

Research article

Taxonomic corrections and new records for vascular plants of Kyrgyzstan, 6

Alexander N. Sennikov¹✉, Georgy A. Lazkov^{2,3}, Myskalai R. Ganybaeva², Nikolai Friesen⁴ and Dmitry A. German⁵

¹Botanical Museum, Finnish Museum of Natural History, University of Helsinki, Finland

²Laboratory of Flora, Institute of Biology, Kyrgyz Academy of Sciences, Bishkek, Kyrgyzstan

³Research Center for Ecology and Environment of Central Asia, Bishkek, Kyrgyzstan

⁴Botanical Garden, University of Osnabrück, Osnabrück, Germany

⁵South-Siberian Botanical Garden, Altai State University, Barnaul, Russia

Correspondence: Alexander N. Sennikov (alexander.sennikov@helsinki.fi)

Nordic Journal of Botany

2025: e04731

doi: [10.1002/njb.04731](https://doi.org/10.1002/njb.04731)

Subject Editor: Torbjörn Tyler

Editor-in-Chief: Torbjörn Tyler

Accepted 25 February 2025

Published 29 April 2025



A series of notes on taxonomy, nomenclature, morphology and distributions of native species of vascular plants in Kyrgyzstan is presented. *Anaphalis roseoalba* is treated as a synonym of *A. virgata*; *Hippolytia herderi* and *H. megacephala* are new synonyms of *H. senecionis*; *Hippolytia darvasica* and *H. schugnanica* are new synonyms of *H. tomentosa*; *Campanula capusii* is a synonym of *C. lehmanniana*. *Allium polyphyllum* is the correct name for a species related to *A. carolinianum*, which occurs in the Tian-Shan. *Hedysarum ledebourii* is the correct name for the illegitimate *H. neglectum*. *Iris* sect. *Cristatae* has priority over *Iris* sect. *Juno*, whereas *Isis* is established as the correct generic name for *Phaeiris*. *Veronica tenuissima* is a superfluous replacement for *V. tetraphylla*. *Stachys nana* is proposed as a new combination for the species previously known as *Hypogomphia turkestanica*. The illegitimate generic name *Chaetolimon* (Bunge) Lincz. is replaced by the new generic name *Hissarolimon*, for which two species-level combinations are also provided. Authorship and nomenclature are clarified or corrected for seven names; spelling is corrected for one name. Lectotypes are designated for four names. Ten species are reported as new to the country, and the presence of one species is confirmed. Two species are excluded from the flora of Kyrgyzstan, and one species is excluded from the flora of Uzbekistan. Range extensions in Kyrgyzstan are reported for seven species. Distributions in Kyrgyzstan are verified and mapped for seven species. Complete distribution ranges are mapped for four species. The IUCN conservation status of *Iris austrotschatkalica* is assessed as 'Critically Endangered' because its known populations are distantly located and severely affected by land use and development. With these additions and corrections, the total number of vascular plant species in Kyrgyzstan reaches 4043.

Keywords: botanical nomenclature, Central Asia, distribution, IUCN conservation status, lectotypification, synonymy



www.nordicbotany.org

© 2025 The Author(s). Nordic Journal of Botany published by John Wiley & Sons Ltd on behalf of Nordic Society Oikos.

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

Introduction

The mountainous Central Asia is a global biodiversity hotspot (Mittermeier et al. 2011). Its exceptional plant diversity has been in focus of regular botanical research since the Soviet times (Kamelin 1973). Kyrgyzstan is almost entirely mountainous and embraces large portions of the two greatest mountain systems of Central Asia, the Tian-Shan and Pamir-Alay, which account for the high number of vascular plants found in the country (Kamelin 2002). According to the latest published count, 4036 species of vascular plants have been registered in Kyrgyzstan (Ma et al. 2024).

After a short break caused by the post-Soviet social depression, which influenced the whole of Central Asia (Sennikov et al. 2016), inventories of the plant diversity in Kyrgyzstan were marked by two editions of the checklist of vascular plants (Lazkov and Sultanova 2011, 2014), which were prepared at the Institute of Biology, National Academy of Sciences of Kyrgyzstan, with the participation of botanists from the University of Helsinki. Since then, a number of important contributions appeared, most notably on the taxonomy of Lamiaceae (Lazkov 2011, 2016). Plant protection was a key part of the botanical research, focusing on areas of the Eastern Tian-Shan (Lazkov et al. 2016), the Sary-Chelek Nature Reserve (Lazkov and Ganybaeva 2023) and certain taxonomic groups of conservation interest (Wilson et al. 2021). Recently, a major compilation summarised the plant diversity in the Tian-Shan (Sennikov and Tojibaev 2021), which covered the greatest part of Kyrgyzstan with the exception of its south-western portion. Scientific publications were complemented by popular books, intended to raise awareness of plant diversity in the broad public and to promote citizen science in the country (Naumenko and Lazkov 2012, Lazkov and Umralina 2015).

Plant endemism is a key feature in biogeographical assessments (Hobohm et al. 2013), but its patterns have never been quantified in Kyrgyzstan, with the first steps being taken in the Fergana Valley (Tojibaev et al. 2023). The high number of endemic plants in Kyrgyzstan, estimated at 326 species, i.e. 8% of the total flora (Ma et al. 2024), contributes to a continuous flow of new species discovered in the country. In the latest ten years, new endemic species were described in Amaryllidaceae (Sennikov and Lazkov 2013a, Krasovskaya 2018), Asteraceae (Lazkov and Sennikov 2019), Euphorbiaceae (Lazkov and Sennikov 2018), Fabaceae (Sytnin and Lazkov 2018), Lamiaceae (Lazkov 2019), Liliaceae (Levichev et al. 2019, Wilson et al. 2022) and Polygonaceae (Lazkov et al. 2020).

The present collection of taxonomic, nomenclatural and distributional novelties for vascular plants of Kyrgyzstan continues a series of floristic contributions (Sennikov et al. 2011, Sennikov and Lazkov 2013b, Lazkov et al. 2014, Lazkov and Sennikov 2015, 2017a). Adding to these, taxonomic inventories (Lazkov and Sennikov 2017b, Sennikov and Lazkov 2023) and nomenclatural corrections (Sennikov 2022, 2024a), which has been based on the current fieldwork and herbarium research, have been published. This

series is mostly focused on native species, whereas the alien plants of Kyrgyzstan, which have been recently inventoried by Sennikov and Lazkov (2024), have been reported separately (Lazkov and Sennikov 2014) and have been detailed in a continuing series of dedicated contributions (Sennikov and Lazkov 2021, 2022, Sennikov et al. 2025a).

In the present contribution, we propose taxonomic corrections in genera which have been recently subjected to phylogenetic studies or taxonomic revisions. Nomenclatural corrections are supplied to clarify cases of illegitimacy, places of valid publication and spelling of plant names, although nomenclatural types are sparingly cited because typifications and research on type specimens are outside the scope of this contribution. New country-level distributional records are provided in the context of plant distributions in Central Asia; range extensions within the country are given when a certain distribution extends to another phytogeographic region, as defined by Sennikov and Lazkov (2021).

The novelties and amendments provided in the present notes contribute to the checklist of vascular plants of Kyrgyzstan (Lazkov and Sultanova 2014), a new edition of which is currently in preparation.

Material and methods

New records in this contribution are based on the authors' ongoing fieldwork in Kyrgyzstan and their revision of herbarium specimens collected from the country and kept at FRU, H, LE, MW and TASH (herbarium acronyms according to Index Herbariorum, <https://sweetgum.nybg.org/science/ih/>). Specimen-based distributional data is supplemented with the use of the online citizen-science platforms Plantarium (www.plantarium.ru) and iNaturalist (<https://www.inaturalist.org/>). A vast corpus of botanical literature has been examined to verify taxonomic identities and distributional information. Nomenclatural decisions are based on the Shenzhen Code, ICN (Turland et al. 2018).

Species distribution data were derived from published records in botanical literature, herbarium collections and documented observations, whose taxonomic identity has been verified by the authors. Species distributions within the country were cross-checked against the information published in the national Flora (Schischkin 1950, 1952, Vvedensky 1951, 1953, 1955a, 1955b, 1957, 1959, 1960, 1962, 1965, 1952, Vykhodtsev 1967, Lebedeva 1970) and the generalised data in the national checklist (Lazkov and Sultanova 2014), with numerous additions and corrections published elsewhere. As Kyrgyzstan is a predominantly mountainous country, species distributions are traditionally detailed to mountain ranges in our work. Distribution patterns in the country refer to the updated scheme of major phytogeographic regions of Kyrgyzstan (Sennikov and Tojibaev 2021, Sennikov and Lazkov 2021).

The material is organised as an annotated checklist, alphabetically according to families, genera, species and infraspecific taxa. Nomenclatural synonyms and typifications are

provided mostly for taxonomic and nomenclatural novelties. Lists of specimens examined and documented observations support the distributional information in Kyrgyzstan and, when possible, in Central Asia. Distribution maps are based on the revised specimens and observations, which have been georeferenced ad hoc using available gazetteers and printed and online maps; the distributional data have been formatted according to the Darwin Core Standard and assembled in a publicly available dataset (Sennikov and Lazkov 2025).

Taxonomic treatment

Amaryllidaceae

Allium polyphyllum Kar. and Kir. (Karelin and Kirilov 1842, p. 509)

Type: Kazakhstan. ‘In lapidosis subalpinis Alatau et fl. Sarchan’, 1841, Karelin, Kirilov 2030 (lectotype LE, designated by Gubanov et al. (1998, p. 18); isolectotype LE).

Previously misapplied name: *Allium carolinianum* auct. non DC.

Allium carolinianum DC. is the type species of *A.* sect. *Falcatifolia* N.Friesen, which includes a few species of *A.* subgen. *Polyprason* Radić with coriaceous or scarious tunics and flat leaves (Friesen et al. 2006). This species is considered to occur from the western Tibet and Himalayas through the Pamir, Hissar-Alay and Tian-Shan to the Altai mountains, thus covering the territories of Afghanistan, China, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Tajikistan, Uzbekistan (Stearn 1960, Wendelbo 1971, Nasir 1975, Egorova 1977, Xu and Kamelin 2000, Oyuntsetseg et al. 2013).

The species name *A. carolinianum* has been highly controversial. A.-P. de Candolle described this species in an illustrated book by P. J. Redouté (1804), who was a botanical artist based in Paris (Stafleu and Cowan 1983). The plant was described from cultivation in the private botanical garden of Jacques-Philippe-Martin Cels (1740–1806), a plant enthusiast and amateur botanist, which was situated near Montrouge, now in Hauts-de-Seine Department, Île-de-France Region. As inferred in the species name, the seeds of *A. carolinianum* were supposed to have originated from ‘Carolina’, where Louis Augustin Guillaume Bosc (1759–1828), a French naturalist based in Paris, collected many objects of natural history including plants during his stay at Charleston (South Carolina, USA) from October 1796 till August 1798 (Beale 1978, Dolan 2020). At his return to Paris, Bosc handed over his plant seeds to Cels, who therefore had successfully grown a number of American plants which became scientifically known from Cels’s garden (Callmander et al. 2017). As evident from Redouté (1804), *A. carolinianum* had been cultivated in this garden for a few years and, during that period, something was seemingly mixed up and the American label became attached to a different seed.

Wallich (1832) described another new species from the Himalayas, *A. blandum* Wall., which he considered to be very

close to but still sufficiently distinct from *A. carolinianum*. Regel (1875, p. 130) stated that the two species are actually conspecific and the alleged American provenance of *A. carolinianum* was a mistake. Watson (1879), an American researcher of *Allium*, accepted this conclusion. Wendelbo (1958) and Stearn (1960) expanded the species circumscription with the inclusion of *A. aitchisonii* Boiss., *A. obtusifolium* Klotzsch, *A. polyphyllum* Kar. and Kir., *A. thomsonii* Baker, thus making it one of the most widely distributed species of *Allium* in the mountainous Asia. This broad treatment has been commonly followed (Dasgupta 2006) but with possible exclusion of *A. blandum* (Vvedensky 1971, Egorova 1977, Xu and Kamelin 2000).

Recent molecular phylogenetic studies (Li et al. 2021) and more precise observations on plant morphology revealed that *A. carolinianum* as circumscribed by Wendelbo (1958) and Stearn (1960) is an assemblage of several closely related species. The future reclassification of the group requires re-assessment of type localities and materials, which are presented here in the part relevant to the plants from the Tian-Shan.

The plant described as *A. carolinianum* is characterised by an open campanulate perianth with largely white tepals, coloured with a pink tint only at the apex, and greenish plane leaves (Redouté 1804). Such plants occur in the Tibet, Qinghai and western Himalayas (Li et al. 2021). Although nothing is known about the exact provenance and origin of the seeds cultivated in Cels’s garden (Stearn 1960), we speculate that the seeds may have been brought by members of the Society of Foreign Missions of Paris (Société des missions étrangères de Paris), a Roman Catholic missionary organization based in Paris that was active in Tibet during the 18th century, especially before the French Revolution (Marin 2008). Its activities were centred at Lhasa and Xigazê (Shigatse), which were accessed not only from the Chinese side but also through the passes leading to Delhi. We suggest that the high mountains on the way from Delhi to Lhasa should be studied for the potential origin of *A. carolinianum*.

Sharma et al. (2021) recently designated a lectotype of *A. carolinianum*, using an illustration from the protologue. In doing so, they overlooked the fact that this species name had already been effectively lectotypified by Wendelbo (1971, p. 14) who stated that the ‘type’ of *A. carolinianum* is a cultivated specimen of uncertain provenance which he examined at G. This specimen, labelled as type by Marion Ownbey already in 1954, was collected in the garden of Cels and dated 3 Fructidor, year XII according to the French Republican calendar then in use. This date corresponds to 21 August 1804, and therefore the specimen was pressed as a voucher for the protologue which was published in November 1804 (Stafleu and Cowan 1983). This fact is affirmed by Candolle’s notation ‘*Allium carolinianum* n.’ and his handwritten species description with comparisons in Latin, which almost literally repeat the French-language protologue of *A. carolinianum*. This specimen is undoubtedly part of the original material, and its selection as a lectotype by Wendelbo is correct and has priority over the type designation by Sharma et al. (2021).

Allium blandum was described as having an open campanulate perianth with pinkish-white tepals and glaucous leaves, which were portrayed as somehow falcate (Wallich 1832), thus looking very close to *A. carolinianum*. Its original locality was stated as 'Khusbusea in Tartaria Chinensis', and the plants were grown in the Calcutta Botanical Garden in March 1819 from bulbs brought by 'Dom. W.S. Webb' in 1818. 'Tartaria Chinensis' was a designation for Chinese possessions and dependencies in Central Asia, as appearing on the map of D'Anville (1737) that was redrawn by Cary (1806) and apparently used by Wallich in its latter version. William Spencer Webb (1784–1865), British military geodesist, who performed the first survey of Kumaon (now a division of Uttarakhand, India) during 1815–1821 (Edney 1990), visited the road to the Niti Pass situated on the watershed between the Ganges river and the Sutlej river, and collected the bulbs of *A. blandum* in a short gorge named Karbasia (30.8698°N, 79.8348°E), at altitudes of 4200–4300 m a.s.l. (Webb 1834). At present, this place falls within a stripe 5–15 km wide which is a territory disputed between India and China but controlled by the latter.

Both species described from the Himalayas, *A. carolinianum* and *A. blandum*, remarkably differ from the plants occurring in the Tian-Shan by their open campanulate perianth with pinkish-white tepals and green or greenish flat leaves. The plants from the Tian-Shan, Dsungarian Alatau and Altai are characterised by a closed ovoid perianth with completely pink tepals and glaucous falcate leaves. Such plants were described as *A. polyphyllum* Kar. and Kir. from the upper course of the Sarqan river (Dsungarian Alatau) in eastern Kazakhstan, near the border with China. This species name is applicable to the plants of *A. carolinianum* s.l. occurring in Kyrgyzstan, and should be returned into use as it was traditionally applied (Nikitina and Kaschenko 1951, Vvedensky 1971). Its lectotype was designated by Gubanov et al. (1998).

Asteraceae

Amberboa bucharica Iljin (Iljin 1932, p. 108)

This species belongs to the group with yellow flowers and is most similar to *A. amberboi* (L.) Tzvelev because of the large appendices of its inner phyllaries, but readily differs from the latter species in abundantly arachnoid involucre, the outer flowers apparently overtopping the inner ones, and the undivided leaves (Tzvelev 1963, Makhmedov 1993).

Amberboa bucharica is widely distributed in Central Asia (Western Tian-Shan, Pamir-Alay, Kopetdagh), Iran and Afghanistan (Rechinger 1980, Makhmedov 1993). Its known distribution in Kyrgyzstan is limited to the mountains surrounding the Fergana Depression (Makhmedov 1993, Lazkov and Sultanova 2011, 2014).

Amberboa bucharica is a species of arid mountains, preferring warmer and drier climatic conditions. In Central Asia, distributions of plants with similar ecology may follow the arid areas along the western parts of Babatag, Zeravshan and Hissar ranges and the Western Tian-Shan, and also the arid mountains surrounding the Fergana Depression,

with penetrations eastwards along the Naryn river (like *Galatella grimmii* (Regel and Schmalh.) Sennikov, Sennikov and Lazkov 2020). Our observations in the mountains surrounding the Toktogul Depression, another highly arid territory, extend the known distribution of *A. bucharica* from the Fergana Depression eastwards in agreement with the floristic connections of this depression with the mountains along the Naryn river, at the easternmost limit of the Western Tian-Shan phytogeographical region (Sennikov and Tojibaev 2021).

Specimen examined

Kyrgyzstan. Suusamyр range (S side), Zagyrа Mts, pass along the road to Torkent, versicolour denudations, 1 June 2018, G.A. Lazkov (FRU).

Anaphalis DC. (Candolle 1838, p. 271)

Six species of *Anaphalis* DC. were listed as occurring in Kyrgyzstan (Lazkov and Sultanova 2011, 2014), largely on the basis of taxonomic treatments in *Flora of the USSR* (Borissova 1959), *Flora of the Kirghizian SSR* (Arbaeva 1965) and *Conspectus Florae Asiae Mediae* (Nabiev 1993). A great number of misidentified specimens and illogical or conflicting distributional reports urged us to revise the collections in LE and FRU, in which closely related taxa, formerly considered distinct on the basis of their presumably isolated distributions, were reported from the same areas or even localities. Only three species of *Anaphalis* were confirmed in collections from Kyrgyzstan during this revision, which, however, does not extend outside the country borders and, therefore, does not evaluate the taxonomic status of the entities described from other territories.

Anaphalis racemifera Franch. (Franchet 1883, p. 310)

Previously misidentified as: *Anaphalis depauperata* auct., *A. roseoalba* auct., *A. velutina* auct.

In Kyrgyzstan, *Anaphalis racemifera* Franch. was reported from the Eastern Tian-Shan and the Kyrgyz range by Arbaeva (1965) and from two biogeographic provinces, Western Tian-Shan and Fergana, by Lazkov and Sultanova (2011, 2014). The species is known to occur widely in the Western Tian-Shan with some localities in the Pamir-Alay (Nabiev 1993), corresponding to the distribution circumscribed in Lazkov and Sultanova (2011, 2014).

Plants with a more developed pubescence, which is the key diagnostic character of *A. velutina* Krasch., occur predominantly in the vicinities of Chimgan Mt (Uzbekistan). The earlier reports of *A. velutina* from Kazakhstan (Roldugin 1965) and Kyrgyzstan (Arbaeva 1965), including the paratype from the Aksu river (Krascheninnikov 1946), are based on plants that do not differ from *A. racemifera* in the density of pubescence and seem to be misidentified.

Anaphalis depauperata Boriss. is said to have a denser indumentum (Borissova 1959) and thickened pappus setae (Nabiev 1993), but this is not the case in the specimens from the Kök-Art Pass (Fergana range) that were provisionally identified as such by Borissova and accepted by Arbaeva

(1965) and Nabiev (1993). Other collections from this pass also belong to *A. racemifera*, which appears to be slightly variable in the density of pubescence.

Arbaeva (1965) reported *A. roseoalba* Krasch. from the Western Tian-Shan and Pamir-Alay, with one locality in the Eastern Tian-Shan. Most of these records belong to *A. racemifera*, which is frequently misnamed in collections, whereas the true *A. roseoalba* differs from the latter in smaller flowering heads (Nabiev 1993).

According to our identifications, *A. racemifera* occurs widely in the Western Tian-Shan with a few localities in the Alay range and a minor extension to the Eastern Tian-Shan (Fig. 1).

Specimens examined

Kyrgyzstan. Kyrgyz range: Tuyuk, 27 July 1939, P. S. Massagetov (LE). Talas Ala-Too: Besh-Tash, archa forest belt, 31 July 1930, M.M. Iljin 368 (LE); mouth of Besh-Tash river, left side, 28 July 1922, E. Korovin 1787 (LE); middle course of Terek river, 18 July 1946, Tkachenko (FRU); Terek-Say, 18 Aug. 1966, Barchev (FRU). Chandalash range: Santalash river valley, 13 Aug. 1902, B. Fedtschenko (LE); Upper reaches of Chandalash river, 2 Aug. 1927, M.M. Sovetkina 1036 (LE) and 14 Aug. 1938, Pyataeva, Momotov

828 (LE). Kök-Suu range: at mouth of Ispara-Say, 19 Sept. 2001, G. Lazkov (FRU). Chatkal range: Terek and Uzun-Akmat, 29 July 1881, A. Fetissov (LE); along Aflatun river, 6 km S of Aslam-Buka river, 3 Sept. 1931, O. von Knorring, L. Emme 466 (LE); Kojo-Ata river, N side of Kelty-Say, walnut forest, 11 Sept. 1927, N. Dzents-Litowska 229 (LE); Kojo-Ata river, Kichi-Karagatun, 1500 m a.s.l., 20 Aug. 1950, I. Linchevsky and O. Roshkova 267 (LE); Sary-Chelek, 17 Aug. 1952, Kaschenko (FRU); Sary-Chelek, Bakaly, 24 and 25 Aug. 1983, Aidarova (FRU); Sary-Chelek, Sandyk, 17 Aug. 1983, Aidarova (FRU); Sary-Chelek, lake side, 26 Aug. 1975, Aidarova, Sudnitsyna (FRU); Sary-Chelek, 28 Aug. 1985, Cheremnykh (FRU); Sary-Chelek, 30 July 1973, Aidarova et al. (FRU). Suusamyrlang range: W part, Uzun-Akmat, 28 July 1881, A. Fetissov (LE); left side of Uzun-Akmat river, Jangy-Jer, sparse graminoids, 29 June 1973, Aidarova et al. (FRU). Babash-Ata Mts: along Kara-Ünkür river, 13 Aug. 1895, S. Korshinsky 1489 (LE); Sere-Suu, 29 July 1911, Z. von Minkwitz 1633 (LE); Kuroves-Suu, 18 Aug. 1911, Z. von Minkwitz 1783 (LE); Ayukty river, 20 July 1927, R. Äboliņš (LE); Arstanbap, 14 Sept. 1937, Spota (FRU); upper reaches of Arstanbap, 15 Aug. 1945, A. Kalinin et al. (LE); Arstanbap, 18 July 1962, 7 Sept. 1964, V. Botschantzev (LE); Arstanbap, 26 July 1955, Lebedeva, Faleeva (FRU);

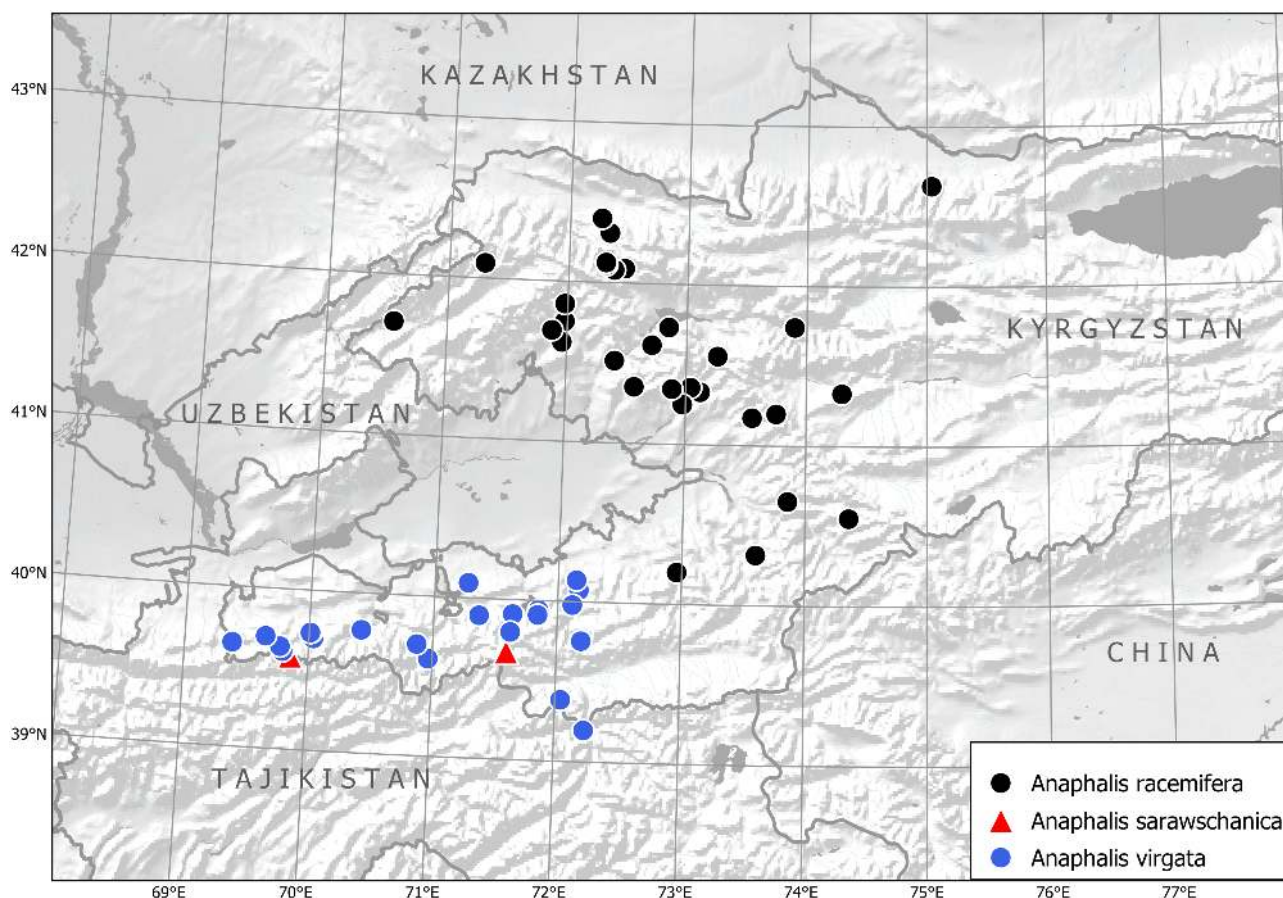


Figure 1. Distributions of *Anaphalis racemifera*, *A. sarawtschanica* and *A. virgata* in Kyrgyzstan according to herbarium specimens examined.

