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A new species of *Viola* (Violaceae) from southern China

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A new stoloniferous violet from Guangdong, Guangxi and Hainan in southern China, ***Viola austrosinensis*** Y.S.Chen & Q.E.Yang **sp. nov.**, is described and illustrated. This species has been previously misidentified as *Viola kiangsiensis*. ***Viola austrosinensis*** is somewhat similar to *Viola sumatrana*, but differs in a series of significant characters. © 2008 The Linnean Society of London, *Botanical Journal of the Linnean Society*, 2008, **158**, 755–761.

ADDITIONAL KEYWORDS: taxonomy – *Viola* series *Australasiaticae* – violets.

INTRODUCTION

In the course of preparing an account of the genus *Viola* L. for the *Flora of China*, the identity and geographical distribution of *Viola kiangsiensis* W.Becker caught our attention. This species was described by Becker (1925) based on a collection, *H. H. Hu 700*, from Woo Kung Shan (= Mt Wugongshan), Anfu County, Jiangxi Province, China. We were informed by a curator of the Botanic Garden and Botanical Museum Berlin-Dahlem (B), where the type material of *V. kiangsiensis* had been deposited, that the type material had been destroyed in World War II, and we failed to find any duplicates of the type material in other herbaria. Merrill & Chun (1940) recorded the occurrence of *V. kiangsiensis* in Guangdong, Guizhou, Hainan and Jiangxi provinces, citing *Steward, Chiao & Cheo 678* (PE) from Guizhou, *F. C. How 73555* (IBK, IBSC, PE) from Hainan and *Sin 9200* (IBSC) from Guangdong, but citing no specimen from Jiangxi. We checked these three collections and found that *Steward, Chiao & Cheo 678* is *Viola davidii* Franch., and that the other two collections belong to another species, but they do not match the original description of *V. kiangsiensis* in, most apparently, the leaf blade not being glandular-dotted on the abaxial surface and the lateral petals being beardless at the base. According to Becker's description of *V. kiangsiensis*, the leaf blade is glandular-dotted on the abaxial surface, and the lateral petals are bearded at the base. Further inspection of all the major Chinese herbaria and several botanical expeditions to southern China have shown that many violet specimens from Guangxi, Guangdong and Hainan, previously identified as *V. kiangsiensis*, do not match Becker's original description either in these two characters or some other characters. As such, we had to assume that those violet specimens from Guangxi, Guangdong and Hainan are not the true *V. kiangsiensis* and should belong to another species, and that the concept of *V. kiangsiensis* as construed by Merrill & Chun (1940) and its geographical distribution given by them, which have been adopted in all the later floristic works of China (Chang & Huang, 1964; Anonymous, 1972; Chen, 1983; Wang, 1991a, b, 2003; Xing, 2000), are not accurate. All the descriptions of *V. kiangsiensis* presented in these works seem to be based on Becker's original description and the misidentified specimens from Guangdong, Guangxi and Hainan, and thus represent a mixture of different taxa.

As the holotype of *V. kiangsiensis* at Berlin had been destroyed, and no isotypes were found in other herbaria, the first author made two botanical expeditions to Mt Wugongshan, Jiangxi Province, the type locality of the species, in order to determine its identity with certainty. From there he collected some violet specimens (Fig. 4) which match the original description of *V. kiangsiensis*, apart from having

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Table 1. Morphological differences between *Viola kiangsiensis* and ***Viola austrosinensis* sp. nov.**

