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SOME NEW OR NOTEWORTHY PLANT SPECIES FOR CHINA FOUND IN NORTH WEST XINJIANG

НОВЫЕ И РЕДКИЕ ДЛЯ КИТАЯ ВИДЫ РАСТЕНИЙ, НАЙДЕННЫЕ В СЕВЕРО-ЗАПАДНОМ СИНЬЦЗЯНЕ

Summary. Six newly recorded species to China, *Cardamine bellidifolia*, *Gentianella sibirica*, *Lotus sergievskiae*, *Saussurea foliosa*, *S. orgaadayi*, and *Veronica smirnovii* found in Mts. Altay of NW Xinjiang are reported and distinguishing characters from the most closely related Chinese taxa are considered. *Lotus krylovii* should be excluded from the flora of China as its records from the country belong to *L. sergievskiae*. Besides, the occurrence of *Draba fladnizensis* in China is confirmed and the distribution of two rare and poorly known species (*Swertia banzragczii* and *Valeriana martjanovii*) in China is updated.

Key words: China, Xinjiang, Altai, flora, new records.

Аннотация. Впервые для Китая указано шесть видов цветковых растений (*Cardamine bellidifolia*, *Gentianella sibirica*, *Lotus sergievskiae*, *Saussurea foliosa*, *S. orgaadayi*, *Veronica smirnovii*), найденных в Северо-Западном Синьцзяне. Приведены конкретные местонахождения и отличия от наиболее близких видов, произрастающих в Китае. *Lotus krylovii* подлежит исключению из флоры Китая, так как указания этого вида для страны основаны на сборах *L. sergievskiae*. Подтверждено присутствие во флоре КНР *Draba fladnizensis*, а также дополнены данные о распространении двух редких и малоизвестных в Китае видов (*Swertia banzragczii* и *Valeriana martjanovii*).

Ключевые слова: Китай, Синьцзян, Алтай, флора, новые находки.

In 2004, the two-year bilateral project “Joint investigation of Altay flora” financially supported by National Scientific Foundation of China (NSFC) and Russian Foundation for Basic Research (RFBR), has started and the study of the first year resulted in finding one genus and six species of vascular plants newly recorded to China (German et al., 2006).

In 2005, we continued exploration which enabled us to make further contribution to the knowl-

edge on the flora of China which is reported herein. Among the noteworthy findings, six species (*Cardamine bellidifolia* L., *Gentianella sibirica* (Kunz.) Holub, *Lotus sergievskiae* Kamelin et S. Koval., *Saussurea foliosa* Ledeb., *S. orgaadayi* V. Khan et Krasnob., and *Veronica smirnovii* Kossaczew et D. German) are novelties in the flora of China, one (*Draba fladnizensis* Wulfen) is confirmed to occur in China, and two (*Swertia banzragczii* Sancez and

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Valeriana martjanovii Kryl.) are rare species previously known from only 2 localities in China.

Most of the mentioned taxa (excluding *Lotus sergievskiae* and *Valeriana martjanovii*) are widely distributed in and predominantly endemic to the mountains of South Siberia/North Mongolia. Their occurrence in Chinese Altai was quite predictable and the finding in any other region of China but the ultimate NW Xinjiang is highly unexpected.

All species (excepting *Saussurea orgaadayi*) are collected by the present authors, except R.V.K. (Sino-Russian Altai Expedition, 中俄阿尔泰考察队, further cited as SRAE), and the vouchers are deposited in PE (duplicates of most of them also in ALTB). Further updates were made based on the revision of selected collections of PE, TK, XJA, and XJBI. Below, the taxa are enumerated; for each of them, the full nomenclature citation, basynonym, type information, distribution in China and general distribution, and distinguishing characters from the most closely related Chinese taxa are presented. Brief comments are also given where needed.

I. Newly recorded species

1. *Cardamine bellidifolia* L., 1753, Sp. Pl. : 654. Type: Herb. Linn. No. 835.1 (lectotype, LINN, designated by Khatri, 1990 : 442) (北极碎米荠 新拟).

Distribution: NW China (Altai mts.), N Mongolia, NE Kazakhstan, Europe, Russia (Arctic regions, mts. of Siberia, Far East), N America.

