

PREPRINT

Author-formatted, not peer-reviewed document posted on 04/11/2021

DOI: <https://doi.org/10.3897/arphapreprints.e77613>

***Lilium shenxianjui* (Liliaceae), a new species from central Zhejiang, East China**

Yue-Liang Xu, Zhi-Ming Zhu, Lu Yi-Fei

Disclaimer on biological nomenclature and use of preprints

The preprints are preliminary versions of works accessible electronically in advance of publication of the final version. They are not issued for purposes of botanical, mycological or zoological nomenclature and **are not effectively/validly published in the meaning of the Codes**. Therefore, nomenclatural novelties (new names) or other nomenclatural acts (designations of type, choices of priority between names, choices between orthographic variants, or choices of gender of names) **should NOT be posted in preprints**. The following provisions in the Codes of Nomenclature define their status:

International Code of Nomenclature for algae, fungi, and plants (ICNafp)

Article 30.2: "An electronic publication is not effectively published if there is evidence within or associated with the publication that its content is merely preliminary and was, or is to be, replaced by content that the publisher considers final, in which case only the version with that final content is effectively published." In order to be validly published, a nomenclatural novelty must be effectively published (Art. 32.1(a)); in order to take effect, other nomenclatural acts must be effectively published (Art. 7.10, 11.5, 53.5, 61.3, and 62.3).

International Code of Zoological Nomenclature (ICZN)

Article: 21.8.3: "Some works are accessible online in preliminary versions before the publication date of the final version. Such advance electronic access does not advance the date of publication of a work, as preliminary versions are not published (Article 9.9)".

Lilium shenxianjui (Liliaceae), a new species from central Zhejiang, east China

Yue-Liang Xu¹, Zhi-Ming Zhu², Yi-Fei Lu³

¹ Zhejiang Museum of Natural History, Hangzhou, Zhejiang, 310014, China

² Government Office of Xianju County, Xianju, Zhejiang, 317300, China

³ College of Life Sciences, Zhejiang University, Hangzhou, Zhejiang, 310058, China

Corresponding author: Yi-Fei Lu (luyifei1023@163.com)

Abstract

Lilium shenxianjui Y.L.Xu & Y.F.Lu, a new species of Liliaceae from Zhejiang, east China, is described with illustrations. The new species is morphologically similar to *L. concolor* and *L. bakerianum* in having campanulate flowers and converging stamens, but differs from the former in having stems dark purple (vs. green, rarely base purple), leaf blades densely papillose at margin and abaxial mid-ribs (vs. glabrous), pedicle base with 2 bracts (vs. solitary), flowers red-orange, 4–10 in a short raceme (vs. dark red, 1–5 in a raceme or sub-umbel), tepals 4.8–6 cm long, 0.8–1.5 cm wide (vs. 2.2–4 cm long, 4–7 mm wide), nectars glabrous at margin (vs. papillose at margin), anthers lunate, ca. 1 cm long (vs. long-oblong, ca. 7 mm long), styles \pm 2 as long as ovaries (vs. slightly shorter). It differs from *Lilium bakerianum* in having pedicle base with 2 bracts (vs. solitary), flowers 4–10, red-orange, unspotted (vs. flowers 1–3, white, purple-red spotted), tepals 4.8–6 cm long, 0.8–1.5 cm wide (vs. 6.5–8 cm long, 1.4–2.3 cm wide), ovaries 8–10 mm long (vs. 1.7–2 cm long).

Keywords

Liliaceae, *Lilium shenxianjui*, new species, Zhejiang of E. China

Introduction

The genus *Lilium* L. (Liliaceae), totalling approximately 100 species and classified into 5 – 11 sections, is mainly distributed in Eurasia and North America, with a centre of diversity in E Asia (Wilson 1925; Comber 1949; Baranova 1988; Liang and Tamura 2000; Gong et al. 2017). Fifty-five species, of which 35 are endemic, are confirmed in China, especially in Sichuan, Yunnan, and Tibet of the Hengduan Mountain Regions with five species occurring in Zhejiang (Liang 1980; Lin 1993; Liang and Tamura 2000; Gong et al. 2017). Some species of this genus are of economic importance, for example, for Chinese herbal medicinal use, edible use or ornamental use (Woodcock and Stearn 1950; Rong et al. 2011).

