

# Taxonomic corrections and new records in vascular plants of Kyrgyzstan, 5

Georgy A. Lazkov & Alexander N. Sennikov\*

Lazkov, G.A., Laboratory of Flora, Institute of Biology and Soil Science, Kyrgyz Academy of Sciences, 720071 Bishkek, Kyrgyzstan. E-mail: glazkov1963@mail.ru

Sennikov, A.N., Botanical Museum, Finnish Museum of Natural History, P.O. Box 7, 00014 University of Helsinki, Finland; & Herbarium, Komarov Botanical Institute of Russian Academy of Sciences, Prof. Popov str. 2, 197376 St Petersburg, Russia. E-mail: alexander.sennikov@helsinki.fi (\*Author for correspondence)

A new series of notes on distribution, taxonomy, morphology and nomenclature of some vascular plants in Kyrgyzstan is collected. A new hybrid, *Eremurus* × *decoloratus* (*E. regelii* × *E. lactiflorus*), is described. *Corydalis schanginii* subsp. *ainae* is elevated to the species rank as *C. ainae* and for the first time reported from Kyrgyzstan (Western Tian-Shan: Talas Depression) and Uzbekistan; its distribution is completed and mapped. Several new records are presented as follows. Native species new to Kyrgyzstan: *Acantholimon titovii* (Boom Ravine), *Allium inops* Vved. (Western Tian-Shan: Echili-Too Mts.), *Filago hurdwarica* (Alay Range), *Pedicularis mariae* (Ysyk-Köl Depression, Naryn River). Alien species new to Kyrgyzstan: *Allium atroviolaceum* (Turkestan Range, historical record). New regional records of native species: *Corydalis schanginii* (Talas Range), *Dryopteris mindshelkensis* (Western Tian-Shan: Chatkal Range; other records are verified), *Melica nutans*, *Sedum hybridum*, *Thalictrum sultanabadense* (all Western Tian-Shan: Uzun-Akmat Mts.), *Nepeta pungens* (Moldo-Too Mts.), *Pedicularis alberti* (Western Tian-Shan: At-Oinok and Uzun-Akmat Mts.), *Phlomooides milkoii* (Uzun-Akmat Mts.), *Picnomon acarna* (Western Tian-Shan: Talas Depression). New regional records of alien species: *Chenopodium vulvaria* (Chatkal Range), *Berteroa incana*, *Galeopsis bifida* (both Western Tian-Shan: Suusamyr Range), *Galeopsis ladanum* (Western Tian-Shan: Fergana Range). The distribution data for *Allium dodecadontum*, *Corydalis ainae* and *C. schanginii* are collected and verified, and the complete distribution areas of these species is mapped for the first time. The distribution of *Berteroa incana* in Kyrgyzstan is mapped, and the status of its localities (native vs. alien) is identified.

## Introduction

The present series of notes is the fifth contribution to the checklist of the flora of vascular plants of Kyrgyzstan (Lazkov & Sultanova 2011, 2014). The flora of vascular plants of Central Asia is still significantly underexplored, and many taxonom-

ic and distributional novelties continue appearing every year in the course of field work and inventories of herbarium collections.

The style and structure of this text follows the previous instalments (Sennikov et al. 2011; Sennikov & Lazkov 2013; Lazkov et al. 2014; Lazkov & Sennikov 2015).

## Materials and methods

Records of vascular plants from Kyrgyzstan were screened and checked against the published information. The collections of the Institute of Biology and Soil Science, Kyrgyz Academy of Sciences, Bishkek (FRU), the Komarov Botanical Institute, Russian Academy of Sciences, St. Petersburg (LE), the Institute of Botany and Zoology, Tashkent (TASH), and authors' collections and field observations were taken into account. The locations of specimens were determined using printed Russian maps with the Pulkovo-1942 datum, except for the recent collections where a GPS navigator with WGS84 datum was used. The distributional data were deposited in the database of records in vascular plants of Kyrgyzstan (Sennikov & Lazkov 2012, continuously updated).

The BGN (United States Board on Geographic Names) / PCGN (Permanent Committee on Geographical Names for British Official Use) romanisation of the Kyrgyz and Kazakh language was employed to transliterate collection labels originally in Cyrillic. The romanisation of toponyms in Kyrgyzstan was based on the official standard of the Cyrillic spelling (Ömürzakov *et al.* 1988). The toponyms expressed by composite words were hyphenated according to the new edition of the orthography of the Kyrgyz language (approved 27.06.2008). The delimitation of mountain ranges and depressions was given according to Ömürzakov *et al.* (1988).

All relevant Floras and other taxonomic literature were analysed for taxonomic and distributional information. An extensive use of online resources was made. First of all, this is the Atlas of Plants and Lichens of Russia and Adjacent Countries Online ([www.plantarium.ru](http://www.plantarium.ru)), which provides a massive data collected by professional and amateur botanists in the form of plant photographs with locality data and georeferences.

The circumscription and sequence of families follow APG IV (2016) for flowering plants and PPG I (2016) for ferns.

## Dryopteridaceae

### *Dryopteris mindshelkensis* Pavlov

Specimens examined: Kazakhstan. Karatau Range: Mingjilqi, 22.08.1946, *P. Poliakov* (AA, holotype; LE, isotype). Kyrgyzstan. Chatkal Range: north side of Sary-Chelek Lake, shrubs with spruce and fir, 22.08.1983, *Aidarova* (FRU); Sary-Chelek Nature Reserve, near Iiri-Köl Lake, 12.07.2016, *Lazkov & Sennikov 459* (FRU, H). Alay Range: the first chain of Alay Range, 1900 m, 05.09.1934, *A. Prozorovsky 429* (LE); Sokh River basin, near Say village, 1630 m, 10.08.2012, *G. Lazkov* (FRU).

New to the Western Tian-Shan within Kyrgyzstan. In Kyrgyzstan this species has been previously reported from the Alay Range (Lazkov *et al.* 2013) on the belief that this was the first record of the species from the country. The first record, however, was published by Frazer-Jenkins (1977) who reported it from the northern side of the Alay Range within Kyrgyzstan, apparently on the basis of *Prozorovsky 429* (LE). This specimen was labelled as collected in Rishton District of Uzbekistan; its administrative assignment was apparently erroneous as the specimen was reportedly collected from the altitudes of 1900 m which lie completely within Kyrgyzstan.

*Dryopteris mindshelkensis* was described from the Karatau Range, Kazakhstan (Pavlov 1954), and considered endemic to that mountain range (Pavlov 1956). Earlier this species was included in *D. komarovii* Koss. (Vvedensky & Puchkova 1968), from which it readily differs in acuminate fronds with a greater number of lateral segments. To date, *D. mindshelkensis* is known from Kazakhstan (Karatau Range) and Kyrgyzstan (Chatkal and Alay Ranges) (Fig. 1); its sparse distribution apparently reflects incomplete knowledge because fern species have received very little attention in Central Asia.

## Asphodelaceae (incl. Xanthorrhoeaceae)

*Eremurus* × *decoloratus* Lazkov & Naumenko, *hybr. nov.* (*Eremurus regelii* × *Eremurus lactiflorus*) (Figs. 2, 3)

Type: Kyrgyzstan. Ak-Tash Mts., near 900 m s. m., 42°40'4.65", 71°35'41.93", 06.04.2016, *A.N. Naumenko* (LE, holotype).

Fig. 1. Distribution of *Dryopteris mindshelkensis* in Central Asia.



Perennial, ephemeroid. Roots fusiform, thick. Scape up to 50 cm, glabrous. Leaves up to 1.5 cm wide, to 30 cm long, shorter than inflorescence, carinate, glaucous-green, glabrous on both sides, shortly ciliate or scabrous on margins. Inflorescence many-flowered, cylindric. Flower bracts lanceolate, long-attenuate at apex, membranous with a coloured median vein, ciliate on margins. Pedicels 1–1.5 mm long, thin, erect or pendent in flower. Perianth campanulate; segments brownish or brownish-yellowish inside, nearly equal, up to 1.3 cm long, 2–3 mm wide, obtuse. Stamens equal to or up to 1.5 times longer than perianth, brownish-orange, anthers yellow or orange. Capsule unknown.

The perianth segments of the first parent of this hybrid, *Eremurus regelii* Vved., are narrowly triangular-oblong, brown-purple in the middle with narrow pale-pink margins (Fig. 4). The perianth segments of the second parent, *E. lactiflorus* O.Fedtsch., are broadly oblong, greenish in the middle with broad white margins (Fig. 5). The hybrid is intersectional, corresponding to the formula *E. sect. Eremurus* × *E. sect. Henningia* (Kar. & Kir.) Baker.



Fig. 2. Flowers of *Eremurus* × *decoloratus*.  
Photo: Alexander Naumenko.



Fig. 3. *Eremurus xdecoloratus* (brownish flowers) co-occurring with *E. lactiflorus* (white flowers).  
Photo: Alexander Naumenko.



Fig. 4. Flowers of *Eremurus regelii*.  
Photo: Georgy Lazkov.



Fig. 5. Flowers of *Eremurus lactiflorus*.  
Photo: Georgy Lazkov.

The hybrid occurs in foothills in mixed populations of its parental species.

Interspecific hybrids are already known for several species of *Eremurus*, including two hybrids recently described from Kyrgyzstan (Lazkov & Sennikov 2015). Another hybrid of *E. regelii*, with *E. turkestanicus* Regel (*E. ×ludmilae* Levichev & Priszter), was described from Uzbekistan (Vvedensky & Kovalevskaya 1971; Priszter 1976).

## Amaryllidaceae

### *Allium atroviolaceum* Boiss.

Specimen examined: Kyrgyzstan. Turkestan Range: foothills between Shaldy-Baldy and Sülüktü, on fields, 17.06.1968, *Ubukeeva et al.* (FRU).

