

Aspidistra daxinensis (Ruscaceae), a new species from limestone areas in Guangxi, China

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ABSTRACT. *Aspidistra daxinensis* M. F. Hou & Yan Liu, a new species of Ruscaceae from the limestone areas in southwestern Guangxi, China, is described and illustrated. It resembles *A. longipetala* S. Z. Huang in the shape and size of the leaves and flowers, but differs in the yellowish-green perianth and glabrous stigma that is adaxially convex at the center with 3 radial lines. The new species is rare, currently known only from southwestern Guangxi, near the border with northern Vietnam.

Keywords: *Aspidistra daxinensis*; China; Chromosome number; Guangxi; Karyotype; Limestone flora; New species; Rare species; Ruscaceae.

INTRODUCTION

The genus *Aspidistra* Ker-Gawler (Ruscaceae) comprises over 90 species distributed from Central China southward to northern Vietnam and northern Laos with a center of diversity in Guangxi, China and adjacent northern Vietnam (Lang et al., 1999; Li, 2004; Tillich, 2005, 2008). Recently, a new species was reported from Peninsular Malaysia (De Wilde and Vogel, 2005). In this study we report the discovery of an unusual *Aspidistra* from a limestone valley in Guangxi. The plants were brought into cultivation in Guilin Botanical Garden for study. In the following two years, they flowered and set fruits regularly, making possible a detailed description based on living plant material. Consultation of herbarium material and relevant literature on *Aspidistra* supports its recognition as a distinct new species, which we describe below.

NEW SPECIES

Aspidistra daxinensis M. F. Hou & Yan Liu, sp. nov.—
TYPE: CHINA. Guangxi Zhuangzu Autonomous Region, Daxin Xian (County), Encheng Zhen (Township), alt. 320 m, on limestone in a valley, 27 May 2004, Yan Liu L0959 (holotype: IBK, here designated; isotype: HAST). 大新蜘蛛抱蛋 Figures 1, 2

Haec species nova Aspidistrae longipetulae S. Z. Huang similis foliorum amplitudine, perianthii lobis longioribus quam tubo et introrsum curvatis, stigmathe peltato, sed perianthio flavo-viridi, stigmathe glabro, supra ad centrum paullo convexo, radialiter 3-striato differt; aspectu etiam similis A. marginellae, sed perianthii tubo campanulato (in A. marginella urceolato), lobis longioribus (in A. marginella brevioribus) quam tubo, margine integris (in A. marginella erosis), stigmathe supra globoso convexo (in A. marginella cruciformi convexo), flavido (in A. marginella nigricanti-purpureo) differt.

Herbs perennial, evergreen, rhizomatous. Rhizome creeping, subterete, ca. 7 mm thick, covered with scales, internodes congested. Roots numerous, elongate. Leaf at tip of rhizome embraced by 2 or 3 reddish-purple cataphylls (3-8 cm long), petiole stiff, upright, 14-22 cm long, 2-4 mm thick, adaxially sulcate; blade ovate to elliptic, 12-20 cm long, 5-10 cm wide, base orbicular to suborbicular, abruptly narrowed to the petiole, margin entire, apex acuminate; peduncle decumbent to suberect, 2-6 cm long, with 3-6 bracts, bracts gradually widened from below; two bracts at perianth base broadly ovate, purple-brown, 1-1.5 cm long, ca. 1 cm in diam., apex acuminate. Flower solitary; perianth campanulate, yellowish-green with purple spots, deeply 6-lobed apically; lobes usually incurved, subequal, ovate-lanceolate, acuminate, 13-18 mm long, 3-4 mm wide at base, basal adaxial appendages 2 or 3, crenate; tube 8-12 mm long, 13-15 mm across; stamens 6, subsessile, inserted at ca. 3 mm from base of perianth tube, anthers oblong, ca. 1-2 mm long, 1