Kyzyl-Üngkür, 13 July 1945, Matveeva 155 (LE) and 5 Aug. 1945, Matveeva 355 (LE); Kayyngdy river, 11 Aug. 1979, V. Botschantzev et al. (FRU, LE); Kyzyl-Beyit, 29 June 1978, B. Sultanova (FRU). Bozbu-Too Mts: right side of Aflatun, opposite to headquarters of Arkyt collective farms, 8 Sept. 1945, O. Knorring, A. Pyataeva (LE). Fergana range: Kulun-Ata, 18 July 1913, Bronevsky 599 (LE); Kulun lake, 18 July 1972, 14 July 1974, R. Aidarova et al. (FRU); Kök-Art Pass, 2 Aug. 1915, M. Spiridonov (LE); upper reaches of Kök-Art river, 31 July 1962, M. Pryakhin (LE); Kök-Art river, 15 Aug. 1946, L. Popova (FRU); Kara-Suu lake, 30 July 1974, V. Botschantzev 267 (LE); Kara-Suu lake, 17 July 1973, Aidarova et al. (FRU); Kara-Kulja river, Ak-Tash, 10 Aug. 1974, Aidarova et al. (FRU). Suuk-Döbö Mts: left side of Köbük river at its confluence with Kökömeren, 20 July 1961, Aidarova et al. (FRU). Ak-Shyyrak Mts: N side, Aldake, archa forest with spruce, 16 Aug. 1958, Ubukeyeva, Filatova (FRU, LE). Moldo-Too: Kyz-Jailoo, July 1983, anonymous (LE). Alay range: Sary-Koy, 21 Aug. 1937, V. Vandyshva (FRU); upper reaches of Kulmambet river, 30 Aug. 1947, A. Gusarova, Khizhniakova (FRU).

***Anaphalis sarawschanica* (C.Winkl.) B.Fedtsch. (Fedtschenko 1905, p. 55), as '*A. seravschanica*'**

Based on the same type: *Antennaria sarawschanica* C.Winkl. (Winkler 1887, p. 88).

This species was reported from the Alay range in Nabiev (1993). This record was not taken into account by Lazkov et al. (2007, p. 1074) when the species was reported as new to Kyrgyzstan on the basis of a single recent specimen from the Turkestan range. An unspecified report from the Alay range, provided by Nabiev, is ambiguous because this territory is shared with Uzbekistan (the exclave of Shohimardon) and Tajikistan. Our examination of herbarium collections from TASH, kindly communicated by K. Tojibaev, revealed that the old record actually belongs to Kyrgyzstan (Fig. 1).

Anaphalis sarawschanica is a high mountain species occurring at altitudes close to 3000 m a.s.l., and whose distribution area stretches extensively across the Pamir-Alay Mt System (Nabiev 1993).

Some major databases (IPNI 2024, POWO 2024) ascribe its species combination in *Anaphalis* to B.Fedtschenko (Fedtschenko and Fedtschenko 1911, p. 208). However, in the latter work, Fedtschenko provided a full and direct reference to the earlier place in which he fulfilled conditions for valid publication of the new combination. Fedtschenko (1905, p. 54–55) wrote: ‘... this species was described by C. Winkler from Seravshan under the name *Antennaria seravschanica*. Nevertheless I doubt the taxonomic placement of this species in *Antennaria*; I think this is a species of *Anaphalis* (*A. seravschanica*)’ [translated from Russian]. Although this sentence appeared in a travelogue narrative rather than in the context of a taxonomic revision, it contains a new species combination that is definitely accepted by the author, and a citation of its basionym that is accompanied by an indirect reference to the place of its valid publication (via the species name authorship). Although Fedtschenko (1905) adopted

a spelling of the species epithet that was different from the spelling used by Winkler (1887, p. 88), Fedtschenko’s usage is considered a correctable error and Winkler’s spelling is to be retained, as also subsequently corrected by Fedtschenko and Fedtschenko (1911).

Specimens examined

Kyrgyzstan. Turkestan range: Kyrk-Bulak, 18 July 2007, M. Ganybaeva (FRU). Alay range: S side, upper course of Kök-Suu river, drainage basin of Abramov glacier, 20 Aug. 1986, 16 Aug. 1987, V. Nozdryukhin (TASH).

***Anaphalis virgata* Thomson ex C.B.Clarke (Clarke 1876, p. 107)**

Taxonomic synonym: *Anaphalis roseoalba* Krasch. (Krascheninnikov 1946, p. 152), syn. nov.

Anaphalis roseoalba Krasch. is said to differ from *A. virgata* in thickened apical parts of the pappus setae (Nabiev 1993). Recent discoveries reported plants with non-thickened setae and plants with thickened setae from the same areas of Kyrgyzstan (Lazkov and Smirnov 2005, Lazkov and Ganybaeva 2007). Our revision of herbarium collections at LE revealed that the setae may have longer apical cells (looking non-thickened) or shorter apical cells (looking thickened in the apical part); this character has no apparent correlation with other features of the involucre and vegetative parts of the plants and with their distribution areas in Kyrgyzstan. As the presumed geographical isolation of these morphotypes has not been confirmed and there is no evidence for their reproductive isolation, we propose to treat these morphotypes as synonyms. Notably, other taxonomic treatments (Zhu and Bayer 2011) do not use this character when characterising the species.

Anaphalis virgata was reported as new to Kyrgyzstan on the basis of a single recent specimen from the Transalay range (Lazkov and Smirnov 2005). The second record was reported from the Turkestan range (Lazkov and Ganybaeva 2007). According to our inventory, including the new synonymy, this species is not rare in the whole of the Pamir-Alay within Kyrgyzstan (Fig. 1).

Specimens examined

Kyrgyzstan. Turkestan range: Ak-Terek river, 14 July 1913, Z. von Minkwitz 1028 (LE); Jeti-Köpürök down from Muzrad river, 3 Aug. 1913, Z. von Minkwitz 1224 (LE); Leylek river at its confluence with Jeti-Köpürök, 1510 m a.s.l., 16 July 2005, G. Lazkov (LE); N side of Daud Mts facing to Karavshin river, 1930 m a.s.l., 19 Aug. 1937, K. Afanasiev 519 (LE); Gush river at its mouth, 1850 m a.s.l., 13 July 1937, K. Afanasiev 64 (LE); Abdyvi-Shor, 2400 m a.s.l., 12 Sept. 1940, K. Afanasiev 86 (LE); Urusalak, 30 July 1956, Aidarova, Faleeva (FRU); Ashat, 21 July 2007, M. Ganybaeva (FRU); middle course of Leylek river, 19 Aug. 2011, A. Sennikov, G. Lazkov 148 (H). Transalay range: Ters-Agar, 31 July 2004, G. Lazkov (FRU). Alay range: near Shohimardon, Kurban-Köl lake, 5 July 1871, O. Fedtschenko (LE); Katta-Karagandy, 21 Aug. 1975, Aidarova, Sudnitsyna

(FRU, LE); Kalay-Mahmud river, Kak-Say, 15 Sept. 1975, Aidarova, Sudnitsyna (LE); Egin-Jay, right side of Pum river, 25 May 1963, Aidarova, Ubukeeva (FRU, LE); Sürmő-Tash river, 12 June 1913, N. Desiatova 993 (LE); Katran-Too, 23 July 1938, Glybin (LE); Isfayram-Say, mouth of Tengiz-Bay, 22 June 1931, S. Lipschitz 150 (LE); Kanda-Kush near Shohimardon, 27 July 1915, V. Drobov (LE); Chauvay, 2 July 1960, V. Janaeva (FRU); Gavian (S of Khaidarken), 22 June 1968, Ubukeeva, B. Sultanova (FRU); Ak-Suu, 27 June 1974, Aidarova et al. (FRU); right side of Kara-Kazyk river, 17 and 22 June 1963, Aidarova, Ubukeeva (FRU).

Identification key to the species of *Anaphalis* in Kyrgyzstan

1. Plants low, stems up to 25 cm; leaves lanceolate; calathidia with a triangular base, in small groups (1–3) terminating upper branches *A. sarawschanica*
– Plants tall, stems up to 70 cm; leaves linear-lanceolate; calathidia with a subrotund base, in dense corymbose synflorescences terminating the stem 2
2. Calathidia smaller, 3–5 mm in diam.; coloured appendices of phyllaries 2 mm long *A. virgata*
– Calathidia larger, 6–12 mm in diam.; coloured appendices of phyllaries 4 mm long *A. racemifera*

Carthamus turkestanicus (Hanelt) Gabrielian (Gabrielian 1995, p. 443)

Based on the same type: *Carthamus lanatus* subsp. *turkestanicus* Hanelt (Hanelt 1963, p. 148).

Carthamus turkestanicus Popov (Popov 1941, p. 36), nom. inval. (Art. 36.1).

Type: Kyrgyzstan. ‘Fergana-Gebiet, Kreis Andishan, linkes Ufer des Kugart [Kök-Art]’, 16 June 1911, O. von Knorring, Z. von Minkwitz 1087 (holotype LE).

This taxon occurs in arid foothills and the lower mountain belt and occupies a large distribution area, ranging from the European part of Turkey and Anatolia, through southern Caucasus, Iran, Iraq, Afghanistan and Pakistan to Central Asia (Western and Northern Tian-Shan and adjacent deserts, Pamir-Alay, Kopetdagh, Badkhyz) (Khidir and Knowles 1970, Rechinger 1980, Makhmedov 1993, Gabrielian 1995). *Carthamus lanatus* occurs in the Mediterranean, Crimea, Anatolia, the Caucasus, Iraq and Iran (Khidir and Knowles 1970, Rechinger 1980, Gabrielian 1995); its reported occurrence in Central Asia (Makhmedov 1993, Lazkov and Sultanova 2011, 2014) is erroneous (Vilatersana et al. 2007).

Genetic evidence (Khidir and Knowles 1970, Vilatersana et al. 2005, 2007, Sehgal et al. 2009) established that *C. turkestanicus* ($2n=64$) originated from hybridization between *C. lanatus* L. ($2n=44$) and *C. glaucus* M.Bieb. ($2n=20$).

Carthamus turkestanicus differs from its progenitor and the most similar species, *C. lanatus*, in subequal (versus highly inaequal) pappus setae, pale yellow (versus intensely yellow)

flowers, wider bracts and greyish (versus green) leaves (Khidir and Knowles 1970, Gabrielian 1995).

The authorship of the combination *C. turkestanicus* is usually ascribed to Popov (1941) who published this new species with a description in Russian only. It was unknowingly but validly published by Gabrielian (1995) who accepted this name from Popov (1941) but at the same time provided a full and direct reference to the place of valid publication of the actual basionym (Hanelt 1963).

Hippolytia Poljak. (Poljakov 1957, p. 288)

This genus, belonging to the tribe Anthemideae, has been phylogenetically supported (Criado-Ruiz et al. 2024). Four species were recognized in Central Asia, which were grouped in pairs according to the shape and size of their phyllaries; within the pairs, the species differed mainly in the density of pubescence (Kovalevskaya 1993). Our observations in herbarium collections do not confirm this splitting. As in many other species of Anthemideae, the density of pubescence is a variable character, and intermediate states of this character are found. A revised treatment follows.

Hippolytia senecionis (Jacquem. ex Besser) Poljakov (Poljakov 1961, p. 414)

Based on the same type: *Artemisia senecionis* Jacquem. ex Besser (Besser 1836, p. 75). *Tanacetum senecionis* (Jacquem. ex Besser) J.Gay ex DC. (Candolle 1838, p. 129). *Chrysanthemum senecionis* (Jacquem. ex Besser) Rech.f. (Rechinger 1955, p. 44).

Type: India. Himalaya, in saxosis supra Ghauli, 28 July 1830, Jacquemont 1527 (K000250004, isosyntype).

The species is highly variable in respect of the length and width of leaf lobes, the density of pubescence on leaves and other parts of the plant, and the width of the coloured margin of phyllaries. Presently two species of *Hippolytia* are recognized in the Western Tian-Shan (Tzvelev 1961, Nikitina 1965, Kovalevskaya 1993). *Hippolytia megacephala* (Rupr.) Poljak. reportedly has a lax pubescence of deeply dissected leaves, whereas *H. herderi* (Regel and Schmalh.) Poljak. is said to differ in a denser pubescence of less deeply dissected leaves. The distribution areas of these two taxa completely overlap, both stretching from the Northern Tian-Shan to the Alay Mts (Nikitina 1965). This can also be observed on our species map covering the localities in Kyrgyzstan (Fig. 2).

The density of pubescence in this species pair does not seem to correlate with the geographical distribution; neither is its variability discrete. In collections of FRU we observed plants with a lax pubescence, which are concentrated in the northern part of the area, including the Central Tian-Shan, but also present in the Alay as an extreme variant, and plants with a more or less densely villous pubescence are equally distributed in the north and the south. The more and less pubescent plants are found intermixed in the same territory and even co-occurring in the same locality. No other characters correlate with the pubescence, and we assume this is infraspecific variability. This observation agrees with the treatment of

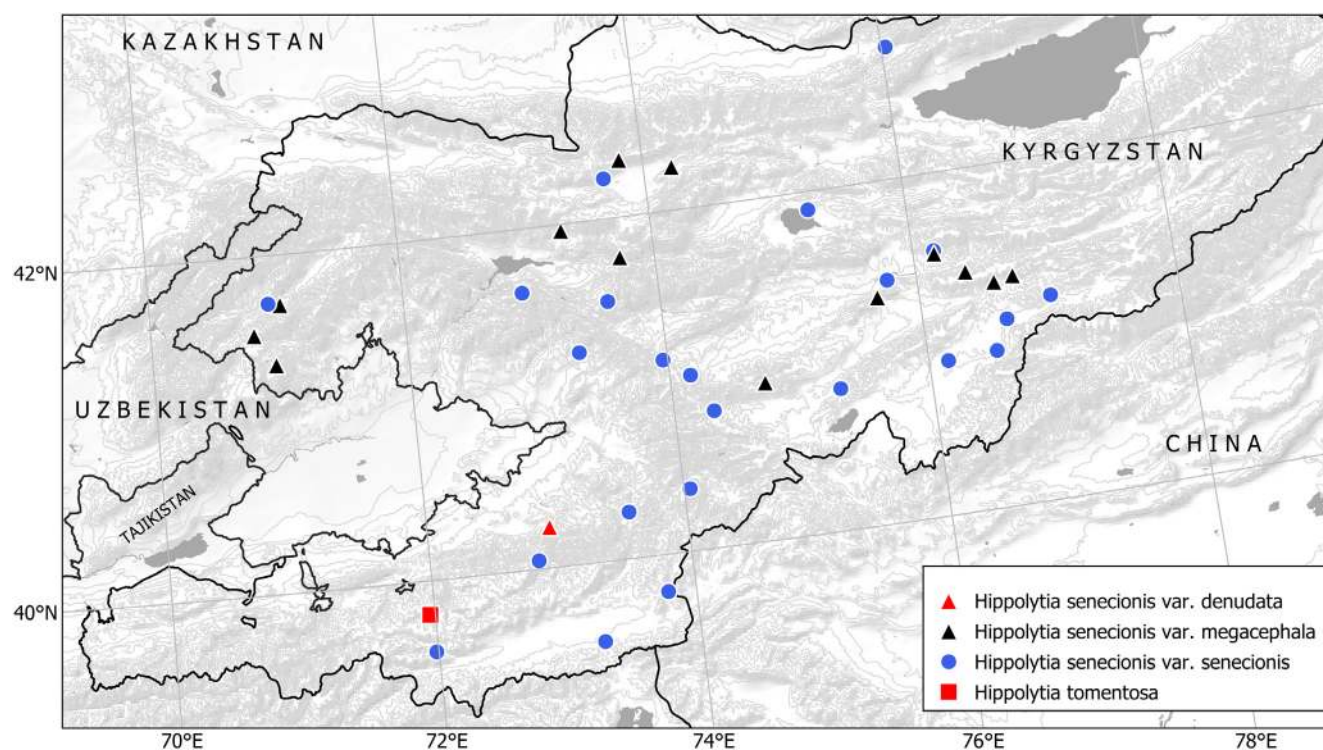


Figure 2. Distributions of *Hippolytia senecionis* (with three varieties) and *H. tomentosa* in Kyrgyzstan according to herbarium specimens examined.

Kovalevskaya (1993) who noted the presence of intermediate forms between *H. megacephala* and *H. herderi*. Furthermore, Kovalevskaya (1993) observed a very close proximity of *H. herderi* with *H. senecionis*, and suggested that the populations from Tajikistan may belong to the latter. Having checked their type collections, we agree that these plants are indistinguishable in their flowering heads, shape and size of leaves, and density of pubescence, and should be considered taxonomically identical. *Hippolytia senecionis* is the name with priority for this species.

Since the differences in the density of pubescence have traditionally been used in the taxonomy of *Hippolytia*, three varieties are proposed here to accommodate the most common or noticeable variants. A new variety is established for the most glabrous variant, known from the holotype only.

Hippolytia senecionis is a species of high elevations, occurring in Central Asia at 2400–3300 m a.s.l. Its distribution is quite extensive and covers the following mountain systems: Western Tian-Shan (Talas, Pskem, Ugam, Chatkal, Suusamyr, Jungoltau, Uzun-Akhmat, Fergana, Kavaktau mountain ranges), Northern Tian-Shan (Kyrgyz, Teskey mountain ranges), Eastern Tian-Shan (Atbashi, Kakshaal-Too, Narat mountain ranges), Jungarian Alatau, Hissar-Alay (Alay mountain range), Western Pamir (Transalay, Peter I mountain ranges), Hindukush, Tibet, West Himalaya (Kovalevskaya 1993, Naithani 1995, Shi et al. 2011).

According to the travelogue published by Jacquemont (1841), who collected and provisionally named *Artemisia*

senecionis Jacquem., its type collection originated from India, Himachal Pradesh, Kinnaur District, when Jacquemont passed over a small ridge between ‘Lipé’ [Loppa] river and ‘Kanam’ [Kanam] village, at approx. 31.66°N, 78.39°E, 3300 m a.s.l.

***Hippolytia senecionis* var. *denudata* Sennikov, var. nov.**

Type: Kyrgyzstan. Alay range: Kök-Bel collective farm, Jumalay, 17 June 1934, I. Vykhodtsev (holotype FRU).

Diagnosis

Stems and leaves nearly glabrous, synflorescences (involucre and branches) with a lax pubescence.

This variety has never been noticed in the taxonomic literature. It is an extremely glabrescent form of the species, which was, however, found in the area with the predominant occurrence of the most hairy forms.

***Hippolytia senecionis* var. *megacephala* (Rupr.) Sennikov, comb. nov.**

Based on the same type: *Artemisia megacephala* Rupr. (Ruprecht 1869, p. 52). *Hippolytia megacephala* (Rupr.) Poljak. (Poljakov 1957, p. 289).

Type: Kyrgyzstan. ‘Dschaman-daban Schlucht: Mayenwand und höchste Stelle des Passes, 21 July 1867, R. F. von der Osten-Sacken (holotype LE).

Taxonomic synonyms:

Tanacetum capusii Franch. (Franchet 1883, p. 308).
Chrysanthemum capusii (Franch.) B.Fedtsch. (Fedtschenko 1915, p. 738).

Type: Uzbekistan. 'Tourpak-Bel, vallée de l'Ona Oulgane, dans les monts Tchirtchik, alt. 2300 mètres', 23 Aug. 1881, Capus 631 (lectotype P00706073, designated here; isolectotypes P00706074, P00706075).

Diagnosis

Plants totally covered with a lax pubescence.

Specimens examined

Kyrgyzstan. Chatkal range: pass in Chon-Tash gorge from Kök-Serek, 30 July 1945, L.Popova, V.Tkachenko (FRU); Chon-Chaar-Tash, 12 July 1960, Ubukeeva (FRU); Chapchyma Pass, 25 July 1960, Ubukeeva (FRU). Kyrgyz range: Töö-Ashuu Pass, 10 Aug. 1970, Arbaeva (FRU). Nura Mts: Chet-Nura, 31 July 1926, M.Sovetkina, M.Uspenskaya (FRU); At-Bashi river valley, 29 July pyear unknown], Elizanova (FRU); At-Bashi river, upstream, Jany-Jer, 11 Aug. 1987, Aidarova, Kashkaraeva (FRU); At-Bashi river, upstream, Ulan, 12 Aug. 1987, Aidarova, Kashkaraeva (FRU). Suusamyр range: Boor-Teke depression, 1 Aug. 1960, Botbaeva (FRU). Jumgal-Too range: 20 Aug. 1952, Sharashova et al. (FRU). Sarykamysh range: Kyzyl-Köl, 5 July 1961, Aidarova et al. (FRU). Naryn range: Burchan-Su river, 7 July 1953, Kaschenko (FRU).

Hippolytia senecionis var. *senecionis*

Taxonomic synonyms:

Tanacetum herderi Regel and Schmalh. (Regel 1878, p. 619), syn. nov.

Based on the same type: *Chrysanthemum herderi* (Regel and Schmalh.) Minkw. and Knorr. (Minkwitz and Knorr 1910, p. 112). *Hippolytia herderi* (Regel and Schmalh.) Poljak. (Poljakov 1957, p. 289).

Type: Kazakhstan. 'In montium alatavicum cisiliensium jugo Alaman, 8000' alt.', Semenow (lectotype LE, designated by Tzvelev (1961, p. 415)).

Tanacetum leucophyllum Regel (Regel 1881, p. 551), syn. nov.

Based on the same type: *Chrysanthemum leucophyllum* (Regel) B.Fedtsch. (Fedtschenko 1915, p. 738). *Hippolytia leucophylla* (Regel) Poljak. (Poljakov 1957, p. 289).

Type: China. 'In Turkestan orientali ad fontes fluvii Kasch ad glacies montis Mongötö', A. Regel (LE, n.v.).

Diagnosis

Plants totally covered with a villous pubescence.

Specimens examined. Kyrgyzstan. Chatkal range: Chon-Chaar-Tash, 12 July 1960, Ubukeeva (FRU). Isfan-Jayloo Mts: Ispy, 24 Aug. 1946, V. Tkachenko (FRU). Fergana range: Kara-Alma, 10 Aug. 1952, Kaschenko (FRU);

Jangyzkyr, 23 July 1957, Aidarova, Ubukeeva (FRU); Ak-Teke, 3 Aug. 1957, Aidarova, Ubukeeva (FRU); left side of Arpa river, watershed of Shilbi-sai and Adybay, 5 Aug. 1987, Aidarova, Kashkaraeva (FRU). Kök-Iirim-Too Mts: Kanachuu river, Karala-Archa, 23 July 1986, Arbaeva (FRU). Kyrgyz range: along Kichi-Korumdu river, 25 July 2009, A. Sennikov (H). Kemin range: Ilych-Novorossiika, 27 July 1944, anonymous (FRU). Son-Köl-Too Mts: Son-Köl lake, 22 July 1996, Lazkov (FRU). At-Bashy Mts: eastern part of Aksay, Surteke, 19 Aug. 1957, Vinogradova (FRU); Tash-Rabat, 9 Aug. 1986, R. Aidarova, K. Kasiev (FRU). Naryn Karatoo Mts: 7 km to southern-west from western end of Ala-Myshschyk range, 6 Aug. 1937, Vykhodtsev (FRU). Nura Mts: Chet-Nura river gorge, 31 July 1931, Sovetkina, Uspenskaya (FRU). Kakshaal-Too range: Aksay, slope to Bash-Kashkasu river, downstream, 10 Aug. 1951, anonymous (FRU). Alay range: Kara-Tuma Pass, 26 Aug. 1946, V.Tkachenko (FRU); Budalyk, 25 Aug. 1947, A.Gusarova, Knizhnikova (FRU); Kurundu-Suu, 1 Aug. 1948, Kaschenko (FRU); eastern Ak-Say, Ak-Baytal, 12 Aug. 1965, L.Popova (FRU); Ak-Buura river basin, jailoo Ak-Tash, 5 July 1974, Aidarova, B. Sultanova, A. Mursaliev (FRU); Kök-Suu river basin, 9 Aug. 1989, Shmakov et al. (FRU). Transalay range: Kyzyl-Art, 11 Aug. 1952, Vovchenko (FRU).

Hippolytia tomentosa (DC.) Tzvelev (Tzvelev 1961, p. 416)

Based on the same type: *Tanacetum tomentosum* DC. (Candolle 1838, p. 130).

Type: India. Kashmir Valley ('Cachemire'), [1821–1831], Herb. Royle 192 (holotype G-DC barcode G00461811).

Taxonomic synonyms:

Tanacetum darwasicum C.Winkl. (Winkler 1890, p. 317), syn. nov.

Based on the same type: *Chrysanthemum darwasicum* (C.Winkl.) B.Fedtsch. (Fedtschenko 1915, p. 738). *Hippolytia darwasica* (C.Winkl.) Poljak. (Poljakov 1957, p. 289).

Type: Tajikistan. 'In terra Darwas ad ripas rivuli Chumbow cum fluvio Pädsch confluentis', Sept. 1881, A. Regel (LE, n.v.).

Tanacetum schugnanicum C.Winkl. (Winkler 1890, p. 318), syn. nov.

Based on the same type: *Chrysanthemum schugnanicum* (C.Winkl.) B.Fedtsch. (Fedtschenko 1915, p. 738). *Hippolytia schugnanica* (C.Winkl.) Poljak. (Poljakov 1957, p. 289).

Described from Tajikistan: 'ad fines regni Schugnan in valle fluminis Jasgolan nec non in terra Darwas prope pagum Omar ad fluvii Pädsch ripam sinistram situm altitudine 6000'. Septembri mense annui 1882 cl. Dr. A. Regel detexit' (syntypes LE).

Two closely related species were reported from the Western Pamir Mts, Darvaz and Shugnan ranges: *Hippolytia darvasica* (C.Winkl.) Poljak. and *H. schugnanica* (C.Winkl.) Poljak.

The latter species was characterized by having sparser pubescence, broader leaf lobes and fewer flowering heads, but these characters were considered unreliable because of a high level of variability (Tzvelev 1961). The pubescence and leaf lobes in the Central Asian species of *Hippolytia* are very variable and may not discriminate taxa at the species level. We recognize only one species of this genus in the Pamir, which differs from *H. senecionis* of the Tian-Shan and Pamir-Alay in larger flowering heads with longer involucre (up to 8 mm long versus up to 7 mm long) and a greater number of flowers (ca 100 versus 50–70 per head). Its phyllaries are more rigid and ovate than those of *H. senecionis* (Tzvelev 1961).