Mount Shenxianju, situated in Xianju County, central Zhejiang Province, is famous for its huge stones of volcanic rhyolite. During botanical explorations of Mount Shenxianju, some new taxa, namely *Tricyrtis xianjuensis* G.Y.Li et al., *Salvia xianjuensis* Z.H.Chen et al., *Aster xianjuensis* Y.F.Lu et al. and *Rhamnus crenata* Siebold et Zucc. var. *xianjuensis* X.F.Jin et Y.F.Lu, were found and described as new to science (Ma et al. 2014; Chen et al. 2016; Lu et al. 2017; Lou et al. 2018). While preparing the new edition of *Flora of Zhejiang* (Liliaceae), we carried out botanical

expeditions in Zhejiang and adjacent regions. We collected some interesting specimens of *Lilium* from Mount Shenxianju of Xianju County. It is most morphologically similar to *Lilium concolor* Salisb., but further comparison between this taxon and the related species revealed that this lily represented an undescribed distinctive species.

***Lilium shenxianjui* Y.L.Xu & Y.F.Lu, sp. nov.** (Liliaceae)

urn:lsid:ipni.org:names:

Chinese name: 神仙居百合

Figs. 1 & 2

Latin Diagnosis. *Ex affinitate Lili concoloris Salisb., sed caulibus, foliis ad marginem et costas infra dense papillulatis, pedicellis basi 2-bracteatis, racemis 4–10-floris, tepalis majoribus, 4.8–6 cm longis, 0.8–1.5 cm latis, eis internis 3 secus nectaria non papillatis, stylis ovarii ca. 1-plo longioribus facile differt.*

Type. CHINA. Zhejiang (浙江): Xianju (仙居), Mount Shenxianju (神仙居), on cliff, alt. 800 m, 9 Jun 2019, Yue-Liang Xu & Zhi-Ming Zhu 1453 (holotype: ZM; isotype: ZM).

Description. *Herb* perennial. **Bulbs** ovoid or ellipsoid, 3.5–4 cm long, 2–3.5 cm in diam.; scales white or whitish-yellow, ovate-elliptic, 3.2–3.5 cm long, 2–2.5 cm wide. **Stems** 40–60 cm tall, dark purple, slender, 4–5 mm in diam., densely papillose. **Leaves** alternate, usually on middle to upper part of stems, lower ones; blade linear, with lowest longer than upper ones, 2–10 cm long, 3–5 mm wide, margin and adaxially papillose, with mid-ribs abaxially papillose. **Flowers** 4–10 in a short-raceme, erect or ascending, red-orange, unspotted, shiny; pedicels 2.5–3.7 cm long, glabrous, base with 2 bracts; bracts linear, 1–2 cm long, 3–6 mm wide, margin papillose. **Tepals** 6, in 2 wheels apex obtuse, outer 3 linear or linear-lanceolate, 4.8–6 cm long, 8–11 mm wide, inner 3 narrowly elliptic, 4.8–6 cm long, 12–15 mm wide, glabrous; nectars neither papillose nor fimbriate. **Stamens** 5, filaments filiform, glabrous, ca. 2 cm long, anthers lunate, dark red-orange, ca. 1 cm long. **Ovary** cylindrical, green, 8–10 mm long, 2–3 mm in diam. **Styles** ca. 1.8 cm long, thickened towards apex, glabrous, stigmas slightly 3-lobed. **Capsules** broadly obovoid, ca. 2 cm long, ca. 1.5 cm wide, narrowly 6-winged. **Seeds** yellow-brown, compressed, broadly ovate to elliptic-ovate, 3.5–5 mm long, 3–4 mm wide, winged. Flowering in June and fruiting in September.

Etymology. The specific epithet ‘*shenxianjui*’ refers to the type locality, Mount Shenxianju of Xianju County, which is situated in central Zhejiang Province, east China.

Habitat and distribution. *Lilium shenxianjui* grows on cliffs at 800–900 m alt. The new species is only known from one population located in Mount Shenxianju, Xianju County, central Zhejiang Province.

Conservation status. According to the IUCN Red List Categories and Criteria: Version 3.1 (IUCN 2001), *Lilium shenxianjui* should be considered as critically endangered (CR) [with criteria: B2aD]. Based on the exploration, three closed subpopulations have been found on cliffs in Mount Shenxianju and the habitats are well preserved. Its area of distribution is less than 5 km² and only

one population was found containing fewer than 50 individuals.

Similar species. The new species *Lilium shenxianjui* is morphologically similar to *L. concolor* and *L. bakerianum* Coll. & Hemsl. in having campanulate flowers and converging stamens. Characters distinguishing the new species from these two relatives are detailed in Table 1.