In Central Asia this species has been recorded from the Western Tian-Shan, Western Pamir-Alay and Kopet-Dagh (Vvedensky 1971). We consider it native to Turkmenistan, whereas its secondary distribution area covers nearly the whole of Central Asia but with very few records, mostly be-

cause of weedy occurrences on cultivated land. As a weed, the species has been recorded from Uzbekistan (Vvedensky 1941) and Tajikistan (Vvedensky 1963), whereas the only record from Kazakhstan (Kamelin 1990) was published with doubts and was not documented by specimens.

The cited specimen makes a country record new to Kyrgyzstan. As in Uzbekistan and Tajikistan, in Kyrgyzstan this species occurs as a weed on fields and may be an established alien, although nothing is known about its populations except for this historical specimen.

### *Allium dodecadontum* Vved. (Fig. 6)

Specimens examined: Uzbekistan. Bozbu-Too Mts.: Ungartepa, 18.05.2010, *F. Karimov* (TASH). Kyrgyzstan. Chatkal Range: Padsha-Ata, 21.05.1957, *M.V. Galkina 321* (TASH); Sary-Chelek, Arkyt, walnut forest, 1600–1700 m, 25.05.1956, *M.V. Galkina 236* (TASH, holotype); Sary-Chelek, Tashköl-Bulung, spruce forest, 18.05.1980, *Aidarova & Kalmurzaeva* (FRU); Sary-Chelek, Karangy-Say, 11.05.1981, *Aidarova & Kalmurzaeva* (FRU); slopes NE of Arkyt village, 1600 m, 29.05.1997, *Fritsch & Khasanov 1628* (GAT); Sary-Chelek, Tuyuk-Köl, 23.06.2009, *G. Lazkov* (FRU); Aflatun, 24.05.1957, *M.V. Galkina 16*



Fig. 6. Flowering population of *Allium dodecadontum*. Photo: Georgy Lazkov.

(TASH); valley of Aflatun river between Jangy-Jol and Karavan, 1000 m, 30.05.1997, *Fritsch & Khassanov 1640* (GAT). Bozbu-Too Mts.: S part, Kyzyl-Alma, 09.04.1977, *Sudnitsyna et al.* (FRU); Ayran-Bash-At, 21.04.1977, *Sudnitsyna et al.* (FRU). Babash-Ata Mts.: Maili-Say, 19.06.1954, *M.V. Galkina & M.M. Nabiev 348* (TASH); K k-Oy river, 14.04.1977, *Sudnitsyna et al.* (FRU). At-Oinok Mts.: valley of Naryn river c. 10 km below Kara-K l, 1000 m, 05.07.1994, *Fritsch et al. 1222* (GAT). Kochkar-D b  Mts.: between Kara-K l Lake and K k-Bel Pass, 26.05.2016, *Lazkov* (FRU).

This species was described and subsequently treated as endemic to Kyrgyzstan (Vvedensky 1971; Lazkov & Sultanova 2011, 2014). Previously it had been known from the Chatkal Range (Sary-Chelek Nature Reserve) only. *Allium dodecadontum* was originally distinguished by its filaments which are regularly bidentate and ciliate at the base (Vvedensky 1971); its current taxonomic position lies within *A.* sect. *Acmopetala* R.M. Fritsch (Fritsch et al. 2010).

It was one of the species of *Allium* described from the Fergana Depression which were collected only once and described on the basis of very limited herbarium material (Fritsch et al. 1998).

Further inventories added one more record of *A. dodecadontum* from the Chatkal Range (Umralina & Lazkov 2008; Lazkov & Umralina 2015). The species is considered rare and is legally protected in Kyrgyzstan as Vulnerable (Ionov & Lazkov 2006).

An intensive fieldwork and a taxonomic inventory of *Allium* in Central Asia (Khassanov 2008; Fritsch 2016) revealed several new localities of *A. dodecadontum* in Kyrgyzstan and Uzbekistan, so that the species no longer can be considered endemic to Kyrgyzstan. The first report of the species in Uzbekistan (Chatkal and Kurama Ranges) was published in Tojibaev (2010) without citations of precise background data; this information has been recently supplemented with citations of specimens (Karimov 2015). The record from the Chatkal Range was based on a specimen collected from the Ungartepa Mt. which is actually part of the Bozbu-Too Mts. rather than the Chatkal Range, and the record from the Kurama Range was based on a specimen collected at Chodoqsoy.

Within Kyrgyzstan, the species has been recently reported from a few new localities situat-

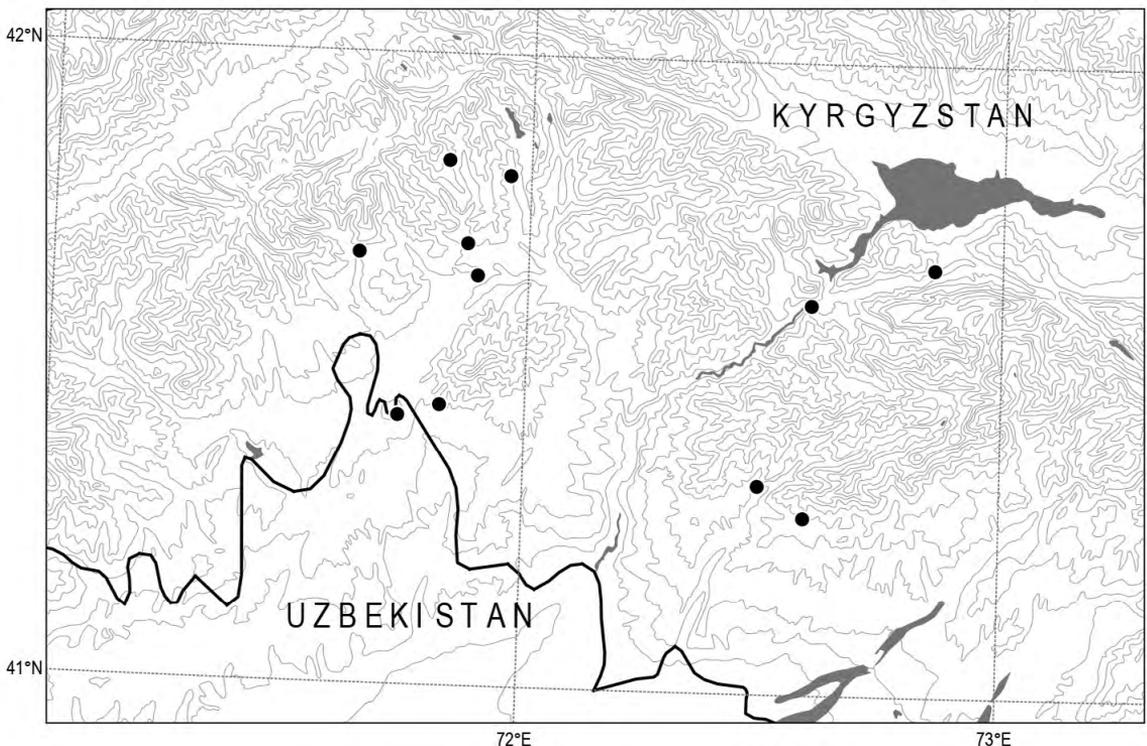


Fig. 7. Distribution of *Allium dodecadontum* (Kyrgyzstan and Uzbekistan).

ed in the Bozbu-Too Mts. and Babash-Ata Mts. (Fritsch 2016). The record from the Gava River in the Kurama Range (Fritsch 2016) is erroneous and belongs to a closely related species, *A. pangassicum* Turak., which differs from *A. dodecadontum* in the outer filaments lacking teeth (Lazkov & Turumatova 2010).

During our (G.L.) revision of herbarium material of *Allium* kept at FRU we discovered some specimens from the Bozbu-Too Mts., Babash-Ata Mts. and small mountain ranges neighbouring to the latter and comprising the northernmost extensions of the Fergana Range, which were certainly referable to *A. dodecadontum*. These specimens supplement the distributional data cited in Fritsch (2016). More citations of specimens collected from Kyrgyzstan were found in Karimov (2015).

We assume that the record from the Kurama Range within Uzbekistan may belong to *A. pangassicum* (cf. Lazkov & Turumatova 2010; Fritsch 2016). So far we accept as reliable only one record from Uzbekistan, i.e. from the Ungartepa Mt. (Bozbu-Too Mts.), which still makes the species known from two countries.

Another record of *A. dodecadontum* from Kyrgyzstan (N side of Chatkal Range, Kumbel, 08.07.1927, R. Āboliņš (TASH)) was published by Tojibaev & Karimov (2012). The occurrence of this species outside the Fergana Depression has not been confirmed yet, and we consider this record as unreliable.

Altogether the verified records constitute a solid distribution area (Fig. 7) which is confined to the eastern part of the Chatkal Range and the northern extremes of the Fergana Range, typical of other narrow endemics of the East Fergana botanical hotspot (Lazkov et al. 2002). A similar distribution shows *Allium viridiflorum* Pobed., another endemic species of the East Fergana which has also been recently found in the Ungartepa Mt. (Tojibaev et al. 2014).

### *Allium inops* Vved.

Specimens examined: Kazakhstan. Talas Range: vicinities of Jambıl (Taraz) town, semidesert hills (adyrs), steppe wormwood vegetation, 14.05.1970, I. Sudnitsyna (FRU). Kyrgyzstan. Echkili-Too (S side): rocky slope facing to Beisheke village, 22.05.1990, S. Sheremetova & G. Lazkov (FRU).

Since the time of original description this species has been known from the Mirzacho'l Desert (part of the Qizilqum Desert) and the Moyinqum Desert (Vvedensky 1924, 1971), separated by the Karatau Range. It was considered endemic to Kazakhstan (Vvedensky 1971). Later, the species was found in the foothills of the Karatau Range and the Talas Range (Pavlov & Poliakov 1958), in an arid depression that continues to Kyrgyzstan and joins with the Talas Depression in the east.