	V. kiangsiensis	***V. austrosinensis*** Y.S.Chen & Q.E.Yang
Stem	Caulescent	Acaulescent
Stolon	Absent	Present
Leaf blade	Chartaceous, triangular or triangular-ovate, rusty glandular-dotted on abaxial surface, green along veins on adaxial surface, margin serrate	Coriaceous, ovate, not glandular-dotted on abaxial surface, purplish-red along veins on adaxial surface, margin crenate
Stipule	Free, rusty glandular-dotted	Adnate to petiole at base, not glandular-dotted
Petal	Pinkish violet, lateral petals bearded, lower petal obtuse or rounded at apex	Whitish violet, lateral petals beardless, lower petal acute at apex
Sepal	Rusty glandular-dotted	Not glandular-dotted
Capsule	Rusty glandular-dotted	Not glandular-dotted

prostrate stems rather than stolons. These specimens are characterized by having prostrate stems (Fig. 4), chartaceous leaves serrate along margin and being rusty glandular-dotted on the abaxial surface (Fig. 7), and the lateral petals bearded at the base (Fig. 9). It is possible that Becker mistook the prostrate stems in *V. kiangsiensis* for stolons, leading him to place this species in his *Serpentes* group. According to these specimens from Mt Wugongshan, and taking into account Becker's original description, the true *V. kiangsiensis* is quite different from those specimens previously identified as *V. kiangsiensis* in several characters as given in Table 1 and shown in Figures 4–9. The true *V. kiangsiensis* seems to be most closely related to, or even conspecific with, *V. kosanensis* Hayata, a species widely distributed in China, belonging to *Viola* section *Viola* subsection *Rostratae* Kupffer by the plant being caulescent, the stipules free and the leaves and stipules rusty glandular-dotted on the abaxial surface. The violet represented by the specimens from Guangdong, Guangxi and Hainan is characterized by having slender and elongated stolons with scattered leaves, rootlets emanating from the nodes and internodes of stolons, and stipules adnate to the petioles at the base and should belong to the *Serpentes* group established by Becker (1923). [Most of the species in this group have been moved to *Viola* series *Australasiaticae* Okamoto (Okamoto, Okada & Ueda, 1993).] Thus, a hitherto undescribed species, *Viola austrosinensis* Y.S.Chen & Q.E.Yang, is described below.

SPECIES DESCRIPTION

VIOLA AUSTROSINENSIS Y.S.CHEN & Q.E.YANG **SP. NOV.** (SECTION *VIOLA* SERIES *AUSTRALASIATICAE* OKAMOTO) (FIGS 1–3, 5, 6, 8)

Type: Guangxi, Tianlin, Langping, Mt Laoshan, 1300~1550 m, 22.iii.2006, *Y. S. Chen* 6026 (holotype, PE).

Diagnosis: Haec species similis *V. sumatranae* W.Becker est, sed a qua foliis coriaceis margine crenatis utrinque glabris subtus haud ferrugineo-glanduloso-punctatis, rhizomate dense nodoso, petalo anteriore apice acuto differt.

Description: HERBS perennial. RHIZOME usually short, 1–4 cm, 2.5–5 mm in diameter. STOLONS slender and elongated, glabrous, with scattered leaves, rooting at nodes or internodes. LEAVES coriaceous, nearly basal, alternate on stolons; stipules adnate to petiole only at base, brown or greenish, dark striate, broadly lanceolate, 1.2–1.8 cm × 3–4 mm, margin long fimbriate-dentate, apex acuminate; petiole 2–7 cm, purplish-red, glabrous, wingless; leaf blade ovate or broadly ovate, 2–7 × 1.6–4.5 cm, deep green and glabrous on adaxial surface, glabrous and purplish-red along veins on abaxial surface, base cordate, margin distinctly crenate, apex obtuse. FLOWERS pinkish white; pedicels usually exceeding leaves, glabrous, 2-bracteolate about the middle; bracteoles opposite, linear, 6–7 mm; sepals purplish-red, lanceolate, 6–7 mm, apex acuminate, basal auricles short, *c.* 0.5 mm, glabrous, apex obtuse; petals oblong-obovate, 1–1.3 cm, lateral petals glabrous, lower petal shorter, *c.* 10 mm long (spur included), distinctly pinkish violet striped, apex usually acute; spur saccate, 2–2.5 mm, *c.* 2.5 mm in diameter; spur of 2 anterior stamens angular, slightly longer than anthers, apex acute; style clavate, apex beaked and conspicuously margined on lateral sides. CAPSULES narrowly orbicular, 5–6 mm, glabrous. Flowering March–April, fruiting June–September.