Table 1 Comparison of *Lilium shenxianjui* with *L. concolor* and *L. bakerianum*.

Characters	<i>Lilium shenxianjui</i>	<i>L. concolor</i>	<i>L. bakerianum</i>
Leaf	margin and adaxially papillose, with mid-ribs abaxially papillose	glabrous adaxially and abaxially	margin papillose, with mid-ribs abaxially papillose
Inflorescence			
bract	2 bracts at pedicle base	1 bract at pedicle base	1 bract at pedicle base
flower numbers	4–10	1–5	1–3
Flower			
colour	red-orange	dark red	white
tepals	outer 3 linear or linear-lanceolate, 4.8–6 cm long, 8–11 mm wide, inner 3 narrowly elliptic, 4.8–6 cm long, 12–15 mm wide; unspotted	oblong-lanceolate, 2.2–4 cm long, 4–7 mm wide; unspotted	outer 3 lanceolate, 6.5–8.3 cm long, 14–18 mm wide, inner 3 oblanceolate, 6.5–8 cm long, 11–23 mm wide; purplish-red spotted
nectar	neither papillose nor fimbriate	margin papillose	neither papillose nor fimbriate
anther	lunate, ca. 1 cm long	long-oblong ca. 7 mm long	long-oblong ca. 1.6 mm long
style vs. ovary	significantly longer	slightly shorter	slightly longer

Additional specimens examined (paratypes). China. Zhejiang, Xianju, Mount Shenxianju, on cliff, 900 m alt., 25 Sept 2019, *Z.M. Zhu s.n.* (ZM).