Moreover, Tzvelev (1961) noted the close similarity of these two species with *H. tomentosa* (DC.) Tzvelev, which was described from the Himalayas and also found in Tibet (Shi et al. 2011). His assertion that the plants from the Himalayas differ from those occurring in the Pamir in even larger flowering heads and ‘in average broader’ leaf segments (Tzvelev 1961) reflects the desire for a greater number of endemics in the USSR rather than the presence of taxonomically reliable characters.

The only locality of *H. tomentosa* in the Alay range makes a species record new to Kyrgyzstan. The plants discovered in Kyrgyzstan are characterized by mostly solitary heads, similar in size to those in the type collection of *Tanacetum schugnanicum* C.Winkl. (Kovalevskaya 1993). The total distribution of this species therefore includes Kyrgyzstan, Tajikistan, India and China.

Specimen examined

Kyrgyzstan. Alay range (N side). Sürmö-Tash Nature Reserve, Isfairam-Say river Basin, 2012, anonymous (FRU).

Rhaponticum integrifolium C.Winkl. (Winkler 1886, p. 425)

This conspicuous (up to 180 cm tall) plant is unique in Central Asia because of the combination of undissected leaves, pale yellow flowers and persistent pappus (Makhmedov

1993). Its distribution covers the mountains of the Pamir-Alay in Kyrgyzstan, Uzbekistan, Tajikistan and Afghanistan (Makhmedov 1993, POWO 2024).

Rhaponticum integrifolium has been reported in Kyrgyzstan from the Fergana range without further specification (Nikitina 1965, Lazkov and Sultanova 2014). By oversight, this occurrence was omitted by Makhmedov (1993) and therefore was not taken into account in the checklist of vascular plants of the Tian-Shan (Sennikov and Tojibaev 2021).

The distribution of *R. integrifolium* is isolated from its main area in the Pamir-Alay, which is not adjacent to the Fergana Depression. We have verified the species occurrence in Kyrgyzstan, which appears to be limited to a small area of walnut forests in the north-western part of the Fergana range (Fig. 3). The exact localities are mapped here for the first time. The complete distribution area (Fig. 3) is mapped on the basis of published information (Dittrich 1980, Karimova 1991).

Although the disjunction between the central Pamir-Alay and the northern Fergana range looks prominent, there are other species with the same distribution type, for example, *Silene ferganica* Preobr. (syn. *S. erubescens* (Schischk.) Czerep.) (Lazkov 2006).

Specimens examined

Kyrgyzstan. Fergana range: Lublinskoe, 22 June 1929, Nikitina, Vykhotsev (FRU); Kara-Mart, 22 July 1936, Neustrueva (FRU); Kurmaidan, 6 June 1955, Lebedeva, Faleeva (FRU); Kurmaidan, 20 June 1956, Lebedeva (FRU); Kurmaidan, 28 May 1973, A. Takhtajan et al. (FRU); Tamchibulak, 4 June 1955, Lebedeva, Faleeva (FRU); middle course of Shaydan river, 3 June 1969, N. Gorbunova (FRU).

Shangwua masarica (Lipsky) Yu J.Wang and Raab-Straube

(Wang et al. 2013, p. 993)

Based on the same type: *Saussurea masarica* Lipsky (Lipsky 1900, p. 81).

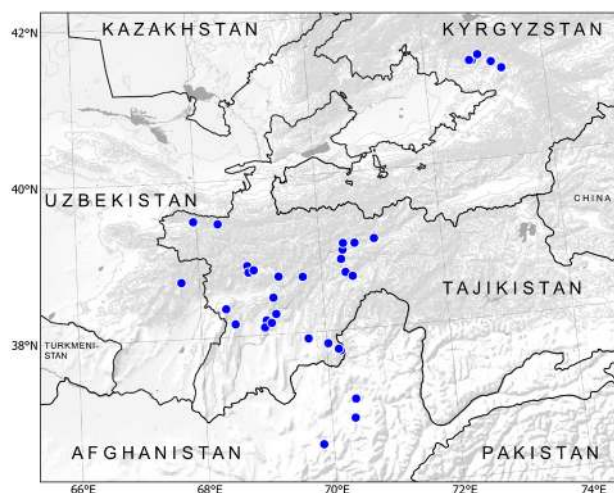
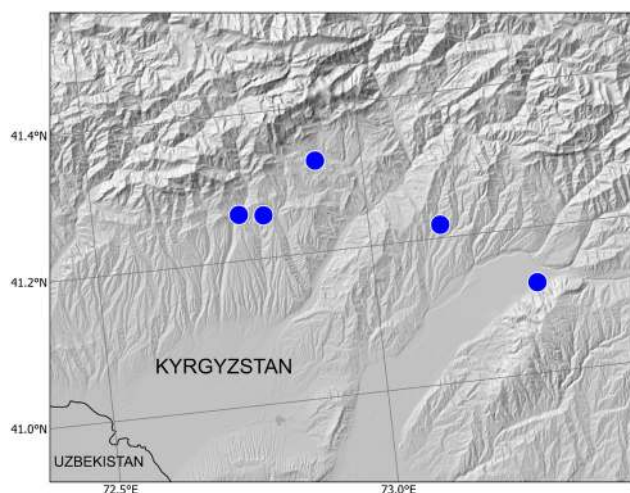


Figure 3. Distribution area of *Rhaponticum integrifolium*. Left. Distribution in Kyrgyzstan. Right. Complete distribution, mapped on the basis of published information (Dittrich 1980, Karimova 1991).



Figure 4. *Shangwua masarica* in Kyrgyzstan (Alay range, Yangi-Daban, 9 July 2023). Photo: G.Lazkov.

Type: Tajikistan. Masar range: Badrut Glacier, 9000 ft., 21 July 1899, V.Lipsky 286 (lectotype LE, designated by Lipschitz (1979, p. 103); isolectotypes B, LE).

Taxonomic synonym:

Saussurea tadshikorum Iljin and Gontsch. (Iljin 1933, p. 67).

Type: Tajikistan. Vakhsh range: ‘ad fl. Chingou, in glareosis faucium austrum versus a p. Jachak’, 1900 m a.s.l., 13 July 1932, N. Gontscharov et al. 639 (holotype LE).

The genus *Shangwua* Yu J.Wang et al. was established for *Saussurea* sect. *Jacea* Lipsch., which was found to take a basal position in Cardueae (Wang et al. 2013). This group differs from *Saussurea* DC., besides microcharacters of flowers and fruits, also by dark appendages of the phyllaries and by long paleae on the receptacle.

Lipschitz (1964, 1979) recognised two species of this group in Central Asia, i.e. *S. masarica* Lipsky and *S. tadshikorum* Iljin and Gontsch. These species were considered to differ from each other by the presence or absence of the tomentum on the lower side of the leaf lamina (Lipschitz 1979, Rasulova and Sharipova 1991). However, the same variability was noted in another species of the same group, *S. jacea* (Klotsch) Clarke which is distributed in the Himalayas, and taxonomically interpreted at the rank of variety (Lipschitz 1964). For this reason, Wang et al. (2013) correctly synonymised *S. tadshikorum* with *S. masarica*. As these two taxa visibly differ in their indumentum, their recognition at the rank of variety is warranted and the necessary new combination for the glabrous variant is provided here: *Shangwua masarica* var. *tadshikorum* (Iljin and Gontsch.) Sennikov, comb. nov.; basionym: *Saussurea tadshikorum* Iljin and Gontsch. (Iljin 1933, p. 67).

According to Rasulova and Sharipova (1991), *S. masarica* is distributed in the high mountains of north-eastern

Tajikistan. Its northernmost localities in the Zulumart range are very close to Kyrgyzstan, so that its records in the latter country were expected. During the recent field work, three localities were discovered in Kyrgyzstan: in the southern part of the Alay Depression (Transalay range) and in the Alay range. These plants (Fig. 4) belong to the typical variant of the species with tomentose leaves and make a new country record of the species.

To date, about a dozen of localities of the species are known (Fig. 5), which are situated in the northern Pamir and adjacent Alay. The species occurs at high elevations, between 1800 and 4000 m a.s.l.

Specimens examined

Kyrgyzstan. Alay range: Yangi-Daban, 9 July 2023, G. Lazkov, U. Neveraev (FRU); Kök-Suu river, 11 July 2024, G. Lazkov (FRU). Transalay range: Ylai-Suu, 6 July 2007, A. Akimaliev (FRU).

Brassicaceae

Arabis montbretiana Boiss. (Boissier 1842, p. 53)

Arabis montbretiana Boiss. is an annual ephemeral plant. It has often been confused with *A. auriculata* Lam., from which it differs by a straight (versus flexuose) infructescence axis and repandely dentate leaves (Nabiev 1974). This species is rather common in the western part of mountainous Middle Asia (Nabiev 1974); its isolated occurrence in the Northern Tian-Shan, previously reported by Nabiev (1974) from the Transili range, has not been confirmed by the recent inventory (Kudabaeva et al. 2023).

In view of its broad distribution in Central Asia, it is therefore quite surprising that the species remained unrecorded

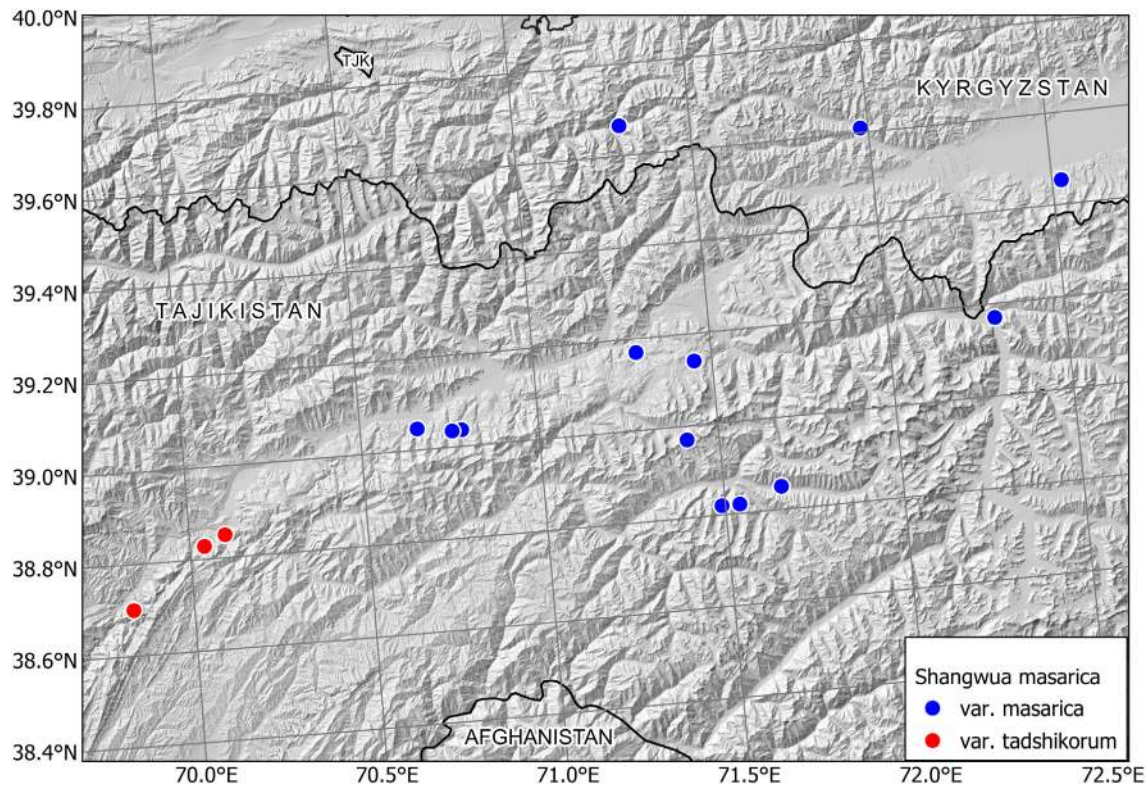


Figure 5. Complete distribution of *Shangwua masarica* and its varieties according to herbarium specimens examined and reliable literature records (Rasulova and Sharipova 1991).

in Kyrgyzstan (Lazkov and Sultanova 2014). No specimens of *A. montbretiana* from Kyrgyzstan (either correctly determined or misidentified) are available in LE, MW and TASH, but we found the three above-cited specimens at FRU, which were misidentified as *A. auriculata* Lam. and constitute a new country record.

The specimen from Arkyt village was collected as a seed voucher for the Millennium Seed Bank, specifically to respond for a call for partnership in arid regions (Van Slageren 2003). We draw attention of ex-situ conservationists to this misidentification, which may affect future efforts in plant conservation.

Specimens examined

Kyrgyzstan. Chatkal range: Sary-Chelek, Bakaly, forest belt, 15 May 1981, Aidarova, Kalmurzaeva (FRU); near Arkyt village, rocks, 7 June 2010, G. A. Lazkov (FRU, K). Fergana range: northern part of Mailuu-Suu Town, 27 May 1977, B. Sultanova et al. (FRU).

Asperuginoides axillaris (Boiss. and Hohen.) Rauschert (Rauschert 1982, p. 558)

Based on the same type: *Buchingera axillaris* Boiss. and Hohen. (Boissier 1849, p. 29).

This species, representing the monotypic genus *Asperuginoides* Rauschert (syn. *Buchingera* Boiss. and Hohen., nom. illeg.) is widely distributed in arid Asian mountains (Transcaucasia, Iran, Tian-Shan, Pamir-Alay, Himalayas) (POWO 2024). It occurs among shrubs and in sparse forests,

in deep fissures and shady ravines in the lower and middle mountain belts (Shermatov 1974).

Despite this broad occurrence, *Asperuginoides axillaris* (Boiss. and Hohen.) Rauschert has generally been overlooked in Kyrgyzstan. Aidarova and Sultanova (1984) were the first to report it from the versicolour denudations of southern Kyrgyzstan, probably referring to the forefront of the Alay Mts, but their voucher specimens are unknown. Lazkov (2007) reported two precise localities documented by his own collections, in Ak-Tash Mts (Talas Depression) and along Bekechal river (Fergana range). Two further localities are added here, with abundant populations, which expand the species distribution in Kyrgyzstan to the southern side of the Fergana Depression. The species is thereby known from more arid mountains in the Talas Depression and around the Fergana Depression (Fig. 6), at altitudes between 1100 and 1200 m a.s.l.

Specimens examined. Kyrgyzstan. Talas Depression: Ak-Tash Mts, 2 June 2005, G. Lazkov (FRU, LE). Fergana range: 5 km upstream the Bekechal river, 19 Apr. 1990, S. Sheremetova, G. Lazkov (FRU, LE); same locality and date, A. I. Shmakov et al. (ALTB); near Kök-Alma village, 20 Apr. 2018, G. Lazkov (FRU). Alay range: 7 km S of Uch-Korgon, 26 Apr. 2017, G. Lazkov (FRU).

Erysimum badghisi (Korsh.) Lipsky (Lipsky 1913, p. 243)

Based on the same type: *Erysimum verrucosum* var. *badghisi* Korsh. (Korshinsky 1898, p. 413).

Taxonomic synonym:

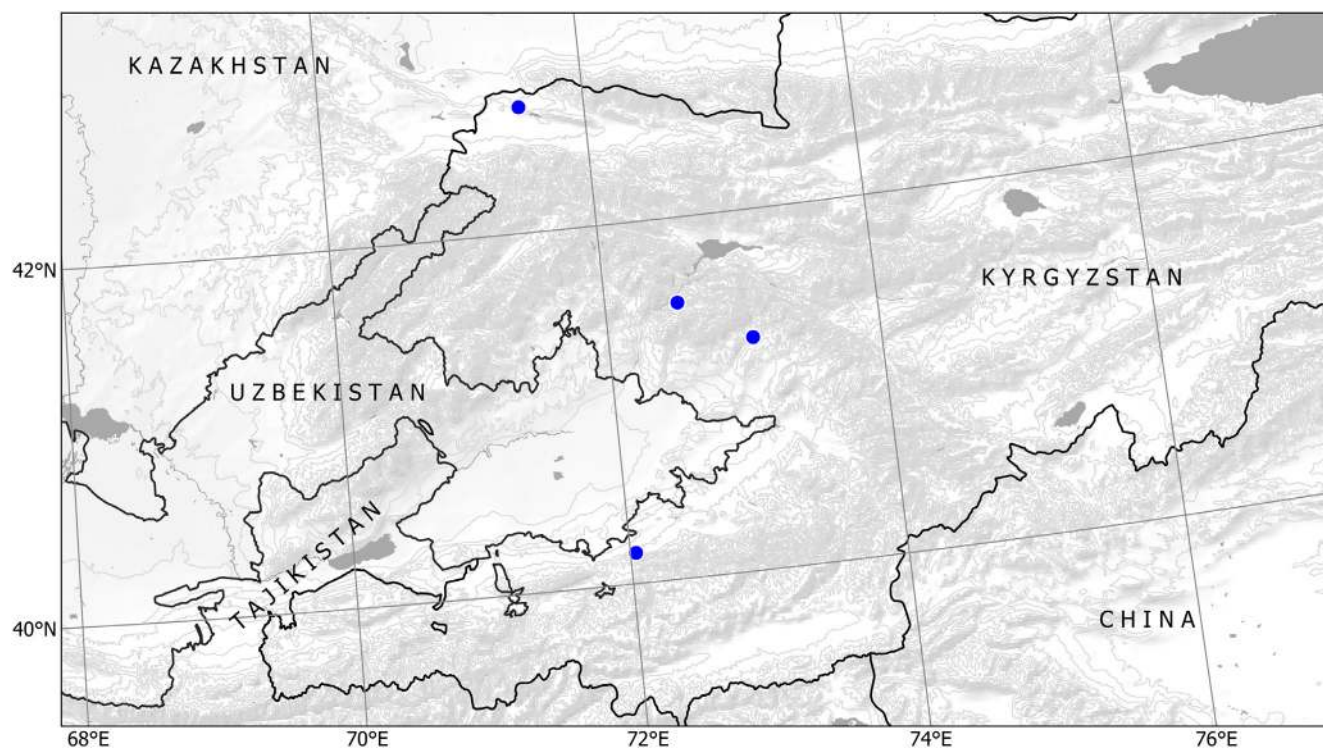


Figure 6. Distribution of *Asperuginoides axillaris* in Kyrgyzstan according to herbarium specimens examined.

Erysimum aitchisonii O.E.Schulz (Schulz 1927, p. 1080).

The distribution of this species confined to Iran, Afghanistan and Turkmenistan was characterized in detail by Polatschek (2010). In the same publication he also revised the single collection (R.R.Stewart 19672) based on which *Erysimum badghisi* had been recorded from outside the outlined area, i.e. from Kashmir by Jafri (1973) who mentioned orange petals untypical for yellow-flowered *E. badghisi*. Polatschek (2010) attributed this collection to the western Himalayan orange-flowered *E. melicentae* Dunn. Shortly thereafter, Polatschek (2011) added Kyrgyzstan to the distribution area of *E. badghisi*. We failed to find any specimens that would be the basis of such a range extension and cannot confirm the species occurrence in Kyrgyzstan, which is considerably remote from the known species distribution area. The complete species distribution is mapped here for the first time (Fig. 7).

POWO (2024) maintains that the name *E. badghisi* was published by Busch (1939) and is therefore a younger synonym of *E. aitchisonii* O.E.Schulz. As clarified by Botschantzev (1983), the priority of *E. badghisi* starts with Lipsky (1913), and therefore its valid publication predates that of *E. aitchisonii*. The type locality of *E. aitchisonii*, indicated as the Harirud river in the protologue (Schulz 1927), is present-day Tyrapul in Afghanistan according to the itinerary of J. E. T.Aichison in 1885 (Aitchison 1888).

Selected specimens examined

Afghanistan. Tyrapul, 21 Apr. 1885, J. E. T. Aitchison 298 (W). Turkmenistan. Kushka, 21 Apr. 1890, N. Androso

(LE); Kushka, 26 May 1911, A. Mikhelson 404 (LE); Childuhter, 26 Mar. 1912, V. I. Lipsky 267 (LE); Karabil, 11 Apr. 1912, V. I. Lipsky 809 (LE); Akarcheshma, 19 Apr. 1912, V. I. Lipsky 1033 (LE); Eroilan, 13 Aug. 1928, B. A. Fedtschenko, A. V. Jarmolenko 1346 (LE); Pul-i Hatum, 23 Apr. 1930, I. Linchevski 169 (LE); Badghyz, Besh-Agi, 7 May 1956, Mosolov (LE); Badghyz, Kepela, 30 Apr. 1976, V. P. Botschantzev 366 (LE).

Campanulaceae

Campanula lehmanniana Bunge (Bunge 1852, p. 211)

Type: Tajikistan. Zeravshan range: ‘in den Felsenklüften’, 10 Sept. 1841, A. Lehmann (holotype P00232123).

Taxonomic synonym:

Campanula lehmanniana var. *capusii* Franch. (Franchet 1884, p. 209), syn. nov.

Based on the same type: *Campanula capusii* (Franch.) Al.Fed. (Fedorov 1957, p. 289). *Campanula lehmanniana* subsp. *capusii* (Franch.) Victorov (Viktorov 2002, p. 226).

Type: Tajikistan. Hissar range: ‘Schivata’ [Shovita], 1 July 1881, G. Capus (holotype P00232121).

The location of type localities for this species has been disputed for a long time. This old confusion partly accounts for the synonymy, which is confirmed here.

Bunge (1852) stated that he described *Campanula lehmanniana* from ‘Karatau’, based on the specimen of A. Lehmann collected 10 September 1841. There are two mountain ranges called Karatau in Central Asia, one in Uzbekistan and another

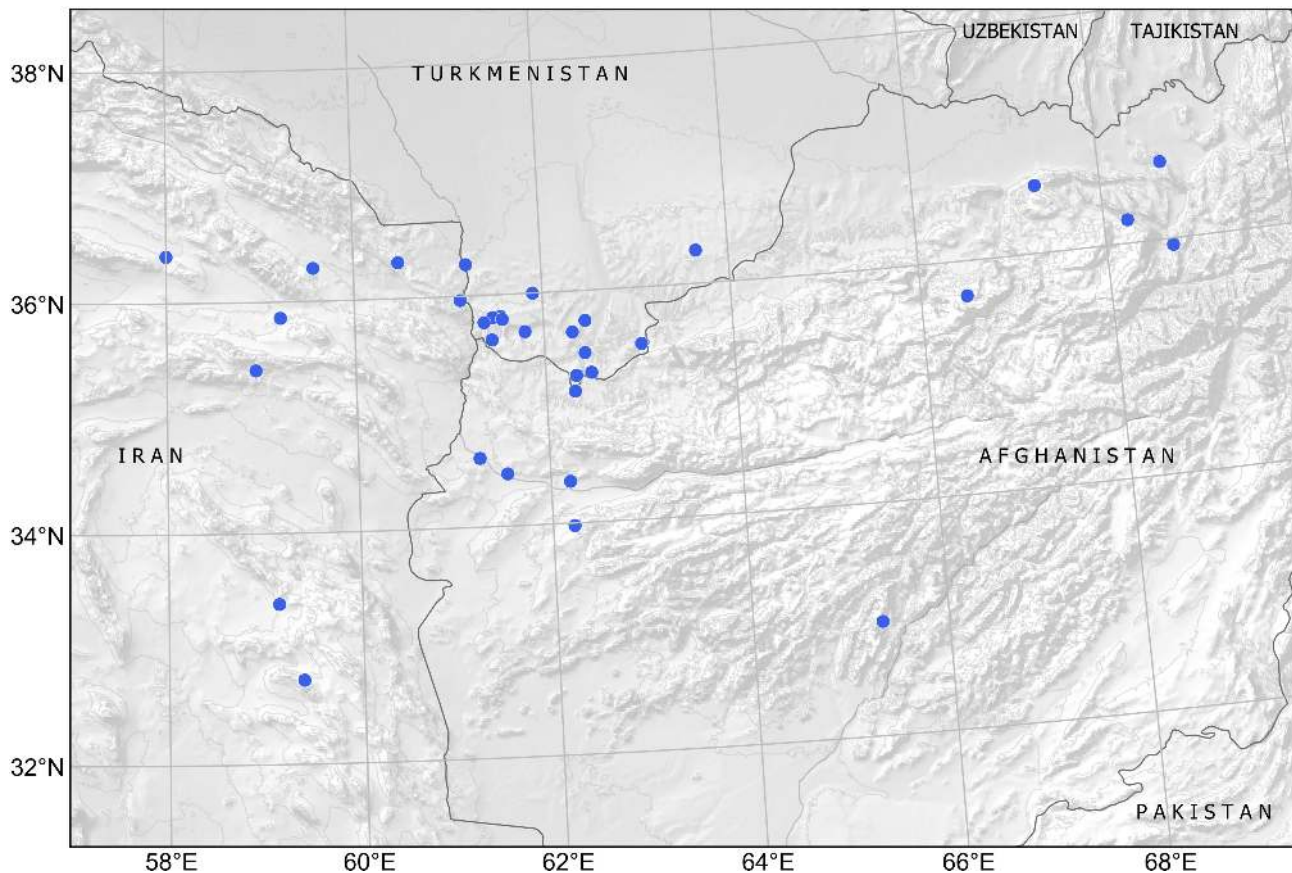


Figure 7. Complete distribution of *Erysimum badghisi* according to herbarium specimens examined.

in Kazakhstan, of which neither is suitable for the species because of much lower altitudes. On that date, Lehmann is known to have travelled along the Fan river in the Zeravshan range in Tajikistan (Lipsky 1905), where the type locality is actually situated. The word 'Karatau' was erroneously written on the field ticket in the Lehmann collection by somebody else than the collector.

The type locality of *C. capusii* was indicated as 'Schivata' in the protologue (Franchet 1884). Lipsky (1905) was unable to trace that locality but Fedorov (1957) deduced that it should be situated in the Zeravshan range. From Soviet military maps we were able to trace that the former village Shovita (39.194°N, 69.076°E) was situated at the left (southern) side of the Yaghnob river, at altitudes of ca 2600 m a.s.l. The river separates the Zeravshan and Hissar ranges, and its southern side formally belongs to the latter.

The distance between the type localities of *C. lehmanniana* and *C. capusii* is approx. 50 km. In reality they belong to the same mountain area, so that the two taxa cannot be separate 'western' and 'eastern' geographical races as speculated by Fedorov (1957).

When elevating *C. capusii* to the species level, Fedorov (1957) postulated that this taxon differs from *C. lehmanniana* in its narrower subentire leaves (versus broader and acutely denticulate leaves) and mostly single (versus several) flowers. These characters indicate that *C. capusii* is a depauperate

variety of *C. lehmanniana* and does not merit any taxonomic recognition (Li 1987). Its recent acceptance at the rank of subspecies (Viktorov 2002, POWO 2024) is not justified.

Fabaceae

Astragalus asaphes Bunge (Bunge 1880a, p. 251)

This species has been referred to *Astragalus* sect. *Macrothrix* Širj. (Tulaganova 1981), and later to *A.* sect. *Adiaspastus* Bunge (Podlech et al. 2013), and is distinguished by subglobose inflorescences, leaflets glabrous above, sparsely pilose below, in 8–9 pairs, calyx teeth approximately as long as the calyx tube (Tulaganova 1981).