China. Xinjiang (新疆): Habahe (哈巴河) (Kabinsky) range, 5–7 km to SE of Bai-Haba (Pyrbe), N slope of mt. Dzhata, 48°40'–48°41' N, 86°45'–86°50' E, alt. ca. 2600 m, alpine tundra. 1 VIII 2005. SRAE 2005097 (PE).

Additional collections studied: Burqin (布尔津) county, vicinities of the lake Kanas, alpine belt. 7 VII 1980. *Anonymous* 847, 852, 940, & 958 (XJA); Altai (阿勒泰) county, 2920 m a.s.l. 15 VII 1957. *Anonymous* 196 (PE, left plant).

Cardamine bellidifolia is a typical arctic-alpine species distributed circumpolar and in mountains of N Eurasia; in Altai mts. it meets its southern distribution limit in Asia. From any of ca. 50 Chinese *Cardamine* L. species, *C. bellidifolia* readily differs in a combination of being tiny caespitose perennial plant with entire, exclusively or nearly so rosette leaves, small flowers and few-flowered, compact, subumbellate racemes. The species is restricted to

alpine belt where it occurs in rock crevices, talus and rocky slopes, pebble and stony streambanks.

2. *Lotus sergievskiae* Kamelin et S. Koval., 1981, in Consp. Fl. As. Med. 6 : 48. Typus: [Russia, Altai province], Sibiria altaica, inter pag. Machanovo et Krasnojarskoe ad fl. Alej, in pratis subsalsis. 11 VII 1913. *P. Krylov* s. n. (holotype, LE; isotype, TK) (中亚百脉根).

Distribution: Afghanistan, W China (Xinjiang, Xizang), India, Iran, Kazakhstan, Kyrgyzstan, W Mongolia, Pakistan, Russia (European part, S Siberia), Tajikistan, Turkmenistan, SE Ukraine, Uzbekistan.

China. Xinjiang (新疆): Fuyun (富蕴), Temaike, valley of Irtysh, 20 km WSW Fuyun, near Ijtek peak (1111 m), 46°57'50" N, 89°19'28" E, alt. 850 m, saline meadows in depressions between hills. 8 VIII 2005. SRAE 2005738 (ALTB, PE).

This widely distributed species is reported in the Flora of China (Wei et al., 2010) as *L. krylovii* Schischk. et Serg. The situation around misapplication of the name *L. krylovii* to this species was discussed several times (summarized in Tulyaganova (1981) and Kurbatsky (1990)). Briefly, the name *L. krylovii* has been validated based on the material which originally included two taxonomically different elements. By subsequent typification, Sergievskaya (in Fl. W Siberia, 12(2): 3363. 1964) restricted the initially broad concept of *L. krylovii* so that this name can be applied to a minor part of the original material and should refer to the species endemic to SW Siberia and adjacent Kazakhstan (Kurbatsky, 1990) while the rest of what was initially described as "*L. krylovii*", she identified as *L. frondosus* (Freyn) Kuprian. Later (Sergievskaya, 1965), she made an attempt to get back the initial (broad) concept of *L. krylovii* by changing the application of this name to what she previously called *L. frondosus* and establishing a new name, *L. confusus* Serg., which turned out to be a homotypic synonym of *L. krylovii*. As a result, the minor part of the original material on *L. krylovii* got two names while the major part, representing the widely distributed Asian taxon (*L. corniculatus* L. var. *versicolor* Bong. et C.A. Mey.), was still lacking the species name until 1981 when the binominal *L. sergievskiae* Kamelin et S. Koval. was validated based on one of the gatherings of the rest (major portion) of the original material on *L. krylovii* sens. orig.

