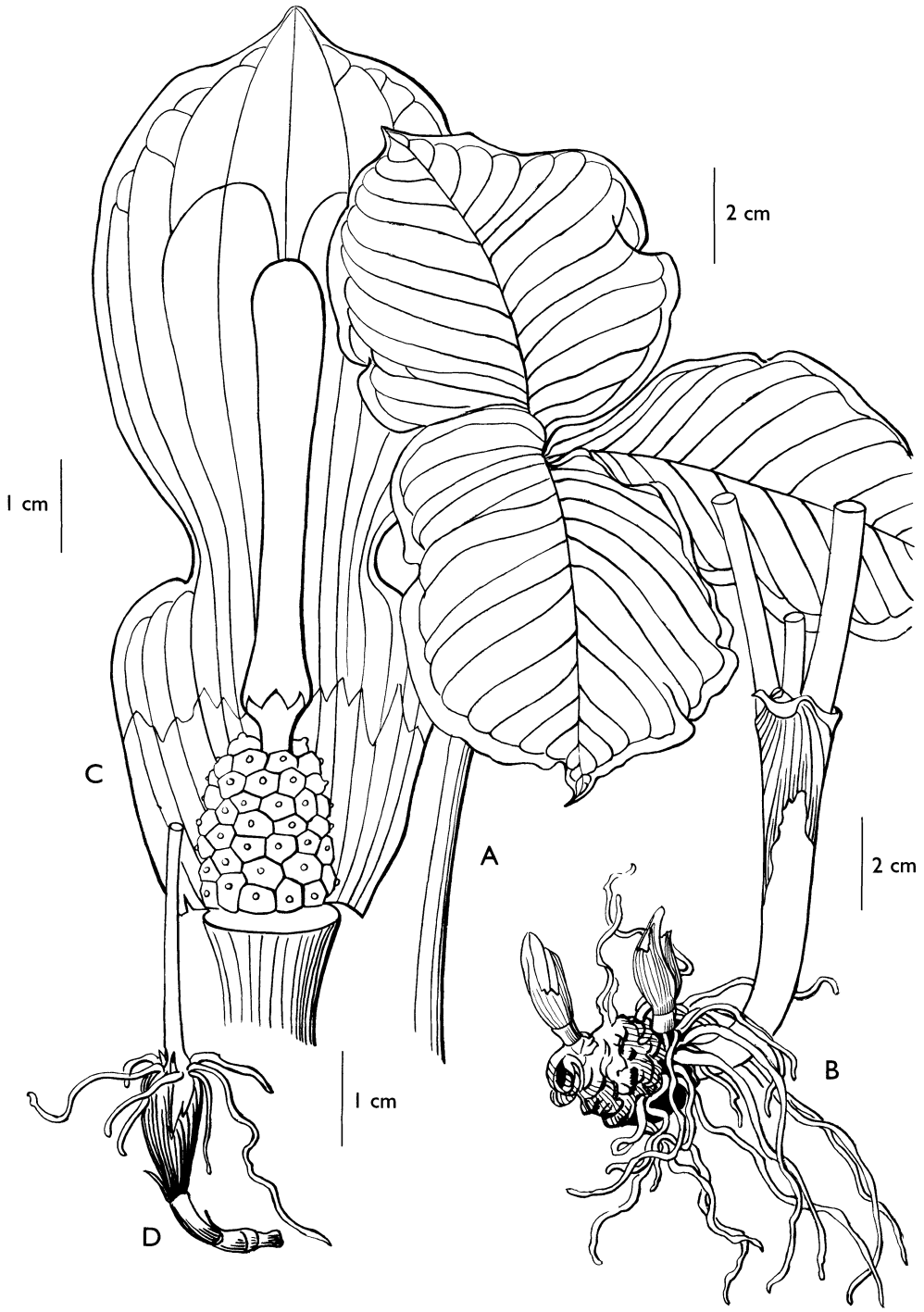

FIG. 2. *Arisaema xuanweiense*. **A** leaf blade; **B** rhizome with new shoots; **C** spathe & spadix; **D** young rhizome. All from *Liu Xian-zhang* 93023. Drawn by Zeng Xiao-lian & Wang Ling.

NOTE. This species belongs to section *Pistillata* Engl. (Engler 1920). It resembles *A. lobatum* Engl. in its erect and stipitate appendix, but differs by the vertical rhizome, sessile terminal leaflet, and spathe with white basal part and a large white oblong area on the dorsal side of the spathe lamina.