Tulaganova (1981) circumscribed the distribution of *A. asaphes* as endemic to the Western Tian-Shan (Pskem, Chatkal, Kurama ranges, Tashkent Ala-Tau). She also added a single discordant locality in the Northern Tian-Shan, Ala-Archa river in the Kyrgyz Ala-Too. This locality, the only basis for the species occurrence in Kyrgyzstan, was grossly misinterpreted in the literature as situated in the vicinity of Osh Town, Alay range (Yakovlev et al. 1996, Zarre 2000, Podlech et al. 2013). Currently, it is also accepted in the checklist of vascular plants of Kyrgyzstan (Lazkov and Sultanova 2014).

The report of *A. asaphes* from Kyrgyzstan has been based on the following specimen: Ala-Archa ravine, 1 July 1965, Yangibaev 254 (TASH). The Ala-Archa river is situated in the

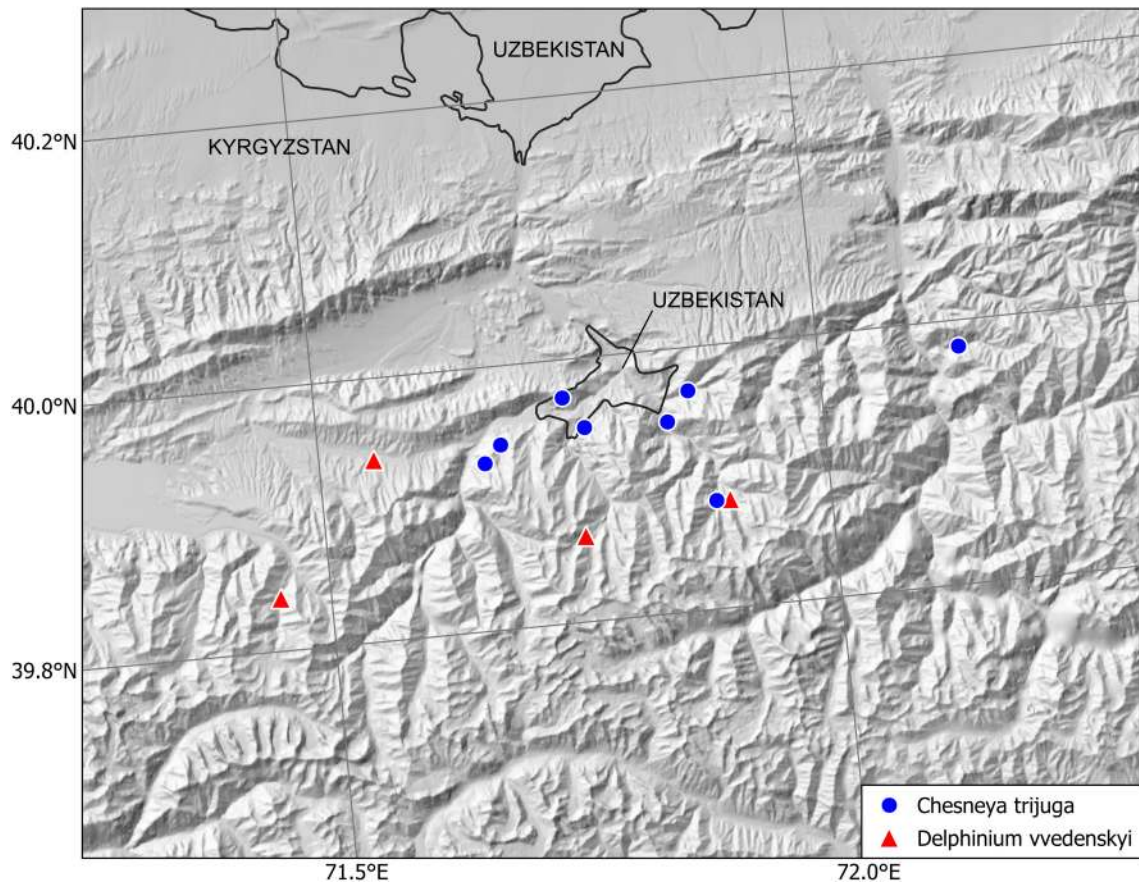


Figure 8. Complete distributions of *Chesneya trijuga* and *Delphinium vvedenskyi* according to herbarium specimens examined.

nearest proximity to Bishkek City and has been sampled very well, being a classical locality because of its extremely easy accessibility; nevertheless, *A. asaphes* has never been refound in that area. Besides, this locality is situated in Northern Tian-Shan, a phytogeographical region different from Western Tian-Shan. We consider this specimen as being mislabelled by the collector, and exclude the species from the flora of Kyrgyzstan.

***Chesneya trijuga* Boriss. (Borissova 1961, p. 247)**

Type: Kyrgyzstan. Alay range: ‘Shahid [Chot] river, near Green [Kök-Köl] lake’, 4 June 1950, N. Shafeev (holotype LE; isotype TASH).

This species was described (Borissova 1961) from the following locality: ‘Alay Region, Shahid river, near Green lake’, which does not correspond to any present-day country. It was eventually referred to Kyrgyzstan (Yakovlev et al. 1996) but, due to the uncertainty concerning the exact location of its type locality, the species was omitted from all checklists of the country (Lazkov and Sultanova 2011, 2014).

Having examined fine-scale and detailed maps of the Shohimardon area, from which the species was collected by N. Shafeev, we confirmed that the Green lake (Kök-Köl lake, dammed Kanda-Kush Southern river; 39.935°N, 71.85°E) and Shahid river (39.8778°N, 71.8874°E; now Chot

river, tributary of the Kök-Suu river, which flows through Qurbon-Köl lake, adjacent to Kök-Köl lake) are situated in the higher mountains of Kyrgyzstan rather than Uzbekistan. For this reason, we add *Chesneya trijuga* to the list of vascular plants of Kyrgyzstan in 60 years after its description from the country. Its complete and precise distribution area is mapped for the first time here on the basis of herbarium specimens (Fig. 8).

Specimens examined

Kyrgyzstan. Alay range: Beksu river, 29 July 1966, Khalkuziev (TASH); Buva river, 7 Sept. 1968, Khalkuziev (TASH); Kul-Kurban lake, 25 May 1972, N. Gorbunova (FRU); Kichik, 26 May 1972, N. Gorbunova (FRU); Katta-Karagandy, 21 Aug. 1975, Aidarova (FRU). Uzbekistan. Alay range: riverside near Yordan village, 21 June 1963, Aidarova (FRU); vicinity of Yordan village, Kyzyl-Tag, 28 May 1967, Khalkuziev (TASH); vicinity of Yordan village, 10 June 1968, Khalkuziev (TASH).

***Hedysarum ledebourii* A.Spreng. (Sprengel 1828, p. 334)**

Based on the same type: *Hedysarum lasiocarpum* Ledeb. (Ledebour 1824, p. 4), nom. illeg., non Palisot de Beauvois (1805, p. 32). *Hedysarum neglectum* Ledeb. (Ledebour 1831, p. 340), nom. illeg. superfl.

In Central Asia, *Hedysarum neglectum* Ledeb. is a common species of Northern and Eastern Tian-Shan, northern Pamir-Alay, Saur, Jungar Alatau and Tarbagatai (Kovalevskaya 1981), also occurring in southern Siberia (Chepinoga et al. 2024), Mongolia (Gubanov 1996) and China (Xinjiang) (Xu and Choi 2010). Nevertheless, this currently accepted name (POWO 2024) is illegitimate. When originally published, it was not a new species name in its own right, based on its own type (Art. 6.9), but rather a replacement for the previously published but illegitimate *H. lasiocarpum* Ledeb. When Ledebour (1831) realised the illegitimacy and coined a replacement, it appeared to be illegitimate in its turn because another replacement, *H. ledebourii* Spreng., had predated Ledebour's attempt. The latter species name is nomenclaturally correct and is restored here.

***Oxytropis leptophysa* Bunge (Bunge 1874, p. 61)**

Oxytropis leptophysa Bunge has previously been found in Tajikistan (Abdusalamova 1978) and the neighbouring territories of Uzbekistan (Gontscharov 1955), where it occurs in the middle mountain belt of the western and central Pamir-Alay. The species belongs to *O.* sect. *Physocarpum* Gontsch. with inflated pods, and is characterised by a long-tapered keel (Filimonova 1983).

During the recent field work, the species was found in the Alay range and Transalay range, southern Kyrgyzstan, as new to the country (Fig. 9). Although the new records were made at very high elevations (3600–4000 m a.s.l.), considerably exceeding those in Tajikistan and Uzbekistan, the plants collected in Kyrgyzstan (Fig. 10) do not show any noticeable difference from the type.

Specimens examined and observations

Kyrgyzstan. Transalay range: Achyk-Tash river, 3600 m a.s.l., 4 July 2022, M. Skotnikova (Plantarium); Petrovsky Peak, 4000 m a.s.l., 5 July 2022, M. Skotnikova (Plantarium). Alay range: Kichi Alay Mts, Bel-Alma river south of Papan village, 3820 m a.s.l., 21 July 2022, G. Lazkov (FRU); Geomüsh Pass, 3950 m a.s.l., 6 July 2023, G. Lazkov, U. Neveraev (FRU).

Gentianaceae

***Swertia dichotoma* L. (Linnaeus 1753, p. 227)**

Based on the same type: *Anagallidium dichotomum* (L.) Griseb. (Grisebach 1838, p. 213).

This species with single, whitish or pinkish, tetramerous flowers, previously placed in the segregate genus *Anagallidium*

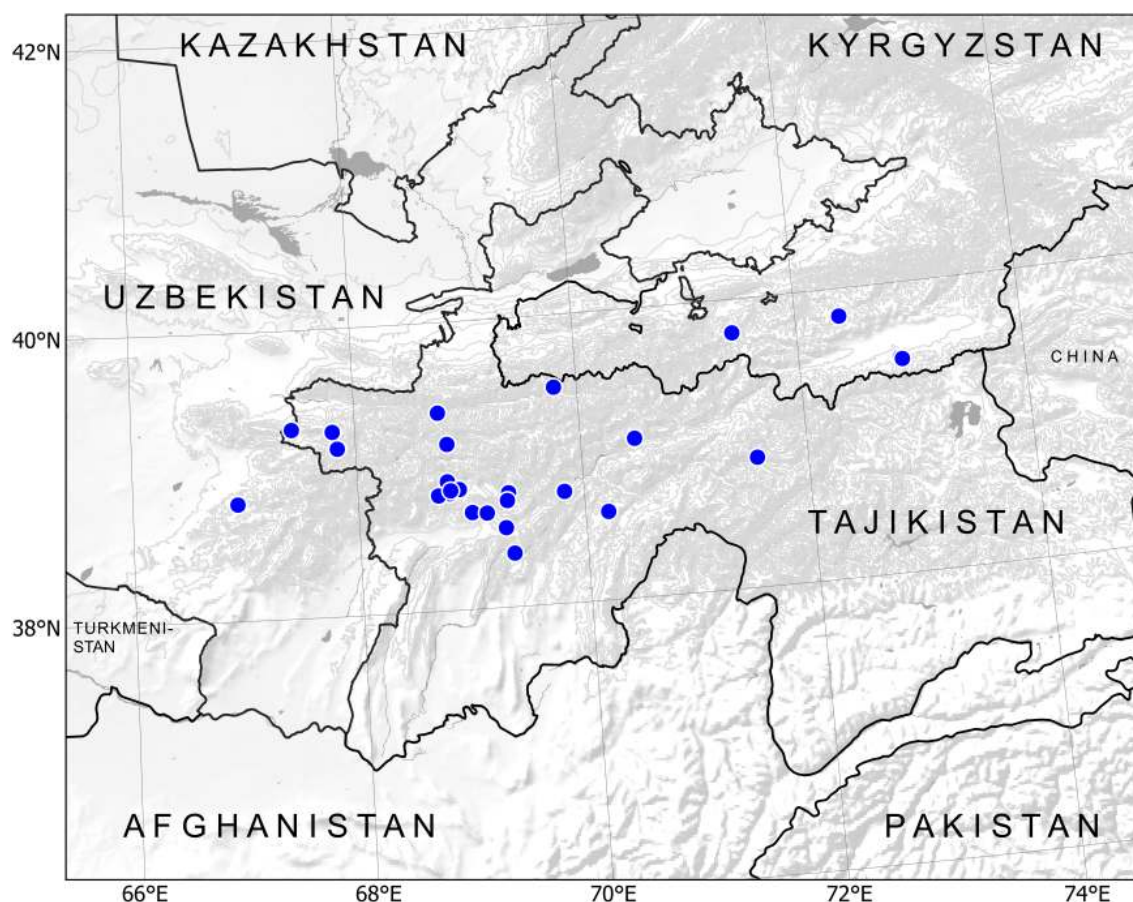


Figure 9. Complete distribution of *Oxytropis leptophysa* according to herbarium specimens examined and reliable literature records (Gontscharov 1955, Abdusalamova 1978).



Figure 10. *Oxytropis leptophylla* in Kyrgyzstan (Bel-Alma River south of Papan village, 21 July 2022). Photo: G.Lazkov.

Griseb. (Aidarova 1959, Pakhomova 1986), is widely distributed in the mountains of Eastern Asia, including southern Siberia, Manchuria, northern China etc. (POWO 2024). Its distribution in Central Asia embraces the north-eastern mountain ranges, i.e. Saur, Tarbagatai, Jungar Alatau, Northern Tian-Shan (Transili, Küngöy, Teskey) (Pakhomova 1986). Its known distribution in Kyrgyzstan was limited to a single locality south of lake Ysyk-Köl (Aidarova 1959).

Recent fieldwork has revealed a further locality of the species in the Eastern Tian-Shan, on the northern side of the At-Bashy range, at the same altitude of 2100–2200 m a.s.l. (Fig. 11). The eastern part of the country is still poorly explored botanically, because of its limited accessibility and the long distance from any botanical centre. Further records are expected.

Specimen examined

Kyrgyzstan. At-Bashy range: Acha-Kayyingdy village, Karajon Mts, 29 May 2021, M. Ganybaeva (FRU).

Geraniaceae

***Erodium ciconium* (L.) L'Hér. (Aiton 1789, p. 415)**

Based on the same type: *Geranium ciconium* L. (Linnaeus 1755, p. 21).

Erodium ciconium differs from *E. cicutarium* by its triangular (versus elliptic) shape of leaves, bluish (versus pinkish) petals 7–8 mm long (versus 4–6 mm long), longer sepals (10–12 versus 6–7 mm long) and fruits (7–10 versus 4–5 cm long) (Nabiev 1983).

This predominantly Mediterranean species (POWO 2024) has a broad distribution in Central Asia, mostly occurring on lower altitudes but ascending to the mountains up

to the high belt (Nabiev 1983). Its known occurrence in the Western Tian-Shan was limited to the western foothills and arid mountains of Kurama range and Mogoltau; besides, the species was recorded from the Kungöy Alatau in the Northern Tian-Shan and from the Alay range in the northern Pamir-Alay (Nabiev 1983). All these records are close to the borders with Kyrgyzstan.

Erodium ciconium was found in Kyrgyzstan along the Uzun-Akhmat river, as the first country record (Fig. 12). Further localities in the Western and Northern Tian-Shan and northern Pamir-Alay are expected. Its previous report from the Alay range (Nabiev 1983), which largely but incompletely belongs to Kyrgyzstan, is unsubstantiated as no relevant specimen has been uncovered at FRU, LE and TASH.

Specimen examined

Kyrgyzstan. Talas Ala-Too: between the confluence of Kara-Kulja and Uzun-Akhmat rivers and Ak-Tektir village, 1090 m a.s.l., 12 May 2016, G. A. Lazkov (FRU).

Huperziaceae

***Huperzia selago* (L.) Bernh. ex Schrank and Mart. (Schrank and Martius 1829, p. 3)**

Based on the same type: *Lycopodium selago* L. (Linnaeus 1753, p. 1102).

Vvedensky and Puchkova (1968) limited the occurrence of *Huperzia selago* (L.) Bernh. ex Schrank and Mart. s.l. in Central Asia to the Jungar Alatau, from which its distribution eastwards in Siberia is continuous (Shaulo 1988). This species is mountainous and boreal, broadly distributed in the Northern Hemisphere (Björk 2020).



Figure 11. *Swertia dichotoma* in Kyrgyzstan (Karajon Mts, 29 May 2021). Photo: M.Ganybaeva.

Among the narrowly defined taxa of the *H. selago* group, *H. selago* s. str. is characterised by gemmae and gemmaphores positioned in pseudowhorls at regular intervals along the stem, and green, ascending to appressed leaves (Björk 2020). The plants collected in Kyrgyzstan (Fig. 13) fully agree with this circumscription.

This record further stresses the boreal component of the flora of Northern Tian-Shan (Sennikov and Tojibaev

2021), which is more humid in comparison with the other parts of this mountain system. Such plants are much more common in the Jungar Alatau, which bridges the Central Asian and Siberian floras (Goloskokov 1984), but the latter mountain range does not make a strict limit in the distribution of boreal plants, which can be found as far southwards as the northern part of the Fergana range (Sennikov et al. 2011).



Figure 12. *Erodium ciconium* in Kyrgyzstan (between the confluence of Kara-Kulja and Uzun-Akhmat rivers and Ak-Tektir village, 12 May 2016). Photo: G.Lazkov.



Figure 13. *Huperzia selago* in Kyrgyzstan (left side of Tüp river, 11 June 2024). Photo: G.Lazkov.

Specimen examined

Kyrgyzstan. Teskey Alatau (N side): left side of Tüp river, moss-covered rocks, 2400 m a.s.l., 11 June 2024, G. Lazkov, M. Ganybaeva (FRU).

Iridaceae

***Crocus korolkowii* Regel ex Maw (Maw 1880a, p. 531)**

This prominent species of *Crocus* is golden- or orange-flowered, externally suffused with brown; flower colour readily distinguishes it from the white-flowered *C. alatavicus* Regel and Semen., which may co-occur in the same territory as *C. korolkowii* (Tscherneva 1971).

The species was originally described from an extensive area in the western Tian-Shan and Pamir-Alay (Regel 1880), whereas its currently known distribution extends to the Hindu Kush in Afghanistan (Wendelbo and Mathew 1975) and Pakistan (Ali and Mathew 2000).

In Kyrgyzstan, the species was first found in the western part of the Kyrgyz range (Nikitina 1967). This record only slightly extended the known species distribution eastwards, because the species had been known from the adjacent part of the same mountain range in Kazakhstan (Poljakov 1958). Although the species is broadly distributed in Tajikistan (Vvedensky 1963), it has not been recorded from the southern territories of Kyrgyzstan (Lazkov and Sultanova 2014).

Recently, extensive yellow-flowered populations of *C. korolkowii* have been observed in the Turkestan range within Kyrgyzstan. This discovery makes a new territorial record and bridges the gap between the Tian-Shan and Pamir-Alay in the species distribution.

The publication of the actual protologue of *C. korolkowii* has been a matter of dispute. Tscherneva (1971) accepted that

the new species was published in Maw (1880a) and, consequently, reappeared in Regel (1880). Sennikov and Turdiboev (2022) noted that Regel (1880) has a separately paginated off-print with the title page dated 1879, and suggested this date to be a publication date of this work. This note may have inspired POWO (2024) for accepting Regel (1880) as the protologue of *C. korolkowii*. However, all versions of Regel (1880) included a letter on *C. korolkowii* (Maw 1880b), which was sent by Maw to Regel on 19 April 1880, thus making the title date of the work impossible. Maw (1880a), which was printed on 24 April 1880, included a diagnosis of *C. korolkowii*, stating its differences from *C. aureus* Sm. (now *C. flavus* Weston) which occurs in Asia Minor, and therefore fulfilled the conditions for valid publication of the species name. This work predates the detailed description of *C. korolkowii*, which was published in Regel (1880) and reviewed in *Botanical Centralblatt* in mid-July 1880.

The authorship of the species name *C. korolkowii* is even less clear. Russian authors (Vvedensky 1963, Tscherneva 1971, Lazkov and Sultanova 2014) cited this authorship as ‘Regel and Maw’, whereas POWO (2024) accepted the reverse order, ‘Maw and Regel’. Maw (1880a) stated that Regel agreed with the new species and proposed its name; as the species name was ascribed to Regel alone and Maw was its publishing author and the author of its diagnosis, the species name authorship should be accepted as *C. korolkowii* Regel ex Maw. The later ascription of the species name to ‘Maw and Regel’ (Maw 1880b) does not stand.

Specimens examined

Kyrgyzstan. Turkestan range: Bulak-Bashy village, foothills, Feb. 2012, S. Ganybaeva (FRU); between Ravat Village and Kara-Suu village, 4–5 Feb. 2014, M. Ganybaeva (FRU);

between Kara-Kamar [Suu-Bashy] village and Ak-Suu village, 19 Feb. 2014, M. Ganybaeva (FRU).

***Iris* sect. *Cristatae* Ledeb. (Ledebour 1852, p. 100)**

Type: *Iris caucasica* M.Bieb. (lectotype designated here).

Taxonomic synonyms:

Juno Tratt. (Trattinnick 1817, p. 135), syn. nov.

Based on the same type: *Iris* subgen. *Scorpiris* Spach (Spach 1846, p. 91). *Xiphion* subg. *Juno* (Tratt.) Baker (Baker 1871, p. 11). *Xiphion* sect. *Juno* (Tratt.) Baker (Baker 1876, p. 527). *Iris* sect. *Juno* (Tratt.) Maxim. (Maximowicz 1880, p. 505).

Type: *Iris persica* L. (lectotype designated by Rodionenko (1961, p. 206)).

Leopold Trattinnick, whose works ‘gave an aestatic direction to botany’ (Zwanziger 1848), was a prolific and highly regarded botanist. However, due to the high cost, private publishing and complicated publication manner of his botanical works, many of which appeared as irregular collections of botanical illustrations with accompanying texts, often overlapping in their contents, Trattinnick’s botanical legacy has never been completely catalogued and nomenclaturally evaluated. In particular, our observations in the historical literature revealed that the publication of Trattinnick (1821), which has not received a common bibliographic attention because of being omitted from Stafleu and Cowan (1986), was more complicated than commonly believed, with bearance on the nomenclature of the genus *Juno* Tratt., which was described there.

The generic name *Juno* was first introduced by Trattinnick (1816) on two drawings named *Juno persica* and *J. scorpioides*. This publication was a collection of black-and-white printed drawings without any accompanying taxonomic text, which were offered for sale ‘in free selection’, i.e. to be chosen from the collection and paid individually. As the drawings were analytical, that means ‘showing details aiding identification’ (Art. 38.9), they could have been counted in place of descriptive matter in the absence of any description or diagnosis. But as the genus was not monotypic at that time and neither of its two species was established as new to science simultaneously with the genus (Art. 38.5), the generic name *Juno* and its respective nomenclatural combinations were not validly published in Trattinnick (1816). Nevertheless, this early publication accounts for the appearance of Trattinnick’s *Juno* names as synonyms in contemporary literature (Roemer and Schultes 1817).

The validating description of *Juno* appeared later, in another selection of the same drawings which were accompanied with annotations and finally collected in a two-volume book (Trattinnick 1821). However, Pritzel (1851) noted that this book was originally published in 23 separate fascicles rather than as a whole. These fascicles are not broadly represented in libraries and, so far, are not publicly available on the Internet, but their information can be traced from contemporary announcements, reviews and publications of other

botanists. The first fascicle of this book was published already in 1815, and reviewed in the beginning of February; this fascicle contained 10 drawings, and the others were planned to follow the pattern (Anonymous 1815). Fascicles 4–8 appeared in 1815 and 1816 (Anonymous 1816). The pages and plates with *Juno* (pp. 135–137, pl. 83–84) appeared, according to Dietrich (1818), in fascicle 10. Dietrich’s book was finalised in March of 1818, and the *Juno* fascicle should have appeared in 1817 as already assumed by Jackson (1893). This detail shifts the valid publication date of *Juno* but does not affect its lectotypification, which was noted by Sennikov et al. (2023).

There is another generic segregate of *Iris* s.l., which was published by Trattinnick (1816, 1817, 1821) in the same works but has been commonly overlooked to the extent that, although it was indexed by Index Kewensis (Jackson 1893), it was not included in IPNI (2024) and was not even mentioned in the latest taxonomic and nomenclatural revision of *Iris* s.l. that aimed at the generic splitting (Crespo et al. 2015). The generic name *Isis* Tratt. was validly published in fascicle 12 of the aforementioned work (pp. 14–19, pl. 111–113), which was prepared and published together with fascicle 10, as evident in their cross-references and contemporary citations (Dietrich 1818). This name was dedicated to a major goddess of the ancient Egypt, and likely its coinage included a word play due to its similarity with the word *Isis*. The new genus was established for three species, all placed in different segregate genera by Crespo et al. (2015): *Evansia* (Alef.) Salisb. ex Decne. (*I. fimbriata* Vent.), *Phaeiris* (Spach) M.B.Crespo, Mart.-Azorin and Mavrodiev (*I. fulva* Ker Gawl.) and *Joniris* (Spach) Klatt (*I. ruthenica* Ker Gawl.). This means that the genus as originally circumscribed was a highly unnatural, artificial assemblage of phylogenetically unrelated species. Of these three generic names, *Phaeiris* is by far the youngest and therefore least familiar to the botanical community; for this reason, *I. fulva* Ker Gawl. is designated here as the type species (lectotype) of *Isis* Tratt., thus establishing the nomenclatural priority of *Isis* over *Phaeiris*.

The sectional subdivision and nomenclature of *Iris* is not settled yet. *Iris* sect. *Juno* (Tratt.) Maxim. is the currently accepted sectional name for a group of *juno* irises with flower stems dying off to base and not swollen (Rodionenko 1961, Sennikov et al. 2023). However, a previously published sectional name, *I. sect. Cristatae* Ledeb., which was coined by Ledebour (1852) for the same group due to the common presence of a crest (prominent central ridge) on the falls (inner tepals of the perigone), has been commonly overlooked and is reinstated here. Ledebour (1852) included a single accepted species in that section, *I. caucasica* M.Bieb., which is designated as type species (lectotype) here. The lectotypification is warranted because of the presence of a species-level synonym in the protologue, *I. iberica* M.Bieb., which is also eligible for typification (as in the case of *Wettsteinia* Petr.: Sennikov et al. (2011)). The sectional name looks like derived from the epithet of *I. cristata* Aiton but is not based on the latter because that North American species was not included in the protologue (Ledebour 1852).



Figure 14. *Iris austrotschatkalica* in Kyrgyzstan (Eneö-Bulak river, 29 Mar. 2021). Photo: A. N. Naumenko. Source: <https://www.inaturalist.org/observations/102553853>.