The two taxa can be separated as follows (modified from Kurbatsky, 1994):

Stems 25–45 cm long; flowers 10–11 mm long, (2)3–4(5) in umbels; leaflets 10–20 mm long ... *L. krylovii*
 Stems 5–30 cm long; flowers 7–9(10) mm long, 1–2(3) in umbels; leaflets 5–13 mm long ... *L. sergievskiae*

Thus, only in case if the two species are treated as one, the name *L. krylovii* can be applied to Chinese plants; however, the taxa despite being closely related are apparently distinct (conf. Kurbatsky, 1990) and, to our knowledge, were only accepted as one species by Yakovlev (1988), a viewpoint not followed by other authors (e. g., cited herein). Sergievskaya (1964) admitted that *L. krylovii* might represent a hybrid species originated from the crossing between *L. strictus* Fisch. et Mey. and what was later called *L. sergievskiae*. The general distribution mentioned for *L. krylovii* by Wei et al. (2010) refers to *L. sergievskiae* most likely including North America (as introduced in Canada). Occurrence of *L. krylovii* s. str. in China is very unlikely.

3. *Gentianella sibirica* (Kusn.) Holub, 1973, in Folia Geobot. Phytotax. 8, 2 : 171. – *Gentiana sibirica* (Kusn.) Grossh., 1952, in Fl. USSR 18 : 612. – *G. aurea* L. var. *sibirica* Kusn., 1904, in Mat. Fl. Cauc. 4, 1 : 388. Type: [Russia], Altai, Tschuja. *Politow* s. n. (holotype, LE) (西伯利亚假龙胆 新拟).

Syn.: *Gentiana pamirica* Grossh., 1952, in Fl. USSR 18 : 751, 612. – *Gentianella pamirica* (Grossh.) Holub, 1973, in Folia Geobot. Phytotax. 8, 2 : 171. Type: [Tajikistan], Pamir, Schugnan; in pratisflum. Gunt prope pagum Vedsh, 31VII 1931. *S. Lipschitz* s. n. (holotype, LE).

Distribution: NW China, Kazakhstan, Kyrgyzstan, Russia (S Siberia), Tajikistan, Uzbekistan.

China. Xinjiang (新疆): Habahe (哈巴河) (Kabinsky) range, 5–7 km to SE of Bai-Haba (Pyrbe), N slope of mt. Dzhata, 48°38'–48°41' N, 86°45'–86°50' E, alt. ca. 2500 m, alpine tundra. 1 VIII 2005. *SRAE 2005219* (PE).

Compared to the other Chinese *Gentianella* Moench species, *G. sibirica* is most close to *G. turkestanorum* (Gand.) Holub with which it shares sessile, ovate-lanceolate to ovate stem leaves, many-flowered cymes, apically mucronate corolla tubes, membranous calyx with rounded sinus between lobes which are often slightly scabrous. The prior differs from the latter in having smaller, up to 10 (not to 20) mm long, and often partly 4-merous (not exclusively 5-merous) flowers, ovate to narrowly ovate or elliptic, strongly narrowed to the base (not linear to linear elliptic, slightly narrowed to the base) calyx lobes, predominantly pink, yellowish, or whitish, rarely pale blue (not usually pale blue and more rarely dark blue, pink or light yellow)

corollas with shorter, ca. 2 (not 3–5) mm long, lobes and smaller, 0.5–0.7 (not (0.8)1–1.2(1.5)) mm long, anthers. Similar to *G. turkestanorum*, *G. sibirica* occurs in alpine and subalpine meadows, river banks, moist forests, shady rocks, lake shores predominantly in upper mountain belt.

4. *Veronica smirnovii* Kossaczew et D. German, 2004, Novit. Syst. Plant. Vasc. 36 : 209. Type: Mongolia, Khovd aimak, Mongolian Altai, upper reaches of Bayan-gol, Arshantyn-Nuru range, N slope, vicinities of the pass Bayan-Hutel, 46°22' N, 91°10' E, 1900–2100 a.s.l., rocky slope with bushes of *Juniperus sabina* L. 14 VII 2003. *D.A. German* s. n. (holotype, ALTB, isotype, LE) (谢氏婆婆纳 新拟).

Distribution: NW China, W Mongolia.

China. Xinjiang (新疆): Fuyun (富蕴), Temaike, Mongolian Altai, valley of Irtysh, 12–18 km SE Kektogai, near the rock “Saint Bell”, 46°14'–18' N, 89°55'–58' E, alt. 1300–1600 m, steppe slopes. 7 VIII 2005. *SRAE 2005703* (ALTB, PE).

