
A New Species of *Asarum* (Aristolochiaceae) from China

Yong Wang, Qing-Feng Wang, Wahiti Robert Gituru, and You-Hao Guo

Laboratory of Plant Systematics and Evolutionary Biology, College of Life Sciences, Wuhan University, Wuhan 430072, People's Republic of China. caldesia@yahoo.com; wangqf97@public.wh.hb.cn (for correspondence); gituru67@hotmail.com; yhguo@whu.edu.cn

ABSTRACT. A new species of *Asarum* L., *A. campaniflorum* Wang Yong & Wang Q. F. (Aristolochiaceae), is described from Hubei Province, China. It belongs to *Asarum* sect. *Heterotropa* (Morren & Decaisne) Braun and is readily distinguishable in having simple bell-shaped flowers and little ornamentation of the calyx. A chromosome count of $2n = 26$ is recorded.

Key words: Aristolochiaceae, *Asarum*, China.

Asarum L. s.l. is a north temperate genus whose center of distribution is eastern Asia. According to the classification system proposed by Cheng and Yang (1983), which has been accepted by previous researchers (Kelly, 1997, 1998), the section *Heterotropa* consists of ca. 50 species that are characterized by perianth tubes of various shapes, orifice rings usually present but sometimes absent, and stamens subsessile or with very short filaments (Cheng & Yang, 1983). During floristic investigation of Jiugongshan Nature Reserve located in southeastern Hubei Province, China, we encountered a new species of *Asarum* with strikingly large bell-shaped flowers whose distinct perianth tube and subsessile stamens indicate its taxonomic placement in section *Heterotropa*. We describe this species on the basis of fresh and live material. A few individuals of this new species are in cultivation at the botanical garden of the Chinese Botanical Institute of Wuhan. These plants have been previously identified as *A. insigne* Diels (Lin et al., 1995), probably due to the similarities of floral morphologies between the two species.

Asarum campaniflorum Wang Yong & Wang Q. F., sp. nov. TYPE: China. Hubei: Jiugongshan Nature Reserve, bamboo bush on slope, yellow sandy soil, 400 m, 23 July 1998, Wang Yong 2390 (holotype, PE; isotype, WH). Figure 1.

Haec species quoad flores magnos atque perianthii tubum campaniformem intus longitudinaliter crasse plicatum *A. maximi* et *A. insignis* similis, sed ab eis perianthii lobulis suberectis atque tubo intus non papillato-rugoso difert.

Perennial herb; rhizomes short, internodes 5–15

mm long, with thick fleshy adventitious roots clustered at nodes. Leaves 2 or 3 on one branchlet, with petiole 10–30 cm long, the cataphylls at its base ovate, up to 2.5 cm long, densely ciliate, shed when leaves fully grown, blade triangular or oblong-ovate, membranous, 7–20 × 5–14 cm, acute or acuminate at apex, auriculate at base, base of the sinus 1–1.5 cm wide, sparsely pubescent above, with or without white blotches along midvein above, glabrous below, margins mucronate as extensions of secondary veins. Flowers solitary, facing downward, pale purplish green, large, ca. 3 cm across, 3.5 cm long, peduncle 4–6 cm long; perianth tube campanulate, with the lower portion broadly cylindrical, ca. 1.3 cm long, 1.0 cm diam., internally pale yellow-green and with ca. 30 longitudinal smooth ribs, with the upper portion abruptly swollen into a broad bell-shaped tube, ca. 1.0 cm long, 3 cm diam., internally glabrous and pale yellow-green, not constricted, without orifice, the connecting part between upper portion and lower portion flat, internally dark purple, having smooth longitudinal ribs continuous with those on the internal tube surface of the lower portion, perianth lobes broadly triangular-ovate, ca. 1 × 2.5 cm, nearly erect, having a dark purplish crescent toward the middle, triangular, pale yellow-green beneath and continuous with internal tube surface, stamens 12, filaments very short, anthers 4 mm long, with connective obtuse, ovary half-inferior, styles 6, ca. 7 mm long, with bifid apices, the stigma oblong-ovoid, inserted in apex notch, ovary subglobose, ca. 1.5 cm long, 1.7 cm diam., seeds ovate, dark brown, concave on one side, protruding on opposite side, ca. 4 mm long, 2.5 mm wide. Chromosome number $2n = 26$.