The species was collected in the southern foothills of the Echkili-Too Mts. in Kyrgyzstan, within the same depression from which the species was known in Kazakhstan, in ca. 40 km from the country border. This makes a country record new to Kyrgyzstan.

*Allium inops* is a rare and poorly known species of desert plains and foothills. Its phylogenetic position has not been studied yet (cf. Friesen et al. 2006), although morphologically this species was placed in *A.* sect. *Pallasia* (Tzag.) F.O' Khass., R.M. Fritsch & N. Friesen of *A.* subgen. *Allium* (Khassanov 2000).

The specimen from Kyrgyzstan closely agrees in morphological characters (flower colour, flower dimensions, filaments) with the specimens collected from foothills of the Talas Range near Taraz in Kazakhstan (FRU).

## Poaceae

### *Melica nutans* L. (Fig. 8)

Specimen examined: Kyrgyzstan. Uzun-Akmat Mts. (S side): Almaly, spring fen, 1380 m, 25.04.2016, G. Lazkov (FRU).

This species has been imprecisely and partly controversially reported from the Tian-Shan: "Eastern Tian-Shan" (Nevski 1934), "Ysyk River" = Trans-Ile Alatau (Lavrenko 1934), Trans-Ile Alatau (Gamayunova 1956), "Central Tian-Shan" (Bondarenko 1968), "Northern Tian-Shan" (Tzvelev 1976). In Kyrgyzstan, the species has been reported first from the mountains surrounding the northern side of the Ysyk-Köl Depression (Sobolev 1972).

While revising the collections of LE, we found specimens collected from the Trans-Ile and Küngöy Ranges in Kazakhstan, concluding that

Fig. 8. Flowers of *Melica nutans*.  
Photo: Georgy Lazkov.



the species has never been known from the Western Tian-Shan. Our record is the first from this territory.

*Melica nutans* differs from the related species which more widely occurs in Kyrgyzstan, *M. secunda* Regel, in the violet-green (vs. whitish-green) spikelets and broader leaves (Bondarenko 1968, Tzvelev 1968). It is a boreal species avoiding arid countries; its presence in the Western Tian-Shan is possible because of the humid continental climate of this territory (Peel et al. 2007).

## Ranunculaceae

### *Thalictrum sultanabadense* Stapf (Fig. 9)

Specimen examined: Kyrgyzstan. Uzun-Akmat Mts. (N side): Koro-Karagay, rocks, 28.04.2016, G. Lazkov (FRU)

This species is characterised by biternate leaves; its distribution is centered in the Alay, Kopet-Dagh, northern Iran and Transcaucasia (Nevski 1937; Kovalevskaya 1972). In Kyrgyzstan the species has been known from the Alay Range only (Nikitina 1955). Our record is new to the Kyrgyzstan part of the Western Tian-Shan and expands the species' distribution area northwards. In the Western Tian-Shan the species has been known from the Kurama and Mogol-Tau Ranges (Kovalevskaya 1972), adjacent to the Alay and showing more arid features of the flora (Kamelin 1973), whereas our record comes from the territories with a more humid climate.

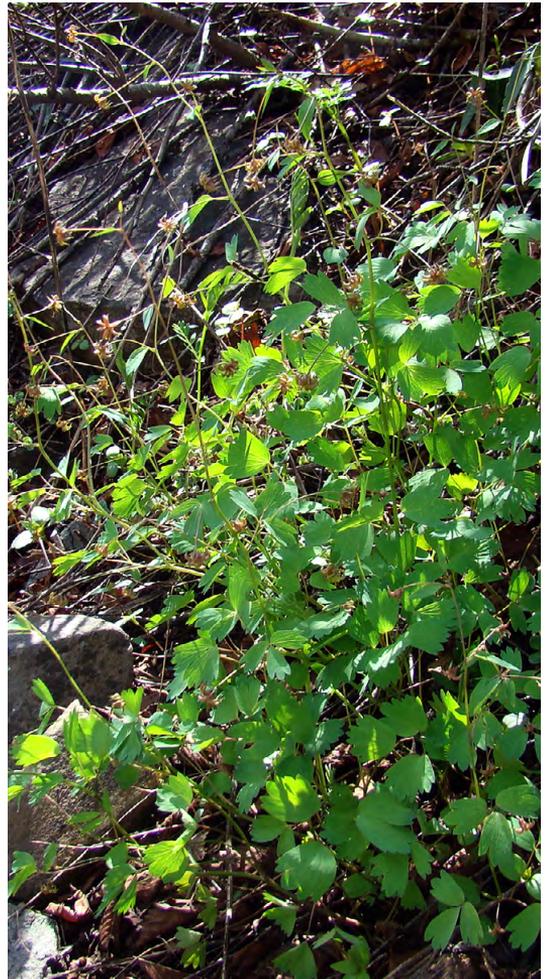


Fig. 9. Fruiting plant of *Thalictrum sultanabadense*.  
Photo: Georgy Lazkov.

## Papaveraceae

*Corydalis ainae* (Rukšāns ex Lidén) Lazkov & Sennikov, **comb. nov.** (Fig. 10)

*Corydalis schanginii* subsp. *ainae* Rukšāns ex Lidén, Willdenowia 21(1/2): 178. 1991, "ainii". — Type: Kazakhstan. [Karatau Range: Berikqara, 1700–2000 m, 26.04.1977], cultivated in Gothenburg Botanical Garden, *J. Rukšāns s.n.* (GB, holotype; isotype B).

Specimens and observations: Kazakhstan. Syrdarya Karatau: Ulken-Burul-Tau, 21.03.2016, *V. Kolbintsev* (observation). Karatau Range: Qarasay, 18.04.2013, *V. Kolbintsev* (observation); Berikqara, 18.04.2014, *V. Kolbintsev* (observation). Üstirt Plateau: 26.04.2012, *E. Evfratova* (observation). Aqtöbe Region: between Embi & Şalqar, *A. Seisums* (observation: Lidén & Zetterlund 1997); Qarabutaq, 24.04.2011, *Yu. Pirogov* (observation). Qarağandı Region: Jariq, 01.05.2017, *M. Kniazev* (observation). Balqaş: 12.04.2008, *A. Malik* (observation). Uzbekistan. Qoraqalpog'iston: Eastern Chink of Üstirt Plateau near Qobonboy, 10.05.2008, *A. Gaziev* (observation). Kyrgyzstan. Ak-Tash Mts., 06.04.2016, *A. Naumenko* (observation). Karatau Range: Karacha-Too Mts., near railway station Maimak, ca. 1100 m a.s.l., scree, 25.03.2016, *G. Lazkov* (FRU!).

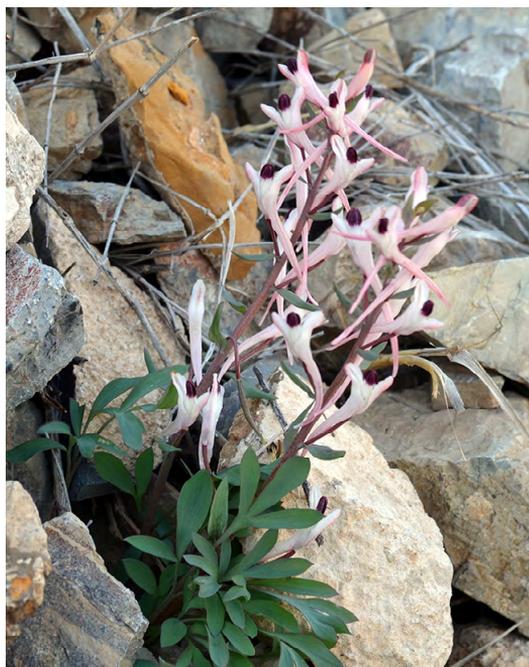
This taxon was described as a subspecies of *Corydalis schanginii* (Pall.) B. Fedtsch., from which it differs in the flower colour: the upper half of the corolla yellow, the tips of the inner petals dark purple (vs. the upper half of the corolla

la purplish pink, the tips of the inner petals dark purple) (Lidén 1991). It was said to occur on the margin of the distribution area of *C. schanginii* s.l. (Lidén & Zetterlund 1997). The distribution of the pink-flowered *C. schanginii* s. str. covers a broad area of Kazakhstan, northern Kyrgyzstan, western China (Xinjiang), western Mongolia and Russia (Altai), whereas its yellow-flowered counterpart *C. schanginii* subsp. *ainae* Rukšāns ex Lidén had been originally known from a restricted area in the Karatau Range of Kazakhstan (Lidén 1991; Rukšāns 2007) but was later reported also from a remote area in western Kazakhstan (Lidén & Zetterlund 1997). Lidén & Zetterlund (1997) doubted this disjunct distribution which appeared to have been highly incompletely known.

The latest field observations ([www.plantarium.ru](http://www.plantarium.ru)) confirmed old records and added several others, expanding the distribution further. We also report this taxon as new to Kyrgyzstan, from which it is known only in the western part of the Talas Depression. Other species have been recently reported from the same territory, so far not found in other regions of Kyrgyzstan: *Iris willmottiana* Foster (Lazkov & Sennikov 2017), *Phlomis regelii* Popov (Lazkov 2014), *Rhaphidophyton regelii* (Bunge) Iljin (Lazkov 2007).



▲ Fig. 10. Flowering plant of *Corydalis ainae*.  
Photo: Georgy Lazkov.



► Fig. 12. Flowering plant of *Corydalis schanginii*.  
Photo: Alexander Naumenko.