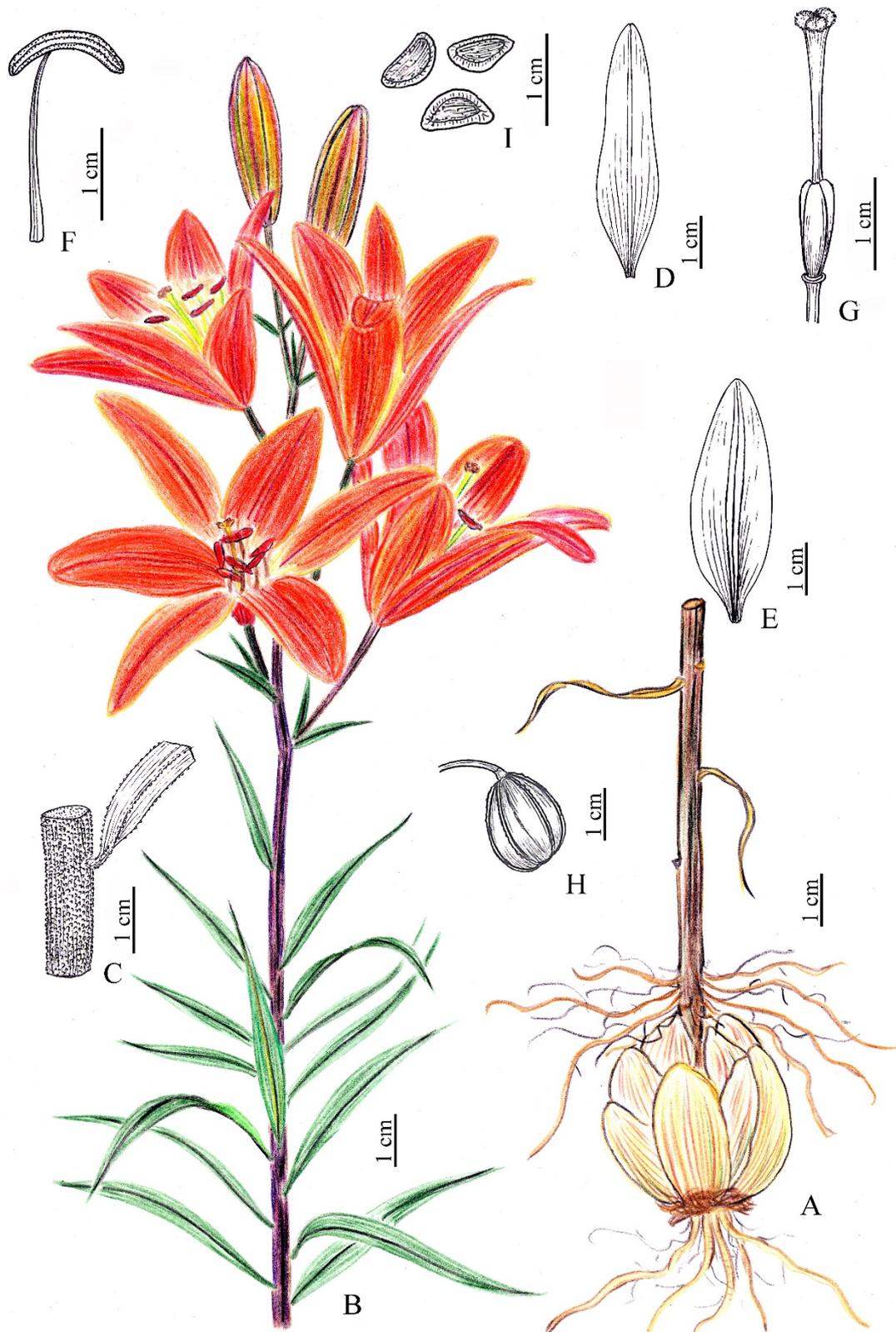


Figure 1. *Lilium shenxianjui* Y.L. Xu & X.F. Jin, sp. nov. **A** habit (showing lower part and bulb); **B** habit (showing upper part and inflorescence); **C** papillose indumentum on stem and leaf; **D** outer tepal; **E** inner tepal; **F** stamen; **G** ovary and style; **H** capsule; **I** seed. (Drawn by Xiao-Feng Jin from Y.L. Xu & Z.M. Zhu 1453, ZM.)