Distribution and habitat: Endemic to southern China (Guangdong, Guangxi, Hainan), growing in humus under shady mixed forests at altitudes of 500–1800 m.

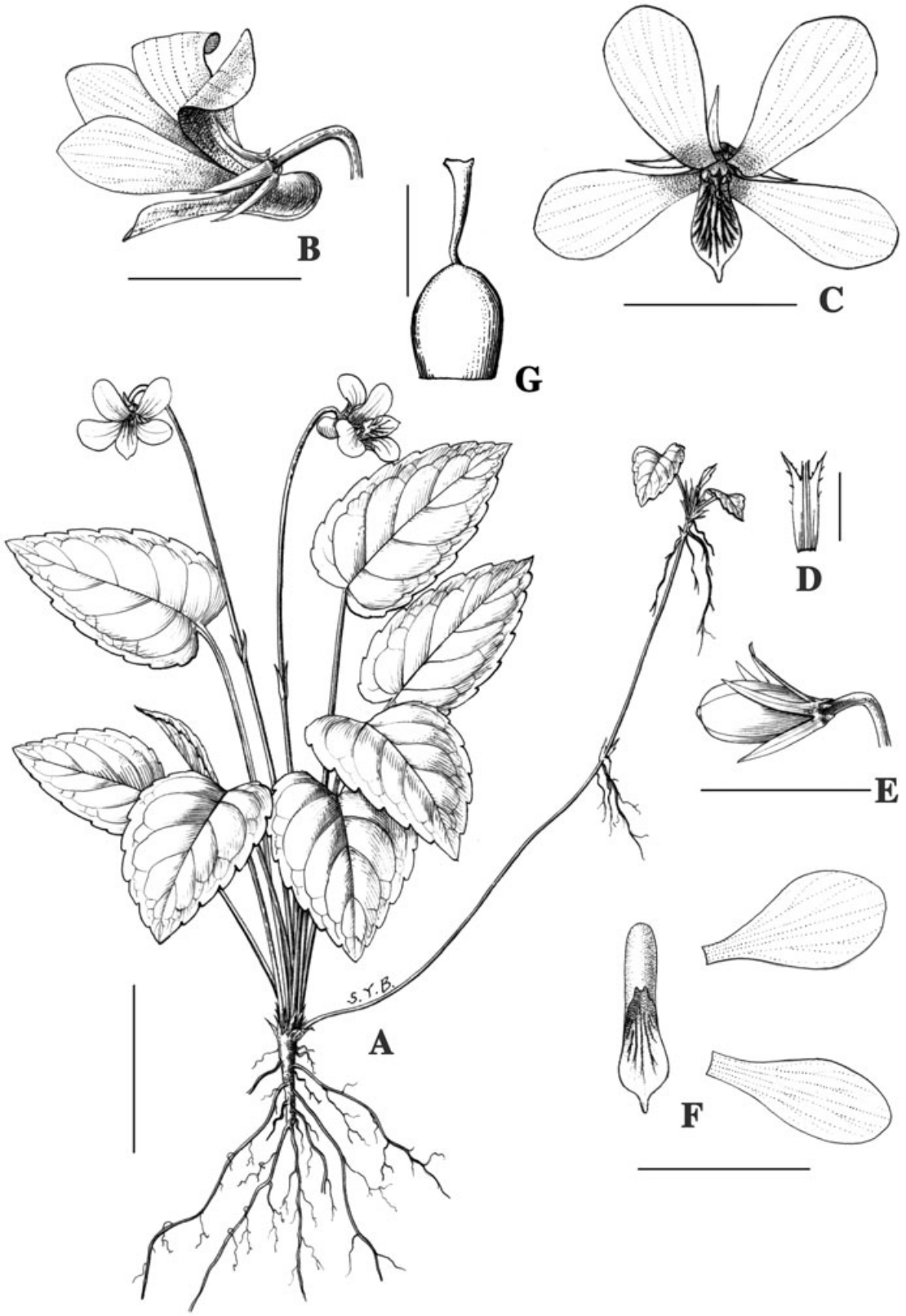


Figure 1. ***Viola austrosinensis*** (*Y. S. Chen 6026*) **sp. nov.** A, habit. B, flower in front view. C, flower in side view. D, stipule. E, fruit. F, petals. G, style. Scale bars = 30 mm (A), 10 mm (B, C, E, F), 4 mm (D), 2 mm (G).