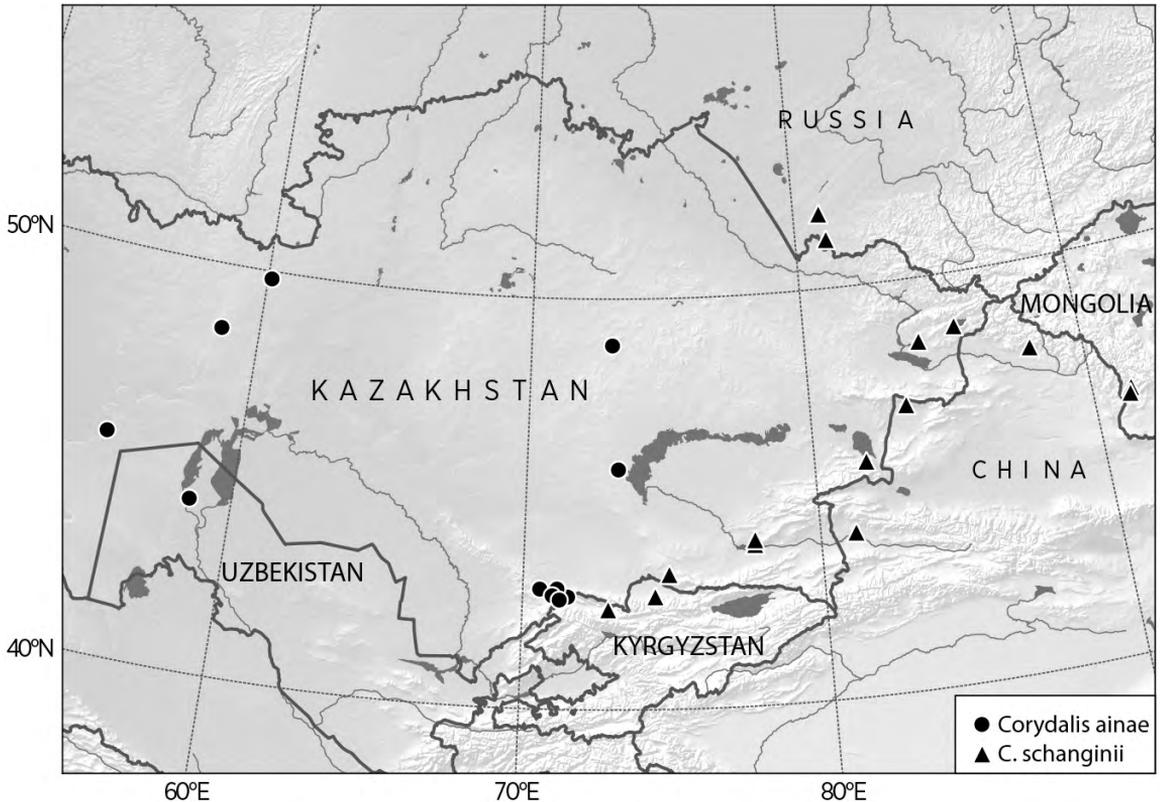


Fig. 11. Distribution of *Corydalis ainae* and *C. schanginii* in Central Asia.

According to the present data, *C. ainae* is widely distributed in low mountains of Kazakhstan, slightly extending to Kyrgyzstan and Kazakhstan (Fig. 11). Further localities can be uncovered because this species has been much neglected in the past. The distribution of *C. ainae* does not overlap with that of *C. schanginii* s. str., contrary to the statement of Lidén & Zetterlund (1997). We think the species status of this taxon is justified because of the prominent differences in morphology and the separate distribution areas. *Corydalis schanginii* and *C. ainae* are capable to produce fertile hybrids in cultivation (Lidén & Zetterlund 1997) but such hybrids are not known in nature.

#### *Corydalis schanginii* (Pall.) B. Fedtsch. (Fig. 12)

Observations: Kazakhstan. South Altai Mts.: Küršim Range, Chertovy Vorota Pass, 01.03.2016, *V. Kolbintsev* (observation); Şolaq Range, north of Qapşağay water reservoir, 13.04.2012, *V. Epiktetov* (observation); Qaljur river,

05.2015, *M. Zhukova* (observation). Shu-Ile Mts.: Qordai pass, 14.04.2014, *V. Kolbintsev* (observation). Dzungarian Alatau Mts.: Köl-Asu ravine, 06.05.2013, *V. Kolbintsev* (observation); Şolaq, 16.03.2008, *A. Malik* (observation). Kyrgyzstan. Kyrgyz Range: near Bishkek (*Rukšāns*, observation: Lidén 1991). Talas Range: between Chat-Bazar and Taldy-Bulak villages, 1700 m, 05.04.2016, *A. Naumenko* (observation).

In Kyrgyzstan this species was first reported by Lidén & Zetterlund (1997) from a single locality near Bishkek, the northern side of the Kyrgyz Range. The second locality has been recently observed in the Talas Range.

The complete distribution of *Corydalis schanginii* (Fig. 11) has been mapped here anew because of its former confusion with *C. ainae* and because the map published in Lidén & Zetterlund (1997) is imprecise and also partly including *C. ainae*. The distribution of *C. schanginii* stretches along lower parts of the Talas and Kyrgyz Alatau Ranges, Dzungarian Alatau and Altai Mts. and includes territories of Kazakhstan, Kyrgyzstan, China, Russia and Mongolia. This spe-

cies has a more eastern distribution than *C. ainae* and seems to tend to higher elevations. Our map of this species is based on records from Kazakhstan and Kyrgyzstan published on [www.plantarium.ru](http://www.plantarium.ru) and listed above, and also on the distributional information published for China (Zhang et al. 2008), Russia (Peshkova 1994) and Mongolia (Smirnov et al. 2003).

## Crassulaceae

### *Sedum hybridum* L.

Specimen examined: Kyrgyzstan. Uzun-Akmat Mts. (S side): Almaly, scree, 25.04.2016, *G. Lazkov* (FRU!).

*Sedum hybridum* is distributed in the north-eastern part of Central Asia; its known westernmost range has been limited by the Kyrgyz Alatau and Karatau (Pratov 1974). In Kyrgyzstan this species has been known westwards up to the Kyrgyz Alatau and Central Tian-Shan (Aidarova 1957).

Our record is new to the Western Tian-Shan within Kyrgyzstan, extending the species' distribution south-westwards.

## Brassicaceae

### *Berteroa incana* (L.) DC.

Specimens examined. Kyrgyzstan. Küngöy Alatau: "Ad lac. Issyk-kul prope Karakol", 5300'–5400', 01.10.1877, *A. Regel* (LE); 09.07.1903, *V. Lipsky* (LE); Tüp, abandoned lands, 04.07.1935, *Sibirtseva* (FRU); Ysyk-Köl Lake, lake side near between Ananievo and Cholpon-Ata villages, 01.07.1963, *IOH expedition* (FRU); east of Ananievo [Baysoorun] village, 21.07.1960, *E. Nikitina* & *I. Sudnitsyna* (FRU); Semenovskoe [On-Jeti-Karagay], 30.07.1963, *I. Sudnitsyna* (FRU); Taldy-Suu, 20.07.1961, *I. Sudnitsyna* (FRU); Bosteri, 18.06.1966, *Mursaliev, B. Sultanova, R. Sultanova* (FRU); Kichi-Örүktü, left river side, 21.06.1966, *Mursaliev, B. Sultanova, R. Sultanova* (FRU); Chong-Örүktü, 14.08.1935, *P. Gomolitsky & T. Semenikhina* (LE); Komsomol, 23.07.1969, *Z. Arbaeva & B. Sultanova* (FRU); Cholpon-Ata, 12.06.1981, *V. Botschantzev et al.* (FRU); Chong-Ak-Suu, 02.07.1998, *N. Kenjebaeva* (FRU); San-Tash, 18.09.1969, *I. Sudnitsyna et al.* (FRU); San-Tash, 08.09.1973, *Mursaliev & Ubukeeva* (FRU); Kichi-Sügöttü, 08.08.1985, *L. Zadirei* (FRU); Kuturgu, fruit garden, 18.06.1968, *N. Gorbunova* (FRU); Shin-Aty, 18.09.1971, *Z. Arbaeva* (FRU); Chong-Örүktü, 09.08.1983, *R. Aidarova* (FRU); Korumdu vil-

lage, 29.05.1910, *A. Michelson* 785 (LE); Bakty-Dolonotu river, 01.08.1936, *T. Semenikhina & V. Keshena* (LE). Teskey Alatau: Saint-Trinity monastery [Ak-Bulung vil-lage], 30.06.1910, *A. Michelson* 841 (LE); San-Tash collective farm, Tosma Mts., 28.07.1932, *Sovetkina & Niki-forova* (LE); left side of Irdyk river, 12.06.1949, *anonymous* (FRU); Chong-Kyzyl-Suu, 25.06.1950, *L. Sobolev* (LE). Ile Range: Kichi-Kemin river, foothills, 20.07.1950, *R. Yakubova* (FRU); Kemin river, 18.07.1953, *R. Aidarova* (FRU); Jargylchak, 16.08.1964, *Abdullaeva & Tulaganova* (TASH); Przewalsk [Karakol], "city garden", 26.06.1920, *Sovetkina* (TASH). Kyrgyz Alatau: Norus, 03.07.1961, *I. Sudnitsyna* (FRU); Norus, 26.08.1965, *F. Zubarev* (FRU); Bishkek, Botanical Garden, 03.06.1948, *Popova & Kaschenko* (FRU); Shamsy, 20.06.1954, *Kaschenko & Aidarova* (FRU); Ysyk-Ata, 23–24.07.1946, *E. Nikitina* (FRU); Ysyk-Ata, near Arashan, 23.07.1914, *V. Titov* (LE); Paspeldek [Basböltök], forest plantations, 22.10.1945, *Inchina* (FRU); Chungkurchak, 16.06.1930, *E. Nikitina & Tarnovsky* (FRU); Koy-Tash, 09.08.1964, *Abdullaeva & Tulaganova* (TASH); Uzun-Kyr, 24.06.1916, *Savenkova* (TASH). Suusamyr Range: Chychkan river, 09.09.2016, *G. Lazkov* (FRU). Alay Range: Iiri-Suu, near an old farm, 22.07.1934, *Vykhodtsev* (FRU). Fergana Depression: Langar, 24.06.1949, *Shahobiddinov & Li* (TASH). Locality uncertain: Naryn [Town?], "Herbst" 1869, *A. Buniakovsky* (LE).