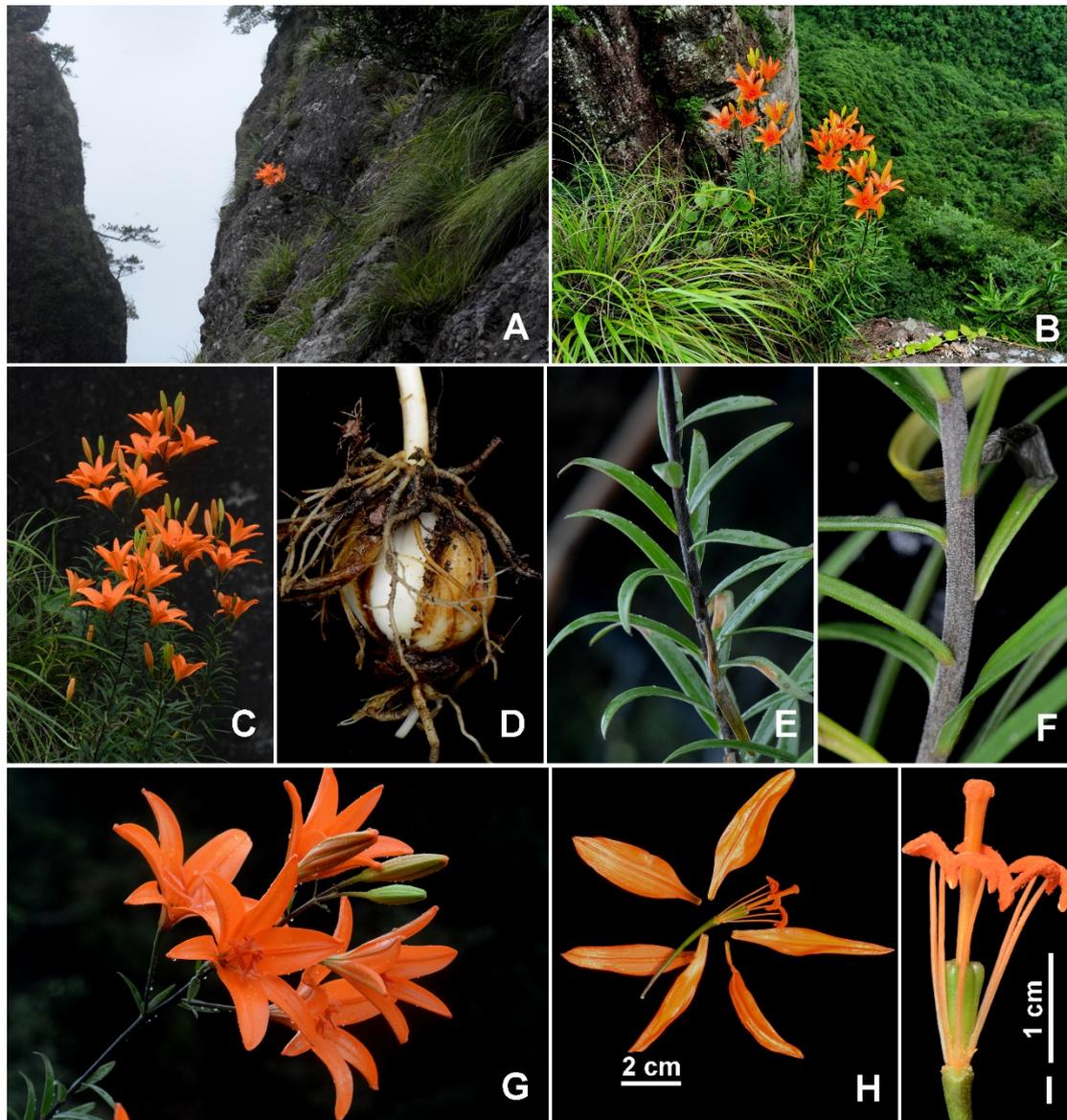


Figure 2. *Lilium shenxianjui*, sp. nov. **A, B** habitat; **C** habit; **D** bulb; **E** alternative leaves; **F** indumentum; **G** inflorescence; **H** tepals, stamens and pistil; **I** stamens and pistil.

Acknowledgements

This work was supported by the provincial project of the new edition of *Flora of Zhejiang* (No. 335010-2015-0005) and the project of Science & Technology Bureau of Hangzhou (20160432B07).

References

- Baranova MV (1988) A synopsis of the system of the genus *Lilium* (Liliaceae). *Botanicheskii Zhurnal* 73: 1319–1329.
- Chen, ZH, Ma DD, Li GY, Fu XQ (2016) New species of Lamiaceae from Zhejiang. *Journal of Zhejiang Forestry Science and Technology* 36(6): 83–86.
- Comber HF (1949) A new classification of the genus *Lilium*. *Lily Yearbook* 13: 86–105.
- Gong X, Hung KH, Ting YW, Hsu TW, Chiang TY (2017) Frequent gene flow blurred taxonomic boundaries of

- sections in *Lilium* L. (Liliaceae). PLoS One 12(8): e0183209. <http://doi.org/10.1371/journal.pone.0183209>
- IUCN (2001) IUCN red list categories and criteria, ver. 3.1. IUCN Species Survival Commission.
- Liang SY (1980) *Lilium* L. In: Wang FT, Tang T (Eds). Flora Reipublicae Popularis Sinicae. (Vol. 15). Science Press, Beijing, 116–157.
- Liang SY, Tamura MN (2000) *Lilium* L. In: Wu ZY, Raven PH (Eds), Flora of China. (Vol. 24). Science Press, Beijing and Missouri Botanical Garden Press, St. Louis, 136–150.
- Lin Q (1993) Flora of Zhejiang. (Vol. 7). Zhejiang Science and Technology Publishing House, Hangzhou, 374–435.
- Lou MX, Lu YF, Sun WY, Geng X, Jin XF (2018) *Rhamnus crenata* var. *xianjuensis*, a new variety of Rhamnaceae from Zhejiang. Journal of Hangzhou Normal University (Natural Science Edition) 17(3): 250–255. <http://doi.org/10.3969/j.issn.1674-232X.2018.03.005>
- Lu YF, Xie WY, Chen JM, Ma DD, Jin XF (2017) *Aster xianjuensis* (Asteraceae, Astereae), a new species from Zhejiang. Journal of Hangzhou Normal University (Natural Science Edition) 16(1): 1–5. <http://doi.org/10.3969/j.issn.1674-232X.2017.01.001>
- Ma DD, Chen ZH, Li GY, Zhu ZM, Zhang RZ, Peng JL (2014) *Tricyrtis xianjuensis* (Liliaceae), a new species from eastern China. Annales Botanici Fennici 51(4): 217–221. <http://doi.org/10.5735/085.053.0405>
- Rong LP, Lei JJ, Wang C (2011) Collection and evaluation of the genus *Lilium* resources in Northeast China. Genetic Resources and Crop Evolution 58: 115–123. <http://doi.org/10.1007/s10722-010-9584-2>
- Wilson EH (1925) The lilies of eastern Asia: a monograph. Dulau and Company Limited, London, 1–110.
- Woodcock HBD, Stearn WT (1950) Lilies of the world, their cultivation and classification. Country Life Limited and Charles Scribner's Sons Limited, London, 1–431.