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Saxifraga viridiflorum (Saxifragaceae), an unusual new species from Guangxi, China

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Abstract

Saxifraga viridiflorum, a remarkable new species of the genus *Saxifraga* sect. *Irregulares* (Saxifragaceae) from Guangxi, is described and illustrated herein. This new species morphologically differs from all known congeneric taxa by its greenish petals, verruculose sepals, and thick leathery leaf blade abaxially scarlet with white spots.

Keywords

Saxifragaceae, China, Guangxi, new species, taxonomy

Introduction

Saxifraga Linnaeus (1753: 398), the largest genus of Saxifragaceae, comprises more than 440 species widely distributed throughout the Northern Hemisphere (Pan et al. 2001; Tkach et al. 2015a, b). Previous molecular phylogenetic studies suggested that *Saxifraga* is monophyletic, providing that *Saxifraga* sect. *Micranthes* (Haw.) D. Don is excluded (Soltis et al. 1996; Prieto et al. 2013; Deng et al. 2015; Tkach et al. 2015a, b). Recent molecular phylogenetic research covered at least 13 sections and 9 subsections within the genus (Tkach et al. 2015b). *Saxifraga* sect. *Irregulares* Haw., characterized by zygomorphic flowers with two elongated petals and stamens with club-shaped filaments (Tkach et al. 2015), is the ancestral clade of *Saxifraga* first described by Haworth (Haworth 1803; Soltis et al. 2001; Zhang et al. 2015; Tkach et al. 2015b;

Zhang et al. 2019). This section currently comprises 18 species mainly distributed in East Asia (Magota et al. 2021).

China has a vast territory with a wide range of complex and diverse topographies and soils and covering several climate types, which contribute to the wealth of Chinese botanical diversity (Sun et al. 2017; Chen et al. 2018). Twelve species of *Saxifraga* sect. *Irregulares* are native to China, including the recently reported new species, *S. daqiaoensis* F.G.Wang & F.W.Xing (Wang et al. 2008), *S. kegangii* D.G.Zhang, Y.Meng & M.H.Zhang (Zhang et al. 2017), *S. luoxiaoensis* W.B.Liao, L.Wang & X.J.Zhang (Zhang et al. 2018), *S. shennongii* L.Wang, W.B.Liao & J.J.Zhang (Zhang et al. 2019), and *S. damingshanensis* W.B.Liao, W.Y.Zhao & J.H.Jin (Zhao et al. 2019).

In 2021, we inadvertently found a peculiar plant photograph posted on Baidu Tieba (<https://tieba.baidu.com/>), one of the most used Chinese communication platform, and immediately deem that it is a new species of *Saxifraga* sect. *Irregulares*, as it possesses greenish petals, which cannot be found in any existing species of *Saxifraga* sect. *Irregulares*. We contacted the author of this photograph and conducted a fieldwork for this undescribed specimen. Subsequent morphological comparisons support the status of the taxon as a new species, and it is described herein.

Taxonomy Treatment

Saxifraga viridiflorum X.J. Zhang, T. Deng, J.T. Chen, H. Sun, *sp. nov.* (Fig. 1, Fig. 2)
Type: CHINA. Guangxi. Guilin City, Yongfu County, Baishou Town, 109°46'58.99"E, 25°5'15.5"N, 586 m alt., 27 June 2021, X.J. Zhang, D.X. Luo Zhangxj98 (Holotype: KUN1519096!; Isotype: KUN1519097!).

Diagnosis: *Saxifraga viridiflorum* is easily distinguished from any other species of *Saxifraga* sect. *Irregulares* by having greenish petals (vs. white petals). *S. viridiflorum* morphologically resembles *S. epiphylla* and *S. kegangii*, but is distinct from the latter two in its leaf blade abaxially scarlet with white spots (vs. abaxially greenish/reddish with brown or yellow-green spots), and sepals with verruculose (vs. sepals without verruculose) (Table 1).

