



УДК 582.683.2(574/575)

On the taxonomy and diversity of Cruciferae in Kazakhstan

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Keywords: Brassicaceae, *Draba*, *Isatis*, *Noccaea*, Middle Asia, *Smelowskia*, *Sophiopsis*, species identity, state records and deletions, synonymy, *Thlaspi*.

Summary. Taxonomy and species diversity of the mustard family (Cruciferae or Brassicaceae) in Kazakhstan is updated. *Draba bajtenovii* described and hitherto known from Kungei Alatau is synonymized with *D. fladnizensis* for which it is a southern limit of distribution in the Eurasia, while Trans-Ili Alatau endemic *D. microcarpella* is found conspecific with a montane Asian *D. lanceolata*. *Noccaea thlaspidioides* (*N. cochleariformis*) is confirmed to occur in the country based on collections from Altai. Finally, *Isatis trachycarpa* and *Smelowskia annua* are shown to be absent in the flora of Kazakhstan due to the lack of gatherings confirming their occurrence in the country.

К систематике и видовому составу крестоцветных (Cruciferae) Казахстана

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Ключевые слова: видовая принадлежность, исключение из состава флоры, синонимика, Средняя Азия, флористические находки, Brassicaceae, *Draba*, *Isatis*, *Noccaea*, *Smelowskia*, *Sophiopsis*, *Thlaspi*.

Аннотация. Уточнён видовой состав крестоцветных (Cruciferae, или Brassicaceae) Казахстана. Два вида рода *Draba*, считавшихся эндемиками страны (*D. bajtenovii* и *D. microcarpella*, известные по единичным сборам из Кунгей и Заилийского Алатау), синонимизированы, соответственно, с арктомонтанным *D. fladnizensis*, для которого данное местонахождение является самым южным в Евразии, и нагорноазиатским *D. lanceolata*. *Noccaea thlaspidioides* (*N. cochleariformis*), факт произрастания которого в Казахстане ранее не подтверждался, вновь включён в список видов природной флоры РК благодаря наличию образцов из казахстанской части Алтая. Нахождение во флоре страны *Isatis trachycarpa* и *Smelowskia annua*, напротив, не получает подтверждения по причине отсутствия сборов с территории Казахстана.

Revision of Cruciferae Juss. (Brassicaceae Burnett) collections from Kazakhstan in AA, LE, MW and the herbarium of Altai Botanical Garden (Ridder) revealed the need of correcting the species list of the family in the country. Relevant updates, viz. relegation of two previously accepted names to synonymy as well as exclusion/re-inclusion of species from/into the flora of Kazakhstan are presented below.

1. Taxonomic novations

Draba fladnizensis Wulfen, 1779, in Jacq., Miscell. Austr. Bot. 1: 147.

Described from the Alps: “in editissimis supra Fladnizenses alpes rupestribus jugis Leitensteig, etc.; item in alpebus circa Reichenau, Garten, Koralpen, etc.”.

Original material: “e monte Flatnitz Carinthiae [Jacquin]” (W, G-DC).

= *Draba bajtenovii* Veselova, 1997, Izv. Min. Nauki Akad. Nauk Resp. Kazakhstan, Ser. Biol. Med. 1997, 2 (200): 60, **syn. nov.**

Typus: [Kazakhstan]: “Northern Tian Shan, southern [actually northern] macroslope of Kungei Alatau, [Kuturga Gorge], alpine belt, stony & gravelly slope, ca. 3500 m a. s. l. 20 VII 1996. P. V. Veselova” (AA!).

Being relatively lax-cespitose plant with numerous elongated creeping shoots somewhat reminding those of *D. sibirica* (Pall.) Thell., the type of *D. bajtenovii* was compared with the latter species (Veselova, 1997) and not with normally very compact, dense-cespitose plants of *D. fladnizensis*. However, in all basic morphological features (indumentum of exclusively simple ciliae confined to leaf margins, slender, leafless or 1-leaved flowering stems to 4.5 cm tall, few-flowered, moderately elongating racemes, white petals to 3.5 mm, oblong-elliptic silicles 6–7 × 2 mm on divaricate pedicels, etc.) it fits the latter species. Somewhat unusual appearance of *D. bajtenovii* is perfectly explained by the character of its habit (in shadow places, under boulders). We therefore consider it a shady form of *D. fladnizensis* not to be distinguished from the latter taxonomically. Having previous corrections of the species range in Middle Asia (Kovalevskaya, 1974; German et al., 2013) in mind, the type locality of *D. bajtenovii* represents southern limit of distribution of *D. fladnizensis* in Eurasia.

