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The first record of *Melilotoides schischkinii* (Fabaceae) from Amur Region, Russia

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ABSTRACT

Information about a new locality of *Melilotoides schischkinii* (Vassilcz.) Soják (Fabaceae), a rare endemic to Amur Region, is provided in the article. The habitat of the plant and the status of its population in the region are described. The new locality is remote from the known range of the species, which significantly expands its distribution.

Keywords: *Melilotoides schischkinii*, Fabaceae, new finding, rare species, endemic, Amur Region

РЕЗЮМЕ

Колдаева М.Н., Калинкина В.А., Дарман Г.Ф. Первая находка *Melilotoides schischkinii* (Fabaceae) в Амурской области, Россия. Приведены сведения о новом местонахождении редкого эндемичного представителя сем. Fabaceae – *Melilotoides schischkinii* (Vassilcz.) Soják. Охарактеризовано местообитание вида и состояние популяции на территории Амурской области. Новое местонахождение значительно удалено от естественного ареала вида, что существенно расширяет его распространение.

Ключевые слова: *Melilotoides schischkinii*, Fabaceae, находка, редкий вид, эндемик, Амурская область

According to the latest revisions of the Far Eastern flora (Pavlova 1989, 2006), two species of the genus *Melilotoides* Heist. ex Fabr. are found in the Russian Far East: *M. ruthenica* (L.) Soják and *M. schischkinii* (Vassilcz.) Soják. *M. ruthenica* was first described by C. Linaeus in 1753 under the name *Trigonella ruthenica* (Linnaei 1753: 776). At different times, the species was placed in the genera *Medicago* L. (Ledebour 1842), *Melissitus* Medik. (Lachashvili 1958), *Turukhania* Vassilcz. (Pavlova 1989), and *Melilotoides* (Cherepanov 1995). For the Russian Far East, this species was first reported by Komarov & Klobukova-Alisova (1932) in the 'Key to the plants of the Eastern Region of the USSR' under the name *Medicago ruthenica* Ldb., which is a synonym to the Linnean species *Trigonella ruthenica*. Grossheim (1945) indicated that the species *Medicago ruthenica* from the Far East did not match the latter in traits, and he related the Far Eastern soecimens of "*Medicago ruthenica*" to the new species, *Trigonella korshinskyi* Grossh., endemic to the rocky slopes of the Zeya-Bureya region (Grossheim 1945). This decision was not supported by Pavlova (1989, 2006). Based on the significant morphological similarity and the overlap of their distribution ranges, Pavlova suggested *Trigonella korshinskyi* to be conspecific to *Melilotoides ruthenica*, and placed the name *Trigonella korshinskyi* as a synonym of the latter species (Pavlova 1989). Analysis the characters of the species, including those listed in the table (Table 1), supports this statement.

The species *Melilotoides schischkinii* was first mentioned for the Russian Far East also in the 'Key to plants of the Far Eastern Region of the USSR' (Komarov & Klobukova-Alisova 1932), but under the erroneous name *Medicago platycarpos* Ledeb. The latter has a great resemblance with *Melilotoides schischkinii* in size and shape of fruit, a character that distinguishes this species from other Far Eastern plants of the genus. The species independence of the authentic Far Eastern specimens was later confirmed by Vassilchenko (1951), who also described this plant under the name *Trigonella schischkinii* Vassilcz. The species was re-described by Voroschilov (1966) as *Medicago vassilczenkoi* Worosch. Subsequently, the priority name of the species underwent the same nomenclature changes as those noted above for *Melilotoides ruthenica* (Lachashvili 1958, Pavlova 1989, 2006, Cherepanov 1995).

The current range of *M. ruthenica* occupies the European part of Russia, the Caucasus, Siberia, and the eastern part of Amur Region (Pavlova 1989); *M. schischkinii* is endemic to the Sikhote-Alin mountain range (Pavlova 1989).

During a trip to the vicinities of the Bureyskaya Hydroelectric Power Plant (HPP) in September 2018, we found several specimens of the genus *Melilotoides* on the right bank of the Bureya River (Fig. 1, 2).