This species is widespread in Eurasia and tends to be a weed or an apophyte. Nikitina (1955) stated that *Berteroa incana* is distributed widely in Kyrgyzstan ("lowlands and foothills within the whole of the agricultural zone of Kyrgyzstan") but she provided no precise information on its distribution. According to our interpretation of the distribution of *B. incana* in Central Asia (Shermatov 1974), this species is native to the Northern Tian-Shan and the Badghyz Mts., as well as to deserts and uplands of central and eastern Kazakhstan, whereas a few isolated localities (at Tashkent and in the Alay Range) are apparently of alien origin.

According to herbarium collections at FRU, LE and TASH, the native distribution of *B. incana* in Kyrgyzstan covers the Teskey Alatau (northern side), Kyrgyz Alatau (northern side), and Küngöy Alatau (southern side). Three old localities of presumably alien origin were known for a century or longer, along the Naryn River (herbarium data, unpublished) and in the Alay Range (Shermatov 1974), and the species was also known as a weed in Bishkek. Our new locality along the Chychkan River is an extension of the species' alien distribution in Kyrgyzstan, the second one in the West-

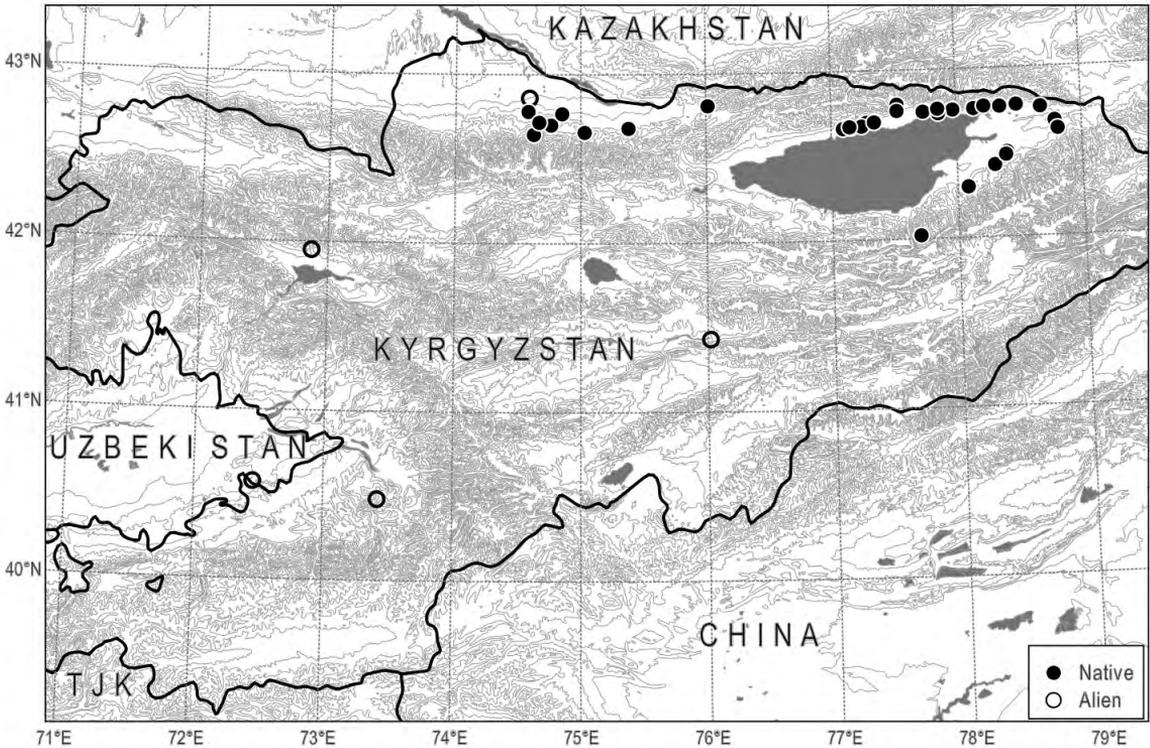


Fig. 13. Distribution of *Berteroa incana* in Kyrgyzstan.

ern Tian-Shan and the first one in these mountains within Kyrgyzstan. The distribution of *B. incana* in Kyrgyzstan is shown in Fig. 13.

In the Western Tian-Shan this species has been long known from Tashkent, where it is of alien origin (Botschantzev & Vvedensky 1955; Sermatov 1974). Because of repeated collections, *B. incana* may be regarded as an established (or at least persisting) alien in the secondary distribution area.

## Plumbaginaceae

### *Acantholimon titovii* Lincz. (Fig. 14)

Specimen examined: Kyrgyzstan. Boom ravine, lower parts of slopes, semidesert communities, 02.07.2016, G.A. Lazkov & A.N. Sennikov 428 (FRU, H).

*Acantholimon titovii* was described and has been known from Shu-Ile Mts. in Kazakhstan (Linczevski 1993). It is a densely pulvinate plant with very rigid and shortly puberulent leaves and rather short flowering spikes. The most simi-

lar species is *A. karatavicum* Lincz. (endemic of Karatau, Kazakhstan), which has narrower leaves (0.3–0.5 mm vs. 0.5–1 mm wide in *A. titovii*) and shorter first bractlets in the inflorescence (Linczevski 1993).

We have discovered this species for the first time in Kyrgyzstan, on the left side of the Boom Ravine, which is adjacent to the Kyrgyz Range. In spite of some distance between the localities in Kazakhstan and our record (ca. 200 km from Xantau Mts. and ca. 120 km from the type locality in Kandyktas Mts.), the plants from Kyrgyzstan seem to show no significant morphological differences from the type collection.

## Amaranthaceae (incl. Chenopodiaceae)

### *Chenopodium vulvaria* L.

Specimen examined: Kyrgyzstan. Chatkal Range: Sary-Chelek Nature Reserve: near Arkyt village, 11.07.2016, G. Lazkov & A. Sennikov 455 (FRU, H).



Fig. 14. Flowering plant of *Acantholimon titovii*. Photo: Georgy Lazkov.

In Central Asia, the species is native to the Flora Iranica area and alien in other countries. In Kyrgyzstan it was recorded from two localities, in the Alay Range and the foothills of the Kyrgyz Range (Lazkov & Sennikov 2014). We have found a small population along a forest path in the vicinity of Arkyt village which was heavily used by cows. This locality makes a record new to the Chatkal Range and confirms the status of the species as established alien.

## Lamiaceae

### *Galeopsis bifida* Boenn.

Specimens and observations: Kyrgyzstan. Suusamyrrange: Kyzyl-Oy, along irrigation ditch, 08.07.2016, *G.A. Lazkov & A.N. Sennikov* (FRU, H). K ng y Range: San-Tash collective farm, Ak-Say river, 16.08.1953, *R. Aidarova* (FRU); Keng-Suu river, tall forb meadow, 15.08.1985, *R. Aidarova & L. Zadirey* (FRU); Semenovskoe [On-Jeti-Karagay], 18.08.1972, *Ubukeeva et al.* (FRU); Kar-Kyra, 21.07.1983, *R. Aidarova* (FRU); Chong-Kemin river, *G. Lazkov* (observation). Teskey Range: T rg n-Ak-Suu river, 27.08.1957, *I. V khdodtsev* (LE); Altyn-Arashan, spruce forest, 24.07.1967, *Mursaliev et al.* (FRU); Tossor, along the river, 29.07.1990, *B. Sultanova* (FRU); Juku, 29.07.1971, *B. Sultanova* (FRU); Chong-Kyzyl-Suu, 16.08.1972, *B. Sultanova* (FRU); Darkan, 10.08.1986, *R. Aidarova* (FRU).

In Central Asia *Galeopsis bifida* has been known from the Dzungarian (Jetisu) Alatau and

Northern Tian-Shan; in the Tian-Shan its distribution was limited to the Trans-Ile, Ketmen, K ng y and Teskey Ranges (Tulaganova 1987). This is the area of the continuous distribution of the species, which is very common in East Europe and southern Siberia (Juzepczuk 1954; Doron'kin 1997).

This species has a clear tendency to spread as a weed. In our new locality, situated in the Suusamyrrange, *G. bifida* was collected as a garden weed. The distance between the main distribution area and this locality also suggests its alien origin. The species should be considered alien in this locality.

Our map (Fig. 15) shows the complete distribution of *G. bifida* in Kyrgyzstan.

### *Galeopsis ladanum* L.

Specimens examined: Kyrgyzstan. Trans-Ile Alatau: Chong-Kemin Mts., 9 km W of Ak-T z village, 26.07.2000, *G.A. Lazkov* (FRU, LE). K ng y Alatau: Kar-Kyra, 16.04.1985, *R. Aidarova* (FRU, LE). Fergana Range: Arstanbap, near tourist market, along irrigation ditch, 25.06.2016, *G.A. Lazkov* (FRU).

This species has a wide distribution in Boreal Eurasia except for arid areas of Central Asia (Juzepczuk 1954). The distinction between the native and the secondary distributions of *Galeopsis ladanum* is obscured by the weedy nature of the species.