Description: Perennial herbs, 12–30 cm tall. Stolons absent. Rhizomes rather short. Leaves all basal; petiole 5–12 cm, crisped villous dark-purple (ca. 6 mm); leaf blade reniform, thick leathery, 2.5–4.0 × 3.5–5.3 cm, base cordate, margin undulate, apex obtuse, both surfaces crisped villous dark-purple (5.0–9.0 mm), adaxially greenish, abaxially purple or dark red, with white spots. Inflorescence paniculate, ca. 20 cm. 5–10-flowered, branches 2.0–3.0 cm, glandular pubescent, 1–2-flowered, flowers zygomorphic; pedicels slender, 1.0–2.0 cm, glandular pubescent. Sepals 5, red, spreading to reflexed, triangular lanceolate, 1.0–1.5 × 1.5–2 mm, glabrous, abaxially white verruculose, 3–5-veined, apex obtuse. Petals 5, greenish, margin entire, glabrous, apex acute; the three smallest lanceolate, 3.0–4.0 mm × 1.0–1.2 mm, 3-veined; the two largest lanceolate oblong, 0.7–1.4 cm × 1.0–1.2 mm, 3-veined. Stamens 3.2–4.0 mm. Ovary ovoid, 1.5–2.0 mm long, disc obscure; styles divergent ca. 1.0–1.8 mm. Capsule winged when mature, carpels 5–7 mm × 3–4 mm. Seeds elliptic, the two sides slightly bent, ca. 0.6 mm.

Etymology: The specific epithet refers to the flowers of this new species that are green

throughout the flowering period, differing from those of all other known *Saxifraga* sect. *Irregulares* species.

Vernacular name: The Chinese name is given as “绿花虎耳草” (lǜ huā hǔ ěr cǎo), referring to the greenish petals of the new species.

Phenology: Flowering was observed from April to July and fruiting from June to August.

Distribution and ecology: The new species *Saxifraga viridiflorum* is currently known only from Yongfu County, Guangxi Province, China. It was observed to grow on dry rocks under dense jungles at altitudes between 500 and 600 m.

Paratypes: CHINA. Guangxi. Guilin City, Yongfu County, Baishou Town, 109°46'49.3"E, 25°5'16.1"N, 547 m alt., 10 July 2021, X.J. Zhang, L.J. Li, J.Y. Peng, P.R. Luo Deng12030 (KUN); same locality, 575 m alt., 27 June 2021, X.J. Zhang, D.X. Luo Zhangxj99 (KUN).