3. Arisaema wumengense *H. Li, Q. T. Zhang & L. S. Xie,* **sp. nov.** *Arisaema arido* H. Li affine, sed spathae tubo viridulo, spathae lamina nivea et spadicis appendice crasso cylindrico tortuoso 4 mm diam. differt. Typus: China, Yunnan Province: Luquan xian, Wumeng village, grassy slope, in thickets, 1960 m, 9 June 1997, *Zhang Qui-tai & Xie Li-shan* 97601 (holotypus KUN!).

Dioecious herb. Tuber depressed-globose, 3 × 4 – 5 cm, renewed seasonally, dark brown, whitish inside, bearing numerous whitish unbranched roots around the pseudostem base. Cataphylls 2 – 3, 17 – 18 × 2.7 cm, chartaceous, whitish green with dark reddish brown stripes, apex acute. Leaves 2; petiole 30 – 40 cm long in total; stout, encircled by cataphylls, whitish green but the sheathing part with short reddish brown stripes, lower part distinctly sheathing, forming a pseudostem 25 – 30 cm long, free portion c. 10 – 15 cm long; leaf blade pedately 5(– 7)-foliolate or palmate-digitate, leaflets sessile, elliptic, 11 – 12 × 3 – 5 cm, bases often connected, apex acute or acuminate, base cuneate, lateral pinnate veins 12 – 15 each side, parallel, connective veins 2, (1 –)3 – 4 mm remote from margin; outer leaflets like central but somewhat smaller, the outermost ones 8 × 3 cm. Inflorescence emerging from second petiole sheath. Peduncle 33 – 36 cm, usually shorter than second petiole, green, unmarked. Spathe slightly recurved, 13 – 15 cm long in total; tube cylindric, 4 × 1.4 – 2 cm, green outside, greenish inside, unmarked, smooth, throat slightly recurved, not auriculate; limb elongate ovate, slightly incurved, 9 – 11 × 3.7 – 5.5 cm, white, unmarked, apex long-acuminate. Spadix unisexual. Female: fertile part conic, 1.5 – 1 cm long, ovary obovate, greenish, style pyramidal, short, stigma small, papillose; appendix sessile, cylindric, 14 cm long in total, entirely dark green, or basal 2 – 3 cm whitish, then green for middle 1.5 cm, narrowing upwards and dull brownish purple, apex 1 – 2 cm, filiform; recurved out beyond the spathe tube at 90°, or sigmoid. Male: fertile part cylindric, 1.5 – 2 × 0.3 cm, dense-flowered; flowers subsessile, anthers 2 – 3, yellowish, anthers globose, dehiscing by apical pores; appendix sessile, tortuose, 8 – 15 cm long, dark green. Fl. May – July. Fig. 3.

CHROMOSOME NUMBERS. 2n = 22 (Zhou Qi-xing 1998, m.s.).

SPECIMENS EXAMINED. CHINA. Yunnan Province: Luquan xian, Wumeng village, 1960 m, grassy slope, in thickets, 9 June 1997, *Zhang Qi-tai & Xie Li-shan* 97601 (holotype KUN!); Dongchuan Shi, Huize xian, *Luo Dachang et al.* 191 (KUN!). Sichuan Province: Huidong xian, 1900 m, *S. K. Wu* 271 (KUN!).

DISTRIBUTION. Endemic to China (S Sichuan, Yunnan provinces); known only from the hot, dry valley of the Jingshajiang river.

NOTES. *Arisaema wumengense* belongs to section *Tortuosa* Engl. (Engler 1920). It resembles *A. aridum* H. Li in its pedately 5 – 7-foliolate leaves, but is easily distinguished from the latter by the white spathe and dark green twisted appendix.