The species is close to *V. porphyriana* Pavl. and *V. laeta* Kar. et Kir. (unjustifiably reduced in the Flora of China to synonymy of *Pseudolysimachion spicatum* (L.) Opiz and *P. pinnatum* (L.) Holub, respectively) and obviously has a hybrid origin from them. From the prior one, *V. smirnovii* differs in having shorter hairs, numerous (16–22, not to 10–12) and narrower stem leaves alternate in the upper part of stem, presence of sterile branches in axils of leaves and longer pedicels; from the second one, it differs in having indumentum of glandular instead of simple hairs, opposite lower and middle cauline leaves and pubescent capsules.

Veronica smirnovii which was known to the date only from the type gathering is endemic to the western slope of Mongolian Altai where it occupies steppe habitats (grasslands, open *Juniperus* communities) of the middle mountain belt.

5. *Saussurea foliosa* Ledeb., 1829, Icon. Pl. Fl. Ross. 1 : 17, tab. 69. Type: [Kazakhstan, Altai], [Habitat in alpinis rarior, v. gr. in monte crucis prope Riddersk, *Ledebour* s. n.] Altai, 1826 (lectotype, LE, designated by Lipschitz, 1979 : 233, “typus”) (多叶风毛菊 新拟).

Distribution: NW China (Altai mts.), Kazakhstan (Altai mts.), Mongolia, Russia (S Siberia).

China. Xinjiang (新疆): Habahe (哈巴河) (Kabinsky) range, 5–7 km to SE of Bai-Haba (Pyrbe), N slope of mt. Dzhata, 48°40'–48°41' N,

86°45'–86°50' E, alt. ca. 2600 m, alpine tundra. 1 VIII 2005. *SRAE 2005093* (PE).

Additional collections studied: Burqin (布尔津) county, vicinities of the lake Kanas. VII 1980. *Anonymous s. n.* (XJBI); Habahe (哈巴河) county, Barbagai, 2900 m a.s.l., alpine meadow. 26 VII 1972. *Anonymous 10953* (XJBI).

The species is confined to the higher mountain belt of Altai and Sayan mts.; till the present time, it was known from all portions of Altai except for the Chinese one. Both revised specimens were previously identified as *S. pseudoalpina* N.D. Simps. However, from the latter species as well as from the related *S. alpina* DC., *S. foliosa* is readily distinguished by densely and uniformly leafy stems (with (6)10–20 leaves of nearly the same size, uppermost somewhat crowded below the inflorescence) and more dense inflorescences with numerous (10–50) capitula. Contrary, *S. pseudoalpina* and *S. alpina* have rather poorly leafy stems with (1)2–4(7) remote leaves, uppermost strongly reduced in size and not crowded below the inflorescence) and less dense inflorescences with 3–10(15) capitula. Habitually (densely leafy stems, numerous capitula), *S. foliosa* reminds *S. latifolia* Ledeb. but differs from the latter species in narrower (up to 3.5–4, not 6–8 cm wide) leaves often sparsely tomentose (vs. not tomentose)

abaxially, and not alate (vs. alate) stems. Besides, *S. latifolia* is a plant of forest and subalpine belts while *S. foliosa* occurs in alpine belt (streamsides, between boulders).

6. *Saussurea orgaadayi* V. Khan. et Krasnob., 1984, Proc. Sib. Branch, Acad. Sci. USSR, ser. biol. 2, 13 : 14. Type: [Russia], Tuva Republic, Mongun-Taiga distr., mt. Mongun-Taiga, upper reaches of Kara-Beldyr (tributary of Shara-Khoragai), 2600 m, NE slope, between boulders. 27 VII 1980. *V. Khanminchun, Yu. Polev, I.I. Krasnoborov* (holotype, NS; isotype, LE) (密毛雪莲 新拟).

Distribution: NW China (Altai mts.), W Mongolia (Altai mts.), Russia (S Siberia: Altai, Tuva).

China. Xinjiang (新疆): Qinghe (青河) county, Dongfeng town. 2900 m a.s.l., alpine gravel slope. 24 VII 1977. *Kelimu 11881* (XJBI); Fuyun (富蕴) county, Koktogay. 17 VII 1977. *Kelimu 11322* (XJBI).

