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君子峰鸢尾，福建鸢尾科植物一新种

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摘要：描述了福建省中北部山区鸢尾科(Iridaceae)鸢尾属(*Iris*)一新种：君子峰鸢尾(*I. junzifengensis* S. P. Chen, X. Y. Chen & L. Ma)，新种与蝴蝶花(*I. japonica* Thunb.)、台湾鸢尾(*I. formosana* Ohwi)相近。与蝴蝶花不同之处在于叶片宽大，叶脉明显，表面粗糙；花为顶生稀疏总状聚伞花序，分枝 2~6；花大，直径 5.0~7.0 cm，花被裂片边缘波状皱褶，全缘，顶端稍有凹缺；蒴果三棱状圆柱形。与台湾鸢尾不同之处在于花小，花被裂片边缘波状皱褶，全缘，顶端稍有凹缺；蒴果三棱状圆柱形。形态特征比较及分子系统发育分析均支持该新种的成立。

关键词：君子峰鸢尾；鸢尾科；新种；福建
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Iris junzifengensis, A New Species of Iridaceae from Fujian

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Abstract: *Iris junzifengensis* S. P. Chen, X. Y. Chen & L. Ma, a new species of Iridaceae from Mingxi County, Fujian Province of East China, is described and illustrated here. The new species is similar to *I. japonica* Thunb. and *I. formosana* Ohwi, but is distinguished from the former by the broad leaf blades with distinct veins and rough surface, terminal sparse racemose cyme with 2−6 branches, bigger flowers that are 5.0−7.0 cm in diam, perianth with undulate margin and retuse apex, and triangular cylindrical capsule, and from the latter by smaller flowers, perianth with undulate margin and retuse apex, and triangular cylindrical capsule. The comparison of morphological characteristics and molecular phylogenetic analysis both support the establishment of the new species.
Key words: *Iris junzifengensis*; Iridaceae; New species; Fujian

鸢尾科(Iridaceae)全世界超过 60 属，800 种以上[1]。鸢尾属(*Iris* L.)是鸢尾科最大的属，约 300 种，分布于北温带，我国约产 60 种、13 变种及 5 变型，主要分布于西南、西北及东北[2]。近年来，在我国不断有鸢尾属新种发表[3–5]。鸢尾属植物在园林观赏上应用广泛，是著名的花卉植物，全世界现有园艺品种超过 7×10^4 个[6]。因具有重要的观赏价值，鸢尾属的分类学研究一直备受植物学家关注。

从 1913 年开始，Dykes[7]对鸢尾属下各类群进行了研究，提出组(section)的分类学单位概念，并建立了一个较为完整的鸢尾属形态分类系统，是鸢尾属系统学研究的开端，为后续鸢尾属的系统分类研究奠基了基础。自 1998 年起，Wilson[8–10]基于分子序列，对不同分布区的鸢尾属物种进行系统学研

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究，修订了各类群间的亲缘关系，极大推动了鸢尾属的分子系统学研究。国内学者也对鸢尾属系统学进行了大量的研究工作，对我国的鸢尾属开发与利用提供大量的理论成果[5,10–15]。

目前，福建省记录的鸢尾属植物共 4 种, 其中野生种有小花鸢尾(*I. speculatrix* Hance)和蝴蝶花(*I. japonica* Thunb.)[16]。2018 年以来，笔者在福建进行植物资源调查，在闽西北山区发现 1 种鸢尾属植物，分布较广，在海拔 300~800 m 的山地林缘处常有发现，之前常被误定为蝴蝶花，但其叶片宽大，叶脉明显，表面粗糙，花序分支少, 花大，果实三棱形，与蝴蝶花较易区分；也与台湾鸢尾(*I. formosana* Ohwi)近似，不同之处在于花小，花被裂片边缘波状皱褶，全缘，顶端稍有凹缺；蒴果三棱状圆柱形。经查阅相关文献和标本[3,8]，进行了形态特征比较(表 1，图 1)和分子系统发育树分析(图 2)。本研究共选取 69 个样品，其中 4 个作为外类群，使用核基因 nrITS 和 1 个叶绿体基因片段(*mat*K)，共获得 69 条 ITS 和 62 条 *matK* 序列, 凭证标本和 GenBank 登录号见表 2。基于最大似然法(maximum likelihood, ML)进行系统发育分析，分别构建 nrDNA、cpDNA 以及 nrDNA 与 cpDNA 联合的系统树。用 ITS 序列、*matK* 序列以及联合矩阵(ITS+*mat*K)构建的 ML 树显示他们之间系统发育关系非常相似，该新种是蝴蝶花和台湾鸢尾的姐妹种(图 2)。基于以上分析认定该物种为鸢尾属一新种，现予以报道。