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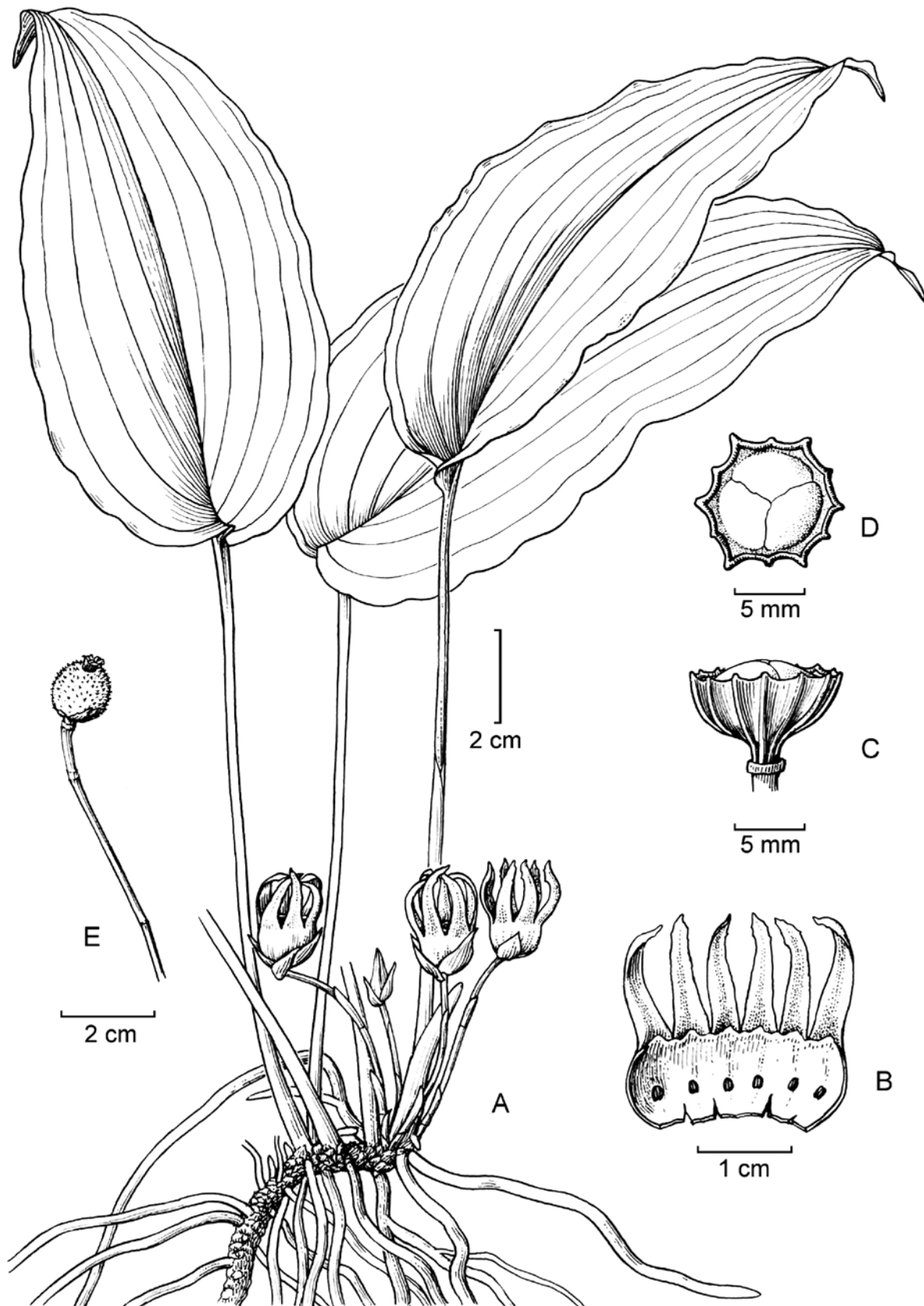


Figure 1. *Aspidistra daxinensis* M. F. Hou & Yan Liu. A, Habit; B, Perianth, dissected opened to show stamens; C, Pistil, side view; D, Stigma, adaxial view; E, Fruit. (Drawn by Shun-qing He from the holotype).