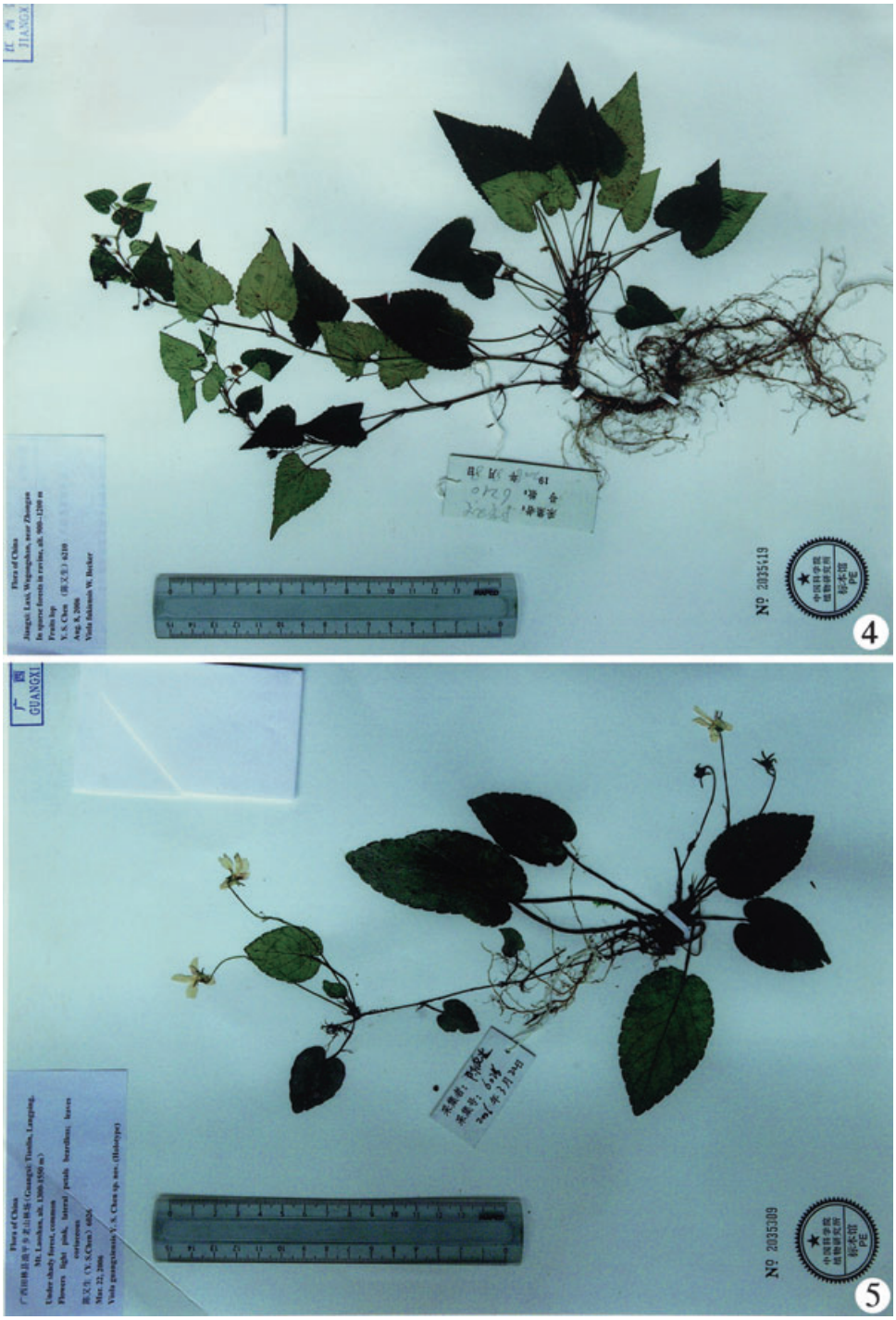
Figures 2–3. ***Viola austrosinensis*** (*Y. S. Chen 6026*) **sp. nov.** in the wild (photographed by Y. S. Chen).