Distribution and habitat. *Asarum campaniflorum* is endemic to a low mountainous area in southeastern Hubei Province in central China. It occurs under dense brush dominated by the bamboo species *Phyllostachys nidularia* Munro. The habitats are shaded and moist throughout the year. There are villages and farms scattered around. We suppose that both special ecological requirements and

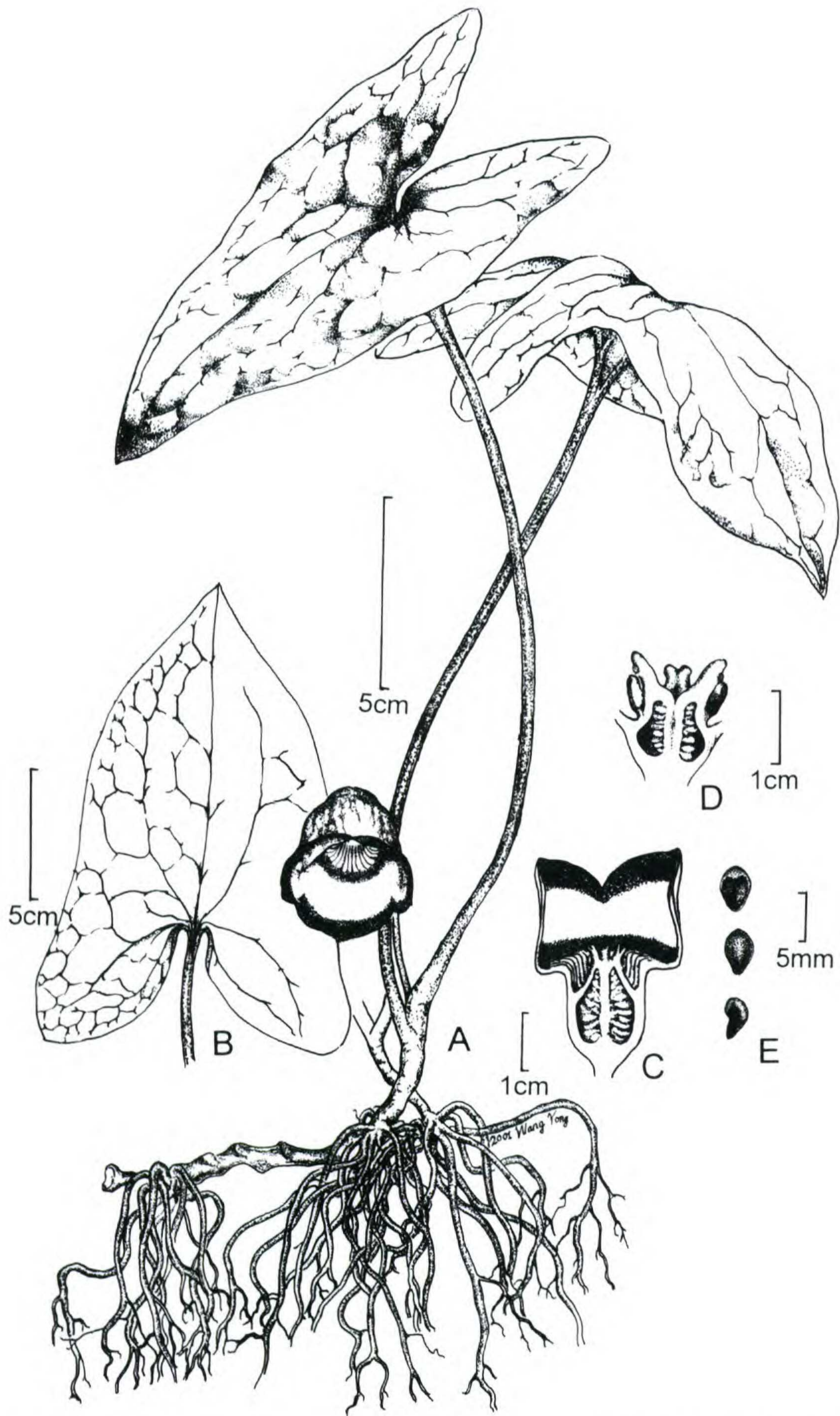


Figure 1. *Asarum campaniflorum* Wang Yong & Wang Q. F. —A. Habit. —B. Leaf blade. —C. Longitudinal section of flower. —D. Styles and stamens, showing longitudinal section of ovary. —E. Seeds, appearance from different views. Drawn from the type gathering, Wang Yong 2390 (PE).

disturbance by human activities contribute to the rarity of this species in nature.