君子峰鸢尾 新种 图 3, 4

Iris junzifengensis S. P. Chen, X. Y. Chen & L. Ma, sp. nov.

This new species is similar to *I. japonica* and *I. formosana*, but is distinguished from the former by the broad leaf blades with distinct veins and rough surface (*vs* without midvein and glossy surface), terminal sparse racemose cyme with 2−6 branches (*vs* 5−12 branches), bigger flowers (5.0−7.0 cm in diam. *vs* 4.5−5.0 cm in diam.), perianth with undulate margin and retuse apex (*vs* with denticulate margin), and triangular cylindrical (*vs* ellipsoid-cylindrical) capsule, and from the latter by smaller flowers (5.0−7.0 cm in diam. *vs* 7.0−8.0 cm in diam.), perianth with undulate margin and retuse apex (with denticulate margin and

表 1 君子峰鸢尾、蝴蝶花、台湾鸢尾形态特征对比

Table 1 Morphological comparison of *Iris junzifengensis*, *I. japonica* and *I. formosana*

	君子峰鸢尾 *I. junzifengensis*	蝴蝶花 *I. japonica*	台湾鸢尾 *I. formosana*
根状茎 Rhizome	具粗壮的斜伸根状茎和横走根状茎 Stout oblique and transverse	具较粗的直立根状茎和纤细的横走根状茎 Thick erect rhizomes and slender transverse rhizomes	根状茎粗壮，直立，指状或不规则分枝 Rhizomes erect, thick, finger like or irregularly branched
叶 Leaf	墨绿色，暗淡，剑形，长 30~70 cm，宽 2.5~4.6 cm，顶端渐尖，具 3~7 纵脉，中间 3~5 脉明显，表面粗糙 Dark, blackish green, sword-shaped, 30−70 cm ×2.5−4.6 cm, apex acuminate, with 3−7 longitudinal veins, middle 3−5 veins distinct, rough surface	暗绿色，有光泽，近地面处带红紫色，剑形，长 25~60 cm，宽 1.5~3 cm，顶端渐尖，无明显的中脉，手感光滑 Dark or yellowish green, glossy on one surface, dull on other, reddish purple at base, sword-shaped, 25−60 cm ×1.5−3 cm, midvein absent	表面亮绿色，背面灰绿色，具白粉，剑形，长 30~40 cm，宽 2~2.5 cm，顶端渐尖，有 3~5 条较明显的纵脉 Leaves grayish green on 1 surface, bright green on other, sword-shaped, 30−40 cm × 2−2.5 cm, veins 3−5
花序分枝 Inflorescence branch	2~6，与苞片等长或略短 2−6, As long as spathes or slightly shorter	5~12，与苞片等长或略超出 5−12, As long as spathes or slightly longer	4~5 个，略超出苞片 4−5, Slightly longer than spathes
花直径 (cm) Flower diameter	5.0~7.0	4.5~5.0	7.0~8.0
花被片 Perianth	外花被轮裂片长 4.0~4.5 cm，宽 2.0~2.5 cm，边缘波状，全缘，内花被裂片长 3.5~4.2 cm，宽 1.5~2.0 cm，边缘波状皱褶，全缘，顶端稍有凹缺 Outer segments obovate, 4.5−5.0 cm × 2.4−2.8 cm, margin undulate, apex retuse; inner segments spreading, 3.5−4.2 cm × 1.5−2.0 cm, margin undulate, apex retus	外花被裂片长 2.5~3 cm，宽 1.4~2 cm, 顶端微凹，基部楔形，边缘波状，有细齿裂，内花被裂片长 2.8~3 cm，宽 1.5~2.1 cm, 边缘有细齿裂，顶端微凹 Outer segments obovate or elliptic, 2.5−3 cm ×1.4−2 cm, margin denticulate, undulate, apex retuse; inner segments spreading, 2.8−3 cm ×1.5−2.1 cm, margin denticulate, undulate, apex retus	外花被裂片倒卵形，长 4~5 cm，宽约 2.5 cm，边缘有均匀的牙齿及缺刻，内花被裂片长 2.5~3 cm，宽约 1.5 cm，边缘有均匀的牙齿，顶端有深的缺刻 Outer segments obovate, 4−5 cm ×ca. 2.5 cm, limb reflexed, margin denticulate, undulate; inner segments spreading, 2.5−3 cm ×ca. 1.5 cm, margin denticulate, apex notch
蒴果 Capsule	三棱状圆柱形，长 5.0~8.0 cm Triangular cylindrical, 5.0−8.0 cm long	椭圆状柱形，长 2.5~3.0 cm Ellipsoid-cylindric, 2.5−3.0 cm long	长圆形至卵圆柱形，长 3.0~4.0 cm Oblong to ovoid-cylindric, 3.0−4.0 cm long