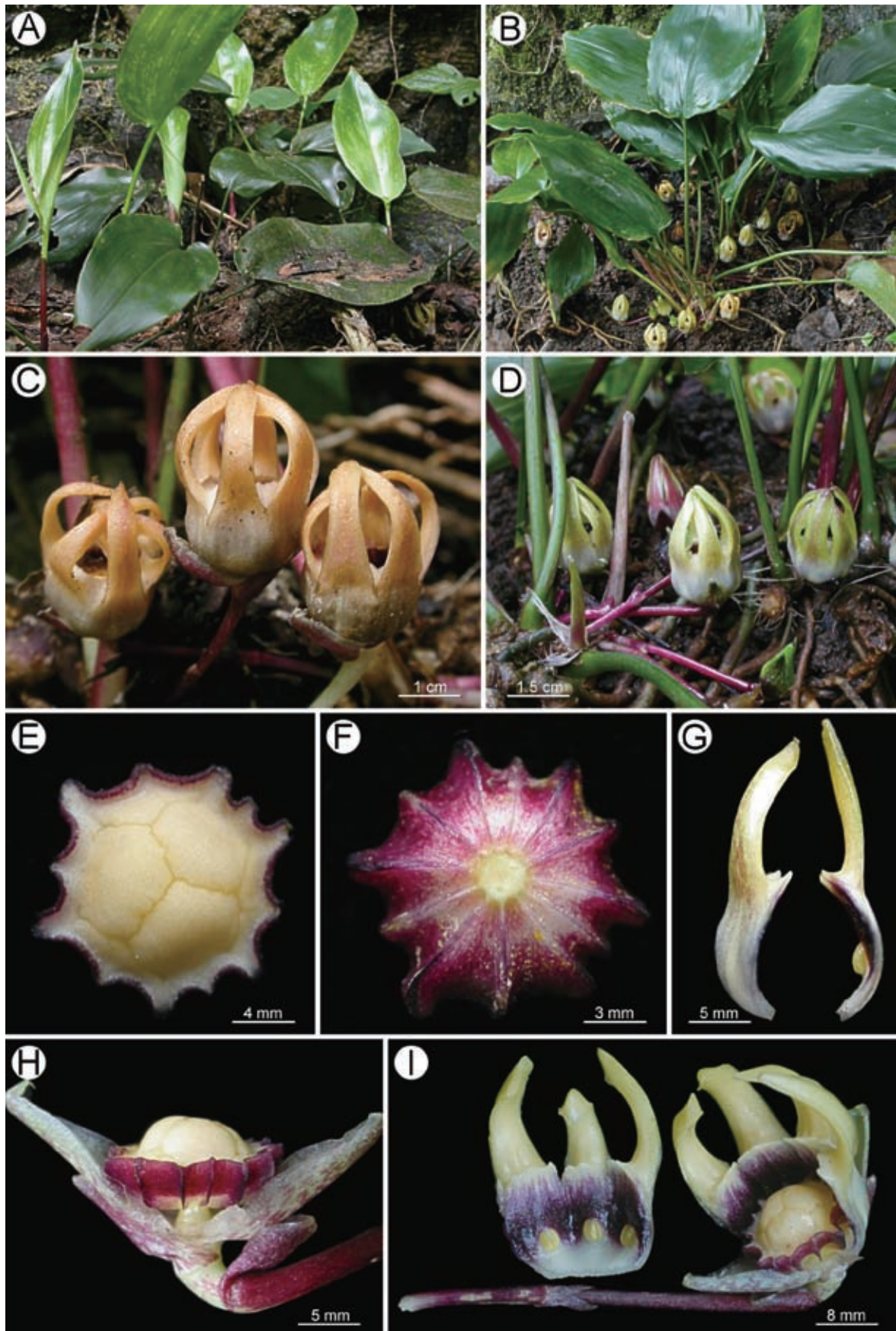


Figure 2. *Aspidistra daxinensis*. A, B, Habit; C, D, Flower, showing color variation in the perianths; E, Stigma, adaxial view; F, Stigma, abaxial view; G, Perianth, longitudinally dissected; H, Pistil, side view; I, Flower (longitudinally dissected) with a scape.

mm wide; gynoecium short, robust, ca. 8 mm long, stigma peltate, enlarged, 8-11 mm across, adaxially pale yellow, glabrous, the central part slightly convex with 3 radial, fork-tipped or inconspicuous forking lines from center to margin, slightly 12-lobed at margin, abaxially purple-red, longitudinally 12-ridged. Berry dark purple, subglobose, 12-16 mm in diam., 12-15 mm long, tuberculate.

Additional specimens examined. CHINA. Guangxi Zhuangzu Autonomous Region, Guilin, Yanshan, cultivated, introduced by Yan Liu from type locality, 5 May 2005 Yan Liu L1205 (IBK), 21 May 2006, Yan Liu L1315 (IBK).

Chromosome cytology. A review of chromosome cytology of 39 species in the genus *Aspidistra* in China was documented by Li (2004). The majority of the species have a chromosome number of $2n = 36$ or 38, suggesting a basic chromosome number of $x = 18$ or 19 in *Aspidistra*. Variable karyotypes were known in 17 species with $2n = 36$ (Huang et al., 1997; Wang et al., 1999, 2000a, 2000b, 2001).