Additional specimens examined: CHINA. GUANGDONG: Conghua County, Shatian, 16.iii.1935, *W. T. Tsang 24937* (IBSC); Conghua County, Shatian, 6.iv.1958, *C. Wang 44713* (IBSC); Fengkai County, Heishiding, 13.x.1980, *G. Q. Ding & L. Yu 6212* (IBSC); Fengkai County, Qixing, 16.vi.1974, *Guangdong Exped. 74–5219* (IBSC); Lechang County, Jiufeng, Mt Yanjushan, 18.iv.1943, *H. S. Chun 3104* (PE, IBK, IBSC, KUN); Luoding County, Fuhe Forestry Plantation, 22.x.1991, *N. Liu & H. G. Liu 2381* (IBSC); Pingyuan County, Zhouhuang, 1200 m, 8.iv.1957, *L. Teng 4164* (KUN); Renhua County, Mt Man-chi-shan, 20.iv.1936, *W. T. Tsang 26161* (IBSC); Xingyi County, Changou, 13.v.1931, *S. P. Ko 51460* (IBSC, IBK); Xingyi County, Shixia, Mt Dalingshan, 1400 m, 11.iii.1957, *Zhanjiang Exped. 3703* (IBSC); Xingyi County, Mt Hualoushan, 22.iii.1932, *C. Wang 317615* (IBK); Yunan County, Mt Tongledashan, 500 m, 5.xi.1991, *N. Liu & H. G. Liu 2819* (IBSC). GUANGXI: Jinxiu County, Mt Shengtangshan, 900 m, 13.x.1981, *Dayaoshan Exped. 11337* (IBSC); Jinxiu County, Gonghe, 12.ix.1981, *Dayaoshan Exped. 10417* (IBSC); Jinxiu County, Gonghe, 1140 m, 3.vi.1958, *Y. K. Li 400142* (IBK, IBSC, KUN); Jinxiu County, Liuxiang, Mt Wuzhishan, *C. Wang 39483* (IBK, IBSC); Lingyun County, Mt Yeo Mar Shan, 1460 m, 27.viii.1928, *R. C. Ching 7175* (IBSC, PE); Lingyun County, Mt Qinglongshan, 1000 m, *C. C. Chang 10550* (IBSC); Longsheng County, Huaping, 25.iii.1962, *S. F. Yuan & L. F. Liu 5051* (IBSC); Longsheng County, Huaping, 16.iv.1962, *S. F. Yuan & L. F. Liu 5196* (IBSC); Longsheng County, Huaping, 700 m, *S. F. Yuan & L. F. Liu 5314* (IBSC); Longsheng County, Huaping, Hongtan, 31.v.1955, *Guangfu Exped. 392* (IBK, IBSC); Longsheng County, Sanmen, 10.iv.1955, *Guangfu Exped. 25* (IBK, IBSC, PE); Mashan County, Yangxu, Mt Damingshan, 6.ix.1958, *S. Q. Zhong A62279* (IBK, PE); Mengshan, Gupu, *C. H. Chung 85040* (IBK) & *90918* (IBK); Nandan County, Changkeng, *C. Wang 41300* (IBSC, PE); Rongshui County, Mt Jiuwashan, 900 m, 22.iv.1984, *R. G. Long 84031* (IBSC); Rongshui County, Pingzhu, 14.vi.1958, *Y. K. Li 4400334* (IBK); Shanglin County, Mt Damingshan, 1800 m, 25.viii.1951, *C. X. Cai 5389* (IBK, IBSC); Tianlin County, Langping, 1300 m, 20.x.1989, *South China Exped. 2701* (IBSC); Wuming County, Damingshan, 23.viii.1951, *C. X. Cai 5371* (KUN); Wuming County, *S. F. Yuan* 6247(IBK); Xing'an County, Huajiang, Mt Maoershan, xi.1953, *Guangxi Exped.* 493 (IBSC, PE); Xing'an County, Shenping, 8.vi.1963, *Guangxi Exped. 2529* (PE); Xing'an County, Huajiang, Mt Maoershan, 19.iii.2005, *Y. S. Chen* 5031(PE). HAINAN: Baisha County, Dengkeng, 20.iii.1936, *S. K. Liou 25798* (IBK, IBSC, KUN, PE); Baisha County, Fanta, 18.iv.1936, *S. K. Liou 26317* (IBSC, PE); Baoting County, Mt Diaoluoshan, 5.v.1983, *Z. X. Li 1533* (IBSC); Baoting County, Xinglong, 970 m, 30.viii.1935, *F. C. How 73555* (IBK, IBSC, PE).