表 2 鸢尾属植物 ITS 和 *mat*K 序列的 GenBank 登录号

Table 2 GenBank accession No. of ITS and *mat*K sequences in *Iirs* species

植物 Species	凭证标本 Voucher	ITS	*mat*K
Iirs bracteata	–	AF488760	FJ197268
I. brevicaulis	L. Karst US01-13 RSA	KC118881	KC118916
I. cathayensis	–	DQ472161	–
I. chrysophylla	–	AF488755	FJ197271
I. delavayi	–	AF488751	FJ197274
I. dichotoma	–	DQ277638	HM574667
I. domestica	–	KP058312	HM574664
I. douglasiana	–	AF488759	FJ197275
I. ensata	Holden Arboretum HA_01_EN_08 RSA	KC118882	KC118918
I. fernaldii	–	AF488754	FJ197277
I. foetidissima	–	MG215832	FJ197278
I. formosana	–	–	KC510980
I. forrestii	UCBG 90.249	KC118884	KC118920
I. hartwegii subsp. *australis*	–	AF488767	FJ197280
I. hartwegii subsp. *columbiana*	–	AF488768	–
I. hartwegii subsp. *hartwegii*	–	AF488766	KC118915
I. hartwegii subsp. *pinetorum*	–	AF488769	FJ197282
I. hookeri	A. Wheeler EB_01_HK_07 RSA	KC118886	KC118923
I. innominata	–	AF488762	FJ197284
I. japonica	–	MH703374	HM574688
I. junzifengensis	ZF18000556	*OK108606	*OK137199
I. koreana	–	KT634245	FJ197285
I. lactea	–	DQ277639	FJ197286
I. lactea var. *chinensis*	–	DQ472163	–
I. laevigata	–	DQ277643	KC118928
I. loczyi	–	KF454301	FJ197288
I. maackii	–	DQ472159	–
I. macrosiphon	–	AF488753	FJ197290
I. mandshurica	–	DQ277642	HM574643
I. minutoaurea	–	KT119547	FJ197291
I. munzii	–	AF488770	FJ197292
I. odaesanensis	–	KT595385	FJ197293
I. prismatica	M. Schafer & J. Sacks EX_01_PR_07 RSA	KC118891	KC118941
I. pseudacorus	-	DQ277646	AY596643
I. purdyi	-	AF488758	FJ197295
I. rossii	-	KT119543	AB733386
I. rossii f. alba	-	KT595304	-
I. rossii var. latifolia	-	KT595306	JF972935
I. ruthenica	-	DQ277640	FJ197296
I. sanguinea	-	DQ277636	KC118929
I. scariosa	-	KF454302	KP089627
I. setosa	T. Bland 3K_01_SE_08 RSA	KC118895	KC118931
I. sibirica	IRSIQU01-130516	MF543721	MF543527
I. tectorum	Q016	MH711021	MH659470
I. tenax subsp. *gormanii*	–	AF488765	–
I. tenax subsp. *klamathensis*	–	AF488761	FJ197303
I. tenax subsp. *tenax*	–	AF488764	–
I. tenuissima	–	AF488756	–
I. tenuissima subsp. *purdyiformis*	–	AF488757	FJ197304
I. thompsonii	–	AF488763	FJ197306
I. tridentata	A. Wheeler NO_01_TR_06 RSA	KC118900	KC118913