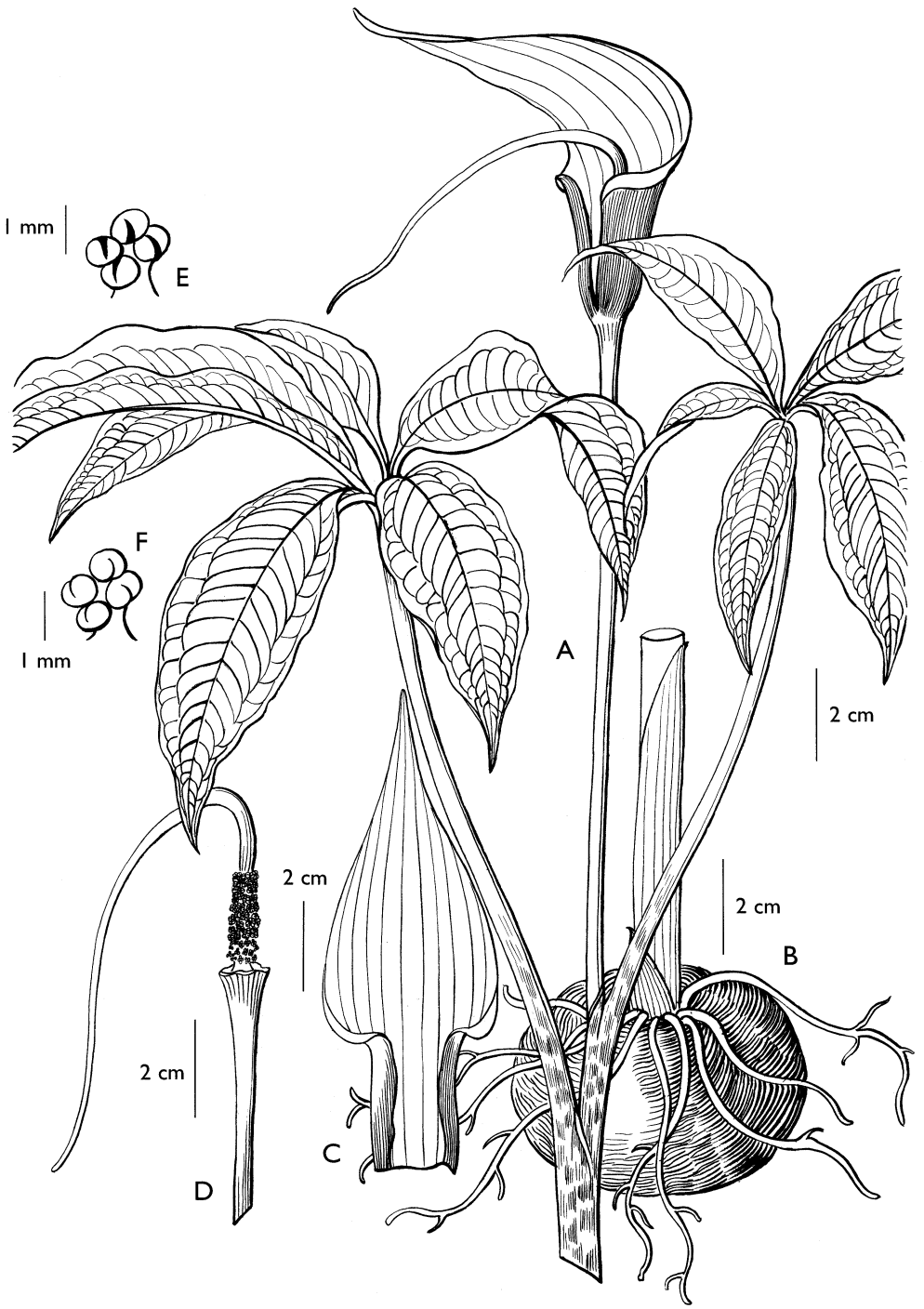

FIG. 3. *Arisaema wumengense*. **A**, **B** flowering plant; **C** spathe; **D** spadix; **E**, **F** synandria. All from *Zhang Qi-tai* & *Xie Li-san* 97601. Drawn by Wang Ling.

It also resembles *A. odoratum* J. Murata & S. K. Wu in its white spathe and pedate leaf, but differs in having 5 – 7 leaflets, a longer and more robust appendix and an odourless spadix.

4. Arisaema zhui *H. Li*, **sp. nov.** *A. echinato* (Wall.) Schott affine, sed pedunculo brevi 7 cm longo, spatha purpurea albo-vittata, spadicis appendice glabra, stipite 3 – 3.6 cm longo suffulta, basi truncata differt. Typus: China. Yunnan: Deqing xian, Meili Snow mountain, 4000 m, Oct. 1992, *Meili Expedition* 25859 (holotypus KUN!).