We compared the collected specimen with the original description and with related species whose ranges overlap (Table 1) and came to the conclusion that the finding should

Table 1. Comparative characteristics of three *Melilotoides* species and specimen found in new locality

Taxonomic character	*M. korshinskyi*	*M. ruthenica*	*M. schischkinii*	Specimen analyzed
Corolla length, mm	5–6*	5–6*	5–8* (5) 6–8 (9)**	–
Color of corolla of live petals	yellow with purple veins	yellow or almost purple	yellow with purple veins in the middle of vexillum	–
Corolla color in herbarium	turning blue	turning blue	from yellow to orange-yellow	–
Number of flowers per inflorescence	3–4*	4–8 (10)*	8–10 (12)* 5–10**	7–8**
Inflorescence type and raceme density	raceme, more or less dense	umbel-like raceme, more or less dense	umbel-like raceme, loose	umbel-like loose raceme
Fruit length, mm	11–12*	5–8 (12)* 8–10 (12)**	(8)10–15 (18)* (10–12) 15–20**	18–22(24)**
Fruit width, mm	4*	(2)4–5* 4–5**	(5) 6–8 (10)* 5–6**	8–9**

* Published data (Grossheim 1945, Pavlova 1989); ** authors' data

be identified as *M. schischkinii* based on such characters as the fruit size and the rostrum position.

Until recently, *M. schischkinii* has been known only from Primorye Territory (Pavlova 1989, 2006), where the localities of the species are confined to the southern and eastern macroslopes of the mountain system Sikhote-Alin (Fig. 2). The northernmost habitats of *M. schischkinii* in Primorsky Krai are located in the interfluve between the Malaya Kema and the Velikaya Kema rivers (Terney District), north of the Sikhote-Alin State Nature Biosphere Reserve. There are no collections of this plant from the territory of the reserve (Pimenova 2016). Recently, *M. schischkinii* has been collected by Kryukova (2013, p. 151) in the valley of the Pravyi Podhorenok River, Khabarovsk Territory, near the border with Primorye Territory (Fig. 2).

Within its range, the species tends to limestone outcrops, but can sometimes grow on slightly alkaline or neutral soil. The small area of habitats, the narrow ecological range of habitat conditions, and the relatively rare occurrence were the reasons for including *M. schischkinii* in the Red Data Book of Primorye Territory (Kozhevnikov 2008). Due to the stenotopic characteristics of the species, the weak competitive abilities, and the industrial development of its habitats (extraction of limestone), *M. schischkinii* has been given the conservation status of a vulnerable plant (VU). This species is not on the list of protected plants of Khabarovsk Territory, since its only locality was discovered there after the Red Data Book (Ishaev 2008) had been published.

The new locality of *M. schischkinii* on the right bank of the Bureya River is very remote (480 km) from the known

Figure 1 *Melilotoides schischkinii* (Vassilcz.) Soják in its habitat on the bank of Bureya River, Amur Region, 20.09.2018. A– general view, B – the infructescence.

Figure 2 Voucher of *Melilotoides schischkinii* (Vassilcz.) Soják. Place: Verkhnebureinskii District, vicinity of town Talakan, Bureya hydropower station, right bank of Bureya River, rocky cliff.

main range of the species (Fig. 3). All the earlier discovered localities of *M. schischkinii* were confined to the southern and central parts of the Sikhote Alin mountain system. For Amur Region and Jewish Autonomous Region, *M. schischkinii* has not been reported to date. Our finding substantially expands the known distribution range of this rare plant.

Below is a description of the habitat and conditions of the *M. schischkinii* coenopopulation found.

Amur Region, Bureya District, near Talakan Village, right bank of the Bureya River, 1500 m downstream of the Bureyskaya HPP (50°26.346'N 130°29.173'E, 151 m alt.), September 20, 2018. Collected by M.N. Koldaeva, V.A. Kalinkina, and G.F. Darman (Amur Branch of the Botanical Garden-Institute, ABGI).