Species in *Asarum* sect. *Heterotropa* have diverse modifications of their flowers, for example, contrasting colors of the perianth lobes, constriction or dilation of calyx ornamentation or surface sculpturing such as tubercles, pulvinus, orifice rings, and longitudinal or reticulate ridges (Kelly, 1997, 1998; Sugawara, 1988). In comparison to other species in section *Heterotropa*, the flowers of *Asarum campaniflorum* are more simplified. They have large perianth tubes with the perianth lobes short and reduced. The calyces are smooth without constriction or orifice rings, and papillate, pulvinate or dilated areas are absent. Only parallel longitudinal ridges are present at the base of the perianth inner surface. The flower color of *A. campaniflorum* is basically pale purplish green, and no strongly color-contrasting area is present. The flowers face downward throughout anthesis and thus the inner parts of the flowers cannot easily be seen by an observer in the field. Among the species of section *Heterotropa*, *Asarum sagittarioides* C. F. Liang is similar to *A. campaniflorum* in vegetative morphology. Both species are robust perennials with a pair of large membranous leaves in each branchlet, a thick cluster of fleshy adventitious roots, leaf margins mucronate as extensions of secondary veins, and an auriculate leaf base with a wide sinus. However, flowers in *A. sagittarioides* differ from those of *A. campaniflorum* by their deeply constricted perianth tubes with conspicuous orifice rings at the throat and perianth lobes with prominent papillae at their base. *Asarum wulingenses* C. F. Liang and *A. longerhizomatosum* C. F. Liang & C. S. Yang are the closely allied species of *A. sagittarioides*, but they differ from *A. campaniflorum* in having smaller (7–17 × 5–9 cm in *A. wulingenses*, 8–14 × 5–8 cm in *A. longerhizomatosum*) chartaceous leaves with narrower sinuses (rounded to cuneate in *A. longerhizomatosum*, cuneate in *A. wulingenses*) at leaf base and gradually enlarged perianth tubes with orifice rings at the throats (Cheng & Yang, 1988; Liang, 1975).

Two other species in *Asarum* sect. *Heterotropa*, *A. maximum* Hemsley and *A. insigne*, appear to be closely allied to *A. campaniflorum*. The floral morphologies of these three species are similar in having numerous (ca. 30) longitudinal smooth ridges at the base of the inner surface of the perianth tubes. In contrast to the simple bell-shaped flowers of *A. campaniflorum*, the flowers of the other two species have larger and spreading perianth lobes and perianth tubes that are externally concave,

forming three semicircular pulvinate areas basal to the lobes. These pulvinate areas in the flowers of *A. maximum* and *A. insigne* are white or pinkish, strongly contrasting in color to the dark velvet margins of the perianth lobes and the central portion of the flowers. In addition, the flowers of these two species tilt upward, making the flowers easily seen by observers.

A chromosome count of $2n = 26$ was obtained for *Asarum campaniflorum*, using the methodology of Sugawara and Ogisu (1992), from fresh root tips. Sugawara and Ogisu (1992) revealed that *A. maximum* shared a chromosome number of $2n = 26$ (the chromosome number of *A. insigne* is still unknown). These results contradict the earlier suggestions that the chromosome number $2n = 24$ is characteristic in *Heterotropa* (Sugawara, 1981; Yinger, 1983; Kelly, 1997). Further investigations are needed to improve our knowledge.

Paratypes. CHINA. **Hubei:** Tongshan County, Gaohu Village, 350 m, 5 July 1998, Wang Yong 2877 (WH); 2 km along the road from Gaohu Village to Jiugongshan Town, 450 m, 24 Mar. 1989, Ye Qigang & Chen Shusen 5476 (WHBI).

Acknowledgments. The authors thank A. Michele Funston at MO for her advice and encouragement, and for reading drafts of the manuscript. The project was supported by the “State Key Basic Research and Development Plan of China (973)” (Project No. G2000046805).

Literature Cited

- Cheng, C. Y. & C. S. Yang. 1983. A synopsis of the Chinese species of *Asarum* (Aristolochiaceae). *J. Arnold Arbor.* 64: 565–597.
- & ———. 1988. *Asarum*. In: H. S. Kiu & Y. R. Ling (editors), *Flora Reipublicae Popularis Sinicae*, Tomus 24. Science Press, Beijing.
- Kelly, L. M. 1997. A cladistic analysis of *Asarum* (Aristolochiaceae) and implications for the evolution of herkogamy. *Amer. J. Bot.* 84: 1752–1765.
- . 1998. Phylogenetic relationship in *Asarum* (Aristolochiaceae) based on morphology and ITS sequences. *Amer. J. Bot.* 85: 1454–1467.
- Liang, C. F. 1975. The Aristolochiaceae of Kwangsi flora. *Guihaiya* 13(2): 10–23.
- Lin G., N. Kang & Q. H. Liu. 1995. A study on introduction and cultivation of *Asarum* in Hubei. *J. Wuhan Bot. Res.* 13(2): 172–176.
- Sugawara, T. 1981. Taxonomic studies of *Asarum* sensu lato I. Karyotype and C-banding pattern in *Asarum* s. str., *Asiasarum* and *Heterotropa*. *Bot. Mag.* 94: 225–238.
- . 1988. Floral biology of *Heterotropa tamaensis* (Aristolochiaceae) in Japan. *Pl. Spec. Biol.* 3: 7–12.
- & M. Ogisu. 1992. Karyomorphology of 11 species of *Asarum* (Aristolochiaceae) from Taiwan and mainland China. *Acta Phytotax. Geobot.* 43: 89–96.
- Yinger, B. R. 1983. A Horticultural Monograph of the Genus *Asarum* sensu lato, in Japan. Master's Thesis, University of Delaware, Newark.