Paradioecious herb. Tuber depressed-globose, 3 – 4 cm in diam., surrounded by a few tubercles. Cataphylls 2, 2 – 5.5 cm long, membranous, greenish, acuminate at apex. Leaves 1 (1995, male) or 2 (1996, female); petiole 32 – 36 cm long, 5 – 8 mm diam., basal 3 – 4 cm sheathing; leaf blade radiate, with 12 (1997, male) or 13 (1995, male) leaflets; leaflets 11 – 13 (including 1 – 1.5 cm filiform tail) × 1.1 – 2.2 cm, subsessile, narrow elliptic, apex acuminate, base cuneate. Peduncle c. 7 cm long, much shorter than petiole. Spathe recurved, c. 11 cm long; tube short, infundibuliform, 3.8 × 1.5 cm to throat, white, greenish inside, throat oblique truncate, not recurved; limb triangular-ovate, incurved, 6.5 – 9 (male) × 4 cm, abruptly narrowed and long-caudate with a 2 (female) – 4.5 (male) cm long filiform tail, purple-green with indistinct stripes outside, dark purple with greenish stripes inside. Spadix unisexual, male and female emerging from the same tuber in different years (male spadix produced in 1995 and 1997, female in 1996 from the same tuber). Male: fertile portion cylindric, 2.4 × 0.3 – 0.4 cm; flowers dense, subsessile, anthers 2 – 6, violet, globose, dehiscing by an apical pore. Female: fertile portion conical, 1.5 cm long; flowers dense, ovaries ovate-globose, green, stigma subsessile, punctate, ovules 4, basal, erect; appendix cylindric, distally slightly swollen, c. 3 × 0.3 – 0.4 cm, greenish with tiny purple dots, apex obtuse, base truncate, stipitate; stipe c. 5 mm purple. Fl. Jun. Fig. 4.

DISTRIBUTION. Endemic to Yunnan Province, China, only known from the type locality.

NOTES. *Arisaema zhui* belongs to section *Sinarisaema* Nakai (Nakai 1950). The unmarked petiole, short peduncle, and stipitate appendix with a truncate base distinguish *A. zhui* from all other species in section *Sinarisaema*.

The tuber collected in October 1992 under *Meili Expedition* 25858 was subsequently grown on at Kunming. This plant produced a male inflorescence in 1995 and 1997, and in these years produced a single leaf with 13 (1995) and 12 (1997) leaflets. In 1995 four small plants also appeared, one with an entire leaf blade, two with trifoliolate leaves and one with five leaflets. They were around the main tuber but separate from it. In 1996 a female inflorescence was produced, together with 2 leaves, again with 13 leaflets, but the small plants were found to have died.

The cataphylls, petiole, peduncle, spathe and appendix of the female plant are of the same appearance as those of the male plant.

The five years of observations show that in the genus *Arisaema*, while the spadix is normally unisexual, the same underground stem may produce either a male or