The coenopopulation is located on the high bank of the Bureya River and occupies the southeastern aspect of a rocky cliff with large cracked boulders. The found *M. schischkinii* was represented mainly by large generative individuals that were growing in cracks of rocks. The generative plants had numerous dangling shoots with rising tops. In addition to *M. schischkinii*, cracks and ledges of the cliff were overgrown by grass and shrub species typical for communities forming on rock outcrops, such as *Allium maximowiczii* Regel, *Artemisia gmelinii* Weber ex Stechm., *A. selengensis* Turcz. ex Bess., *A. stolonifera* (Maxim.) Kom., *Aster maackii* Regel, *Bromopsis pumpelliana* (Scribn.) Holub, *Caragana manshurica* (Kom.) Kom., *Carex* sp., *Cystopteris fragilis* (L.) Bernh., *Dasiphora fruticosa* (L.) Rydb., *Eremogone juncea* (Bieb.) Fenzl, *Euonymus pauciflora* Maxim., *Heteropappus hispidus* (Thunb.) Less., *Philadelphus tenuifolius* Rupr. et Maxim., *Poa* sp., *Potentilla fragarioides* L., *Primula farinosa* L., *Pulsatilla cernua* (Thunb.) Bercht. ex J. Presl, *Rhododendron dauricum* L., *Valeriana fauriei* Briq., *Vicia amoena* Fisch., *Woodsia ilvensis* (L.) R. Br., and green mosses.

Amur Region is located at the boundary between the Circumboreal and East Asian floristic regions (Tahtajan 1979, Krestov et al. 2005, Starchenko 2009). However, by characteristics of the flora, the Bureya River valley is referred rather to the East Asian floristic region. In the flora in the Bureya River valley, families Fabaceae (to which the found plant belongs), Lamiaceae, and Caryophyllaceae show a markedly increased species diversity and a significant coenotic role (Strachenko et al. 2015).

These families comprise a significant number of light-demanding and drought-tolerant species with xeromorphic characters, tending to montane and rocky habitats (Galanin 1979, Khokhryakov 2000, Starchenko 2008). Along with the nemoral vegetation of zonal types, the increase in the number of xeromorphic species is partly a consequence of the historically formed transitory function of the Amur River valley. Species and communities of the continental steppe flora from northern China, Mongolia, Transbaikalia, and South Siberia penetrate into the forest zone across the Amur Valley. Similarly, xeromorphic species of steppe plants are distributed further along the major Amur tributaries, including the Bureya River.

As floristic studies show, the Bureya River valley appears to be a natural biogeographical boundary for many nemoral species (Starchenko et al. 2015) including our finding. The relatively small area of the Bureya Valley accommodates several endemic species, two of them, *Saxifraga korshinskii* Kom. and *Taraxacum lineare* Worosch. et Schaga are narrow local endemics to the Bureya Valley and are confined to the humid rocks of the steep sides of the valley. All of them, including *M. schischkinii*, are a part of the rocky-stony complex, and this fact is emphasizes the significance of rock clif ecotopes as environmental refugia, and their significant role in the formation of the biological diversity of the territory.

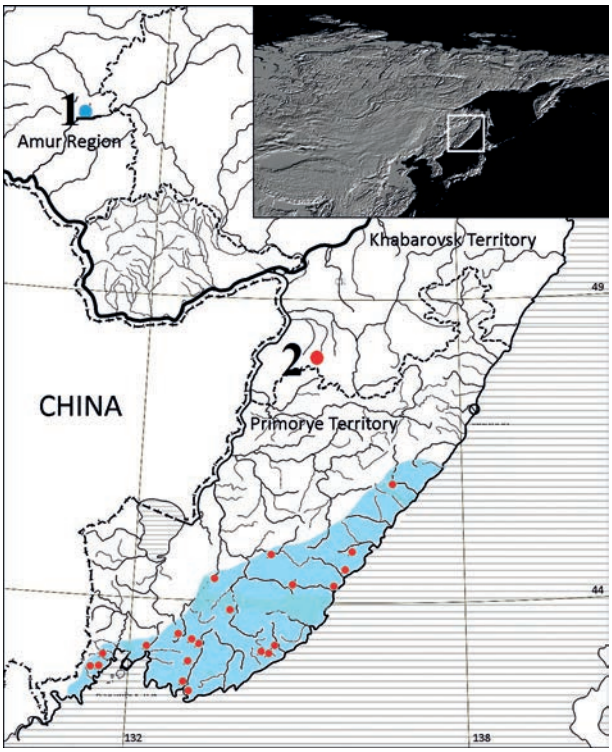

Figure 3 The range of *Melilotoides schischkinii* (Vassilcz.) Soják. 1 – new locality, 2 – the site of collection of *M. schischkinii* by M.V. Kryukova in Khabarovsk Teritory

This finding of a rare species new to Amur Region in the Bureya River valley is apparently not accidental. According to Starchenko et al. (2015), this area is characterized by a high level of biodiversity exposed to specific climatic, geographical, and orographic conditions. Moreover, this area hosts a high concentration of rare species, which determines its importance for solving biodiversity conservation issues.