In this study somatic chromosomes were examined using root tips collected from plants planted in Guilin

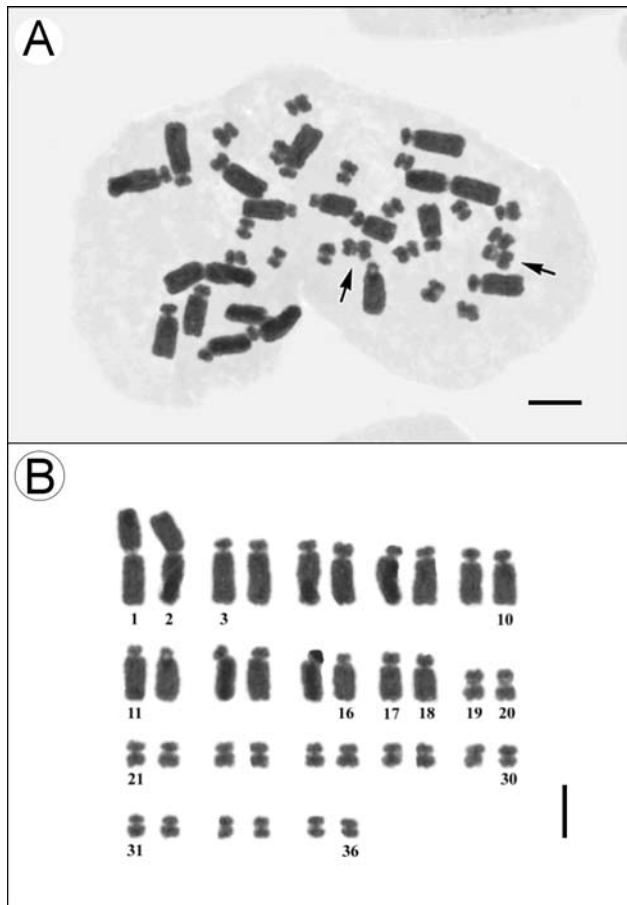


Figure 3. Somatic chromosomes at mitotic metaphase of *Aspidistra daxinensis* ($2n = 36$, from Yan Liu L1315). A, Arrows indicate metacentric chromosomes with secondary constrictions. Scale bar = 5 μm ; B, Serial arrangement of chromosomes at mitotic metaphase by chromosome length. Scale bar = 5 μm .



Figure 4. Distribution of *Aspidistra daxinensis* (★), *A. longipetala* (●) and *A. marginella* (■) in Guangxi Zhuangzu Autonomous Region, China.

Botanical Garden. Methods of pretreatment, fixation and staining for chromosome observations followed Oginuma and Nakata (1988). Classification of chromosome morphology was based on the position of centromeres, following Levan et al. (1964).

The chromosome number of *Aspidistra daxinensis* was determined to be $2n = 36$. Chromosomes at mitotic metaphase showed a trimodal karyotype in chromosome length (Figure 3). Of the 36 chromosomes, two are much longer (ca. 9.1 μm) than the rest; the next 16 chromosomes gradually varied among themselves (ca. 4.6-6.3 μm long); and the remaining 18 chromosomes varied similarly (ca. 1.9-3 μm long). Of the thirty-six chromosomes, twenty (Figure 3B: Nos. 1, 2 and 19-36), two (Nos. 17 and 18 in Figure 3B) and fourteen (Nos. 3-16 in Figure 3B) chromosomes have the centromere at median (m), submedian (sm) and subterminal (st) positions, respectively. Secondary constrictions (SC) were observed at interstitial regions of the short arms of two median chromosomes (Arrows in Figure 3A; Nos. 19 and 20 in Figure 3B). The karyotype formula of *Aspidistra daxinensis* is $2n = 36 = 20\text{m}^{2\text{SC}} + 2\text{sm} + 14\text{st}$.

Ecology. On shaded rocky limestone slopes in broad-leaved forests.

Distribution. Known only from the type locality, Daxin Xian, Guangxi Zhuangzu Autonomous Region, China (Figure 4).

Phenology. Flowering from May to June; fruiting from July to May.

Etymology. The specific epithet 'daxinensis' is derived from the county name of the type locality, Daxin Xian, Guangxi Zhuangzu Autonomous Region, China.

Notes. *Aspidistra daxinensis* (Figures 1, 2) resembles *A. longipetala* (Figure 5A-D) in leaf size, perianth lobes longer than tube and bent inwards, and the peltate stigma, but



Figure 5. A-D *Aspidistra longipetala*. A, B, Flowers; C, Flower, dissected; D, stigma, adaxially view; E-I, *Aspidistra marginella* D. Fang et L. Zeng. E, F, flowers; G, Flower, dissected; H, Stigma, adaxial view; I, Stigma, abaxial view.

Table 1. Comparison of *Aspidistra daxinensis*, *A. longipetala* and *A. marginella*.