Saussurea orgaadayi is comparatively rare species of the upper belt of Altai mts. previously known from Russia (Altai Republic and Tuva) and Mongolia (Smirnov, 2004, 2007) and most closely related to *S. involucrata* (Kar. et Kir.) Sch. Bip. The two taxa can be distinguished as follows:

Petiolar remains of basal leaves of previous years split into numerous dark brown stripes to 2–3 mm wide. Stem leaves oblong or ovate-oblong. Bracts ovate-oblong to suborbicular, often broader than stem leaves. Calathidia 5–12; phyllaries glabrous, rarely sparsely pubescent apically or along midvein ... *S. involucrata*
Petiolar remains of basal leaves of previous years split into few yellowish brown stripes to 1 cm wide. Stem leaves and bracts lanceolate. Calathidia 8–20(25); phyllaries densely pubescent throughout ... *S. orgaadayi*

As previously suggested (Smirnov, 2004), the records of *S. involucrata* from Chinese Altai (Shen, 1996) based on the cited above specimens, belong to *S. orgaadayi*.

II. Species confirmed to occur in China

1. *Draba fladnizensis* Wulfen, 1779, in Jacq., Miscell. Austr. Bot. 1 : 147. Type: In editissimis supra Fladnizenses alpes rupestribus jugis Leitensteig, etc.; item in alpebus circa Reichenau, Garten, Koralpen, etc. (holotype, W). 福地葶苈

Distribution: NW China (Altai mts.), Mongolia, E Kazakhstan, Europe, Russia (Arctic regions, mts. of Siberia, Far East), N America.

China. Xinjiang (新疆): Habahe (哈巴河) (Kabinsky) range, 5–7 km to SE of Bai-Haba (Pyrbe), N slope of mt. Dzhata, 48°40'–48°41' N, 86°45'–86°50' E, alt. ca. 2400–2600 m, alpine tun-

dra. 1 VIII 2005. *SRAE 2005072* (ALTB, PE).

Additional collections studied: Burqin (布尔津) county, Tir Sha Han, alpine belt. 27 VII 1972. *Anonymous 472* (XJA); Altai Shan, Fuyun (富蕴) county, Da Qiao Lin Chang. 27 VII 1972. *Anonymous A721275* (XJA); Burqin county, vicinities of the lake Kanas, 2600 m a.s.l., near the glacier. 2 VII 1987. *Yang Chang-you, Wang Bing & Ma Xiao-qiang H87-0488 & 0522* (XJA); Altai (阿勒泰) county, vicinities of the lake Kanas, 2300 m a.s.l., alpine belt. 17 VII 1980. *Yang Chang-you 783* (XJA); Same locality, 22 VII 1980. *Yang Chang-you 1190* (XJA); Altai county, 2920 m a.s.l. 15 VII 1957. *Anonymous 196* (PE, right plant); Burqin county, 2570–2650 m a.s.l., alpine meadow. 4 VIII 1957. *Chen Sunli s. n.* (PE); [China, Xinjiang, Altai Shan, Temaïke town]: Mongolia, pass from Small Kairty to Small Ku-Irtys, talus slopes. 17 VII 1908. *V.V. Sapozhnikov s.n.* (TK).

Draba fladnizensis was already recorded from Chinese Altai in some previous treatments (e.g., Flora RPS, Flora Xinjiangensis) but it was not included into the latest Flora of China because its authors have not seen correctly determined material from China (Zhou et al., 2001). However, description and illustration of *D. fladnizensis* in both Fl. RPS (Lou, 1987 : 154, 160–161) and Fl. Xinjiang. (An, 1995 : 117–119) are accurate and, as shown here, the species is not rare in alpine belt of Chinese Altai. Distribution of *D. fladnizensis* in Xinjiang is probably wider since the species is known from Tian-Shan of Kazakhstan and its finding in Chinese part of Tian-Shan is also possible; at the same time, we agree with Zhou et al. (2001) that previous records of the species from other provinces of China are incorrect. From other Chinese *Draba* L. species, *D. fladnizensis* is readily distinguished by a combination of very sparse indumentum of few simple and rarely forked stalked trichomes at leaf margins, sometimes also at the top of adaxial side of leaf blades (up to complete absence of indumentum), white flowers and 1–2-leaved to leafless stems.