***Iris austrotschatkalica* Tojibaev, F.Karimov and Turgunov (Tojibaev et al. 2014, p. 12)**

This species belongs to the *Iris orchiioides* group and is characterised by abbreviated internodes, narrow falcate leaves, and fall lamina whitish (pale yellow) with a narrow yellow stripe along the crest (Tojibaev et al. 2014, Sennikov et al. 2023).

Since its original description, this species has been considered a local endemic of the Ungor-Tepa Mt in Uzbekistan (Sennikov et al. 2023). This small mountain together with the Bozbu-Too Mts, of which it is an outlier on the highly arid forefront of the Chatkal range, host a number of narrow endemics (Tojibaev et al. 2023) and belong to the Eastern Fergana botanical hotspot within the Western Tian-Shan (Usmonov et al. 2021).

Besides the noted local endemism, previous research identified the botanical connection between narrow endemics of the Arkit–Ungor-Tepa area in the Chatkal range and those of the northern Fergana range (Sennikov and Lazkov 2013a), to which the Bozbu-Too Mts are adjacent. Recently, a population of *I. austrotschatkalica* has been found in the Kök-Kyya Mts of the northern Fergana range (Fig. 14), thus strengthening our understanding of the patterns of endemism in the Eastern Fergana botanical hotspot.

The known populations of *I. austrotschatkalica* (Fig. 15) are under apparent anthropogenic pressure and under immediate threat of extinction. The population in Uzbekistan (GBIF 2024) is situated close to the state border with Kyrgyzstan and within the operation area of a local cement factory, which causes extensive destructions of land surface by excavation and road construction. It is also affected by agricultural activities of neighbouring Poromon village and operations of the border defence guards, who established an observation post in the middle of this territory. Its maximal extent of occurrence (i.e. the hilly plain between the Ungor-Tepa

Mt and Poromon village) can be estimated at 3–5 km². The population in Kyrgyzstan lies within the operation area of the Kök-Kyya coal deposit, Özgön (East Fergana) coal basin, and is situated along a transportation road that may cause further land destruction during its operation and development. Its estimated extent of occurrence is 0.5 km². As the species extent of occurrence is estimated to be less than 100 km² and its area of occupancy is estimated to be less than 10 km², the species distribution is severely fragmented, and continuing decline is inferred for the area of occupancy and the number of mature individuals, we can assess the IUCN Red List category for *I. austrotschatkalica* as ‘Critically Endangered’ (criteria B1a,b; B2a,b).

Observation

Kyrgyzstan. At-Oinok range: Kök-Kyya Mts, right side of Eneö-Bulak river, 1000 m a.s.l., 29 Mar. 2021, A. N. Naumenko (photo!).

Lamiaceae

***Stachys nana* (Benth.) Sennikov, comb. nov.**

Basionym: *Hypogomphia nana* Benth. (Bentham 1876, p. 1201).

Type: Afghanistan. ‘Syghan’ [Saighan], Grant in Herb. Griffith (holotype K barcode K000928090).

Taxonomic synonyms:

Hypogomphia turkestanica Bunge (Bunge 1872a, p. 30), non *Stachys turkestanica* (Regel) Popov ex Knorring (1954, p. 209).

Based on the same type: *Hypogomphia turkestanica* Regel (Regel 1886, p. 610), nom. illeg. *Stachys bungeana* Sennikov (Sennikov and Tojibaev 2021, p. 351).

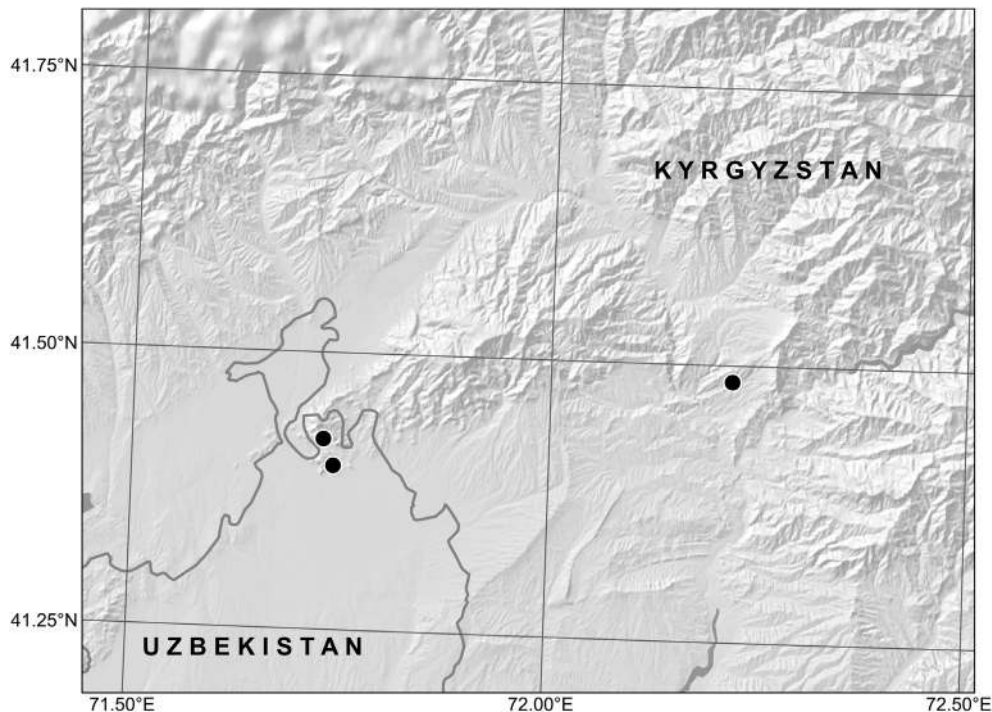


Figure 15. Complete distribution of *Iris austrochatkalica* according to the observation in Kyrgyzstan and reliable published records in Uzbekistan (Tojibaev et al. 2023).

Type: Uzbekistan. ‘In montosis circa Taschkent’, Krause (lectotype P barcode P04160513, designated by Rechinger (1982, p. 251)).

Hypogomphia turkestanica var. *elator* Regel (Regel 1886, p. 610).

Based on the same type: *Hypogomphia elator* (Regel) Vassilcz. (Vassilczenko 1954, p. 492).

Type: Uzbekistan. ‘Prope Tashkent, O. Fedtschenko (holotype LE).

Phylogenetic studies of Lamiaceae (Bendiksby et al. 2011, Zhao et al. 2021) revealed that *Stachys* L. is paraphyletic and other segregate genera of the Stachydeae Dumort. are nested within it, whereas no morphological support can be observed for major phylogenetic lineages of the tribe (Zhao et al. 2021). A broader taxonomic circumscription was therefore favoured by Sennikov and Tojibaev (2021), who preferred monophyletic taxa and accepted the placement of *Hypogomphia* Bunge in the synonymy of *Stachys* L.

The IPNI (2024) made an incorrect record that Sennikov (Sennikov and Tojibaev 2021) published *Stachys bungeana* Sennikov as a superfluous and illegitimate replacement for *Hypogomphia turkestanica* Bunge. Instead, it was suggested that the new combination ‘*S. turkestanica*’ should have been published because it was not treated as a parahomonym of *S. turkestanica* (Regel) Popov ex Knorring. This conclusion cannot stand because both epithets, ‘turkestanica’ and ‘turkestanica’, are derived from the same historical province of Turkestan, the first being irregularly derived directly from the word root and the second being properly formed by adding

an adjectival suffix ‘-ic-’ (Stearn 1966). Both epithets have identical meaning and are clearly confusable, as evident by the illegitimate correction from ‘turkestanica’ to ‘turkestanica’ proposed by Regel (1886) for the same species. Their distinction was not accepted by Bunge himself, who replaced *Dipelta turkestanica* Regel and Schmalh. (Regel 1878, p. 579) by *Astragalus dipelta* Bunge (Bunge 1880b, p. 368) due to the existence of the earlier *Astragalus turkestanus* Bunge (Boissier 1872, p. 278). Since then, the legitimacy of *Astragalus dipelta* has never been questioned, and this species name is currently accepted in all major sources and databases (Podlech and Zarre 2013, POWO 2024).

Nevertheless, the nomenclatural replacement of *Hypogomphia turkestanica* by *Stachys bungeana* was incorrect because of the existence of two obscure species-level synonyms, whose epithets are still available in *Stachys*. *Hypogomphia nana* Benth. is the earliest synonym (Rechinger 1982), whose epithet should be accepted in *Stachys* under the rules. This transfer is consequently proposed here.

Papaveraceae

***Oreomecon involucrata* (Popov) Galasso, Banfi and Bartolucci (Banfi et al. 2022, p. 58)**

Based on the same type: *Papaver involucratum* Popov (Popov 1937, p. 748).

The genus *Oreomecon* Banfi et al. (2022) was established for a group of poppies previously known as *Papaver* ‘sect.’ *Meconella* Spach; as Spach (1838) used the rank of sections for two non-consecutive taxonomic levels, i.e. subdivisions

of tribes and genera, his 'sectional' names are to be treated as unranked under Art. 37.8. Its taxonomic separation has been supported by phylogenetic data (Peng et al. 2024), and an updated classification and nomenclature have recently been proposed for its accepted taxa (Elvebakk and Bjerke 2024).

Oreomecon involucrata (Popov) Galasso et al. (2023, syn. *Papaver involucratum* Popov) is related to *O. crocea* (Ledeb.) Banfi et al. (syn. *Papaver croceum* Ledeb., *P. angrenicum* Pazij) and differs from the latter by its smaller pale orange flowers (petals ca 1 cm long) of cup-like shape, which tend to persist on the stalk after flowering (Tolmachev 1975). The species is confined to the upper mountain belt, at elevations from 2800 to 4600 m a.s.l. (Tolmachev 1975). It was considered endemic to Tajikistan (Pazij 1974) and then reported from the neighbouring provinces of Afghanistan (Breckle et al. 2013), but its broad distribution in the Pamir (Tolmachev 1975) suggested its likely occurrence in the high mountains of Kyrgyzstan. Indeed, Aidarova (1955) reported its presence in the Chatkal Mts of the Tian-Shan, but this record was considered erroneous and belonging to *O. crocea* (Lazkov and Sultanova 2011, 2014).

Recently, *O. involucrata* was collected by Lazkov from a few places in Turkestan and Alay ranges at elevations of 3200–3900 m a.s.l. (Fig. 16). Besides, the species was observed in the Alay and Transalay ranges by citizen scientists (Plantarium 2024). These records agree with the species distribution in Tajikistan, make a new country record and considerably expand its distribution range northwards (Fig. 17).

Specimens examined and observations

Kyrgyzstan. Turkestan range: Kayingdy, 3200 m a.s.l., 17 July 2022, Lazkov (FRU). Kichi-Alay range: Bel-Alma river,

3820 m a.s.l., 22 July 2022, Lazkov (FRU). Alay range: on the way to Geomüsh Pass, 10 July 2023, Lazkov (FRU); Tengizbay Pass, 3900 m a.s.l., 8 July 2023, P. Gorbunov (<https://www.plantarium.ru/page/image/id/777619.html>). Transalay range: Travellers Pass, 3900 m a.s.l., 6 July 2022, M. Skotnikova (<https://www.plantarium.ru/page/image/id/736344.html>).

Plantaginaceae

Veronica L. (Linnaeus 1753, p. 9)

A revision of the nomenclature in *Veronica* L. for the *Flora of Uzbekistan* (Sennikov et al. 2016) revealed the need for some changes in accepted species names, as summarised below.

***Veronica campylopoda* Boiss. (Hohenacker 1843, No. 145; Boissier 1844, p. 80)**

Type: Egypt. 'Ad radices montis Sinai locis planis in glareosis graniticis', 19 Apr. 1835, W. Schimper in Hochstetter and Steudel, *Unio itineraria* 118 (1835) (lectotype M barcode M0188537, first-step lectotype designated by Fischer (1981, p. 67), second-step lectotype designated here by Sennikov; isolectotypes FI, G, HBG, HOH, K, M M0188536, MPU, PRC, S, WU).

This species name has commonly been attributed as validly published in Boissier (1844), in June 1844 (Stafleu and Cowan 1976). The original material of this name was included by Hohenacker (1843) in a commercially distributed set of plants collected by Th. Kotschy in Syria (Aleppo) and Iraq (Kurdistan and Mosul). However, it was also commonly overlooked that the collections distributed by Hohenacker were accompanied by printed labels which are effectively published under the Code (Turland et al. 2018).



Figure 16. *Oreomecon involucrata* in Kyrgyzstan (Kayingdy, 17 July 2022). Photo: G.Lazkov.

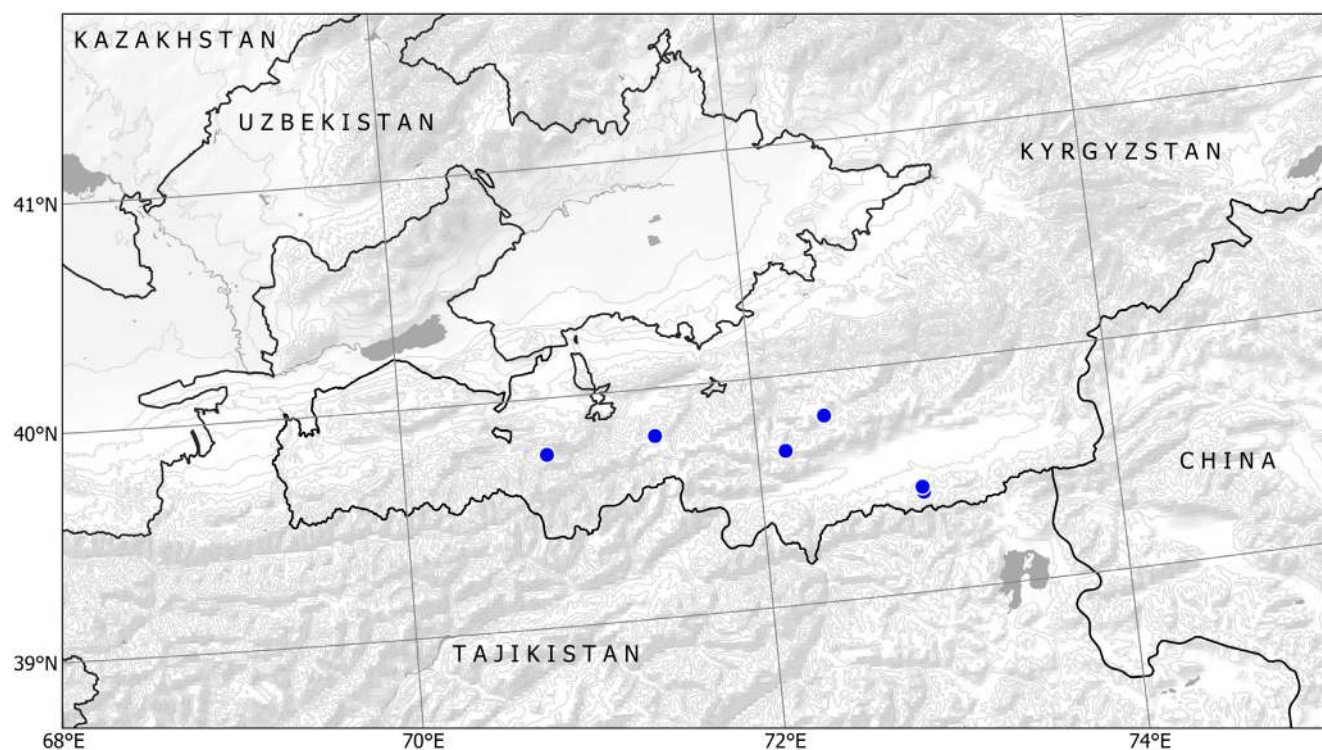


Figure 17. Distribution of *Oreomecon involucreta* in Kyrgyzstan according to herbarium specimens examined and documented observations.

Kotschy's specimens were treated by E. Boissier, who provided new plant names when necessary. For *Veronica campylopoda*, a brief diagnosis distinguishing this species from *V. biloba* L. accompanied the plant name. The label text was credited to Boissier, who therefore validly published the new species name on Hohenacker's label.

Boissier (1844) cited four collections under *V. campylopoda*, of which *Schimper 118* was designated as the lectotype by Fischer (1981). This collection was directly cited also in the protologue (Hohenacker 1843) as a former misidentification (*V. biloba* auct.), and is therefore a syntype of the species name. Although Fischer (1981) made his lectotypification from the context of Boissier (1844) rather than the actual protologue, it is formally correct and should stand. Fischer (1981) designated as the lectotype specimens kept at three different institutions, FI, M and WU. This designation is referable to at least 4 herbarium sheets, from which a second-step lectotype is formally designated here.

In the spring of 1835, W. Schimper collected plants while based at the Saint Catherine's Monastery on the Mount Sinai, the Sinai Peninsula, now Egypt, for the order of the Esslingen Botanical Travel Society (German *Esslinger Botanische Reiseverein*, Latin *Unio itineraria*), a scientific society whose purpose was to organise and subsidise (through subscribers) botanical collectors sent to unexplored countries for a high yield of rare and undescribed plants (Wörz 2016). The society's collectors delivered thousands of plants, which were identified by the directors of the society (C.F. Hochstetter, E.G. Steudel) and invited plant taxonomists; the directors

were responsible for labelling the plants with printed labels, and also selling and distributing the collections to the subscribers according to their share payments (Wörz 2016). The specimens collected by Schimper in 1835 were quickly processed and distributed already in the same year (Hochstetter and Steudel 1835, 1836).

***Veronica pusilla* Kotschy ex Boiss. (Hohenacker 1845, No. 717)**

Based on the same type: *Veronica perpusilla* Boiss. (Boissier 1846, p. 490), nom. illeg. superfl.

Type: Iran. In humidis montis Kuh-Daëna Persiae austr., 21 July 1842, Th. Kotschy 717 in Hohenacker, *Flora Persiae australis* (1845) (lectotype W, designated by Fischer (1981, p. 67); islectotypes G, etc.).

Taxonomic synonym:

Veronica hispidula Boiss. and A.Huet (Boissier 1856, p. 173).

Type: Turkey. Anatolia, prope Erzeroum, in arenosis, June 1853, Huet du Pavillon (holotype G; isotypes S, W).

The name *Veronica perpusilla* Boiss. is illegitimate but commonly accepted for this species in the Russian literature (Borissova 1955, Filimonova 1987). The taxonomy of this group, *V. acinifolia* L. s.l., is still unsettled; some researchers accepted only one species in the group, *V. acinifolia*, as in *Flora Europaea* (Walters and Webb 1972), whereas the others accepted at least three but defined them differently

(Borissova 1955, Fischer 1981, Filimonova 1987). The lumping approach may be justified here, but for the time being we tentatively accept *V. pusilla* as a separate race occurring in Central Asia (Elenevsky 1978).

***Veronica tetraphylla* Popov (Popov 1922, p. 58)**

Based on the same type: *Veronica tenuissima* Boriss. (Borissova 1955, p. 403), nom. illeg. superfl.

Type: Kyrgyzstan. Sary-Too Mts, 24 June 1920, M. G. Popov 629 (lectotype TASH, designated by Elenevsky (1978, p. 216); isoelectotype LE).

Borissova (1955) introduced *Veronica tenuissima* Boriss., a replacement name for *V. tetraphylla* Popov, on the belief that the latter name was an illegitimate later near-homonym of '*V. tetraphyllos* Boeber ex Georgi'. Likely she based her opinion on the relevant entries in Trautvetter (1884) and *Index Kewensis* (Jackson 1895), in which the species name (indicated as not accepted, unresolved) was listed as published in Georgi (1800, p. 653). However, in the latter work this species name appeared as nomen nudum, thus being inoperative in questions of priority.

The lectotype locality of *V. tetraphylla* is situated in Kyrgyzstan; this is a small hill located immediately south of the Sary-Too Mts (Popov 1922), approximately at 39.996°N, 70.383°E.

Plumbaginaceae

Linczevski (1940) started his famous and influential revision of the genus *Acantholimon* Boiss. in Central Asia (Linczevski 1993) by the description of *Chaetolimon* Lincz. Although Linczevski discussed *A. sect. Chaetolimon* Bunge in the introduction to his article, this section, based on its sole original species, *A. setiferum* Bunge, was not the nomenclatural basis of the new generic name. Linczevski (1940) included *A. setiferum* in the original circumscription of his *Chaetolimon* but described the latter as a genus of its own, ascribing it to himself alone with a statement 'gen. nov.', with a new descriptive matter (description and diagnosis) in Latin and a new type, *C. sogdianum* Lincz., which was a new species described by Linczevski in the same work. As Linczevski provided conditions for valid publication of a generic name in its own right, i.e. based on its own type (Art. 6.9), his type designation is final and cannot be corrected (Art. 9.1, Note 1).

In some of his earlier works Linczevski (1961) cited the authorship of *Chaetolimon* according to its protologue. Nevertheless, due to the same name and the inclusion of Bunge's type in the original circumscription, he re-interpreted *Chaetolimon* and *A. sect. Chaetolimon* as homotypic names, and erroneously amended the generic authorship as '(Bunge) Lincz.' (Linczevski 1952, 1968, 1993). Many subsequent authors and some modern databases followed suit (Kamelin 1973, Czerepanov 1981, 1995, Mabberley 2017, POWO 2024). Consequently, *C. setiferum* (Bunge) Lincz. was erroneously treated as the type of *Chaetolimon*.

On this assumption, Linczevski (1979) excluded the original type of *Chaetolimon* from the genus and based a new generic segregate, *Vassilczenkoa* Lincz., on *C. sogdianum*. As this type change is ineffective, the generic name *Vassilczenkoa* is an illegitimate replacement for *Chaetolimon*. At the same time, the illegitimate new name '*Chaetolimon* (Bunge) Lincz.' remained invalidly published because of the lack of a full and direct reference to the basionym (Beshko et al. 2020).

Unexplainably, Malekmohammadi (in Malekmohammadi et al. 2024) accepted the authorship of *Chaetolimon* as '(Bunge) Lincz.' but designated another, now the third type for this genus name, *C. limbatum* Lincz.

A sister relationship was found between *Vassilczenkoa sogdiana* and *Chaetolimon setiferum* in a phylogenetic analysis, which placed this small lineage at the base of one of two *Acantholimon* subclades (Moharrek et al. 2017); their relationship was resolved by ITS only and unresolved by other markers. Based on these results, Beshko et al. (2020) reduced *Chaetolimon* to a synonym of *Acantholimon* s.l. However, Malekmohammadi et al. (2024) argued against this lumping because the resulting genus would be large and morphologically heterogeneous and because another work (Koutroumpa et al. 2018), although based on a different sampling, suggested a different phylogenetic placement of *Chaetolimon*, albeit also with low support. As long as the phylogeny of *Acantholimon* s.l. remains unresolved, Malekmohammadi et al. (2024) proposed to maintain segregate genera in this group.

As *Vassilczenkoa* is currently accepted in the circumscription of Plumbaginaceae by Malekmohammadi et al. (2024) and has been accepted in all recent checklists of vascular plants of Kyrgyzstan (Lazkov and Sultanova 2011, 2014), its continued acceptance in their future edition may be maintained. Since this generic name is illegitimate and must be replaced by *Chaetolimon*, a new genus should be formally established because of the current misapplication of the latter generic name. Their nomenclature is summarised below.

***Chaetolimon* Lincz. (Linczevski 1940, p. 586)**

Based on the same type: *Vassilczenkoa* Lincz. (Linczevski 1979, p. 166), nom. illeg. superfl.

Type: *Chaetolimon sogdianum* Lincz.

***Hissarolimon* Sennikov, gen. nov.**

Replaced synonym: *Acantholimon* sect. *Chaetolimon* Bunge (Bunge 1872b, p. 68).

Based on the same type: *Chaetolimon* (Bunge) Lincz. (Linczevski 1979, p. 166), nom. inval.

Type: *H. setiferum* (Bunge) Sennikov.

Etymology

The new genus is named after the Hissar Mts in Central Asia, in which both species of the genus occur.

***Hissarolimon setiferum* (Bunge) Sennikov, comb. nov.**

Basionym: *Acantholimon setiferum* Bunge (Bunge 1872b, p. 68).

Based on the same type: *Chaetolimon setiferum* (Bunge) Lincz. (Linczevski 1940, p. 591).

***Hissarolimon limbatum* (Lincz.) Sennikov, comb. nov.**

Basionym: *Chaetolimon limbatum* Lincz. (Linczevski 1940, p. 595).

***Psylliostachys suworowii* (Regel) Roshkova (Roshkova 1952, p. 469)**

Based on the same type: *Stachys suworowii* Regel (Regel 1881, p. 550).

Psylliostachys suworowii (Regel) Roshkova is characterised by dense inflorescences and lobate, mostly glabrous basal leaves (Roshkova 1993). It is widely distributed on highly arid lowlands, foothills and in the middle belt (up to 1200 m) of the mountains forming the western side of the Tian-Shan and Pamir-Alay, from the Aral Sea to northern Iran (Roshkova 1993). This species was known from the Fergana Depression within Tajikistan and Uzbekistan (Linczevski 1961, 1986) but its occurrence in Kyrgyzstan has never been recorded.

However, a single locality of *P. suworowii* in Kyrgyzstan has been found in Leylek District, Batken Region, in highly arid forefront mountains of the Turkestan range, making a new country record of the genus (Fig. 18). This locality is close to the Mogoltau range of the Western Tian-Shan, from which the species was originally described (Linczevski 1986).

Specimen examined

Kyrgyzstan. Turkestan range: between Vostochny village and Kyzylbaglan river, 27 May 2024, G. Lazkov, M. Ganybaeva (FRU).

Polygonaceae

***Rheum turkestanicum* Janisch. (Janischewsky 1916, p. 92)**

Rheum turkestanicum is a scapose plant with lax subglobose inflorescences and fruit wings (4)5–7(8) mm wide (Kovalevskaya 1971). This species is broadly distributed on highly arid lowlands and foothills surrounding the western part of the Western Tian-Shan (Kyzylkum deserts) and Pamir-Alay (Karakum deserts) (Kovalevskaya 1971), stretching into northern Iran and the Transcaucasia (POWO 2024). Its registered occurrence in the western part of the Fergana Depression (Kovalevskaya 1971) suggested its likely presence in the arid lowlands of western Kyrgyzstan.

During our revision of herbarium collections at FRU, an old specimen collected from the foothills of the Turkestan range at the border with Tajikistan has resurfaced. This specimen makes the first record of this species in Kyrgyzstan.

Specimen examined

Kyrgyzstan. Turkestan range: Samarkandek village, versicolour denudations, 10 May 1978, Aidarova, Ubukeeva (FRU).

Polypodiaceae

***Polystichum lonchitis* (L.) Roth (Roth 1799, p. 71)**

Basionym: *Polypodium lonchitis* L. (Linnaeus 1753, p. 1088).