LITERATURE CITED

Cherepanov, S.G. 1995. *Vascular plants of Russia and neighboring countries (in the former USSR).* "Mir i Semiya-95", St. Petersburg, 992 pp. (in Russian) [Черепанов С.Г. 1995. Сосудистые растения России и сопредельных государств (в пределах бывшего СССР). СПб: "Мир и семья-95". 992 с.]

Galanin, A.V. 1979. Ecotopological structure of the flora of Kurkure range (Eastern Altai). *Botanicheskii Zhurnal* 64(10):1401–1413 (in Russian with English abstract). [Галанин А.В. 1979. Экотопологическая структура флоры хребта Куркуре (восточный Алтай // Ботанический журнал. Т. 64, № 10. С. 1401–1413].

Grossheim, A.A. 1945. *Trigonella.* In: *Flora of the USSR, vol. 11* (B.K. Schischkin, ed.), pp. 102–129, Izdatel'stvo AN SSSR, Moskva, Leningrad (in Russian). [Гроссгейм А.А. 1945. *Trigonella* L. // Флора СССР / под ред. Б.К. Шишкина М.; Л.: Изд-во АН СССР. , Т. 11. С. 102–129].

Fabricii, Ph.C. 1763. *Enumeratio methodica plantarvm.* Litteris Ioannis Drimbornii, Helmstadii. 304 pp.

Ishaev, V.I. (ed.). 2008. *Red Data Book of the Khabarovsk Territory: rare and endangered species of plants and animals*. Priamurskie vedomosti, Khabarovsk, 632 pp. (in Russian). [Красная книга Хабаровского края. Редкие и находящиеся под угрозой исчезновения виды растений и животных / Ишаев В.И. (предс. ред. коллегии). 2008. Хабаровск: Приамурские ведомости. 632 с.].

Khokhryakov, A.P. 2000. Taxonomic spectra and their role in comparative floristics. *Botanicheskii Zhurnal* 85(5):1–11 (in Russian with English abstract). [Хохряков А.П. 2000. Таксономические спектры и их роль в сравнительной флористике // Ботанический журнал. Т. 85, № 5. С. 1–11.]

Komarov, V.L. & E.N. Klobukova-Alisova 1932. Key to plants of the Far Eastern Region of the USSR. AN SSSR, Leningrad. 1175 pp. (in Russian) [Комаров В.Л., Клобукова-Алисова Е.Н. 1932. Определитель растений Дальневосточного края. Л.: АН СССР. 1175 с.].

Kozhevnikov, A.E. (ed). 2008. *Red Data Book of Primorye Territory: Plants. Rare and endangered species of plants and fungi.* AVK "Apel'sin", Vladivostok, 688 pp. (in Russian). [Красная книга Приморского края: Растения. Редкие и находящиеся под угрозой исчезновения виды растений и грибов / под ред. А.Е. Кожевникова. 2008. Владивосток: АВК «Апельсин». 688 с.].

Krestov, P.V., V.Yu. Barkalov, A.M. Omelko, V.V. Yakubov, Yu. Nakamura & K. Sato 2005. Proposals to the floristic zoning of North Asia based on a comparative analysis of floras at the generic level. *V.L. Komarov Memorial Lectures* 51:15–56 (in Russian). [Крестов П.В., Баркалов В.Ю., Омелько А.М., Якубов В.В., Накамура Ю., Сато К. 2005. Предложения к флористическому районированию северной Азии на основе сравнительного анализа флор на родовом уровне // Комаровские чтения. Вып. 51. С. 15–56.]

Kryukova, M.V. 2013. *Vascular plants of the Lower Amur*. Dal'nauka, Vladivostok, 354 pp. (in Russian). [Крюкова М.В. 2013. Сосудистые растения Нижнего Приамурья. Владивосток: Дальнаука. 354 с.]