III. New records of rare species in China

1. *Swertia banzragczii* Sanczir, 1984, Novit. Syst. Pl. Vasc. 21 : 136. Type: Mongolia, Altai, Dayan-Nuur lake, in dwarf birch groves along southern shore, 26 VII 1977. *Ch. Sanczir, Z. Karamysheva et al. 1273* (holotype, LE) (黄绿獐牙菜新拟).

Distribution: NW China (Altai mts.), W Mongolia (Altai mts.).

China. Xinjiang (新疆): Habahe (哈巴河) (Kabinsky) range, 5–7 km to SE of Bai-Haba (Pyrbe), N slope of mt. Dzhata, 48°40'–48°41' N, 86°45'–86°50' E, alt. ca. 2400–2600 m, alpine tundra. 1 VIII 2005. *SRAE 2005080* (ALTB, PE).

Swertia banzragczii is closest to *S. obtusa* Ledeb.: similar to the latter species, it is characterized by presence of rhizomes, alternate cauline leaves (sometimes except uppermost), 2 fimbriate nectaries per corolla lobe, many-flowered inflorescence, 5-merous flowers, corolla readily exceeding calyx, discoid winged seeds, etc., but differs from the latter in having yellow-green corolla with violet dots and streaks inside (not grey-violet to dark-blue) with crenulate or apically emarginated (not entire) lobes.

The species is endemic to the southern portion of Altai mts. and until now it was only known from the system of Mongolian Altai. *Swertia banzragczii* is not included into any of the Chinese flor-

as (e. g., Ho, Pringle, 1995) but it is reported for China from two localities not far from Mongolian border (Grubov, 2002). Our collection from Habahe range (system of Southern Altai) represents the third gathering of the species in China and extends its distribution range to the west making it theoretically possible the finding of *S. banzragczii* also in Kazakhstan. The plant grows in alpine meadows and tundras, open larch woods, dwarf birch groves mostly in upper mountain belt.

2. *Valeriana martjanovii* Kryl., 1903, in Acta Horti Petrop. 21, 1 : 9. Type: [Russia], Altai, between upper reaches of Shavla and Maashei, 27 VI 1901. *P. Krylov s. n.* (lectotype, TK, designated by Balashova in Polozhij and Balashova, 1989 : 34; isolectotype, LE) (马氏缬草 新拟).

Distribution: NW China (Xinjiang: Altai & Tian-Shan mts.), Iran, Kazakhstan, W Mongolia, Russia (S Siberia), Tajikistan.

China. Xinjiang (新疆): Habahe (哈巴河) (Kabinsky) range, 5–7 km to SE of Bai-Haba (Pyrbe), N slope of mt. Dzhata, 48°40'–48°41' N, 86°45'–86°50' E, alt. ca. 2400–2600 m, alpine tundra. 1 VIII 2005. *SRAE 2005085* (ALTB, PE).

This species was not known from China until the recent time unless it was reported from the two localities in Manas region of Tian-Shan (Grubov, 2006). It is readily distinguished from other Chinese species of *Valeriana* L. by a combination of reduced rhizomes, fascicled roots 1.5–2 mm wide, often ascending glabrous scapes 5–25 cm tall, leaves with 1–2(3) pairs of ovate to ovate-lanceolate entire or subentire segments and petiolate terminal segment (rarely basal leaves undivided), 2–3 pairs of cauline leaves crowded in lower half of stem (lowermost pair with clasping petioles), linear obtuse, often sparsely ciliate or glandular bracteoles not exceeding fruits, inflorescence capitate in anthesis and expanding to paniculiform in fruit, rose corollas 3–4 mm long with short tube, glabrous narrowly ovate achenes ca. 4 mm long (grey, often with yellowish spots) and 16-rayed pappus ca. 6 mm long.

Valeriana martjanovii which is reported here for the first time for Chinese Altai, occupies open habitats in the upper mountain belt (morains, rock crevices, stony, gravelly and talus slopes, alpine tundra).

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