续表(Continued)

植物 Species	凭证标本 Voucher	ITS	*mat*K
Iirs typhifolia	C. Wilson DBG05-35 RSA	KC118901	KC118942
I. uniflora	–	DQ277641	FJ197309
I. ventricosa	–	DQ472162	JF954191
I. versicolor	A. Wheeler WP_01_VE_06 RSA	KC118906	KC118948
I. virginica var. *shrevei*	A. Wheeler LM_01_VS_06 RSA	KC118907	KC118951
I. virginica var. *virginica*	A. Wheeler HH_01_VS_06 RSA	KC118911	KC118950
Sisyrinchium burchellii	Castillo s.n.; RSA	JN389287	JN565683
S. demissum	Ocampo & Columbus 1515; RSA	JN389284	JN565680
S. fiebrigii	Porter 11912; RSA	JN389288	JN565684
S. idahoense var. *idahoense*	Zika 16205; HPSU	JN389245	JN565641
S. idahoense var. *macounii*	Zika 16242; HPSU	JN389246	JN565642
S. macranthum	UCBG 83.0255; UC	JN389257	JN565653
S. praealtum	Davis 1702; RSA	JN389275	JN565671
S. tinctorium	Karst UK04-23; RSA	JN389232	JN565628
S. xerophyllum	Benz s.n. 2005; RSA	JN389285	JN565681
Outgroup			
Asphodelus albus	–	AB933495	KU147409
Crocus sativus	SKUAST-K3	MH307752	MG946960
Gladiolus palustris	–	MK005919	MF543525
Hemerocallis fulva	Q330	MH711290	MH659757

*: 本研究获得。

*: Obtained in this study.

notched apex), triangular cylindrical (*vs* ellipsoid-cylindrical) capsule.

China. Fujian Province (福建省), Mingxi County (明溪县), Junzifeng (君子峰), under the forest on slope, elevation 500 m, 4 April 2018, X. Y. Chen JZF18000556 (holotype: FJFC; isotype: IBSC).

多年生草本。根状茎可分为粗壮的斜伸根状茎和横走根状茎，斜伸的根状茎扁圆形，具多数较短的节间，棕褐色，横走的根状茎节间长 2.2~3.0 cm，黄白色；须根生于根状茎的节上，分枝多。叶基生，墨绿色，暗淡，剑形，长 30.0~70.0 cm，宽 2.5~4.6 cm，顶端渐尖，具 3~7 纵脉，中间 3~5 脉明显，表面粗糙。花茎直立，高于叶片，顶生稀疏总状聚伞花序，分枝 2~6，与苞片等长或略短；苞片 2~3 枚，叶状，宽披针形或卵圆形，长 2.0~4.0 cm，顶端渐尖，包含 2~4 朵花。花淡蓝色或蓝紫色，直径 5.0~7.0 cm；花梗包于苞片内或略伸出，长 1.5~3.0 cm；花被管明显，长 1.3~2.0 cm，花被裂片 6 片，排成 2 轮，外轮花被裂片倒卵形，长 4.0~4.5 cm，宽 2.0~2.5 cm，顶端稍凹缺，基部楔形，边缘波状皱褶，中脉上有 3 条隆起的黄色鸡冠状附属物，中间一条最明显，内花被裂片狭倒卵形，长 3.5~4.2 cm，宽 1.5~2.0 cm，基部楔形，顶端微凹，边缘波状皱褶，花盛开时向外展开；雄蕊长约 2.0 cm，花药长椭圆形，白色；花柱 1 枚，上部 3 分枝，扩大扁平成花瓣状，花柱分枝较内轮花被裂片略短，淡紫色，顶端缝状丝裂，子房纺锤形，长 1.6~2.0 cm。蒴果三棱状圆柱形，长 5.0~8.0 cm，宽 0.8~1.5 cm，棱上具小沟，每面具中脉，顶端钝，成熟时自顶端开裂至中部；种子多数，褐色。花期 3—4 月，果期 4—6 月。