	<i>A. daxinensis</i> (Figures 1, 2)	<i>A. longipetala</i> (Figure 5A-D)	<i>A. marginella</i> (Figure 5E-I)
Leaf			
Petiole	14-22 cm	6-7 cm	11-17(-25) cm
Blade base	Rotund	Ovate to elliptic	Rotund
Peduncle			
Length	2-6 cm	0.7-1.5 cm	2.5-6 cm
Perianth			
Tube			
Shape	Campanulate	Campanulate	Urceolate
Length	0.8-1.2 cm	1 cm	1-1.3 cm
Color	Yellow-green	Greenish with purple dots	Purple
Lobes			
Number	6	6	6-8
Length	1.3-1.8 cm; longer than tube	(1.7-)2-2.5 cm; longer than tube	0.9 cm; shorter than tube
Margin	Entire	Entire	Erose
Pistil height	8 mm	12 mm	4.5 mm
Stigma			
Adaxial surface	Shallowly convex with 3 radial lines	Depressed, markedly 6-areolate	Markedly elevated, cross-shaped
Color	Pale yellow	White	Blackish purple
Marginal ribs	12	12	16
Chromosome number	2n = 36 (Figure 3)	Data not available	2n = 38 (Wang et al., 2001)

differs in having yellowish-green flowers and the glabrous stigma adaxially convex at the center with 3 radial, fork-tipped lines. In *A. longipetala* the stigma is depressed with ridges anastomosing into 6-8 meshes on the adaxial surface. *Aspidistra daxinensis* is also similar to *A. marginella* in aspect (Figure 5E-I), but is distinguishable by the perianth tube campanulate (vs. urceolate), lobes longer (vs. shorter) than tube, lobe margin entire (vs. erose), stigma adaxially globose convex (vs. cross-shaped convex), pale yellow (vs. blackish purple). Detailed comparison of the three species is presented in Table 1.

Limestone karsts in southern China and adjacent northern Vietnam are well known biodiversity hotspots. A string of botanical novelties has been reported from these remarkably extensive limestone habitats in recent years, e.g. *Aspidistra* (Tang and Liu, 2003; Bräuchler and Ngoc, 2005; De Wilde and Vogel, 2005; Tillich, 2005, 2006; Tillich and Averyanov, 2008; Tillich et al., 2007), Acanthaceae (Chen et al., 2009), *Begonia* (Fang et al., 2006; Ku et al., 2006, 2008; Liu et al., 2007; Peng et al., 2006, 2007, 2008a,b), Gesneriaceae (Wei, 2006, 2007; Chen et al., 2008; Wei et al., 2008; Xu et al., 2008), *Polystichum* (Zhang and He, 2009a, b) and *Imaptiens* (Yu et al., 2008, 2009). Species of *Aspidistra* are at first glance inconspicuous members of the forest undergrowth, but the flower types make this genus one of the most spectacular among Angiosperms (Tillich et al., 2007). Notably, more

than 30 new species of *Aspidistra* have been discovered since 2005. Many members of *Aspidistra* occur in forests on remote, jagged limestone hills that are not readily accessible. Further exploration will undoubtedly unveil many more novelties of this fascinating plant group.

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中國廣西石灰岩地區假葉樹科蜘蛛抱蛋屬一新種植物： 大新蜘蛛抱蛋

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本文報導中國廣西壯族自治區西南部石灰岩地區蜘蛛抱蛋屬一新種植物：大新蜘蛛抱蛋 (*Aspidistra daxinensis*)，提供線繪圖與彩色照片以資識別，並報導其染色體數 ($2n = 36$) 與核型。大新蜘蛛抱蛋與長瓣蜘蛛抱蛋 (*A. longipetala*) 相似，但前者柱頭上表面中心部稍隆起，光滑，具三條從中央呈放射狀排列的線紋，柱頭邊緣不明顯 12 淺裂，下表面紫紅色，具 12 條不等大之翅狀縱稜；而後者柱頭上表面具縱稜形成的網紋，網眼 6-8 個，凹陷。大新蜘蛛抱蛋與齧邊蜘蛛抱蛋 (*A. marginella*) 也近似，區別在於後者花被繖狀，花被裂片短於花被筒，兩側具狹的不規則齧蝕狀膜邊，柱頭上表面十字形隆起，紫黑色，具密集乳突。大新蜘蛛抱蛋甚為稀有，目前僅知分布於廣西西南與越南北部毗連的大新縣。

關鍵詞： 大新蜘蛛抱蛋；中國；染色體數；廣西；核型；石灰岩植物；新種；稀有植物；假葉樹科。