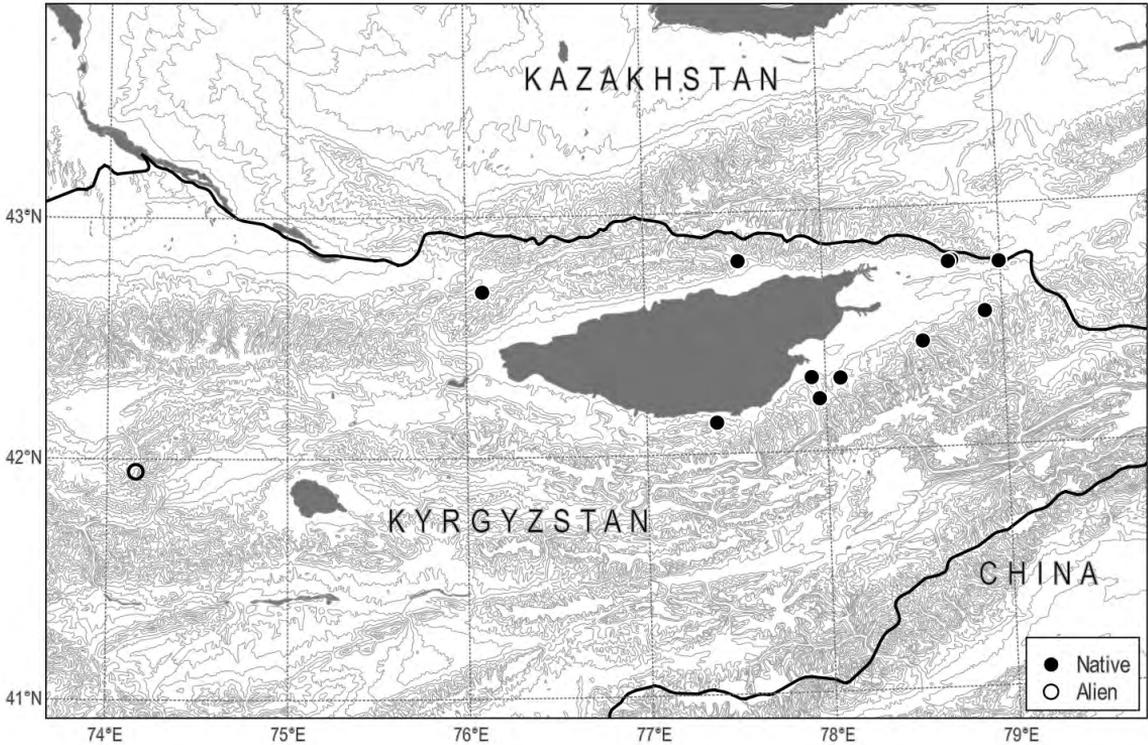


Fig. 15. Distribution of *Galeopsis bifida* in Kyrgyzstan.

In Central Asia this species has been known from a few localities: it was collected once as an alien from fields near Tashkent (Botschantzev 1961; Tulaganova 1987), twice in Kyrgyzstan, from the Ysyk-Köl Depression and the Chong-Kemin River basin (Lazkov 2001), as a naturalised alien, and twice in the Tarbagatai and Dzungarian (Jetisu) Alatau, eastern Kazakhstan, with unspecified status but probably as a naturalised alien (Tulaganova 1987; www.plantarium.ru). The species is not known from China (Li & Hedge 1994).

Another alien locality, reported here, is new to the Kyrgyzstan part of the Western Tian-Shan. In the locality at Arstanbap the species forms an extensive local population and should undoubtedly be also considered naturalised. The distribution of *G. ladanum* in Central Asia (based on our collections and the published information cited above) is shown in Fig. 16.

### *Nepeta pungens* (Bunge) Benth.

Specimens examined: Kyrgyzstan. Moldo-Too: N side, near confluence of Ming-Kush and K k meren rivers,

south of Sary-Bulung village, near Ak-K l lake, 06.07.2016, G.A. Lazkov & A.N. Sennikov (FRU, H), Echkili-Too: S side, near Orlovka [Ak-D b ] village, 18.07.2005, G.A. Lazkov (FRU).

This species is widely distributed in Central Asia, with an extensive presence in deserted hills, Dzungarian (Jetisu) Alatau, Tian-Shan (K ng y Alatau, Trans-Ile Alatau, Shu-Ile Alatau, Karatau, Kurama Range, Mogoltau), Pamir-Alay Mt. System (Alay, Turkestan, Zaravshan, Darvaz Ranges, Western Pamir), and Badghyz (Zuckerwanik 1987). This distribution displays considerable disjunctions, probably explainable by still insufficient floristic research in the area.

Although several localities have been known in Kazakhstan and Uzbekistan, bordering with Kyrgyzstan, the distribution in Kyrgyzstan was originally considered limited to a single, isolated locality in the western side of the Fergana Range (Popova 1960). Lazkov (2007) added a locality from Echkili-Too, a small mountain range that continues eastwards directly from the Karatau, from which the species had been recorded earlier in Kazakhstan (Tzagolova 1964).

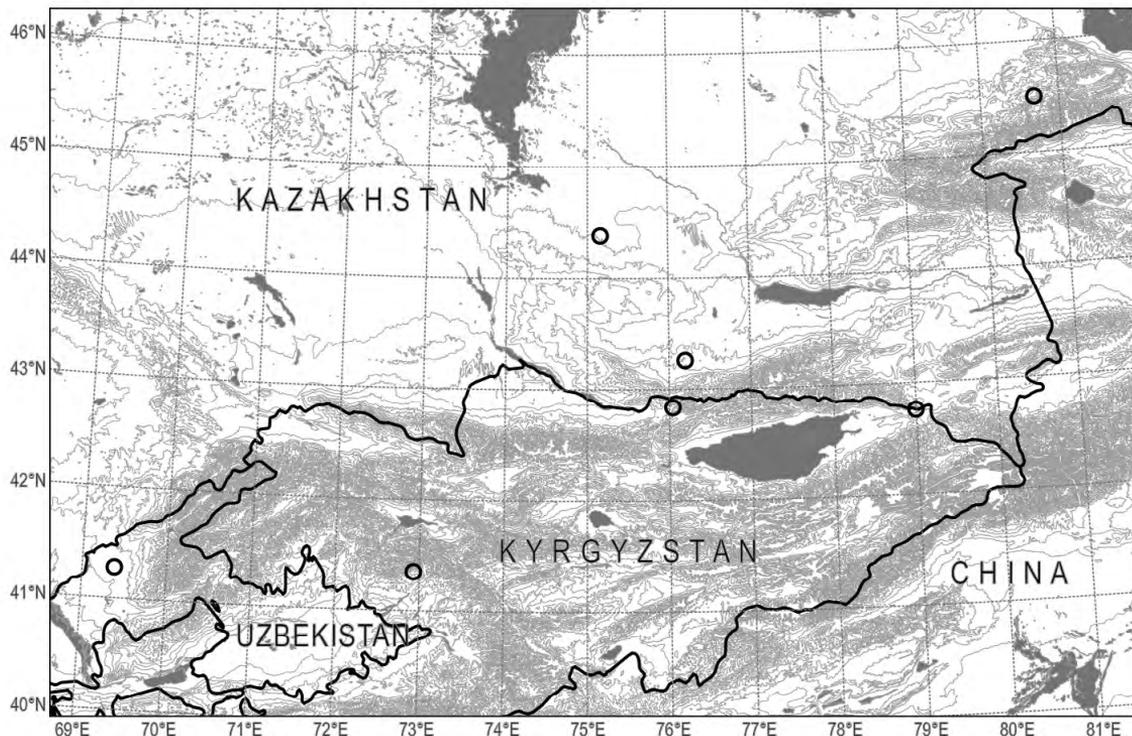


Fig. 16. Distribution of *Galeopsis ladanum* in Central Asia (alien occurrence only).

Our record is new to Moldo-Too and lies between the two localities previously known from the country. More records can be expected from the arid mountains of Kyrgyzstan, although the scarcity of the present collections apparently indicates its natural rarity and scattered occurrence.

### *Phlomoides milkoii* Lazkov

Specimens examined: Kyrgyzstan. Uzun-Akmat Range: near confluence of Uzun-Akmat and Kara-Kulja rivers, rocky slopes, 25.04.2016, *G.A. Lazkov* (FRU). Ketmen-Döbö Depression: Sargata river, 1200 m, 03.06.2007, *G. Lazkov* & *D. Milko* (LE, holotype; MW, FRU, isotypes) & 05.05.2007, *D. Milko* (FRU).

This species is narrowly distributed in central Kyrgyzstan. It was described (Lazkov 2008) and has been known (Lazkov 2011) from a single locality along the Sargata river in the mountains along the Naryn river, off the eastern part of the Ketmen-Döbö Depression.

A new record, the second of the species', is from the Uzun-Akmat Range, the area at the western part of the Ketmen-Döbö Depression. Now

the species is therefore known from the farthest points of the depression, and its further records in the mountains surrounding the depression can be expected. The distribution area of *Phlomoides milkoii* is ca. 70 km in diameter.

## Orobanchaceae

### *Pedicularis mariae* Regel (Fig. 17)

Acta Horti Petropolitani 6: 351. 1880. — Type: Kazakhstan. Almaty Region: Kegen river, 17.07.1877, *A. Kuschakewicz* (LE, syntype).

*Pedicularis altaica* var. *narynensis* Rupr., Mém. Acad. Imp. Sci. St.-Petersbourg (7 série) 14(4): 63. 1869. — Type: Kyrgyzstan. Naryn River, 17.07.1867, *F. von der Osten-Sacken* (LE, holotype, not found).

Specimens examined: Kyrgyzstan. Ysyk-Köl Lake: Taldy-Suu District, side of Ysyk-Köl Lake, 27.07.1949, *P.Ya. Kozhevnikova* (FRU). Naryn River and its tributaries: Ak-Jar, 20.07.xxxx, collector unknown (FRU); Kulnakh District, floodplain of Naryn River, 12.08.1958, *Ubukeeva & Filatova* (FRU); floodplain of Naryn River near its confluence with At-Bashy river, 03.07.2016, *G.A. Lazkov & A.N. Sennikov 434f* (FRU, H).