This fern, characterised by stiff, linear pinnate fronds with serrately dentate pinnae, is broadly distributed in the mountain regions of the Northern Hemisphere (POWO 2024), including the Tian-Shan mountain system (Vvedensky and Puchkova 1968). In Kyrgyzstan, the known species distribution was limited to the Western Tian-Shan (Nikitina 1952, Lazkov and Sultanova 2011, 2014). The species was found in eastern Kazakhstan (Jungar Ala-Too, Transili Ala-Too)



Figure 18. *Psylliostachys suworowii* in Kyrgyzstan (between Vostochny village and Kyzylbaglan river, 27 May 2024). Photo: G.Lazkov.



Figure 19. *Polystichum lonchitis* in Kyrgyzstan (Tüp river, 11 June 2024). Photo: G.Lazkov.

(Pavlov 1956) but has never been recorded from northern Kyrgyzstan.

During field work in northern Kyrgyzstan, *Polystichum lonchitis* (Fig. 19) was found in two localities situated on the Teskey and Küngöy mountain ranges, making the first records for that part of the country. The plants were growing on mossy rocks along riversides, at elevations of 2000–2500 m a.s.l. These records agree with the species distribution pattern in Central Asia, which includes the most moisture-rich portions of the Tian-Shan.

Specimens examined

Kyrgyzstan. Teskey Ala-Too: N side, Tüp river, 2400 m a.s.l., 11 June 2024, G. A. Lazkov, M. R. Ganybaeva (FRU). Küngöy Ala-Too: S side, Kol-Tor ravine above the lake, 9 June 2024, G. A. Lazkov, M. R. Ganybaeva (FRU).

Ranunculaceae

***Delphinium pavlovii* Kamelin (Kamelin 1975, p. 136)**

Type: Kazakhstan. Syrdarya Karatau: Tersakkan, 8 July 1973, R. Kamelin (holotype LE).

Delphinium bitermatum Huth is widely distributed in the Jungar Alatau, Tian-Shan and the adjacent Pamir-Alay, as well as in the Kopet-Dagh (Pakhomova 1972) within Kazakhstan, Uzbekistan, Kyrgyzstan, China, Tajikistan, Turkmenistan, Afghanistan and Iran (POWO 2024). It is characterised by sulphur-yellow flower colour. Kamelin (1975) recognised a close relative of this species, *D. pavlovii* Kamelin, which differs primarily by its snow-white flower colour (Fig. 20). The latter species has a restricted distribution in the Syrdarya Karatau (in which *D. bitermatum* is nearly absent) and the

southern part of the Moynqūm desert, thus being considered endemic to Kazakhstan (Kubentayev et al. 2024).

Kamelin (1975) predicted that *D. pavlovii* may be found in the northern foothills of the Kyrgyz Ala-Too because of its occurrence in the Moynqūm desert. Indeed, we have found a locality of this species in Kyrgyzstan, south of Kant Town, the same place in which another former endemic of Kyrgyzstan, *Allium valentinae* Pavlov, has recently been discovered (Sennikov and Lazkov 2023). This finding makes a new country record for Kyrgyzstan.

The area of the Syrdarya Karatau and the Moynqūm desert, in which *D. pavlovii* is distributed, is highly arid. On the opposite, *D. bitermatum* is more mesophytic and tends to occur in forested localities (Kamelin 1975). Similar ecological differences were found in another pair of endemic plants of Central Asia, *Corydalis ainae* (Rukšāns ex Lidén) Lazkov and Sennikov and *C. schanginii* (Pall.) B.Fedtsch., in which the former is confined to arid mountains of the Karatau and deserted hills of Central Kazakhstan, whereas the latter occurs along more humid and elevated mountains of eastern Central Asia (Lazkov and Sennikov 2017a, b).

Due to a special climate and rather isolated geographical position of the Syrdarya Karatau, its flora includes a significant number of endemic vascular plants, of which Kamelin (1990) counted 150 species and 3 genera. Remarkably, the taxonomic separation of two of these genera (*Botschantzevia* Nabiev, *Rhaphidophyton* Iljin) still stands, whereas the third genus (*Pseudomarrubium* Popov) has recently been reduced to a synonym of *Phlomoideis* Moench (Zhao et al. 2023). *Delphinium pavlovii* was also considered endemic to the Karatau by Kamelin (1990); its currently known distribution, mapped for the first time on the basis of Kamelin



Figure 20. *Delphinium pavlovii* in Kyrgyzstan (south of Kant Town, 1 July 2009). Photo: G.Lazkov.

(1975) and the specimens and observations examined here, is shown in Fig. 21.

Specimens examined and observations

Kyrgyzstan. Kyrgyz range: foothills south of Kant Town, 1 July 2009, G. A. Lazkov (FRU, Plantarium). Kazakhstan. Syrdarya Karatau: Karasay, 30 June 2011, E. Davkaev (Plantarium); Alatau Mts, 27 June 2014, E. Davkaev (Plantarium); Shymbulak, 7 July 2019, A. Ebel (Plantarium).

***Delphinium vvedenskyi* Pachom. (Pakhomova 1972, p. 238)**

Type: Kyrgyzstan. Alay range: Shahid Meadows, 2800 m a.s.l., 26 July 1948, N. Shafeev (LE).

Shohimardon is a small exclave of Uzbekistan within Kyrgyzstan. Its cultural significance and territorial separation from the main part of Uzbekistan has brought attention of many botanists studying the flora of Central Asia, and several new plant species were described from the

vicinities of Shohimardon and considered endemic to the area (Khalkuziev 1971).

N. G. Shafeev, who worked at the Fergana Pedagogical College, gathered an extensive collection of vascular plants and lichens from the vicinities of Shohimardon, which was sent for examination to various experts and scientific centres (Makryj and Yatsyna 2019). Among other novelties, one of Shafeev's specimens became the type of *Delphinium vvedenskyi* Pachom., a close relative of *D. oreophilum* Huth. This new species was distinguished by the dense and long glandular pubescence in its inflorescence and considered a narrow endemic to Shohimardon (Pakhomova 1972), recorded as present in Uzbekistan (Pakhomova 1972) and Kyrgyzstan (Lazkov and Sultanova 2011, 2014).

Our examination of the complete set of specimens of *D. vvedenskyi* at TASH revealed that the species was collected from higher mountains around Shohimardon (Fig. 8), ranging from 2400 to 3440 m a.s.l. These altitudes are situated

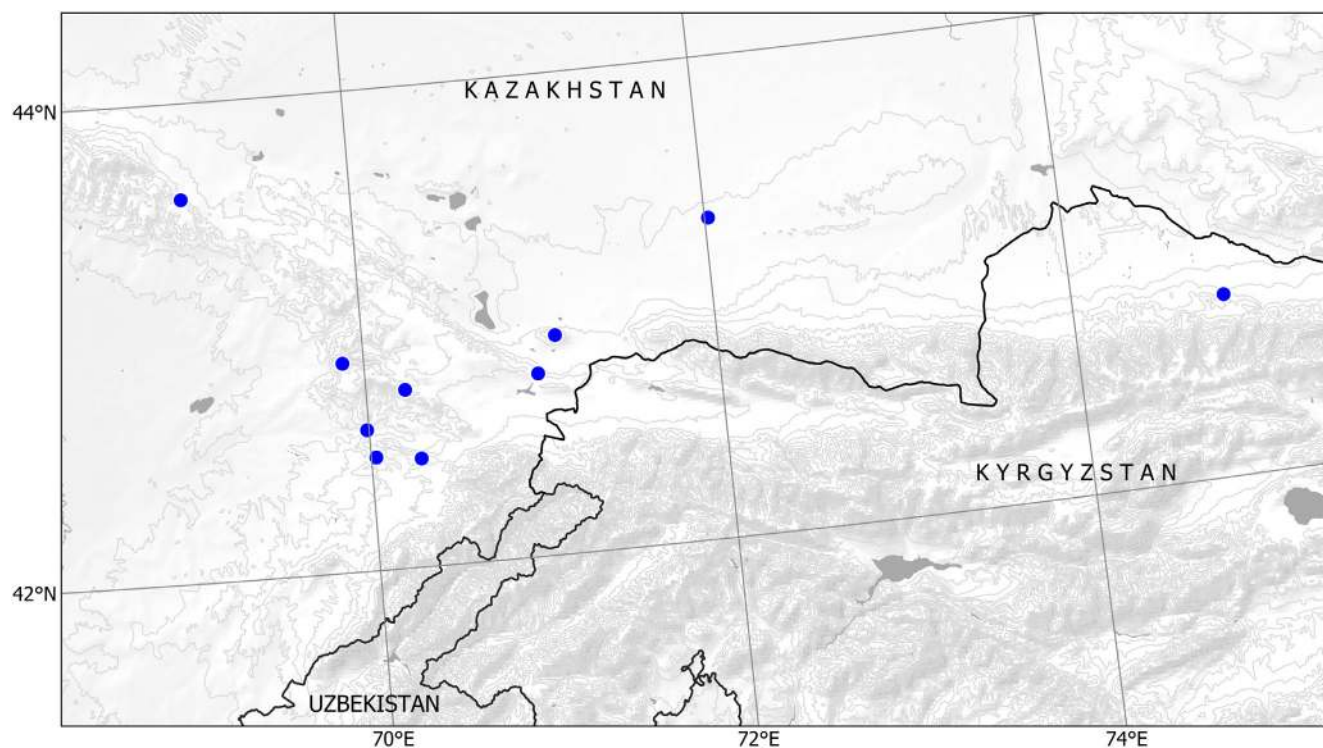


Figure 21. Complete distribution of *Delphinium pavlovii* according to herbarium specimens examined, documented observations and reliable literature records (Kamelin 1975).

outside the enclave, exclusively in the territory of Kyrgyzstan. This species is, therefore, endemic to Kyrgyzstan.

Specimens examined

Kyrgyzstan. Alay range: Alaudinsay, 6 July 1950, Korotkova (TASH); Shivali, 14 July 1961, Pyataeva (TASH); confluence of Aktash and Surmetash, 27 Aug. 1962, Belolipov (TASH).

Pulsatilla campanella (Regel and Tiling) Hayek (Hayek 1904, p. 467)

Pulsatilla albana var. *campanella* Regel and Tiling (Regel and Tiling 1858, p. 30).

Type: Russia. «Altai» in Herb. Fischer (lectotype LE01040923, designated by Luferov in Grabovskaya-Borodina (2018, p. 223); isolectotype LE).

It is commonly believed (POWO 2024) that this species name was validly published in Krylov (1931, p. 1169). However, Hayek (1904) was the first to accept this taxon as a species with due nomenclatural references in his commonly overlooked synopsis of *Pulsatilla* Mill.

Ranunculus brotheri Freyn (Freyn 1898, p. 885), 'Brotherusi'

The original spelling of this species name was 'Ranunculus brotherusi' (Freyn 1898), subsequently corrected to 'brotherusi' under Art. 60.8 (POWO 2024). The species was named after V. F. Brotherus (1849–1929), a famous bryologist and botanical traveller from Finland, who made a fruitful excursion from Almaty (Kazakhstan) to Karaköl (Kyrgyzstan)

in 1896 (Taponen 2014). This corrected spelling is currently accepted (Schegoleva 2023, POWO 2024).

According to Art. 60.8, the formation of plant species epithets from personal names by adding a stem augmentation and a genitive inflection is reserved for the personal names which are not already in Greek or Latin. The surname Brotherus, first adopted by S. Brotherus (ca 1580–1651) who was a priest in the Helsinki parish (<https://family-brotherus.firebaseio.com/>), was originally in Latin in accord with the contemporary custom among Scandinavian clergy. As the personal name does not fall under Art. 60.8 in this case, the species epithet should be corrected to 'brotheri'.

Similarly, the name '*Astragalus brotherusii*', used for an endemic of Kazakhstan (Kubentayev et al. 2024, POWO 2024), should be corrected to *A. brotheri* Podlech.

Xanthorrhoeaceae

Eremurus comosus O.Fedtsch. (Fedtschenko 1904, p. 772)

Eremurus comosus O.Fedtsch. is a species of *E. sect. Ammolirion* (Kar. and Kir.) Boiss., which differs in the campanulate flowers and conspicuously ciliate flower bracts (Vvedensky and Kovalevskaya 1971, Makhmudjanov et al. 2022). This species, widely distributed in the mountainous Tajikistan (Vvedensky 1963) with the presence in Afghanistan (Breckle et al. 2013) and Uzbekistan (Makhmudjanov et al. 2022), was reported from Kyrgyzstan on the basis of herbarium specimens collected in the Isfairam river basin, Alay range (Vvedensky and Kovalevskaya 1971). So far, it was the only record of the

species from the northern part of its distribution area, i.e. mountains surrounding the Fergana Depression.

Our revision of herbarium collections (FRU) revealed another specimen of *E. comosus* from Kyrgyzstan, collected near Isfana village in the Turkestan range. This record suggests that further scattered localities of the species may be expected in the country.

Specimens examined

Kyrgyzstan. Alay range: Akterek, 16 May 1930, A. F. Ioffe (TASH). Turkestan range: W of Isfana village, 18 June 1968, Ubukeyeva et al. (FRU).

Conclusions

This series of critical notes is based on our ongoing field and herbarium work on vascular plants in Kyrgyzstan, and is also dealing with previously published records. As a result, it confirms the presence of one species, excludes two species previously reported in error, and adds ten species as new country records. Among the species previously reported from the country, two are reduced here to synonyms. With these additions and corrections, the total number of vascular plant species in Kyrgyzstan reaches 4043.

The synonymisations reported here reflect the floristic connections of Central Asia with the Himalayas (Kamelin 1973). Such broadly distributed species, independently described from neighbouring or even more remote countries, may still obscure distribution patterns in some species-rich and taxonomically difficult groups, like Asteraceae and Brassicaceae (Koch et al. 2012).

Although the flora of Kyrgyzstan is relatively well studied, new country records regularly emerge and demonstrate that further effort is needed in the botanical exploration of the country. However, most of the records reported here are range extensions with very close connections to the neighbouring countries. The presence of these species in Kyrgyzstan may be considered expected but that situation was far from obvious because most of the taxonomic groups in Central Asia have not been mapped yet.

To secure a better understanding of plant distributions and to facilitate further botanical and conservational research in the country, we mapped several species in Kyrgyzstan and partly in the neighbouring countries in connection with our study. This work also contributes to the data mobilisation in botanical studies of Central Asia, which is still at the rudimentary stage in Kyrgyzstan due to a very limited number of botanists working in the country.

Last but not least, our ongoing work towards the nomenclatural cleaning and bibliographical completeness once again resulted in numerous changes in accepted plant names, synonymy and typifications. Perhaps unsurprisingly, our further research on grey literature yielded a number of changes in previously accepted protologues. Notably, some of these changes come from exsiccata and exsiccata-like series of commercially distributed herbarium sets, whose nomenclatural significance

has been largely overlooked and whose current examination continues bringing further surprising results (Sennikov 2024b).

Acknowledgements – AS acknowledges the financial support received from the Societas pro Fauna et Flora Fennica for his travels to Kyrgyzstan. Komiljon Tojibaev and Orzimat Turginov (Tashkent) kindly communicated the information from TASH. Joel Calvo (Genève) sent photos of the handwritten description of *Allium carolinianum*. Sampsa Lommi (Helsinki) produced distribution maps.

Funding – The work of GL was supported by the research project of Korea National Arboretum, ‘Central Asia Green Road Project II. Conservation of Plant Diversity and Ethnobotanical Research (KNA 1-1-26, 20-1)’. Open access was funded by the University of Helsinki.

Author contributions

Alexander N. Sennikov: Conceptualization (lead); Data curation (lead); Investigation (equal); Resources (supporting); Supervision (lead); Writing – original draft (lead); Writing – review and editing (lead). **Georgy A. Lazkov:** Data curation (supporting); Investigation (equal); Resources (lead); Writing – original draft (supporting); Writing – review and editing (supporting). **Myskalai R. Ganybaeva:** Investigation (supporting); Resources (supporting). **Nikolai Friesen:** Investigation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting). **Dmitry A. German:** Investigation (supporting); Resources (supporting); Writing – original draft (supporting); Writing – review and editing (supporting);

Data availability statement

Data are available from the Dryad Digital Repository: <https://doi.org/10.5061/dryad.x3ffb7wt> (Sennikov et al. 2025)

References

- Abdusalamova, L. N. 1978. *Oxytropis* DC. – In: Ovchinnikov, P. N. (ed.), Flora of the Tajik SSR, vol. 5. Science Publishers, pp. 426–496 (in Russian).
- Aidarova, R. A. 1955. Papaveraceae. – In: Vvedensky, A. I. (ed.), Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR, vol. 6. Academy of Sciences of the Kirghizian SSR, pp. 118–142 (in Russian).
- Aidarova, R. A. 1959. Gentianaceae. – In: Vvedensky, A. I. (ed.), Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR, vol. 8. Academy of Sciences of the Kirghizian SSR, pp. 184–201 (in Russian).
- Aidarova, R. A. and Sultanova, B. A. 1984. Floristic records from Kirghizia. – *Izv. Kirgizskoi SSR* 4: 21 (in Russian).
- Aitchison, J. E. T. 1888. I. The botany of the Afghan delimitation commission. – *Trans. Linn. Soc. Lond. Ser. 2* 3: 1–139.
- Aiton, W. 1789. *Hortus kewensis*, vol. 2. – G. Nicol.
- Ali, S. I. and Mathew, B. 2000. Iridaceae. – In: Ali, S. I. and Qaiser, M. (eds), Flora of Pakistan, vol. 202. Department of Botany, Univ. of Karachi; Miss. Bot. Gard. Press, pp. 1–35.

- Anonymous. 1815. Litteratur. – Oest. Beobachter 33: 187–188.
- Anonymous. 1816. Journal général de la littérature étrangère, année 1816. – Treuttel et Würtz.
- Arbaeva, Z. S. 1965. *Anaphalis* DC. – In: Vvedensky, A. I. (ed.), Flora of Kirghiz SSR, vol. 11. – Academy of Sciences of the Kirghiz SSR, pp. 72–77 (in Russian).
- Baker, J. G. 1871. Monograph of the genus *Xiphion*. – J. Bot. 9: 9–14, 41–43, 108–110.
- Baker, J. G. 1876. A synopsis of the known species of *Iris*, I. – Gard. Chron. 5: 526–527.
- Banfi, E., Bartolucci, F., Tison, J.-M. and Galasso, G. 2022. A new genus for *Papaver* sect. *Meconella* and new combinations in *Roemeria* (Papaveraceae) in Europe and the Mediterranean area. – Nat. Hist. Sci. 9: 67–72.
- Beale, G. R. 1978. Bosc and the exequatur. – Prologue Q. Natl. Arch. 10: 132–151.
- Bendiksby, M., Thorbek, L., Scheen, A.-C., Lindqvist, C. and Ryding, O. 2011. An updated phylogeny and classification of Lamiaceae subfamily Lamioideae. – Taxon 60: 471–484.
- Benthams, G. 1876. Labiatae. – In: Benthams, G. and Hooker, J. D. (eds), Genera plantarum, vol. 2. Reeve and Co., pp. 1160–1223.
- Beshko, N. Yu., Khassanov, F. O. and Sennikov, A. N. 2020. Plumaginaceae Juss. – In: Sennikov, A. N. (ed.), Flora of Uzbekistan, vol. 3. Ma'naviyat, pp. 1–46 (in Russian).
- Besser, W. S. 1836. Supplementum ad synopsis Absinthiorum, tentamen de Abrotanis, dissertationem de Seriphidiis atque de Dracunculis. – Bull. Soc. Imp. Nat. Mosc. 9: 1–115.
- Björk, C. R. 2020. Notes on the Holarctic species of *Huperzia* (Lycopodiaceae), with emphasis on British Columbia, Canada. – Ann. Bot. Fenn. 57: 255–278.
- Boissier, E. 1842. Plantea Aucherianae Orientales enumeratae, cum novarum specierum descriptione (suite). – Ann. Sci. Nat. Bot. 17: 45–90.
- Boissier, E. 1844. Diagnoses plantarum orientalium novarum, ser. 1, vol. 4. – B. Hermann.
- Boissier, E. 1846. Species nuper detectae. – In: Candolle, A. P. de. (ed.), Prodromus systematis naturalis regni vegetabilis, vol. 10. Masson, pp. 490–491.
- Boissier, E. 1849. Diagnoses plantarum orientalium novarum, ser. 1, vol. 8. – B. Hermann.
- Boissier, E. 1856. Diagnoses plantarum novarum praesertim orientalium nonnullis europaeis boreali-africanisque additis, ser. 2, vol. 3. – B. Hermann.
- Boissier, E. 1872. Flora Orientalis, sive Enumeratio plantarum in Oriente a Graecia et Aegypto ad Indiae fines hucusque observatarum, vol. 2. – H. Georg.
- Borissova, A. G. 1955. *Veronica* L. – In: Schischkin, B. K. and Bobrov, E. G. (eds), Flora of the USSR, vol. 22. Academy of Sciences of the USSR, pp. 329–500, 809 (in Russian).
- Borissova, A. G. 1959. *Anaphalis* DC. – In: Schischkin, B. K. (ed.), Flora of the USSR, vol. 25. Academy of Sciences of the USSR, pp. 361–377, 589–593 (in Russian).
- Borissova, A. G. 1961. Taxonomic notes on Galegeae Brown (Leguminosae). – Bot. Mater. Gerb Bot. Inst. Komarova Akad. Nauk SSSR 21: 243–258 (in Russian).
- Botschantzev, V. P. 1983. Nota de *Erysimum badghisi* (Korsh.) Lipsky (Brassicaceae). – Nov. Sist. Vyssh. Rast. 20: 111–112 (in Russian).
- Breckle, S.-W., Hedge, I. C. and Rafiqpoor, M. D. 2013. Vascular plants of Afghanistan: an augmented checklist. – Scientia Bonensis.
- Bunge, A. 1852. Beitrag zur Kenntniss der Flor Russlands und der Steppen Central-Asiens. – Kaiserliche Akademie der Wissenschaften.
- Bunge, A. 1872a. *Hypogomphia*, eine neue Labiatengattung aus Taschkend. – Bull. Acad. Imp. Sci. 3: 28–30.
- Bunge, A. 1872b. Die Gattung *Acantholimon* Boiss. – Mém. Acad. Imp. Sci. Saint-Petersbourg, sér. 7 18: 1–72.
- Bunge, A. 1874. Species generis *Oxytropis*, DC. – Mém. Acad. Imp. sci. St.-Petersbourg, sér. 7 22: 1–166.
- Bunge, A. 1880a. Astragaleae. – Izv. Imp. Obshch. Lyubit. Estestv. Moskovsk. Univ. 26: 161–318.
- Bunge, A. 1880b. Supplementum ad Astragaleas Turkestanicae. – Acta Hort. Petropolit. 7: 362–380.
- Busch, N. A. 1939. *Erysimum* L. – In: Busch, N. A. (ed.), Flora of the USSR, vol. 8. Academy of Sciences of the USSR, pp. 92–127 (in Russian).
- Callmander, M. W., Durbin, O. D., Lack, H. W., Bungener, P., Martin, P. and Gautier, L. 2017. Etienne-Pierre Ventenat (1757–1808) and the gardens of Cels and Empress Joséphine. – Candollea 72: 87–132.
- Candolle, A. P. de. 1838. Prodromus systematis naturalis regni vegetabilis, vol. 6. – Treuttel et Würtz.
- Cary, J. 1806. [Map] A new map of Chinese and independent Tartary, from the latest authorities. – Printed for J. Cary, Engraver and Map-seller.
- Chepinoga, V. V. et al. 2024. Checklist of vascular plants of Asian Russia. – Bot. Pacifica 13: 3–310.
- Clarke, C. B. 1876. Compositae indicae descriptae et secus genera Benthamii ordinatae. – Thacker et Spink.
- Crespo, M. B., Martínez-Azorín, M. and Mavrodiev, E. 2015. Can a rainbow consist of a single colour? A new comprehensive generic arrangement of the '*Iris* sensu latissimo' clade (Iridaceae), congruent with morphology and molecular data. – Phytotaxa 232: 1–78.
- Criado-Ruiz, D., Vallès, J., Bayer, R. J., Palazzesi, L., Pellicer, J., Lorenzo, I. P., Maurin, O., François, E., Roy, S., Leitch, I. J., Forest, F., Baker, W. J., Pokorný, L., Hidalgo, O. and Nieto Feliner, G. 2024. A phylogenomic approach to disentangling the evolution of the large and diverse daisy tribe Anthemideae (Asteraceae). – J. Syst. Evol.
- Czerepanov, S. K. 1981. Vascular plants of the USSR. – Science Publishers (in Russian).
- Czerepanov, S. K. 1995. Vascular plants of Russia and adjacent states (the former USSR). – Cambridge Univ. Press.
- D'Anville, J.-B. 1737. Nouvel Atlas de la Chine, de la Tartarie Chinoise, et du Thibet. – H. Scheurleer.
- Dasgupta, S. 2006. Alliaceae. – In: Singh, N. P. and Sanjappa, M. (eds), Fascicles of Flora of India, vol. 23. – Botanical Survey of India, pp. 1–48.
- Dietrich, F. G. 1818. Nachtrag zum vollständigen Lexicon der Gärtnererei und Botanik, 4. Band. – Gebrüder Gädicke.
- Dittrich, M. 1980. Rhaponticum. – In: Rechinger, K. H. (ed.), Flora iranica, vol. 139b. Akademische Druck- u. Verlagsanstalt, pp. 299–302.
- Dolan, J. R. 2020. 'One must be a citizen before being a naturalist' – the story of Louis Bosc, a Linnean in a time of the French revolution. – Colligo 3. <https://perma.cc/JB3N-3T2D>.
- Edney, M. H. 1990. Mapping an empire: the geographical construction of British India, 1765–1843, vol. 10. – Univ. of Chicago Press.
- Egorova, T. V. 1977. *Allium* L. – In: Grubov, V. I. (ed.), Plants of Central Asia, vol. 7. Science Publishers, pp. 18–67 (in Russian).