Draba lanceolata Royle, 1834, Illustr. Bot. Himal. Mts. 1: 72.

Described from Himalayas: “Shalkur”.

Lectotypus (Al-Shehbaz, 2015a: 14): “*D. lanceolata* Royle. N. W. India [Shalkur, J. F. Royle]. Herb. Royle” (K: K000568101!, iso – DD).

= *D. microcarpella* A. Vassil. et Golosk., 1960, Vestnik Akad. Nauk Kazakh. SSR 1960, 1 (178): 89, 90, **syn. nov.**

Typus: “Trans-Ili Alatau, basin of West Talgar, contemporary poorly matted moraines of Bogdanovich Glacier, 3350 m. 17 VIII 1943. V. P. Goloskokov” (AA!, iso – LE!).

The authors of this species, in our opinion, were right in comparing it with *D. lanceolata* (Vassiljeva, Goloskokov, 1960) and mentioning the only difference from the latter in fruit shape and dimensions (ovate, 3–4 mm long [oblong-ovate, 3.8–4.9 mm according to our data] [vs. lanceolate to lanceolate-linear, (6)7–12(20) mm (Al-Shehbaz, 2015b)]). Weak reliability of such distinction was discussed in detail by Kovalevskaya (1974: 177) who assumed conspecificity of the two species but tentatively accepted *D. microcarpella* pleading for the need of accumulation of additional material from Trans-Ili Alatau in order to firmly solve the problem. Although no collections of plants corresponding the unusual Goloskokov’s specimens from Bogdanovich Glacier were repeated in subsequent decades, we believe that Kovalevskaya’s assumption is correct. It should be added that hitherto unreported reason for untypical shape and small size of silicles of *D. microcarpella* is their full sterility: all ovules in several studied fruits are aborted. This fact opens the doors for hypothesizing the hybrid nature of the discussed taxon and morphologically close *D. lasiophylla* Royle might be assumed as possible second parental species. Such features as short (to 3 mm) pedicels and number of ovules (8–12 per locule) intermediate between *D. lanceolata* and *D. lasiophylla* would favour this hypothesis. However, we find it more reasonable to rely on the overall morphology (in particular, indumentum of silicles of 2–3–4-rayed trichomes and distinct styles ca. 0.5 mm long) and therefore reduce *D. microcarpella* to synonymy of *D. lanceolata* admitting that further studies might support other hypotheses. In any case, species status of *D. microcarpella* does not find confirmation and its soonest exclusion from the Red Data Book of Kazakhstan (Nesterova, 2014) is strongly recommended.

2. Updates to the checklist of Cruciferae of Kazakhstan

Noccaea thlaspidioides (Pall.) F. K. Mey. (*Thlaspi thlaspidioides* (Pall.) Kitag., *Th. cochleariforme* DC., *N. cochleariformis* (DC.) Á. Löve et D. Löve)

“Sarym-Sakty Range, pass Burkhat, 2200 m. *Dryas-Kobresia* tundra. 15 July [19]84, [Yu. A. Kotukhov]”; “Narymsky Range, southern steppe slope, 2150 m a. s. l. 2 August 1968. Yu. Kotukhov” (both – herbarium of Altai Botanical Garden, Ridder!).

Formerly this species was multiple times (Busch, 1913; Krylov, 1931; Vasilyeva, 1961; Vinogradova, 1974; Goloskokov, 1984; Abdulina, 1999; Kotukhov et al., 2002; etc.) reported for Kazakhstan unless German (2008) [in agreement with subsequent data of Meyer (2010)] revealed that all revised gatherings belong to *N. ferganensis* (N. Busch) Czer. and occurrence of *N. thlaspidioides* in the country could not be confirmed. However, it was noted that treatment of some temporarily inaccessible collections from Altai Mts. in the herbarium of Altai Botanical Garden (Ridder) might prove the contrary because of high similarity of geographic conditions and flora of adjacent parts of Kazakhstani and Russian Altai where *N. thlaspidioides* is rather common. Recent check of relevant collections confirmed this assumption. To be noted, subsequent records of the species from other parts of the country (e. g., Mukhtubayeva, 2017) are not supported by correctly identified material and occurrence of *N. thlaspidioides* in Kazakhstan outside Altai is very unlikely.

Isatis trachycarpa Trautv.