*Pedicularis mariae* is similar to *P. schugnana* B. Fedtsch., from which it differs in the basal leaves with oblong-lanceolate (vs. oblong or ovate) lateral segments and a narrow rachis (Vvedensky 1955; Li 1987). This species was originally described from two localities situated in Kazakhstan and China (Xinjiang), and was believed to be endemic to those countries (Vvedensky 1955; Li 1987; Yang et al. 1998). In Central Asia this species has been known from its eastern part adjacent to Xinjiang, i.e. Trans-Ile, Ketmen, Küngöy and Teskey Ranges (Li 1987). *Pedicularis mariae* has not been reported from Kyrgyzstan (Aidarova 1962; Lazkov & Sultanova 2011, 2014), although the same plant was described as *P. altaica* var. *narynensis* Rupr. at the confluence of Kurtka and Naryn rivers in present-day Kyrgyzstan (Ruprecht 1869). This variety was neglected in Vvedensky (1955) but synonymised with *P. mariae* by Li (1987). However, Li (1987) omitted the type locality of this va-

riety from the species' distribution, thus leaving the species formally unreported from Kyrgyzstan.

Besides the locality published in Ruprecht (1869), there are three specimens of *P. mariae* kept at FRU. We also recollected this species lately along the Naryn river. All the known localities have been mapped to show the species' distribution in Kyrgyzstan (Fig. 18).

#### *Pedicularis alberti* Regel (Fig. 19)

Specimens examined: Kyrgyzstan. Uzun-Akmat Mts. (N side): Almaly, 25.04.2016, G. Lazkov (FRU). At-Oinok Mts.: Kara-Kulja river system, upper reaches of Köl river, spruce-fir forest, 24.04.2016, G. Lazkov (FRU).

This species has been known from the Northern Tian-Shan (Trans-Ile, Küngöy, Kyrgyz Ranges) and Central Tian-Shan (Moldo-Too Range) (Li 1987). Its distribution area lies within Kazakhstan and Kyrgyzstan (Li 1987), and also China, Xinjiang (Ivanina 1970).



Fig. 17. Flowering plant of *Pedicularis mariae*. Photo: Georgy Lazkov.

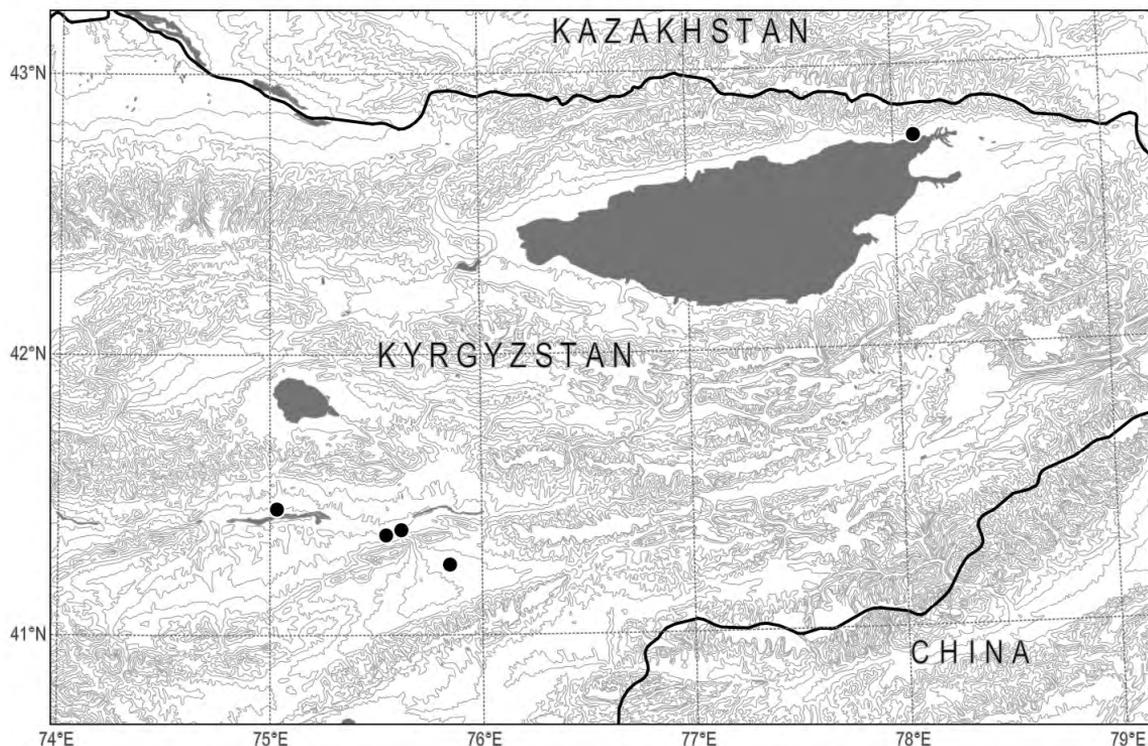


Fig. 18. Distribution of *Pedicularis mariae* in Kyrgyzstan.

The new records reported here make a range extension of the species to the Western Tian-Shan. Considering the ecological preferences of *Pedicularis alberti*, we think its distribution follows spruce forests.

## Asteraceae

*Filago hurdwarica* (Wall. ex DC.) Wagenitz (Fig. 20)

Specimens examined: Kyrgyzstan. Alay Range: Katran-Too Mts., Ak-Turpak village, versicolour denudations, 08.06.2012, G. Lazkov (FRU). Uzbekistan. Alay Range: Shohimardon, 25.06.1878, I. Skornjakov (LE).

This small annual species has been rather neglected in the past. It can be distinguished by the long spatulate leaves, which are crowded below the glomerules of capitula, resembling those of *Leontopodium* sp.; cauline leaves are rather few, remote on the stem; involucre triseriate (Nabiev 1993).



Fig. 19. Flowering plant of *Pedicularis alberti*. Photo: Georgy Lazkov.

In Central Asia the species was originally known under its later synonym, *Filago bornmuelleri* Hausskn. (Smoljaninova 1959). Wagenitz (1968) researched its characters and circumscribed the distribution area, ranging from southwestern Iran to eastern Afghanistan and the northwestern Himalayas in India (from which *F. hurdwarica* was originally described), and including its north-easternmost locality in Central Asia, i.e. Shohimardon (Alay Range) in Uzbekistan. Currently the species is known also from many mountain ranges in Tajikistan and Turkmenistan (Smoljaninova 1959; Czukavina 1988; Nabiev 1993).

The first locality of *F. hurdwarica* in Kyrgyzstan was discovered in the foothills of the Alay Range. This place is quite close to the nearest known locality at Shohimardon, which is situated in ca. 65 km eastwards from our locality. The plants were found on bare ground in fissures under rocks.

***Picnomon acarna* (L.) Cass. (Fig. 21)**

Specimen examined: Kyrgyzstan. Karatau Range: Karacha-Too Mts., near railway station Maimak, ca. 1100 m a.s.l., scree, 25.03.2016, G. Lazkov (FRU).

*Picnomon acarna* is an annual species with a broad distribution in Central Asia, including the Western Tian-Shan and adjacent foothills within Kazakhstan and Uzbekistan, and also Pamir-Alay and Kopetdagh Mts. (Tulaganova 1993). In Kyrgyzstan the species has been found in the Alay and Turkestan Ranges (Nikitina 1965).

Our record is new to the Western Tian-Shan within Kyrgyzstan. It is another example of the flora extending from the Kazakh Karatau to Kyrgyzstan.

*Acknowledgements.* Sampsa Lommi (Helsinki) designed and produced the maps. Komiljon Tojibaev (Tashkent) kindly communicated the herbarium data from TASH.



Fig. 20. Flowering plant of *Filago hurdwarica*. Photo: Georgy Lazkov.



Fig. 21. Withered (overwintered) plant of *Picnomon acarna*. Photo: Georgy Lazkov.

Distributional data on *Corydalis* were harvested from the online resource Plantarium ([www.plantarium.ru](http://www.plantarium.ru)). Alexander Naumenko (Bishkek) allowed the use of his field photographs. The text has much benefited from proofreading and critical comments of Arto Kurtto (Helsinki). G.L. acknowledges 'Central Asia Green Road Project' for partial financial support.

## References

- Aidarova, R. A. 1957: Crassulaceae DC. — In: Vvedensky, A. I. (ed.), Flora of the Kirghiz SSR 7: 5–22. Academy of Sciences of the Kirghiz SSR, Frunze. (In Russian)
- Aidarova, R. A. 1962: Pedicularis L. — In: Vvedensky, A. I. (ed.), Flora of the Kirghiz SSR 10: 197–227. Academy of Sciences of the Kirghiz SSR, Frunze. (In Russian)
- APG IV 2016: An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. — Botanical Journal of the Linnean Society 181(1): 1–20.
- Bondarenko, O. N. 1968: Melica L. — In: Kovalevskaya, S. S. (ed.), Conspectus florum Asiae Mediae 1: 122–125. Academy of Sciences of the Uzbek SSR, Tashkent. (In Russian)
- Botschantzev, V. P. 1961: Galeopsis L. — In: Vvedensky, A. I. (ed.), Flora of Uzbekistan 5: 360–361. Academy of Sciences of the Uzbek SSR, Tashkent. (In Russian)
- Botschantzev, V. P. & Vvedensky, A. I. 1955: Berteroa DC. — In: Vvedensky, A. I. (ed.), Flora of Uzbekistan 3: 65–221. Academy of Sciences of the Uzbek SSR, Tashkent. (In Russian)
- Czukavina, A. P. 1988: Filago L. — In: Kinzikaeva, G. K. (ed.), Flora of the Tajik SSR 9: 266–272. Science Publishers, Leningrad. (In Russian)
- Doron'kin, V. M. 1997: Galeopsis L. — In: Malyshev, L. I. (ed.), Flora of Siberia 11: 189–190. Science Publishers, Novosibirsk. (In Russian)
- Fraser-Jenkins, C. R. 1977: Three species in Dryopteris (Pteridophyta, Aspidiaceae). — Candollea 32: 305–311.
- Friesen, N., Fritsch, R. M. & Blattner, F. R. 2006: Phylogeny and new intrageneric classification of Allium (Alliaceae) based on nuclear ribosomal DNA ITS sequences. — Aliso 22: 372–395.