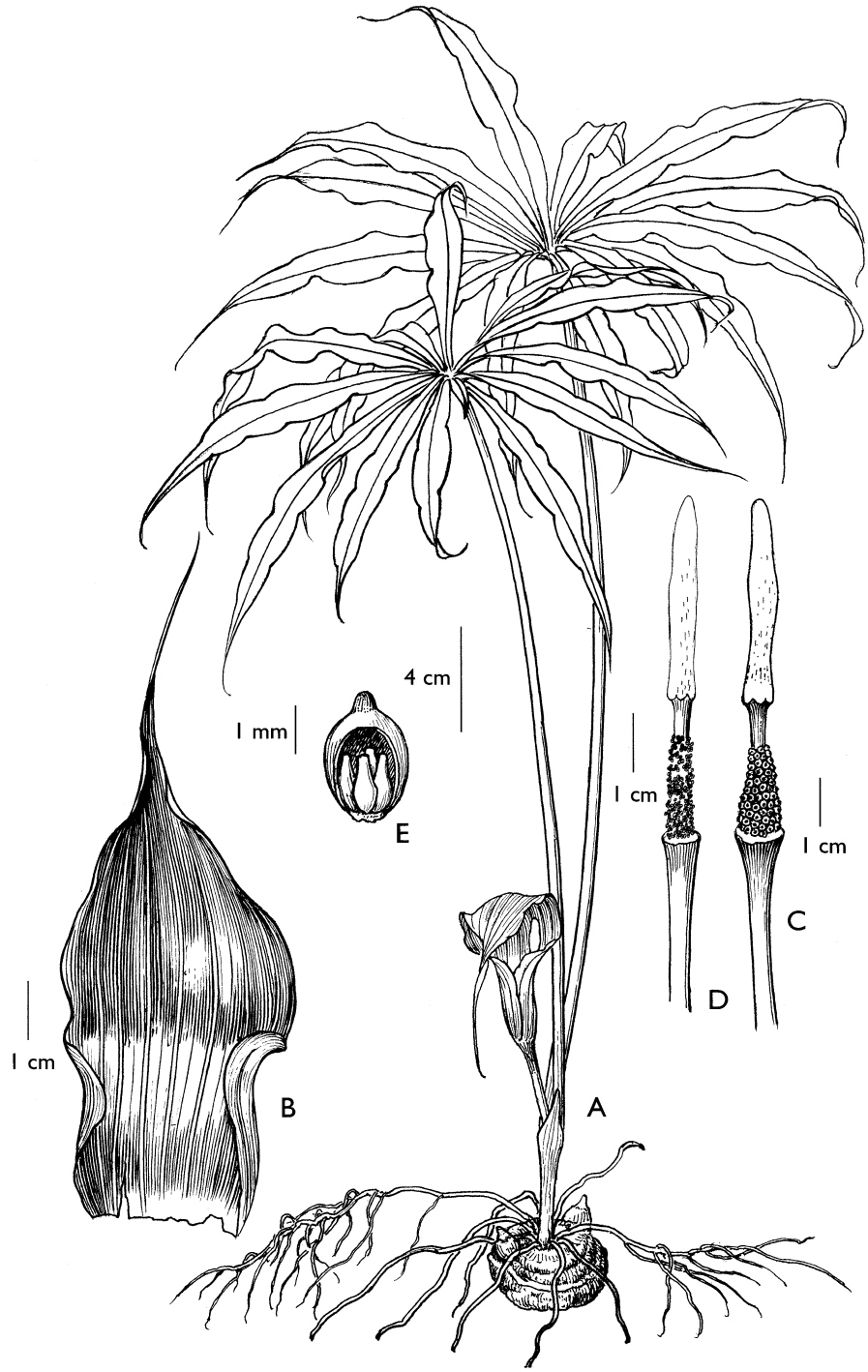

FIG. 4. *Arisaema zhui*. **A** flowering plant; **B** spathe; **C** female spadix; **D** male spadix; **E** ovary and ovules. All from *Meili expedition* 25859: female from 1996, male from 1995. Drawn by Li Xi-chou & Wang Ling.

female inflorescence in different years. Sexual expression may be related to the nutrient status of the tuber, but it does not appear that female spadices are produced by mature plants and male ones from small plants. It seems that all flowering individuals, male or female, must be mature. Certainly there is no regular alternation of sex expression; a female inflorescence is not automatically formed after a male one.

Arisaema zhui is named in honour of its collector, Prof. Wei-Ming Zhu (W. M. Chu) a distinguished fern taxonomist, now on the botanical staff of Yunnan University, Kunming, Yunnan, China.

5. Arisaema echinoides *H. Li*, **sp. nov.** *A. echinato* (Wall.) Schott affine, sed spathae faucis late auriculatis, lamina oblongo-ovata atropurpurea pinnatinervis vittiformibus albis suffulta; appendices stipite 7 mm longo 2 mm crasso, appendice basi truncata differt. Typus: China, Yunnan: Lijiang xian, Judian distr., Xizu Reserve, 2900 m, *SBIE* 419 (holotypus K!).

Dioecious herb. Tuber subglobose, 2 cm in diam. Cataphylls membranous, acute at apex. Leaf 1; petiole 24 cm long; leaf blade radiate, leaflets 9, sessile, oblanceolate, 13 – 16 × 2 – 3 cm, apex acuminate, base cuneate. Peduncle 10 cm long, shorter than petiole. Spathe c. 12 cm long ; tube cylindric, c. 5 × 1 cm, purple with numerous white longitudinal stripes, broadly auriculate and recurved at throat; limb oblong-ovate, c. 7 × 4 cm, abruptly narrowed at apex, slightly constricted at base, dark purple with white midrib, with 4 – 5-pinnate veins each side, these ascending and connected into an connective vein c. 2 – 3 mm from the margin. Spadix white, unisexual. Male: fertile portion cylindric, 1.8 cm long, sparse flowers sessile, anthers 2 – 3, globose, dehiscing by apical pores; appendix cylindric, slightly swollen in the middle, 3.2 × 0.5 mm, smooth, echinate at apex, sessile. Female: fertile portion conical, 1.8 × 0.7 cm, flowers dense; appendix erect, thickened, 3 × 0.7 cm, obtuse and densely echinate at apex, truncate and stipitate at base; stipe 7 × 3 mm. Fl. May – Jun.

SPECIMENS EXAMINED. CHINA. Yunnan Province: Lijiang xian, Zhugu Shan, in shade under shrub, 3300 m, 28 May 1987, *SBIE* 190 (K!); Lijiang xian, Judian, Xizu Reserve, shaded bank in forest, 2900 m, 6 May 1987, *SBIE* 419 (K!).

DISTRIBUTION. Endemic to Yunnan Province, China.

NOTE. This species belongs to section *Sinarisaema*. It differs from *A. echinatum* (Wall.) Schott in its dark purple ovate spathe limb with white venation, and in the broadly auriculate margin of the spathe throat.

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