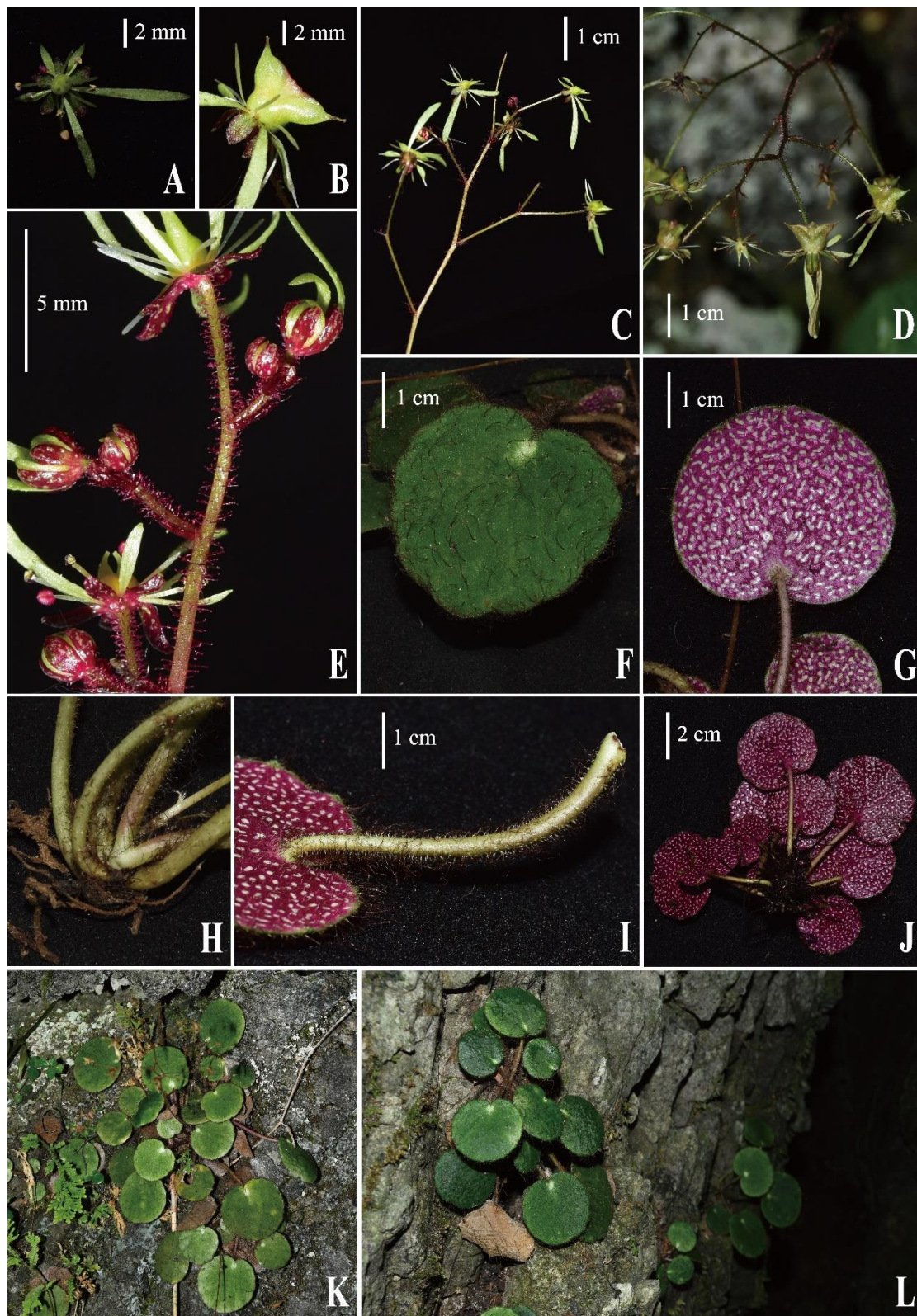


Figure 1. *Saxifraga viridiflorum* X.J. Zhang, T. Deng, J.T. Chen, H. Sun. **A.** Flower, petals 5, greenish; **B.** Fruit, capsule winged when mature; **C.** Inflorescence; **D.** Infructescence; **E.** Pedicels glandular pubescent; sepals red, glabrous, abaxially white verruculose; **F.** Adaxial leaf surface dark green, crisped villous; **G&J.** Abaxial leaf surface scarlet, with white spotted, crisped villous; **H.** Rhizomes crisped villous, petiole

base unsheathed; **I.** Petiole with crisped villous; **K&L.** Plants and habitat.



Figure 2. Photograph of the holotype of *Saxifraga viridiflorum* X.J. Zhang, T. Deng, J.T. Chen, H. Sun (KUN1519096).

Table 1. Diagnostic characters of *Saxifraga viridiflorum* and comparison with other related species of sect. *Irregulares*

Characters	<i>S. viridiflorum</i>	<i>S. epiphylla</i>	<i>S. kegangii</i>
Foliar embryo	absent	present	absent
Leaf shape	reniform to orbicular	ovate	fan-shaped to orbicular
Leaf margin	shallowly dentate or subentire	undulate, thickly dentate	entire or 8–10-crenate
Leaf texture	thick leathery to succulent	leathery	leathery
Abaxial surface of leaf blade	scarlet, with white spotted	gray-green to red, with brown or yellow-green spotted	gray-green, with yellow-green spotted
Trichomes on leaf	both surfaces crisped villous	both surfaces glandular hispid	adaxially glabrous, abaxially glabrous or sparsely hispid
Petals	greenish	white	white
Sepals	red, glabrous, abaxially white verruculose	greenish, abaxially and marginally glandular hairy, without verruculose	greenish, abaxially and marginally glandular hairy, without verruculose

Discussion

The new species *Saxifraga viridiflorum* has zygomorphic flowers and stolons absent, which indicate a position in sect. *Irregulares* ser. *Rufescentes*. *Saxifraga viridiflorum* is distinct from all known sect. *Irregulares* taxa by its greenish petals, verruculose sepals, and thick leathery leaf blade abaxially scarlet with white spots.

Geographically, *Saxifraga viridiflorum* was only found in Yongfu County of Guangxi Province, China. It was observed to grow merely on dry rocks under dense jungles in limestone area, whereas other related species of sect. *Irregulares* usually grow on damp cliffs and rocks nearby valleys. Here we argued that the environmental heterogeneity plays an important role in the differentiation of the species in sect. *Irregulares*, given the leaf blade of *Saxifraga viridiflorum* is thick leathery or succulent (grow on dry rocks), while the leaf blade of other related species of sect. *Irregulares* are mainly papery or leathery (grow on damp rocks).

Notably, only seven species of *Saxifraga* sect. *Irregulares* were recorded in “Flora of China” (Pan et al. 2001). However, six new species of *S.* sect. *Irregulares* were discovered in China in recent years, provided that *Saxifraga viridiflorum* is counted. Furthermore, most of these new species were confined to a narrow geographical range.

Species richness of *S.* sect. *Irregulares* was quite underrated, more field investigations and phylogenetic analyses are needed to infer its biodiversity and speciation history.

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