Herbs perennial. Rhizomes dimorphic, oblique ones thick, flattened, internode short, brown; creeping ones with internodes 2.2−3.0 cm long, yellow-white, fibrous roots grow on the nodes, branches. Leaves basal, dark, blackish green, sword-shaped, 30−70 cm × 2.5−4.6 cm, apex acuminate, with 3−7 longitudinal veins, middle 3−5 veins distinct, surface rough. Flowering stems erect, higher than leaves, terminal sparse racemose cymes, with 2−6 short branches near apex; branches as long as or slightly shorter than spathes; spathes 2−3, leaf-like, broadly lanceolate or oval, 2.0−4.0 cm long, apex acuminate, 2−4-flowered. Flowers pale bluish or bluish violet, 5.0−7.0 cm in diam; pedicel 1.5−3.0 cm long, enclosed in spathes or

slightly exerted. Perianth tube obvious, 1.3−2.0 cm long; perianth 6, 2 rounds, outer segments obovate, 4.0−4.5 cm ×2.0−2.5 cm, with 3 yellowish crests on midvein, middle one most obvious, margin undulate, apex retuse, base cuneate; inner tepals spreading obliquely, narrowly obovate, 3.5−4.2 cm ×1.5−2.0 cm,

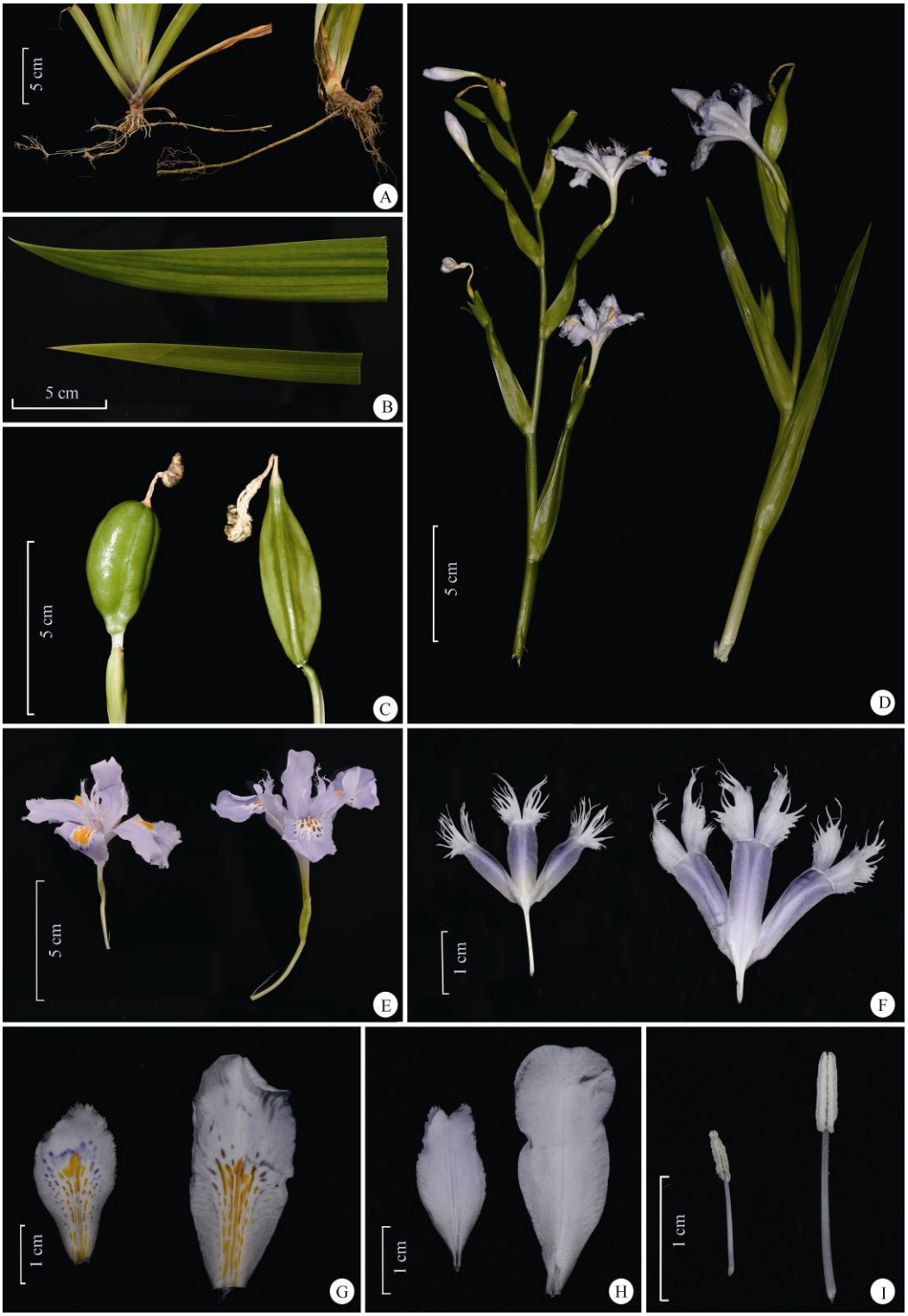

图 1 蝴蝶花(左)和君子峰鸢尾(右)的形态特征。A: 根状茎; B: 叶; C: 蒴果; D: 花茎; E: 花; F: 花柱和柱头; G: 外轮花被片; H: 内轮花被片; I: 雄蕊。

Fig. 1 Morphology of *Iris japonica* (left) and *I. junzifengensis* (right). A: Rhizomes; B: Leaves; C: Capsule; D: Flowering stems; E: Flowers; F: Style and stigmas; G: Outer tepal; H: Inner tepal; I: Stamen.

margin undulate, apex retuse, base cuneate. Stamens ca. 2.0 cm long; anthers oblong, white. Style branches pale blue; terminal lobes fimbriate. Style 1, upper 3 branches, petal shape, slightly shorter than inner tepals,