DISCUSSION

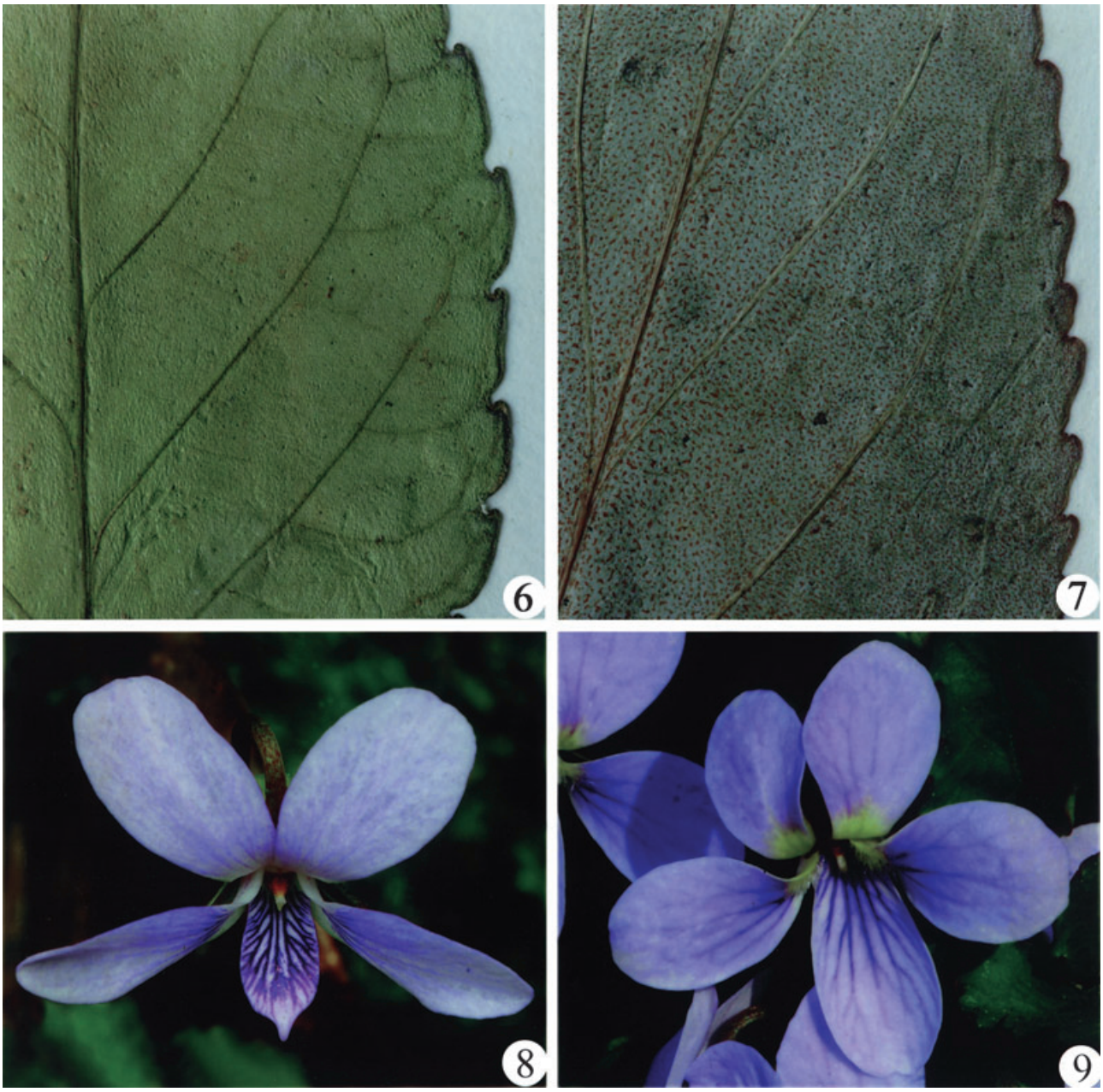
Viola austrosinensis is a member of *Viola* series *Australasiaticae* because it has slender and elongated stolons scattered with leaves, rootlets arising from nodes and internodes of stolons and stipules adnate to petioles at the base. However, unlike other species in the series, in which the lower petal is rounded at the apex, the lower petal of *V. austrosinensis* is acute at the apex, a character usually appearing in the species of the *Diffusae* group established by Becker (1923), a closely related group to *Viola* series *Australasiaticae*. This fact may further suggest the close affinity of the two groups.