- Elenevsky, A. G. 1978. Taxonomy and geography of *Veronica* of the USSR and adjacent countries. – Science Publishers (in Russian).
- Elvebakk, A. and Bjerke, J. W. 2024. *Papaver* recircumscribed: a review of neighbouring Papaveraceae genera, including *Afropapaver* nom. et stat. nov. and *Oreomecon*, a large, Arctic-Alpine genus. – *PhytoKeys* 248: 105–188.
- Fedorov, Al. A. 1957. Campanulaceae Juss. – In: Schischkin, B. K. and Bobrov, E. G. (eds), *Flora of the USSR*, vol. 24. Academy of Sciences of the USSR, pp. 126–450, 459–475 (in Russian).
- Fedtschenko, B. A. 1905. Travel letters (conclusion). – *Izv. Imp. S.-Peterburgsk Bot. Sada* 5: 51–56 (in Russian).
- Fedtschenko, B. A. 1915. Plant world of Turkestan. Illustrated manual of plants native to Turkestan and Kirghiz steppes. – Department of Agriculture, General Administration of Land Use and Agriculture (in Russian).
- Fedtschenko, B. A. 1904. Trois espèces nouvelles du genre *Eremurus*. – *Bull. Herb. Boissier*. ser. 2 4: 771–774.
- Fedtschenko, O. A. and Fedtschenko, B. A. 1911. Conspectus florum turkestanicae. A list of plants occurring wild in the Russian Turkestan, namely in the Transcaspia, Syr-Daria, Fergana, Samarkand, Semirechie, Semipalatinsk (except for its eastern part), Akmola, Turgai and Uralian (over the Ural River), as well as in Xiva, Buxara and Kulja. Part 4. – *Izv. Turkest Otd Imp. Russk Geogr. Obsch* 6: 157–402, tab. 1–5.
- Filimonova, Z. N. 1983. *Oxytropis* DC. – In: Adylov, T. A. (ed.), *Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia*, vol. 7. Science Publishers, pp. 323–368 (in Russian).
- Filimonova, Z. N. 1987. *Veronica* L. – In: Adylov, T. A. (ed.), *Conspectus florum asiae mediae*, vol. 9. Science Publishers, pp. 223–245 (in Russian).
- Fischer, M. 1981. *Veronica* L. – In: Rechinger, K. H. (ed.), *Flora Iranica. Flora des Iranischen Hochlandes und der umrahmenden Gebirge*, vol. 147. Akademische Druck- u. Verlagsanstalt, pp. 52–165.
- Franchet, A. 1883. *Plantes du Turkestan (suite)*. – *Ann. Sci. Nat., Bot.* (sér. 6) 16: 280–336.
- Franchet, A. 1884. *Plantes du Turkestan (suite)*. – *Ann. Sci. Nat., Bot.* (sér. 6) 18: 207–277.
- Freyn, J. 1898. Ueber neue und bemerkenswerthe orientalische Pflanzenarten. – *Bull. Herb. Boissier*, ser. 1 6: 881–892.
- Friesen, N., Fritsch, R. M. and Blattner, F. R. 2006. Phylogeny and new intrageneric classification of *Allium* (Alliaceae) based on nuclear ribosomal DNA ITS sequences. – *Aliso* 22: 372–395.
- Gabrielian, E. Ts. 1995. Subtribe Centaureinae Dumort. – In: Takhtajan, A. L. (ed.), *Flora of Armenia*, vol. 9. Koeltz Scientific Books, pp. 307–450 (in Russian).
- Galasso, G., Banfi, E. and Bartolucci, F. 2023. New combinations in *Oreomecon*. – *Pl. Rev.* 5 5: 58.
- GBIF. 2024. Global biodiversity information facility. – GBIF Occurrence Download.
- Georgi, J. G. 1800. Geographisch-physikalische und naturhistorische Beschreibung des Russischen Reichs, zur Uebersicht bisheriger Kenntnisse von demselben, vol. 3. – F. Nicolovius.
- Goloskokov, V. P. 1984. *Flora of the Jungar Alatau*. – Science Publishers (in Russian).
- Gontscharov, N. F. 1955. *Oxytropis* DC. – In: Vvedensky, A. I. (ed.), *Flora of Uzbekistan*, vol. 3. Academy of Sciences of the Uzbek SSR, pp. 686–715 (in Russian).
- Grabovskaya-Borodina, A. E. 2018. *Pulsatilla*. – In: Sokolova, I. V. (ed.), *Catalogue of the type specimens of the vascular plants from Siberia and the Russian Far East kept in the Herbarium of the Komarov Botanical Institute (LE)*, Part 2. KMK Scientific Press, pp. 222–225 (in Russian).
- Grisebach, A. H. R. 1838. Genera et species Gentianearum adjacentis observationibus quibusdam phytogeographicis. – J.G.Cotta.
- Gubanov, I. A. 1996. Checklist of the flora of Outer Mongolia (vascular plants). – Valang.
- Gubanov, I. A., Bagdasarova, T. V. and Balandina, T. P. 1998. Scientific heritage of outstanding Russian florists G. S. Karelin and I. P. Kirilov. – Moscow State Univ. (in Russian).
- Hanelt, P. 1963. Monographische Übersicht der Gattung *Carthamus* L. (Compositae). – *Feddes Repert Spec. Nov. Reg. Veg.* 67: 41–180.
- Hayek, A. von. 1904. Kritische Übersicht über die *Anemone*-Arten aus der Section *Campanaria* Endl. und Studien über deren phylogenetischen Zusammenhang. – In: Urban, I. and Graebner, P. (eds), *Festschrift zur Feier des siebenzigsten Geburtstages des Herrn Professor Dr. Paul Ascherson* (4. Juni 1904) verfasst von Freunden und Schülern. Gebrüder Borntraeger, pp. 451–475.
- Hobohm, C. et al. 2013. Synthesis. – In: Hobohm, C. (ed.), *Endemism in vascular plants*. Springer, pp. 311–321.
- Hochstetter, C. F. and Steudel, E. G. 1835. [Exsiccata] *Unio itineraria*. – Esslinger Botanische Reiseverein.
- Hochstetter, C. F. and Steudel, E. G. 1836. Recent information on the subject of the *Unio Itineraria*. – *Companion Bot. Mag.* 2: 248–249.
- Hohenacker, R. F. 1843. [Exsiccata] Th. Kotschy's *Plantae aleppicae, kurdistanicae et mossulenses*. – Esslinger Botanische Reiseverein.
- Hohenacker, R. F. 1845. [Exsiccata] Th. Kotschy's *Plantae Persiae australis*. – Esslinger Botanische Reiseverein.
- Iljin, M. M. 1932. A critical survey of the genus *Amberboa* Less. – *Izv. Bot. Sada Akad. Nauk SSSR* 30: 101–116 (in Russian).
- Iljin, M. M. 1933. New species of Asteraceae from Tajikistan. – *Izv. Tadzhih Baz Akad. Nauk SSSR* 1: 63–71 (in Russian).
- IPNI. 2024. International plant names index. – The Royal Botanic Gardens, Kew, Harvard Univ. Herbaria and Libraries and Australian National Herbarium.
- Jackson, B. D. 1893. *Index Kewensis plantarum phanerogamarum. Nomina et synonyma omnium generum et specierum a Linnaeo usque ad annum MDCCCCLXXXV complectens nomine recepto auctore patria unicuique plantae subjectis*, vol. 1. – E. Prelo Clarendoniano.
- Jackson, B. D. 1895. *Index Kewensis plantarum phanerogamarum. Nomina et synonyma omnium generum et specierum a Linnaeo usque ad annum MDCCCCLXXXV complectens nomine recepto auctore patria unicuique plantae subjectis*, vol. 4. – E. Prelo Clarendoniano.
- Jacquemont, V. 1841. *Voyage dans l'Inde, par Victor Jacquemont, pendant les années 1828 à 1832*, vol. 2. – D. Frères.
- Jafri, S. M. H. 1973. Brassicaceae. – In: Nasir, E. and Ali, S. I. (eds), *Flora of West Pakistan*, vol. 55. Ferozsons, pp. 1–308.
- Janischewsky, D. 1916. *Rheum turkestanicum* n. sp. – In: Litwinow, D. I. (ed.), *Schedae ad Herbarium florum Rossicae, a Museo Botanico Academiae Scientiarum Petropolitanae editum*, vol. 8. Russian Academy of Sciences, p. 92.
- Kamelin, R. V. 1973. Florogenetic analysis of the native flora of the Mountainous Central Asia. – Science Publishers (in Russian).
- Kamelin, R. V. 1975. A new species of the genus *Delphinium* L. from the Syr Daria Karatau. – *Byull. Moskovsk. Obshch. Isp. Priro.*, Otd. Biol. 80: 136–137 (in Russian).

- Kamelin, R. V. 1990. Flora of the Syrdarya Karatau. – Science Publishers (in Russian).
- Kamelin, R. V. 2002. Introduction. A brief overview of the vegetation of Kirghizia. – In: Pimenov, M. G. and Kljuykov, E. V. (eds), Umbelliferae of Kirghizia. KMK Scientific Press, pp. 3–18 (in Russian).
- Karelin, G. and Kirilov, J. 1842. Enumeratio plantarum in desertis Songoriae orientalis et in jugo summorum alpium Alatau anno 1841 collectarum (continuatio). – Bull. Soc. Imp. Nat. Mosc. 15: 503–542.
- Karimova, V. V. 1991. *Rhaponticum* Ludw. – In: Rasulova, M. R. (ed.), Flora of the Tajik SSR, vol. 10. Science Publishers, pp. 238–242 (in Russian).
- Khalkuziev, P. 1971. Flora and vegetation of the Shohimardon River Basin. – Abstract of PhD thesis, Tashkent State Univ., USSR (in Russian).
- Khidir, M. O. and Knowles, P. F. 1970. Cytogenetic studies of *Carthamus* species (Compositae) with 32 pairs of chromosomes. I. Intrasectional hybridization. – Am. J. Bot. 57: 123–129.
- Knorring, O. E. 1954. *Stachys* L. – In: Schischkin, B. K. (ed.), Flora of the USSR, vol. 21. Academy of Sciences of the USSR, pp. 194–237 (in Russian).
- Koch, M., Karl, R., German, D. A. and Al-Shehbaz, I. 2012. Systematics, taxonomy and biogeography of three new Asian genera of Brassicaceae tribe Arabideae: an ancient distribution circle around the Asian high mountains. – Taxon 61: 955–969.
- Korshinsky, S. 1898. Fragmenta florum Turkestaniae. Plantae novae vel minus cognitae Turkestaniae describuntur. I. – Bull. Acad. Imp. Sci. 9: 399–424.
- Koutroumpa, K., Theodoridis, S., Warren, B. H., Jiménez, A., Celep, F., Doğan, M., Romeiras, M. M., Santos-Guerra, A., Fernández-Palacios, J. M., Caujapé-Castells, J., Moura, M., Menezes de Sequeira, M. and Conti, E. 2018. An expanded molecular phylogeny of Plumbaginaceae, with emphasis on *Limonium* (sea lavenders): taxonomic implications and biogeographic considerations. – Ecol. Evol. 8: 12397–12424.
- Kovalevskaya, S. S. 1971. *Rheum* L. – In: Kovalevskaya, S. S. (ed.), Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia, vol. 2. Science Publishers, pp. 171–176 (in Russian).
- Kovalevskaya, S. S. 1981. *Hedysarum* L. – In: Kamelin, R. V., Kovalevskaya, S. S. and Nabiev, M. M. (eds), Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia, vol. 6. Science Publishers, pp. 286–311 (in Russian).
- Kovalevskaya, S. S. 1993. *Hippolytia* Poljak. – In: Adylov, T. A. and Zuckerwanik, T. I. (eds), Conspectus florum Asiae Mediae, vol. 10. Academy of Sciences of the Uzbek SSR, pp. 599–601 (in Russian).
- Krascheninnikov, H. M. 1946. New species of compositae. – Not. Syst. Herb. Horti Bot. Petrop. 9: 152–184 (in Russian).
- Krasovskaya, L. S. 2018. *Allium sarychelekense* (Alliaceae), a new species from Kirghizia (Western TianShan). – Nov. Sist. Vyssh. Rast. 49: 14–18 (in Russian).
- Krylov, P. 1931. Flora of Western Siberia, vol. 5. – Russian Botanical Society, Tomsk Department (in Russian).
- Kubentayev, S. A., Alibekov, D. T., Perezhogin, Y. V., Lazkov, G. A., Kupriyanov, A. N., Ebel, A. L., Izbastina, K. S., Borodulina, O. V. and Kubentayeva, B. B. 2024. Revised checklist of endemic vascular plants of Kazakhstan. – PhytoKeys 238: 241–279.
- Kudabaeva, G. M. et al. 2023. Cadaster of higher vascular plants of Almaty Region. – Trudy Inst. Bot. Fitointroduktsii 26: 1–456 (in Russian).
- Lazkov, G. A. 2006. The Caryophyllaceae of Kyrgyzstan. – KMK Scientific Press (in Russian).
- Lazkov, G. A. 2007. Vascular plant species of the Western and Inner Tian-Shan, which are new to and rare in Kyrgyzstan. – Nov. Sist. Vyssh. Rast. 39: 307–312 (in Russian).
- Lazkov, G. A. 2011. The genus *Phlomoides* (Lamiaceae) in Kirghizia. – Komarovia 7: 1–64.
- Lazkov, G. A. 2016. Labiatae in the flora of Kyrgyzstan. – Korea National Arboretum.
- Lazkov, G. A. 2019. *Phlomoides hypoviridis* (Lamiaceae), a new species from Kyrgyzstan. – Turczaninowia 22: 82–86 (in Russian).
- Lazkov, G. A. and Ganybaeva, M. 2007. New and rare species of flowering plants of Kyrgyzstan from Pamir–Alay. – Bot. Zhurn. 92: 171–173 (in Russian).
- Lazkov, G. A. and Ganybaeva, M. 2023. Flora of the Western Tian-Shan. The Sary-Chelek Biosphere Nature Reserve. – Korea National Arboretum.
- Lazkov, G. A. and Smirnov, S. V. 2005. New and noteworthy plant records from Kyrgyzstan. – Nov. Sist. Vyssh. Rast. 37: 195–199 (in Russian).
- Lazkov, G. A. and Sennikov, A. N. 2014. New records in vascular plants alien to Kyrgyzstan. – Biodivers. Data J. 2: e1018.
- Lazkov, G. A. and Sennikov, A. N. 2015. Taxonomic corrections and new records in vascular plants of Kyrgyzstan, 4. – Memoranda Soc. Fauna Fl. Fenn. 91: 67–83.
- Lazkov, G. A. and Sennikov, A. N. 2017a. Taxonomic corrections and new records in vascular plants of Kyrgyzstan, 5. – Memoranda Soc. Fauna Fl. Fenn. 93: 79–100.
- Lazkov, G. A. and Sennikov, A. N. 2017b. Taxonomy of two blue-flowered Juno irises (*Iris* subgen. *Scorpiris*, Iridaceae) from the Western Tian-Shan. – Ann. Bot. Fenn. 54: 297–305.
- Lazkov, G. A. and Sennikov, A. N. 2018. *Euphorbia talassica* (E. sect. *Esula*, Euphorbiaceae), a new species of leafy spurge from the Western Tian-Shan. – Ann. Bot. Fenn. 56: 135–143.
- Lazkov, G. A. and Sennikov, A. N. 2019. *Ligularia philanthrax* (Asteraceae), a new species from a coal mining region of Kyrgyzstan. – Ann. Bot. Fenn. 56: 355–359.
- Lazkov, G. A. and Sultanova, B. A. 2011. Checklist of vascular plants of Kyrgyzstan. – Norrlinia 24: 1–166 (in Russian).
- Lazkov, G. A. and Sultanova, B. A. 2014. Checklist of vascular plants of Kyrgyzstan. – United Nations Development Programme (in Russian).
- Lazkov, G. A. and Umralina, A. R. 2015. Endemic and rare plant species of Kyrgyzstan (Atlas), 2nd rev. edn. – Food and Agriculture Organization of the United Nations.
- Lazkov, G. A., Ganybaeva, M. R. and Toktosunova, K. R. 2007. Vascular plants new to and rare in Kirghizia. – Bot. Zhurn. (St. Petersburg) 92: 1071–1076 (in Russian).
- Lazkov, G. A., Sennikov, A. N., Koichubekova, G. A. and Naumenko, A. N. 2014. Taxonomic corrections and new records in vascular plants of Kyrgyzstan, 3. – Memoranda Soc. Fauna Fl. Fenn. 90: 91–110.
- Lazkov, G. A., Davletbakov, A. T., Milko, D. A. and Ganybaeva, M. R. 2016. Atlas of the flora and fauna of protected areas in Central TianShan (Kyrgyz Republic). – United Nations Development Programme (in Russian).
- Lazkov, G. A., Choi, H. J. and Jang, C.-G. 2020. A new species of genus *Rheum* L. (Polygonaceae) from Kyrgyz Republic (Inner Tian shan, Uzengu-Kuush River Basin). – J. Asia Pac. Biodivers. 13: 120–122.
- Lebedeva, L. P. (ed.) 1970. Flora of the Kirghizian SSR, suppl. 2. – Science Publishers (in Russian).

- Ledebour, C. F. von 1824. Supplementum II Indicis Seminum Horti Academici Dorpatensis. – Hortus Botanicus Dorpatensis.
- Ledebour, C. F. von. 1831. *Hedysarum* L. – In: Ledebour, C. von, Meyer, C. A. and Bunge, A. (eds), *Flora altaica*, vol. 3. – G. Reimer, pp. 337–342.
- Ledebour, C. F. von. 1852. *Flora rossica*, vol. 4. – E. Schweizerbart.
- Levichev, I. G., Jang, C.-G., Oh, S. H. and Lazkov, G. A. 2019. A new species of genus *Gagea* Salisb. (Liliaceae) from Kyrgyz Republic (Western Tian Shan, Chatkal Range, Sary-Chelek Nature Reserve). – *J. Asia Pac. Biodivers.* 12: 341–343.
- Li, A. D. 1987. Campanulaceae. – In: Adylov, T. A. (ed.), *Conspectus florae asiae mediae*, vol. 9. Science Publishers, pp. 351–360 (in Russian).
- Li, M.-J., Yu, H.-X., Guo, X.-L. and He, X.-J. 2021. Out of the Qinghai–Tibetan Plateau and rapid radiation across Eurasia for *Allium* section *Daghestanica* (Amaryllidaceae). – *AoB Plants*. 13: plab017.
- Linczevski, I. A. 1940. A new genus of Plumbaginaceae from Central Asia. – *Trudy Tadzhikistanskoi Bazy Akad. Nauk SSSR* 8: 585–599 (in Russian).
- Linczevski, I. A. 1952. *Chaetolimon* (Bge.) Lincz. – In: Schischkin, B. K. and Bobrov, E. G. (eds), *Flora of the USSR*, vol. 18. Academy of Sciences of the USSR, pp. 372–376 (in Russian).
- Linczevski, I. A. 1961. Plumbaginaceae (excl. *Psylliostachys*). – In: Vvedensky, A. I. (ed.), *Flora of Uzbekistan*, vol. 5. Academy of Sciences of Uzbek SSR, pp. 53–82 (in Russian).
- Linczevski, I. A. 1968. Tentamentum systematis ordinis Plumbaginalium Lindl. – *Nov. Sist. Vyssh. Rast.* 5: 171–177 (in Russian).
- Linczevski, I. A. 1979. Notulae de Limoniaceis, 4. – *Nov. Sist. Vyssh. Rast.* 16: 166–168.
- Linczevski, I. A. 1986. Limoniaceae. – In: Kochkareva, T. F. (ed.), *Flora of the Tajik SSR*, vol. 8. Science Publishers, pp. 10–52 (in Russian).
- Linczevski, I. A. 1993. Limoniaceae (excluding *Psylliostachys*). – In: Adylov, T. A. and Zuckerwanik, T. I. (eds), *Manual of vascular plants of Central Asia*, vol. 10. Science Publishers, pp. 7–43 (in Russian).
- Linnaeus, C. 1753. *Species plantarum*. – L. Salvius.
- Linnaeus, C. 1755. *Centuria I. plantarum*. – L. M. Höjer.
- Lipschitz, S. Y. 1964. On the genus *Saussurea*, 1. – *Nov. Sist. Vyssh. Rast.* 1: 314–328 (in Russian).
- Lipschitz, S. Y. 1979. The genus *Saussurea* DC. (Asteraceae). – Science Publishers (in Russian).
- Lipsky, V. I. 1900. *Contributio ad floram Asiae Mediae*. – *Acta Horti Petropolit* 18: 1–146.
- Lipsky, V. I. 1905. *Flora of Central Asia, i.e. Russian Turkestan and the khanates of Bukhara and Khiva*, 3. Botanical collections from Central Asia. – *Tr. Tiflis Bot. Sada* 7: 339–841 (in Russian).
- Lipsky, V. I. 1913. A brief overview of the flora of Transcaspien Region. – In: Fedtschenko, B. A. (ed.), *Preliminary report on botanical explorations in Siberia and Turkestan in 1912*. Migration Department, General Administration of Land Use and Agriculture, pp. 235–256 (in Russian).
- Ma, S., Li, W., Tojibaev, K. S., Turginov, O., Yang, W. and Ma, K. 2024. Regionwide and nationwide floristic richness reveal vascular plant diversity in Central Asia. – *Plants* 13: 2275.
- Mabberley, D. J. 2017. *The plant-book. A portable dictionary of the higher plants*. – Cambridge Univ. Press.
- Makhmedov, A. M. 1993. *Rhaponticum* Ludw., *Amberboa* (Pers.) Less., *Carthamus* L. – In: Adylov, T. A. and Zuckerwanik, T. I. (eds), *Manual of vascular plants of central Asia*, vol. 10. Science Publishers, pp. 400–404, 428–429 (in Russian).
- Makhmudjanov, D., Juramurodov, I., Kurbonalieva, M., Yusupov, Z., Dekhkonov, D., Deng, T., Tojibaev, K. and Sun, H. 2022. Genus *Eremurus* (Asphodelaceae) in the flora of Uzbekistan. – *Plant Divers. Cent. Asia* 2: 82–127.
- Makryj, T. V. and Yatsyna, A. P. 2019. On type specimens and taxonomic status of species of the genus *Dermatocarpon* s. l. (Verrucariaceae), described by M. P. Tomin in 1950–1951. – *Nov. Sist. Nizsh Rast.* 53: 143–156 (in Russian).
- Malekmohammadi, M., Koutroumpa, K., Crespo, M. B., Domina, G., Korotkova, N., Akhani, H., von Mering, S., Borsch, T. and Berendsohn, W. G. 2024. A taxonomic backbone for the Plumbaginaceae (Caryophyllales). – *PhytoKeys* 243: 67–103.
- Marin, C. 2008. *Missions étrangères de Paris. 350 ans au service du Christ*. – Editeurs Malesherbes Publications.
- Maw, G. 1880a. A new *Crocus* from Turkestan. – *Gardeners' chronicle*. 13: 531.
- Maw, G. 1880b. *Crocus korolkowi*. Maw et Rgl. – *Acta Horti Petropolit.* 6: 499–500.
- Maximowicz, C. J. 1880. Diagnoses de plantes nouvelles de l'Asie, III. – *Bull. Acad. Imp. Sci.* 26: 420–542.
- Minkwitz, Z. A. von. and Knorring, O. E. von. 1910. Vegetation of Chimkent District of Syr-Daria region. – *Trudy Pochv.-Bot. Eksped. Izsl. Kolon. Rajonov Aziatsk. Rossii*, 4: 1–132 (in Russian).
- Mittermeier, R. A., Turner, W. R., Larsen, F. W., Brooks, T. M. and Gascon, C. 2011. Global biodiversity conservation: the critical role of hotspots. – In: Zachos, F. and Habel, J. (eds), *Biodiversity hotspots*. Springer, pp. 3–22.
- Moharrek, F., Kazempour-Osaloo, S., Assadi, M. and Nieto Feliner, G. 2017. Molecular phylogenetic evidence for a wide circumscription of a characteristic Irano-Turanian element: *Acantholimon* (Plumbaginaceae: Limonioideae). – *Bot. J. Linn. Soc.* 184: 366–386.
- Nabiev, M. M. 1974. *Arabis* L. – In: Pakhomova, M. G. (ed.), *Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia*, vol. 4. Science Publishers, pp. 85–88 (in Russian).
- Nabiev, M. M. 1983. Geraniaceae. – In: Adylov, T. A. (ed.), *Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia*, vol. 7. Science Publishers, pp. 6–18 (in Russian).
- Nabiev, M. M. 1993. *Anaphalis* DC. – In: Adylov, T. A. and Zuckerwanik, T. I. (eds), *Conspectus florae asiae mediae*, vol. 10. Academy of Sciences of the Uzbek Republic, pp. 469–473 (in Russian).
- Naithani, B. D. 1995. Anthemideae Cass. – In: Hajra, P. K., Rao, R. R., Singh, D. K. and Uniyal, B. P. (eds), *Flora of India*, vol. 12. Botanical Survey of India, pp. 3–75.
- Nasir, E. 1975. Alliaceae. – In: Nasir, E. and Ali, S. I. (eds), *Flora of West Pakistan*, vol. 83. Department of Botany, Univ. of Karachi, pp. 1–31.
- Naumenko, A. N. and Lazkov, G. A. 2012. *Plants of Kyrgyzstan*. – V. R. S. Company (in Russian).
- Nikitina, E. V. 1952. Pteridophyta. – In: Schischkin, B. K. (ed.), *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 1. Kirghizian SSR Branch of the Academy of Sciences of the USSR, pp. 30–49 (in Russian).
- Nikitina, E. V. 1965. *Hippolytia* Poljak., *Rhaponticum* Adans. – In: Vvedensky, A. I. (ed.), *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 11. Academy of Sciences of the Kirghiz SSR, pp. 151–153, 383–386 (in Russian).