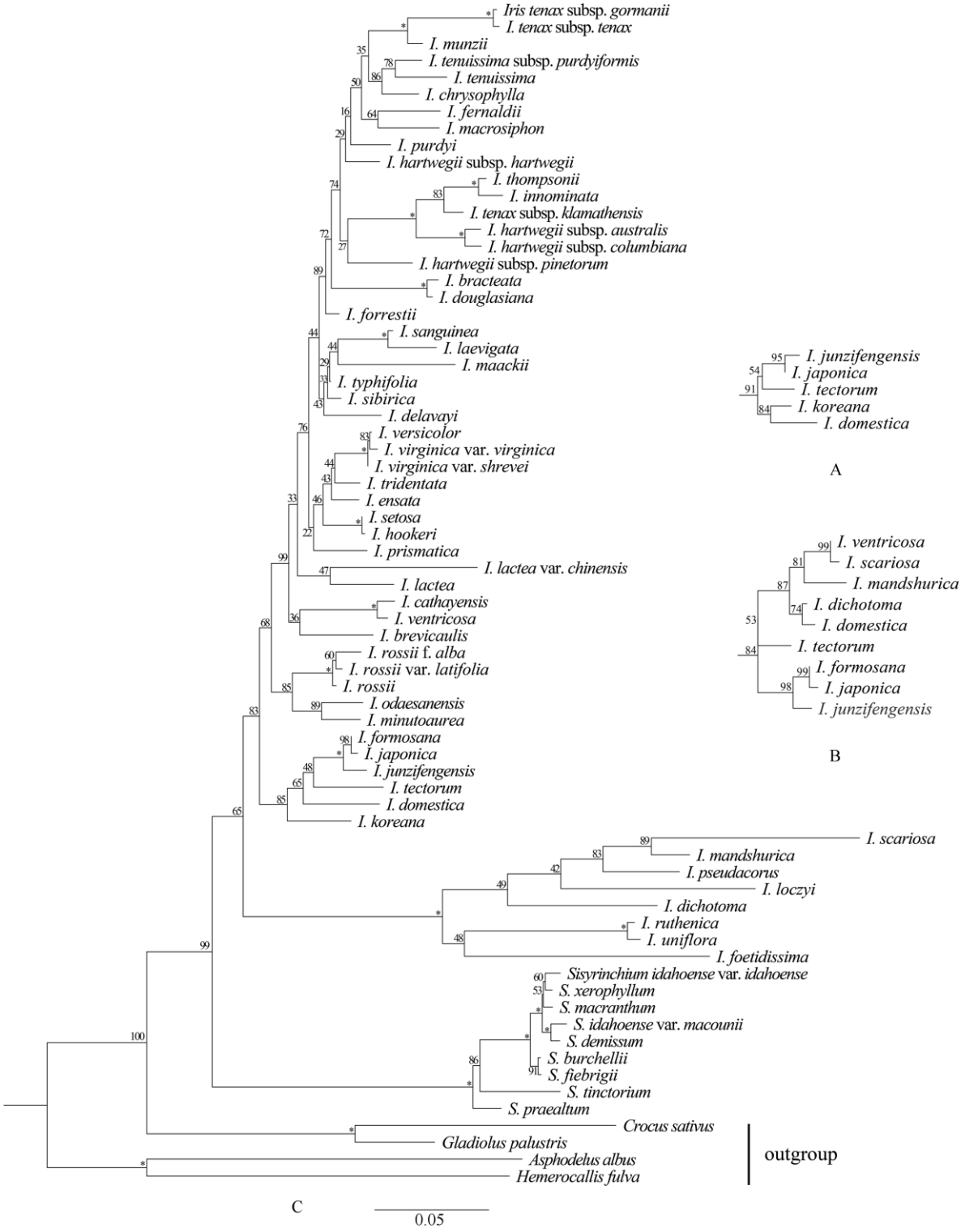

图 2 基于 ITS 序列(A，仅显示局部)、*matK* 序列(B，仅显示局部)及联合数据矩阵(ITS + *matK*)(C)的君子峰鸢尾及其近缘种分子系统发育分析 ML 树。节点附近的数值是 bootstrap 值，*: Bootstrap = 100。

Fig. 2 ML tree of *Iris junzifengensis* and related species based on ITS (A, showing part of tree), *matK* (B, showing part of tree) and combined matrix (ITS + *matK*) (C). Bootstrap values are shown near the nodes; *: Bootstrap = 100.

lavender, top filiform, Ovary spindle-shaped, 1.6−2.0 cm long. Capsule triangular cylindrical, 5.0−8.0 cm ×0.8−1.5 cm, furrow on ribs, midvein, apex obtuse, crack from the apex to the middle at maturity. Seeds many, brown. Flowering in March to April and fruiting in April to June.

该物种主要分布于福建省闽西北海拔 300~800 m 的山区，在一些山坡林缘处常能发现，种群数量大。在三明市三元区罗拔顶、梅列区大佑山、永安市天宝岩和南平市光泽县地质公园、武夷山市国家公园居群进行调查发现，其形态特征稳定，未发现变异类型。其形态特征与南方地区广泛分布的