Although *V. austrosinensis* has long been misidentified as *V. kiangsiensis*, they appear to be only distantly related to each other. The former species is easily distinguishable from the latter by its stolons producing new plants, the absence of rusty-red glands on the abaxial surface of leaves, the lateral petals being beardless at the base and the lower petal being acute at the apex. *Viola austrosinensis* is somewhat



Figures 4–5. Habit of *Viola kiangsiensis* and of ***Viola austrosinensis* sp. nov.** Fig. 4. *Viola kiangsiensis* (China. Jiangxi: Mt Wugongshan, altitude 900–1200 m, 8.viii.2006, *Y. S. Chen 6210*). Note the prostrate stem which does not produce new plant individuals and roots. Fig. 5. ***Viola austrosinensis*** (*Y. S. Chen 6026*).

similar to *V. sumatrana* W.Becker in having stolons, a short spur on the lower petal, short auricles on the sepals, and in the leaf shape, but differs by its rhizome being usually short and densely noded, leaves coriaceous, glabrous, not glandular-dotted on abaxial surface, margin distinctly crenate, apex obtuse, veins on abaxial surface purplish-red, and lower petal acute at apex.



Figures 6–9. Comparison of *Viola kiangsiensis* and ***Viola austrosinensis* sp. nov.** Fig. 6. Abaxial surface of leaf blade in ***V. austrosinensis***. Fig. 7. Abaxial surface of leaf blade in *V. kiangsiensis*, showing the rusty glandular dots. Fig. 8. ***Viola austrosinensis***, flower in front view. Fig. 9. *Viola kiangsiensis*, flower in front view.

Viola austrosinensis is also somewhat similar to *Viola mucronulifera* Hand.-Mazz. in its stoloniferous habit, leaf blade ovate, base cordate, margin crenate, lateral petals beardless, lower petal distinctly striate, and spur short. In fact, some specimens of *V. austrosinensis* (e.g. *H. S. Chun 3104* from Guangdong, *F. C. How 73555* from Hainan) had been previously misidentified as *V. mucronulifera*. *Viola mucronulifera* can be easily distinguished from *V. austrosinensis* by the following characteristics: leaves chartaceous, deep green on both surfaces, apex acute, teeth conspicuously spinose at apices, and the lower petal rounded at the apex. *Viola mucronulifera* was described by Handel-Mazzetti (1931) based on *R. C. Ching 7016* (holotype, PE; isotypes, A, IBSC, NY) from Lingyun County, Guangxi, China. Wang (1991a) considered that *V. mucronulifera* is widely distributed in Fujian, Guangdong, Guangxi, Guizhou, Hubei,