- Nikitina, E. V. 1967. Iridaceae Lindl. – In: Vykhodtsev, I. V. (ed.), Flora of the Kirghizian SSR. Science Publishers, p. 57 (in Russian).
- Nikitina, E. V. and Kaschenko, L. I. 1951. *Allium* L. – In: Vvedensky, A. I. (ed.), Flora of the Kirghizian SSR, vol. 3. Kirghizian SSR Branch of the Academy of Sciences of the USSR, pp. 50–96 (in Russian).
- Oyuntsetseg, B., Friesen, N. W. and Darikhand, D. 2013. *Allium carolinianum* DC., a new species to the Outer Mongolia. – *Turczaninowia* 16: 88–90.
- Pakhomova, M. G. 1972. *Delphinium* L. – In: Bondarenko, O. N. and Nabiev, M. M. (eds), Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia, vol. 3. Science Publishers, Uzbek Academy of Sciences, pp. 156–181 (in Russian).
- Pakhomova, M. G. 1986. Gentianaceae Juss. – In: Nabiev, M. M. (ed.), Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia, vol. 8. Science Publishers, pp. 32–56 (in Russian).
- Palisot de Beauvois, A. M. F. J. 1805. Flore d'Oware et de Benin, en Afrique, vol. 1. – Fain Jeune et Compagne.
- Pavlov, N. V. 1956. Polypodiaceae R.Br. – In: Pavlov, N. V. (ed.), Flora of Kazakhstan, vol. 1. Academy of Sciences of the Kazakh SSR, pp. 36–52 (in Russian).
- Pazij, V. K. 1974. Papaveraceae. – In: Pakhomova, M. G. (ed.), Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia, vol. 4. Science Publishers, pp. 6–30 (in Russian).
- Peng, H.-W., Xiang, K.-L., Lian, L., Liu, B., Erst, A. S., Gao, T.-G., Ortiz, R. D. C., Jabbour, F., Chen, Z.-D. and Wang, W. 2024. A revised tribal classification of Papaveraceae (poppy family) based on molecular and morphological data. – *Taxon* 73: 762–783.
- Plantarium. 2024. Plantarium. Plants and lichens of Russia and neighboring countries: open online galleries and plant identification guide. – <https://www.plantarium.ru/lang/en.html>.
- Podlech, D. and Zarre, S. 2013. A taxonomic revision of the genus *Astragalus* L. (Leguminosae) in the Old World, vol. 1. – Naturhistorisches Museum Wien.
- Podlech, D., Zarre, S., Ekici, M., Maassoumi, A. and Sytin, A. K. 2013. A taxonomic revision of the genus *Astragalus* L. (Leguminosae) in the Old World, vol. 2. – Naturhistorisches Museum Wien.
- Polatschek, A. 2010. Revision der Gattung *Erysimum* (Cruciferae): Teil 1: Russland, die Nachfolgestaaten der USSR (excl. Georgien, Armenien, Azerbaidzan), China, Indien, Pakistan, Japan und Korea. – *Ann. Naturhistorischen Museums Wien B* 111: 181–275.
- Polatschek, A. 2011. Revision der Gattung *Erysimum* (Cruciferae), Teil 2: Georgien, armenien, Azerbaidzan, Türkei, Syrien, Libanon, Israel, Jordanien, Irak, Iran, Afghanistan. – *Ann. Naturhistorischen Museums Wien B* 112: 369–497.
- Poljakov, P. P. 1957. A brief overview of *Hippolytia* P. Pol., a new genus. – *Bot. Mater. Gerb Bot. Inst. Komarova Akad. Nauk SSSR* 18: 285–290 (in Russian).
- Poljakov, P. P. 1958. Iridaceae. – In: Pavlov, N. V. (ed.), Flora of Kazakhstan, vol. 2. Academy of Sciences of the Kazakh SSR, pp. 232–253 (in Russian).
- Popov, M. G. 1922. On the vegetation of Sary-Tau Mts. and Sel-Rokho in Kokand District of Fergana Region. – *Trudy Turk. Gosudarstvennogo Univ.* 4: 1–68 (in Russian).
- Popov, M. G. 1937. Papaveraceae. – In: Schischkin, B. K. (ed.), Flora of the USSR, vol. 7. Academy of Sciences of the USSR, pp. 573–717, 748–753 (in Russian).
- Popov, M. G. 1941. On the flora of the Zeravshan Valley. – *Trudy Uzbeks. Gosud. Univ.* 27: 1–107 (in Russian).
- POWO. 2024. Plants of the world online. – Facilitated by the Royal Botanic Gardens. <https://powo.science.kew.org>.
- Pritzel, G. A. 1851. Thesaurus literaturae botanicae omnium gentium inde a rerum botanicarum initiis ad nostra usque tempora, quindecim millia operum recensens. – F. A. Brockhaus.
- Rasulova, M. R. and Sharipova, B. A. 1991. *Saussurea* DC. – In: Rasulova, M. R. (ed.), Flora of the Tajik SSR, vol. 10. Science Publishers, pp. 144–159 (in Russian).
- Rauschert, S. 1982. Nomina nova generica et combinationes novae Spermatophytorum et Pteridophytorum. – *Taxon* 31: 554–563.
- Rechinger, K. H. 1955. Compositae. – *Biol. Skr.* 8: 5–215.
- Rechinger, K. H. 1980. *Carthamus* L., *Amberboa* (Pers.) Less. – In: Rechinger, K. H. (ed.), Flora iranica, vol. 139b. Akademische Druck- u. Verlagsanstalt, pp. 430–443.
- Rechinger, K. H. 1982. *Hypogomphia* Bunge. – In: Rechinger, K. H. (ed.), Flora iranica, vol. 150. Akademische Druck- u. Verlagsanstalt, pp. 250–251.
- Redouté, P. J. 1804. *Les Liliacées*, vol. 2. – Chez l'auteur, Imprimerie De Didot Jeune.
- Regel, E. 1875. Alliorum adhuc cognitorum monographia. – *Acta Horti Petropolit* 3: 1–266.
- Regel, E. 1878. Plantae regiones turkestanicas incolentes, secundum specimina sicca a Regelio et Schmalhausenio determinatae. – *Acta Horti Petropolit* 5: 577–620.
- Regel, E. 1880. Descriptiones plantarum novarum et minus cognitarum, VII. – *Acta Horti Petropolit* 6: 287–538.
- Regel, E. 1881. Descriptiones plantarum novarum et minus cognitarum, VIII. – *Acta Horti Petropolit* 7: 541–690.
- Regel, E. 1886. Descriptiones plantarum novarum et minus cognitarum, X. – *Acta Horti Petropolit* 9: 527–620.
- Regel, E. and Tiling, H. 1858. Florula ajanensis. Aufzählung der in der Umgegend von Ajan wachsenden Phanerogamen und hoeheren Cryptogamen, nebst Beschreibung einiger Neuer Arten und Beleuchtung anderer Verwandter Pflanzen. – *Nouv. Mem. Soc. Imperiale Nat. Mosc.* 11: 1–128.
- Rodionenko, G. I. 1961. The genus *Iris* L.: questions of morphology, biology, evolution and systematics. – *Academy of Sciences of the USSR* (in Russian).
- Roemer, J. J. and Schultes, J. A. 1817. *Systema Veg.* vol.1. – J. G. Gotta.
- Roldugin, I. I. 1965. *Anaphalis* DC. – In: Pavlov, N. V. (ed.), Flora of Kazakhstan, vol. 8. Science Publishers, pp. 378–380 (in Russian).
- Roshkova, O. I. 1952. *Psylliostachys* (Jaub. et Spach) Nevski. – In: Schischkin, B. K. and Bobrov, E. G. (eds), Flora of the USSR, vol. 18. Academy of Sciences of the USSR, pp. 467–474 (in Russian).
- Roshkova, O. I. 1993. *Psylliostachys* (Jaub. et Spach) Nevski. – In: Adylov, T. A. and Zuckerwanik, T. I. (eds), *Conspectus florae asiae mediae*, vol. 10. Academy of Sciences of the Uzbek Republic, pp. 43–46 (in Russian).
- Roth, A. W. 1799. *Tentamen Florae Germanicae*, vol. 3. – Bibliopolium Gleditschianum.
- Ruprecht, F. J. 1869. *Sertum Tianschanicum*. Botanische Ergebnisse einer Reise im mittleren Tian-Schan. – *Mém. Acad. Imp. Sci.* 14: 33–74.

- Schegoleva, N. V. 2023. *Ranunculus* L. – In: Sennikov, A. N. (ed.), Flora of Uzbekistan, vol. 6. Ma'naviyat, pp. 87–154 (in Russian).
- Schischkin, B. K. (ed.). 1950. Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR, vol. 2. – Kirghizian SSR Branch of the Academy of Sciences of the USSR (in Russian).
- Schischkin, B. K. (ed.). 1952. Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR, vol. 1. – Kirghizian SSR Branch of the Academy of Sciences of the USSR (in Russian).
- Schrank, F. von. P. and Martius, C. F. P. von. 1829. Hortus Regius Monacensis. – Königlich Central-Schulbücher-Verlag.
- Schulz, O. E. 1927. Beiträge zur Kenntnis der Cruciferen des nordwestlichen Himalaya-Gebirges. – Notizblatt K. Bot. Gartens Museums Berl. 9: 1057–1095.
- Sehgal, D., Raina, S. N., Devarumath, R. M. and, Sasakuma, T. 2009. Nuclear DNA assay in solving issues related to ancestry of the domesticated diploid safflower (*Carthamus tinctorius* L.) and the polyploid (*Carthamus*) taxa, and phylogenetic and genomic relationships in the genus *Carthamus* L. (Asteraceae). – Mol. Phylogenet. Evol. 53: 631–644.
- Sennikov, A. N. 2022. Reaffirming the legitimate status of *Calamagrostis neglecta* (Poaceae). – Phytotaxa 531: 85–87.
- Sennikov, A. N. 2024a. *Taraxacum stepanekii*, a replacement name for *Taraxacum roseolum* Kirschner & Štěpánek non Charit., with nomenclatural notes on the taxonomic legacy of Boris S. Kharitontsev in the digital era. – Botanica 30: 51–58.
- Sennikov, A. N. 2024b. The taxonomic circumscription and nomenclatural history of *Pilosella suecica* (Asteraceae): a special case of grey literature in taxonomic botany. – Plants 13: e1301.
- Sennikov, A. N. and Lazkov, G. A. 2013a. *Allium formosum* Sennikov & Lazkov (Amaryllidaceae), a new species from Kyrgyzstan. – PhytoKeys 21: 29–36.
- Sennikov, A. N. and Lazkov, G. A. 2013b. Taxonomic corrections and new records in vascular plants of Kyrgyzstan, 2. – Memoranda Soc. Fauna Fl. Fenn. 89: 125–138.
- Sennikov, A. N. and Lazkov, G. A. 2020. Taxonomic revision and reclassification of *Pseudolinosyris* with related taxa in *Galatella* (Asteraceae). – Ann. Bot. Fenn. 57: 367–375.
- Sennikov, A. N. and Lazkov, G. A. 2021. The first checklist of alien vascular plants of Kyrgyzstan, with new records and critical evaluation of earlier data. Contribution 1. – Biodivers. Data J. 9: e75590.
- Sennikov, A. N. and Lazkov, G. A. 2022. The first checklist of alien vascular plants of Kyrgyzstan, with new records and critical evaluation of earlier data. Contribution 2. – Biodivers. Data J. 10: e80804.
- Sennikov, A. N. and Lazkov, G. A. 2023. Taxonomic revision of the *Allium filidens* group (Amaryllidaceae) in Kyrgyzstan. – Nord. J. Bot. 2023: e04050.
- Sennikov, A. N. and Lazkov, G. A. 2024. Alien plants of Kyrgyzstan: the first complete inventory, distributions and main patterns. – Plants 13: e286.
- Sennikov, A. N. and Lazkov, G. A. 2025. Distribution records of vascular plants in Kyrgyzstan. Occurrence dataset, ver. 8. – <https://archive.org/details/DistributionRecordsOfVascularPlantsInKyrgyzstan>.
- Sennikov, A. N. and Tojibaev, K. S. (eds). 2021. Checklist of vascular plants of the Tian-Shan mountain system. – Korea National Arboretum.
- Sennikov, A. N. and Turdiboev, O. 2022. Species conservation profile and revision of *Salvia korolkowii* (Lamiaceae, Lamiales), a narrow endemic of the Western Tian-Shan. – Biodivers. Data J. 10: e89437.
- Sennikov, A. N., Lazkov, G. A., Uotila, P. and Weber, H. 2011. Taxonomic corrections and new records in vascular plants of Kyrgyzstan. – Memoranda Soc. Fauna Fl. Fenn. 87: 41–64.
- Sennikov, A. N., Tojibaev, K. Sh., Khassanov, F. O. and Beshko, N. Yu. 2016. The flora of Uzbekistan project. – Phytotaxa 282: 107–118.
- Sennikov, A. N., Khassanov, F. O., Ortikov, E., Kurbonaliyeva, M. and Tojibaev, K. Sh. 2023. The genus *Iris* L. s. l. (Iridaceae) in the Mountains of Central Asia biodiversity hotspot. – Plant Divers. Cent. Asia 2: 1–104.
- Sennikov, A. N., Lazkov, G. A., Ganybaeva, M. R., Friesen, N. and German, D. A. 2025. Data from: Taxonomic corrections and new records for vascular plants of Kyrgyzstan, 6. – Dryad Digital Repository: <https://doi.org/10.5061/dryad.x3ffbg7wt>.
- Sennikov, A. N., Lazkov, G. A. and German, D. A. 2025a. The first checklist of alien vascular plants of Kyrgyzstan, with new records and critical evaluation of earlier data. Contribution 3. – Biodivers. Data J. 13: e145624.
- Sharma, D., Dwivedi, M. D., Upadhyay, K. and Pandey, A. K. 2021. Typification of *Allium carolinianum* (Amaryllidaceae). – Kew Bull. 2021.
- Shauro, D. N. 1988. Huperziaceae. – In: Krasnoborov, I. M. (ed.), Flora of Siberia, vol. 1. Science Publishers, pp. 37–38 (in Russian).
- Shermatov, G. M. 1974. *Buchingera* Boiss. et Hohen. – In: Pakhomova, M. G. (ed.), Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia, vol. 4. Science Publishers, p. 166 (in Russian).
- Shi, Z., Humphries, C. J. and Gilbert, M. G. 2011. *Hippolytia* Poljakov. – In: Wu, Z. Y., Raven, P. H. and Hong, D. Y. (eds), Flora of China, vol. 20–21. Sci. Press, Miss. Bot. Gard. Press, pp. 753–756.
- Spach, É. 1838. Histoire naturelle des végétaux: phanérogames, vol. 7. – Librairie Encyclopédique de Roret.
- Spach, É. 1846. Histoire naturelle des végétaux: phanérogames, vol. 13. – Librairie encyclopédique de Roret.
- Sprengel, A. 1828. Systema vegetabilium, 16th edn., vol. 5. – Libreria Dietrichiana.
- Stafleu, F. A. and Cowan, R. S. 1976. Taxonomic literature. A selective guide to botanical publications and collections with dates, commentaries and types, vol. 1. – Bohn, Scheltema and Holkema. [Regnum vegetabile 94.].
- Stafleu, F. A. and Cowan, R. S. 1983. Taxonomic literature. A selective guide to botanical publications and collections with dates, commentaries and types, vol. 4. – Bohn, Scheltema and Holkema. [Regnum vegetabile 110.].
- Stafleu, F. A. and Cowan, R. S. 1986. Taxonomic literature. A selective guide to botanical publications and collections with dates, commentaries and types, vol. 6. – Bohn, Scheltema and Holkema. [Regnum vegetabile 115.].
- Stearn, W. T. 1960. *Allium* and *Mihula* in the Central and Eastern Himalaya. – Bull. Brit. Mus. (Nat. Hist.) Bot. 2: 161–191.
- Stearn, W. T. 1966. Botanical Latin: history, grammar, syntax, terminology and vocabulary. – T. Nelson.
- Sytin, A. K. and Lazkov, G. A. 2018. *Astragalus issykkulensis* (Fabaceae), a new species from Kyrgyzstan. – Turczaninowia 21: 257–261 (in Russian).
- Taponen, A. 2014. V.F. Brotherus in Central Asia: following the trail between Almaty and Karakol. – Bryobrotherella 17: 91–94.

- Tojibaev, K. S., Karimov, F. I. and Turgunov, M. D. 2014. A new species of the genus *Iris* L. (Iridaceae Juss.) from the Fergana Valley. – *Turczaninowia* 17: 12–16 (in Russian).
- Tojibaev, K. S., Karimov, F. I., Hoshimov, H. R., Gulomov, R., Lazkov, G. A., Jang, C.-G., Gil, H.-Y., Jang, J.-E., Batoshov, A. R., Iskandarov, A. and Choi, H. J. 2023. Important plant areas (IPAs) in the Fergana Valley (Central Asia): the Bozbu-Too-Ungortepa massif. – *Nat. Conserv.* 51: 13–70.
- Tolmachev, A. I. 1975. Papaveraceae. – In: Ovchinnikov, P. N. (ed.), *Flora of the Tajik SSR*, vol. 4. Science Publishers, pp. 174–194 (in Russian).
- Trattinnick, L. 1816. *Liber delectus iconum plantarum singularium typo nigro expressarum*. – Auf Kosten des Herausgebers.
- Trattinnick, L. 1817. Auswahl vorzüglich schöner, seltner, berühmter und sonst sehr merkwürdiger Gartenpflanzen in getreuen Abbildungen, nebst Erläuterungen über ihre Charakteristik, Verwandtschaft, Klassifikation, Geschichte, Verwendung, Kultur und ästhetische Ansichten, fasc. 10–12. – Auf Kosten des Herausgebers.
- Trattinnick, L. 1821. Auswahl vorzüglich schöner, seltner, berühmter und sonst sehr merkwürdiger Gartenpflanzen in getreuen Abbildungen, nebst Erläuterungen über ihre Charakteristik, Verwandtschaft, Klassifikation, Geschichte, Verwendung, Kultur und ästhetische Ansichten, vol. 1–2. Auf Kosten des Herausgebers.
- Trautvetter, E. R. von. 1884. *Incrementa florae phaenogamae rossicae*, fasc. III. – *Acta Horti Petropolit* 9: 1–220.
- Tscherneva, O. V. 1971. *Crocus* L. – In: Kovalevskaya, S. S. (ed.), *Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia*, vol. 2. Science Publishers, p. 123 (in Russian).
- Tulaganova, M. 1981. *Astragalus* sect. *Macrothrix* Širj. – In: Kameilin, R. V., Kovalevskaya, S. S. and Nabiev, M. M. (eds), *Manual of vascular plants of Central Asia* Critical synopsis of the flora of Central Asia, vol. 6. Science Publishers, pp. 180–184 (in Russian).
- Turland, N. J., Wiersema, J. H., Barrie, F. R., Greuter, W., Hawksworth, D. L., Herendeen, P. S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T. W., McNeill, J., Monro, A. M., Prado, J., Price, M. J. and Smith, G. F. (eds) 2018. International code of nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the nineteenth international botanical congress Shenzhen, China, July 2017. – Koeltz Botanical Books. [Regnum Vegetabile 159].
- Tzvelev, N. N. 1961. *Hippolytia* Poljak. – In: Schischkin, B. K. and Bobrov, E. G. (eds), *Flora of the USSR*, vol. 26. Academy of Sciences of the USSR, pp. 411–416 (in Russian).
- Tzvelev, N. N. 1963. *Amberboa* (Pers.) Less. – In: Bobrov, E. G. and Czerepanov, S. K. (eds), *Flora of the USSR*, vol. 28. Academy of Sciences of the USSR, pp. 323–332 (in Russian).
- Usmonov, M., Tojibaev, K. S., Jang, C.-G. and Sennikov, A. N. 2021. Species conservation profile and amended distribution of *Cousinia knorringiae* (Asteraceae), a narrow endemic of the Western Tian-Shan. – *Biodivers. Data J.* 9: e64115.
- Van Slageren, W. 2003. The Millennium Seed Bank: building partnerships in arid regions for the conservation of wild species. – *J. Arid Environ.* 54: 195–201.
- Vassilczenko, I. T. 1954. *Hypogomphia* Bge. – In: Schischkin, B. K. and Juzepczuk, S. Y. (eds), *Flora of the USSR*, vol. 20. Academy of Sciences of the USSR, pp. 491–493 (in Russian).
- Viktorov, V. P. 2002. Taxonomic synopsis of *Campanula* L. (Campanulaceae) in Russia and adjacent countries. – *Novosti Sist. Vyssh. Rast.* 34: 197–234 (in Russian).
- Vilatersana, R., Garnatje, T., Susanna, A. and Garcia-Jacas, N. 2005. Taxonomic problems in *Carthamus* (Asteraceae): RAPD markers and sectional classification. – *Bot. J. Linn. Soc.* 147: 375–383.
- Vilatersana, R., Brysting, A. K. and Brochmann, C. 2007. Molecular evidence for hybrid origins of the invasive polyploids *Carthamus creticus* and *C. turkestanicus* (Cardueae, Asteraceae). – *Mol. Phylogenet. Evol.* 44: 610–621.
- Vvedensky, A. I. (ed.). 1951. *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 3. – Kirghizian SSR Branch of the Academy of Sciences of the USSR (in Russian).
- Vvedensky, A. I. (ed.). 1953. *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 4. – Kirghizian SSR Branch of the Academy of Sciences of the USSR (in Russian).
- Vvedensky, A. I. (ed.). 1955a. *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 5. – Academy of Sciences of the Kirghizian SSR (in Russian).
- Vvedensky, A. I. (ed.). 1955b. *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 6. – Academy of Sciences of the Kirghizian SSR (in Russian).
- Vvedensky, A. I. (ed.). 1957. *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 7. – Academy of Sciences of the Kirghizian SSR (in Russian).
- Vvedensky, A. I. (ed.). 1959. *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 8. – Academy of Sciences of the Kirghizian SSR (in Russian).
- Vvedensky, A. I. (ed.). 1960. *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 9. Academy of Sciences of the Kirghizian SSR (in Russian).
- Vvedensky, A. I. (ed.). 1962. *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 10. – Academy of Sciences of the Kirghizian SSR (in Russian).
- Vvedensky, A. I. 1963. Liliaceae Hall., Iridaceae Juss. – In: Ovchinnikov, P. N. (ed.), *Flora of the Tajik SSR*, vol. 2. – Academy of Sciences of the USSR, pp. 178–290, 370–396 (in Russian).
- Vvedensky, A. I. (ed.). 1965. *Flora of the Kirghizian SSR. Manual of vascular plants of the Kirghizian SSR*, vol. 11. – Science Publishers (in Russian).
- Vvedensky, A. I. 1971. *Allium* L. – In: Kovalevskaya, S. S. (ed.), *Manual of vascular plants of central Asia*, vol. 2. – Academy of Sciences of the Uzbek SSR, pp. 39–89 (in Russian).
- Vvedensky, A. I. and Puchkova, E. G. 1968. Pteridophyta. – In: Kovalevskaya, S. S. (ed.), *Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia*, vol. 1. Science Publishers, pp. 7–19 (in Russian).
- Vvedensky, A. I. and Kovalevskaya, S. S. 1971. *Eremurus* MB. – In: Kovalevskaya, S. S. (ed.), *Manual of vascular plants of Central Asia. Critical synopsis of the flora of Central Asia*, vol. 2. Science Publishers, pp. 14–27 (in Russian).
- Vykhodtsev, I. V. (ed.). 1967. *Flora of the Kirghizian SSR*, suppl. 1. – Science Publishers (in Russian).
- Wallich, N. 1832. *Plantae Asiaticae Rariores* 3. – Treuttel et Würtz.
- Walters, S. M. and Webb, D. A. 1972. *Veronica* L. – In: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. and Webb, D. A., with the assistance of Ball, P. W., Chater, A. O., DeFilipps, R. A., Ferguson, I. K. and Richardson, I. B. K. (eds.), *Flora Europaea*, vol. 3. Cambridge Univ. Press, pp. 242–251.
- Wang, Y.-J., Raab-Straube, E. von, Susanna, A. and Liu, J.-Q. 2013. *Shangwua* (Compositae), a new genus from the Qinghai-Tibetan Plateau and Himalayas. – *Taxon* 62: 984–996.

- Watson, S. 1879. Contributions to American botany: revision of the North American Liliaceae; descriptions of some new species of North American plants. – Proc. Amer. Acad. Arts 14: 213–303.
- Webb, W. S. 1834. Altitudes of places in Kumaon. – J. R. Geogr. Soc. Lond. 4: 376–418.
- Wendelbo, P. 1958. *Allium* L. – In: Køie, M. and Rechinger, K. H. (eds), *Symbolae Afghanicae*. Det kongelige danske Videnskabernes Selskabs Biologiske Skrifter 10: 167–184.
- Wendelbo, P. 1971. Alliaceae. – In: Rechinger, K. H. (ed.), *Flora iranica*, vol. 76. Akademische Druck- u. Verlagsanstalt, pp. 1–100.
- Wendelbo, P. and Mathew, B. 1975. Iridaceae. – In: Rechinger, K. H. (ed.), *Flora iranica*, vol. 112. Akademische Druck- und Verlagsanstalt, pp. 1–79.
- Wilson, B., Dolotbakov, A., Burgess, B. J., Clubbe, C., Lazkov, G. A., Shalpykov, K. T., Ganybaeva, M., Sultangaziev, O. and Brockington, S. F. 2021. Central Asian wild tulip conservation requires a regional approach, especially in the face of climate change. – *Biodivers. Conserv.* 30: 1705–1730.
- Wilson, B., Lazkov, G. A., Shalpykov, K. T. and Brockington, S. F. 2022. *Tulipa toktogulica* (Liliaceae), a cryptic, endangered new species from the western Tien-shan, Kyrgyzstan. – *Phytotaxa* 566: 1–12.
- Winkler, C. 1886. Decas compositarum novarum Turkestaniae nec non Bucharae incolarum. – *Acta Horti Petropolit* 9: 417–428.
- Winkler, C. 1887. Decas tertia compositarum novarum Turkestaniae nec non Bucharae incolarum. – *Acta Horti Petropolit* 10: 83–94.
- Winkler, C. 1890. Decas octava Compositarum novarum Turkestaniae nec non Bucharae incolarum. – *Acta Horti Petropolit* 11: 315–326.
- Wörz, A. 2016. Der Esslinger botanische Reiseverein 1825–1845. Eine Aktiengesellschaft zur Durchführung naturkundlicher Sammelreisen. – *Logos*. [Stuttgarter Beiträge zur Wissenschafts- und Technikgeschichte 9].
- Xu, J.-M. and Kamelin, R. V. 2000. *Allium* L. – In: Wu, Z.-Y. and Raven, P. H. (eds), *Flora of China*, vol. 24. Sci. Press, Miss. Bot. Gard. Press, pp. 73–263.
- Xu, L.-R. and Choi, B.-H. 2010. *Hedysarum* L. – In: Wu, Z.-Y., Raven, P. and Hong, D. Y. (eds), *Flora of China*, vol. 10. Sci. Press, Miss. Bot. Gard. Press, pp. 514–525.
- Yakovlev, G. P., Sytin, A. K. and Roskov, Y. R. 1996. Legumes of northern Eurasia: a checklist. – *R. Bot. Gard., Kew*.
- Zarre, S. 2000. Systematic revision of *Astragalus* sect. *Adiaspastus*, sect. *Macrophyllum* and sect. *Pterophorus* (Fabaceae). – *Englera* 18: 3–219.
- Zhao, F., Chen, Y.-P., Salmaki, Y., Drew, B. T., Wilson, T. C., Scheen, A.-C., Celep, F., Bräuchler, C., Bendiksby, M., Wang, Q., Min, D.-Z., Peng, H., Olmstead, R. G., Bo, L. and Xiang, C.-L. 2021. An updated tribal classification of Lamiaceae based on plastome phylogenomics. – *BMC Biol.* 19: e2.
- Zhao, Y., Chen, Y.-P., Yuan, J.-C., Paton, A. J., Nuraliev, M. S., Zhao, F., Drew, B. T., Salmaki, Y., Turginov, O. T., Sun, M., Sennikov, A. N., Yu, X.-Q., Li, B. and Xiang, C.-L. 2023. Museomics in Lamiaceae: resolving the taxonomic mystery of *Pseudomarrubium*. – *Curr. Plant Biol.* 35–36: e100300.
- Zhu, S. and Bayer, R. J. 2011. *Anaphalis* Candolle. – In: Wu, Z. Y., Raven, P. H. and Hong, D. Y. (eds), *Flora of China*, vol. 20–21. Sci. Press, Miss. Bot. Gard. Press, pp. 792–815.
- Zwanziger, I. 1848. Biographische Umriss lebender österreichischer Naturforscher. I. Leopold Trattinnick. – *Sonntagsblätter Heimathliche Interessen* 8: 169–172.