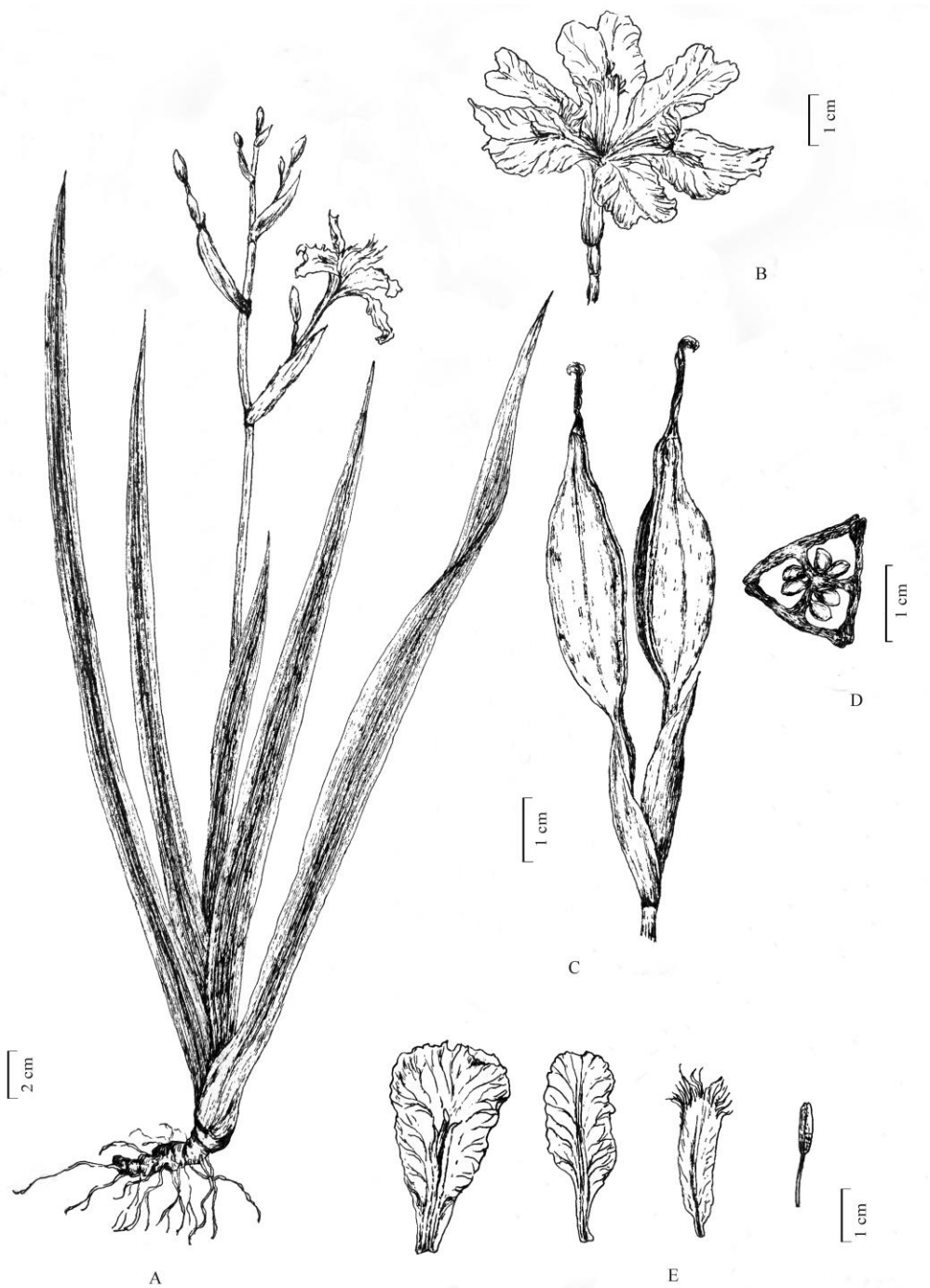

图 3 君子峰鸢尾。A: 植株; B: 花; C: 蒴果; D: 果横切面; E: 花部形态, 从左到右依次为外轮花被片、内轮花被片、花柱和柱头、雄蕊。

Fig. 3 *Iris junzifengensis* S. P. Chen, X. Y. Chen & L. Ma, sp. nov. A: Plant; B: Flower; C: Capsules; D: Cross section of capsule; E: Floral part, from left to right showing outer tepal, inner tepal, style and stigma, stamen.

蝴蝶花相似，故在之前的调查被误认为蝴蝶花，但可以通过斜伸的茎、宽大粗糙的叶片、更少的花序分枝、较大的花和花被片边缘波状皱褶、三棱形的果实与蝴蝶花区分。

图 4 君子峰鸢尾。A: 生境; B: 花序和幼果; C: 植株; D: 蒴果; E: 开裂的果实，示种子; F: 幼果及其纵切面(右上)和横切面(右下); G: 花; H: 花部形态，示雄蕊、外轮花被片、花柱和柱头、内轮花被片、花梗及苞片。

Fig. 4 *Iris junzifengensis* S. P. Chen, X. Y. Chen & L. Ma, *sp. nov.* A: Habitat; B: Inflorescence and young capsule; C: Plants; D: Capsule; E: Dehiscent capsule, showing seeds; F: Immature capsule and longitudinal section (upper right) and transverse section (lower right); G: Flower; H: Flora part, showing stamens; outer tepals; style and stigmas; inner tepals; pedicel and bract.

鸢尾属植物具有重要的观赏价值和经济价值，君子峰鸢尾的发现增加了我国鸢尾属种质资源，可为鸢尾属植物培育优良观赏品种提供亲本材料。新种比南方园林常应用的蝴蝶花植株更高大，花更大，果实更具特色，且能够适应贫瘠的土壤，适宜作为园林观赏植物推广应用，丰富园林观赏花卉种类。

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