Lachashvili, I.Ya. 1958. On one forgotten genus (*Melissitus* Medik.). *Trudy Tbilisskogo botanicheskogo instituta* 19:3–29 (in Russian) [Лачашвили И.Я. 1958. Об одном забытом роде (*Melissitus* Medik.) // Тр. Тбилисского ботанического института. Вып. 19. С. 3–29].

Ledebour, C.F. 1842. *Medicago* L. In: *Flora Rossica, sive Enumeratio Plantarum in totius imperii Rossici, vol. 1*, pp. 523–625, Sumtibus Librariae E. Schweizerbart, Stuttgartiae.

Linnaei, C. 1753. *Species plantarum, vol. 2,* pp. 561–1231. Impensis Laurentii Salvii, Holmiae.

Pavlova, N.S. 1989. Fabaceae. In: *Vascular plants of the Soviet Far East, vol. 4* (S.S. Kharkevich, ed.), pp. 191–339, Nauka, Leningrad (in Russian). [Павлова Н.С. 1989. Бобовые – Fabaceae // Сосудистые растения советского Дальнего Востока / отв. ред. С.С. Харкевич. Л.: Наука. Т. 4. С. 191–339.]

Pavlova, N.S. 2006. Fabaceae. In: *Flora of the Russian Far East: Additions and changes to the publication "Vascular plants of the Soviet Far East". vols. 1–8 (1985–1996)* (A.E. Kozhevnikov & N.S. Probatova, eds), pp. 168–182, Dal'nauka, Vladivostok (in Russian). [Павлова Н.С. 2006. Сем. Бобовые – Fabaceae // Флора российского Дальнего Востока: Дополнения и изменения к изданию «Сосудистые растения советского Дальнего Востока». Т. 1–8 (1985–1996). Владивосток: Дальнаука. С. 168–182].

Pimenova, E.A. 2016. Vascular plants. In: *Plants, fungi and lichens of the Sikhote-Alin reserve* (Pimenova E.A., ed.), pp. 172–365, Dal'nauka, Vladivostok (in Russian with English abstract). [Пименова Е.А. 2016. Сосудистые растения // Растения, грибы и лишайники Сихотэ-Алинского заповедника / под ред. Е.А. Пименовой. Владивосток: Дальнаука. С. 172–365].

Starchenko, V.M. 2008. *Flora of the Amur Region and the issues of its protection: the Far East of Russia.* Nauka, Moscow. 228 pp. (in Russian). [Старченко В.М. 2008. Флора Амурской области и вопросы ее охраны: Дальний Восток России. М.: Наука. 228 с.].

Starchenko, V.M. 2009. Taxonomic analysis of the aboriginal flora of Amur Oblast. *V.L. Komarov Memorial Lectures* 56:152–169 (in Russian). [Старченко В.М. 2009. Таксономический анализ аборигенной флоры Амурской области // Комаровские чтения. Вып. 56. Владивосток: Дальнаука. С. 152–169.]

Starchenko, V.M., G.F. Darman & I.G. Borisova 2015. Flora of the Bureya River Valley (Amur Oblast). *V.L. Komarov Memorial Lectures* 63:69–98 (in Russian). [Старченко В.М., Дарман Г.Ф., Борисова И.Г. 2015. Флора долины реки Буреи (Амурская область) // Комаровские чтения. Вып. 63. Владивосток: Дальнаука. С. 69–98].

Tahtajan, A.L. 1978. *Floristic Regions of the Earth*. Nauka, Leningrad, 248 pp. (in Russian). [Тахтаджян А.Л. 1978. Флористические области Земли. Л.: Наука. 248 с.].

Vassilchenko, I.T. 1951. *Trigonellae* generis species et sections nova. *Notulae Systematicae ex Herbario institute Botanici Nomine V.L. Komarovii Academiae scientiarus URSS* 14:229–235 (in Russian). [Васильченко И.Т. 1951. Новые виды и секции рода пажитник // Ботанические материалы гербария Ботанического института им. В.Л. Комарова. Т. 14. С. 229–235].

Voroschilov, V.N. 1966. *Flora of the Soviet Far East*. Nauka, Moscow. 477 pp. (in Russian). [Ворошилов В.Н. 1966. Флора советского Дальнего Востока. М.: Наука. 477 с.].