KEY TO ***VIOLA AUSTROSINENSIS* SP. NOV.** AND ITS CLOSELY RELATED SPECIES

1. Leaf blade obviously spinose on margin.
2. Rhizome thick and internodes long; leaf blade distinctly crenate; spines distinct and borne between teeth..... ..... ***V. mucronulifera***
2. Rhizome short and densely noded; leaf blade serrate; spines not distinct and borne at apices of teeth..... ..... ***V. kwangtungensis***
1. Leaf blade without spines on margin.
3. Leaves coriaceous; lower petal acute at apex..... ***V. austrosinensis***
3. Leaves chartaceous; lower petal rounded or obtuse at apex
4. Leaf blade orbicular or ovate, apex rounded, margin crenate; rhizome usually densely noded; flowers white; lateral petals bearded..... ***V. davidii***
4. Leaf blade triangular-ovate or oblong-ovate, apex acuminate or acute, margin crenate-serrate; rhizome long and thick, internodes elongated; flowers purple to light purple; lateral petals glabrous..... ***V. sumatrana***

Hunan, Jiangxi, Sichuan, Yunnan, and Zhejiang provinces. The first author's recent revision of the Chinese violets (Chen, 2006) showed that *V. mucronulifera* is only distributed in western Guangxi and southeastern Yunnan, and that the specimens misidentified as *V. mucronulifera* from Fujian, Guangdong, Guizhou, Hubei, Jiangxi, Sichuan and Zhejiang should be referred to *Viola kwangtungensis* Melchior, a species also distributed in southern China.

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REFERENCES

Anonymous. 1972. Violaceae. In: Anonymous, ed. *Iconographia cormophytorum sinicorum*, Vol. 2. Beijing: Science Press, 900–919.

Becker W. 1923. Violae Asiaticae et Australenses.V. *Beihefte zum Botanischen Centralblatt, Abt. 2* **40:** 69–171.

Becker W. 1925. *Viola kiangsiensis* sp. nov. *Repertorium Specierum Novarum Regni Vegetabilis* **21:** 321.

Chang CC, Huang MX. 1964. Violaceae. In: Chun WY, ed. *Flora hainanica*, Vol. 1. Beijing: Science Press, 356–362.

Chen SY. 1983. Violaceae. In: Anonymous, ed. *Iconographia cormophytorum sinicorum supplementum II*. Beijing: Science Press, 510–525.

Chen YS. 2006. *Taxonomic revision of* Viola *L. (Violaceae) in China*. PhD thesis, Institute of Botany, Chinese Academy of Sciences, Beijing.

Handel-Mazzetti H. 1931. Plantae novae Chingianae. *Sinensia* **2:** 1–7.

Merrill ED, Chun WY. 1940. Additions to our knowledge of the Hainan Flora, III. *Sunyatsenia* **5:** 1–200.

Okamoto M, Okada H, Ueda K. 1993. Morphology and chromosome number of *Viola pilosa*, and its systematic position. *Taxon* **42:** 781–787.

Wang CJ. 1991a. *Viola* L. In: Anonymous, ed. *Flora reipublicae popularis sinicae*, Vol. 51. Beijing: Science Press, 8–129.

Wang CJ. 2003. Violaceae. In: Fu LG, Hong T, eds. *Higher plants of China*, Vol. 5. Qingdao: Qingdao Publishing House, 135–173.

Wang YS. 1991b. Violaceae. In: Li SG, Liang CF, eds. *Flora of Guangxi*, Vol. 1. Nanning: Guangxi Science and Technology Publishing House, 458–465.

Xing FW. 2000. Violaceae. In: Wu TL, ed. *Flora of Guangdong*, Vol. 4. Guangzhou: Guangdong Science and Technology Publishing House, 65–79.