According to the basic treatments on the flora of Kazakhstan, the species is known in the country from Caspian, Bukeyevsky and Kyzyl-Kum botanical-geographic regions (Vasilyeva, 1961, 1969), and some more recent publications (Aralbayev et al., 2002; Shormanova et al., 2013) also list *I. trachycarpa*. At the same time, no specimens confirming this information are available in the studied herbaria (the only gathering with such identification from Kazakhstan, “Western Kyzyl-Kym, 70 km to the north-east from Amu-Darya. 16 May 1978. M. S. Baitenov” (AA) is a misidentified plant of *I. emarginata* Kar. et Kir.). Evidently, relevant data in the Flora of Kazakhstan as well as in the Flora of Turkmenistan (Vassilczenko, 1948) were based on the information from the Flora of USSR where distribution of *I. trachycarpa* is given as follows: “Middle Asia: Aral-Caspian, Kara-Kum, Kyzyl-Kum” (Busch, 1939). Material studied demonstrates occurrence

of the species in Kara-Kum and exclusively Turkmenian part of Aral-Caspian region as well as in Mountainous Turkmenian region of the Flora of USSR, where most of the specimens originate from, but not in Kyzyl-Kum. This fully agrees with subsequent treatments on Turkmenistan (Gudkova, 1985; Nikitin, Geldikhanov, 1988), the only Middle Asian country where the discussed species is proven to occur. Its finding in Kazakhstan does not seem likely, although one locality (Kumsebshen sands) reported by Nikitin & Geldikhanov (1988) is situated close to the border with Kazakhstan. However, this northernmost locality is considerably remote from others and identity of relevant specimen, missing in the herbaria consulted, needs verification.

Noteworthy, with the present exclusion of *I. trachycarpa*, the number of species of *Isatis* L. s. str. in Kazakhstan decreased to five which is twice less compared to 11 reported by Vasilyeva (1961, 1969) and nine by Abdulina (1999) first of all due to broader concept of *I. costata* C. A. Mey. (Nabiev, 1974) and *I. emarginata* Kar. et Kir. (Jafri, 1956) adopted here and subsequent synonymizing with these species of endemic *I. frutescens* Kar. et Kir. (German, 2006) and *I. maxima* N. Pavl. (Vesselova, 2010), respectively.

Smelowskia annua Rupr. (*Sophiopsis annua* (Rupr.) O. E. Schulz)

Similarly to the above case, revision of available material made it evident that information on occurrence of the species in Kazakhstan (Vasilyeva, 1961, 1969; Goloskokov, 1984; Aralbayev et al., 2002) derives from the data of the Flora of USSR where *S. annua* is reported, in particular, for Dzhungarian-Tarbagatai and Tian Shan regions of relevant treatment (Busch, 1939). According to the herbarium collections, all gatherings from the part of Tian Shan covered by the Flora of USSR, originate from Kyrgyzstan and Uzbekistan while no specimens from both Dzhungarian Alatau and Tarbagatai do exist. As a result, presence of the species in the flora of Kazakhstan cannot be confirmed.

Worth mentioning, distribution of its closest congener, *S. sisymbrioides* (Regel et Herd.) Lipsky, in the country also requires correction. Unlike *S. annua*, its occurrence in Kazakhstan is not questioned, but it is much less widely distributed compared to the information given in relevant publications (Busch, 1939 [Balkhash district]; Vasilyeva, 1961, 1969; Goloskokov, 1984; Aralbayev et al., 2002; Shormanova et al., 2013) being confined to the ultimate south-east (eastern part of Ili & Kungei Alatau and Ketmen & Terskey Alatau floristic regions).

Acknowledgements

The authors are grateful to curators and responsible managers of all visited herbaria for the opportunity of treating the collections. The study was supported by the Ministry of Science and Higher Education of Russian Federation (project No. FZMW-2020-0003) and the Ministry of Ecology, Geology and Natural Resources of Kazakhstan (topic BR10264557, program code O.0986). / Выражаем признательность кураторам посещённых гербариев и их отделов за предоставленную

возможность обработки коллекций. Работа выполнена в рамках реализации государственного задания Министерства науки и высшего образования Российской Федерации (тема № FZMW-2020-0003) и научно-технической программы BR10264557 «Кадастровая оценка современного экологического состояния флоры и растительных ресурсов Алматинской области как научная основа для эффективного управления ресурсным потенциалом» (шифр программы O.0986).

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