- Fritsch, R. M. 2016: A Preliminary Review of *Allium* subg. *Melanocrommyum* in Central Asia. — Leibniz-Institut für Pflanzengenetik und Kulturpflanzenforschung Gatersleben (IPK), Gatersleben.
- Fritsch, R. M., Blattner, F. R. & Gurushidze, M. 2010: New classification of *Allium* L. subg. *Melanocrommyum* (Webb & Berthel.) Rouy (Alliaceae) based on molecular and morphological characters. — *Phyton* 49: 145–320.
- Fritsch, R. M., Khassanov, F. O. & Friesen, N. W. 1998: New taxa, new combinations, and taxonomic remarks on *Allium* L. from Fergan depression, Middle Asia. — *Linzer Biologische Beiträge* 30: 281–292.
- Gamayunova, A. P. 1956: *Melica* L. — In: Pavlov, N. V. (ed.), *Flora of Kazakhstan* 1: 216–218. Academy of Sciences of the Kazakh SSR, Alma-Ata. (In Russian)
- Ionov, R. N. & Lazkov, G. A. (eds.) 2006: Vascular plants. — In: Davletkeldiev, A. A. (ed.), *Red Data Book of Kyrgyzstan* (ed. 2): 46–227. State agency on environment protection and forestry under the Government of Kyrgyz Republic, etc. (In Kyrgyz, Russian and English)
- Ivanina, L. I. 1970: *Scrophulariaceae* Juss. — In: Grubov, V. I. (ed.), *Plants of Central Asia* 5: 110–189. Science Publishers, Leningrad. (In Russian)
- Juzepczuk, S. V. 1954: *Galeopsis* L. — In: Schischkin, B. K. (ed.), *Flora of the USSR* 21: 112–124. Academy of Sciences of the USSR, Moscow & Leningrad. (In Russian)
- Kamelin, R. V. 1973: A florogenetic analysis of the native flora of the Mountainous Central Asia. — Science Publishers, Leningrad. (In Russian)
- Kamelin, R. V. 1990: *Flora of the Syrdarya Karatau*. — Science Publishers, Leningrad. (In Russian)
- Karimov, F. I. 2015: Monocotyledonous geophytes of the Fergana Depression. — Electronic resource on CD-ROM. Institute of Gene Pool of Plants and Animals of the Uzbek Academy of Sciences, Tashkent.
- Khassanov, F. O. 2000: Subinfrageneric grouping in genus *Allium* subgenus *Allium*. — In: Ashurmetov, O., Khassanov, F. & Salieva, Y. (eds.), *Plant life in Southwest and Central Asia*: 107–112. Proceedings of the 5th International Symposium, 18–22 May 1998, Tashkent, Uzbekistan.
- Khassanov, F. O. 2008: The genus *Allium* L. in Central Asia. Abstract of Dr. Sci. thesis. — Scientific Centre 'Botany' of the Uzbek Academy of Sciences, Tashkent. (In Russian)
- Kovalevskaya, S. S. 1972: *Thalictrum* L. — In: Bondarenko, O. N. & Nabiev, M. M. (eds.), *Conspectus Florae Asiae Mediae* 3: 225–228. Science Publishers, Tashkent. (In Russian)
- Lavrenko, E. M. 1934: *Melica* L. — In: Komarov, V. L. (ed.), *Flora of the USSR* 2: 340–352. Academy of Sciences of the USSR, Moscow & Leningrad. (In Russian)
- Lazkov, G. A. 2001: A new species of *Dracocephalum* (Lamiaceae) and floristic records from Kyrgyzstan. — *Botanicheskii Zhurnal* (St. Petersburg) 86(6): 146–149. (In Russian).
- Lazkov, G. A. 2007: On the species new to and rare in the Western and Inner Tian-Shan of Kyrgyzstan. — *Novitates Systematicae Plantarum Vascularium* 39: 307–312. (In Russian)
- Lazkov, G. A. 2008: New species of Lamiaceae from Middle Asia. — *Botanicheskii Zhurnal* (St. Petersburg) 93(10): 1596–1601. (In Russian)
- Lazkov, G. A. 2011: The genus *Phlomisoides* (Lamiaceae) in Kirghizia. — *Komarovia* 7: 1–64.
- Lazkov, G. A. 2014: Taxonomy and distribution of *Phlomis salicifolia* Regel sensu lato and related species of *Phlomis* sect. *Oxyphlomis* (Benth.) Kamelin et Makhm. (Lamiaceae) in Central Asia. — *Novitates Systematicae Plantarum Vascularium* 45: 84–90. (In Russian)
- Lazkov, G. A., Geltman, D. V., Neveraev, U. A. & Turdumatova, N. K. 2013: Species of vascular plants new to and rare in Kyrgyzstan (Alay and Turkestan Ranges). — *Botanicheskii Zhurnal* (St. Petersburg) 98(5): 86–92. (In Russian)
- Lazkov, G. A. & Sennikov, A. N. 2014: New records in vascular plants alien to Kyrgyzstan. — *Biodiversity Data Journal* 2: e1018. doi: 10.3897/BDJ.2.e1018
- Lazkov, G. A. & Sennikov, A. N. 2015: Taxonomic corrections and new records in vascular plants of Kyrgyzstan, 4. — *Memoranda Societatis pro Fauna et Flora Fennica* 91: 67–83.
- Lazkov, G. A. & Sennikov, A. N. 2017: Taxonomy of two blue-flowered juno irises (*Iris* subgen. *Scorpiris*, Iridaceae) from the Western Tian-Shan. — *Annales Botanici Fennici* 54: 297–305.
- Lazkov, G. A., Sennikov, A. N., Koichubekova, G. A. & Naumenko, A. N. 2014: Taxonomic corrections and new records in vascular plants of Kyrgyzstan, 3. — *Memoranda Societatis pro Fauna et Flora Fennica* 90: 91–110.
- Lazkov, G. A. & Sultanova, B. A. 2011: Checklist of vascular plants of Kyrgyzstan. — *Norrlinia* 24: 1–166. (In Russian)
- Lazkov, G. A. & Sultanova, B. A. 2014: Checklist of vascular plants of Kyrgyzstan. — United Nations Development Programme, Bishkek. (In Russian)
- Lazkov, G. A., Sultanova, B. A. & Kenjebaeva, N. V. 2002: The level of studies on the flora of the Western Tian-Shan within Kyrgyzstan and the centres of its local endemism. — In: Shukurov, E. J. (ed.), *Biodiversity of Western Tian-Shan: Achievements and prospects*. Proceedings of the scientific conference, Bishkek, 26 Dec 2001. Central Asia Transboundary Biodiversity Project, Bishkek, pp. 172–175. (In Russian)
- Lazkov, G. A. & Turdumatova, N. K. 2010: Species of *Allium* (Alliaceae) new to and rare in Kyrgyzstan. — *Botanicheskii Zhurnal* (St. Petersburg) 95: 1637–1639. (In Russian)
- Lazkov, G. A. & Umralina, A. R. 2015: Endemic and rare plant species of Kyrgyzstan (Atlas). — Food and Ag-

- riculture Organization of the United Nations, Ankara. (In Russian and English)
- Li, A. D. 1987: *Pedicularis* L. — In: Adylov, T. A. (ed.), *Conspectus Florae Asiae Mediae* 9: 254–269. Science Publishers, Tashkent. (In Russian)
- Li, X.-W. & Hedge, I. C. 1994: *Lamiaceae*. — In: Wu, Z.-Y. & Raven, P. H. (eds.), *Flora of China* 17: 50–299. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis.
- Lidén, M. 1991: New tuberous species of *Corydalis* (Papaveraceae). — *Willdenowia* 21: 175–179.
- Lidén, M. & Zetterlund, H. 1997: *Corydalis*: a gardener's guide and a monograph of the tuberous species. — Alpine Garden Society, Worcestershire.
- Linczevski, I. A. 1993: *Limoniaceae* (excl. *Psylliostachys*). — In: Adylov, T. A. & Zuckerwanik, T. I. (eds.), *Conspectus Florae Asiae Mediae* 10: 7–43. Academy of Sciences of the Uzbek Republic, Tashkent. (In Russian)
- Nabiev, M. M. 1993: *Filago* L. — In: Adylov, T. A. & Zuckerwanik, T. I. (eds.), *Conspectus Florae Asiae Mediae* 10: 475–477. Academy of Sciences of the Uzbek Republic, Tashkent. (In Russian)
- Nevski, S. A. 1934: *Schedae ad Herbarium Florae Asiae Mediae ab Universitate Asiae Mediae editum. Fasciculus XXI–XXII*. — *Acta Universitatis Asiae Mediae* (Series VIIIb). *Botanica* 17: 1–72.
- Nevski, S. A. 1937: *Thalictrum* L. — In: Schischkin, B. K. (ed.), *Flora of the USSR* 7: 510–528. Academy of Sciences of the USSR, Moscow & Leningrad. (In Russian)
- Nikitina, E. V. 1955: *Berteroa* DC. — In: Vvedensky, A. I. (ed.), *Flora of the Kirghiz SSR* 6: 237–238. Academy of Sciences of the Kirghiz SSR, Frunze. (In Russian)
- Nikitina, E. V. 1955: *Thalictrum* L. — In: Vvedensky, A. I. (ed.), *Flora of the Kirghiz SSR* 6: 108–112. Academy of Sciences of the Kirghiz SSR, Frunze. (In Russian)
- Nikitina, E. V. 1965: *Picnomon* Adans. — In: Vvedensky, A. I. (ed.), *Flora of the Kirghiz SSR* 11: 364–365. Academy of Sciences of the Kirghiz SSR, Frunze. (In Russian)
- Ömürzakov, S. Ö., Keshikbaev, A. A., Makhrina, L. I., EsHENkulov, T. & Ryskulbekova, B. 1988: A dictionary of toponyms of the Kyrgyz SSR. — Science Publishers, Frunze. (in Russian)
- Pavlov, N. V. 1954: New plants of the Kazakhstan flora, IV. — *Vestnik Akademii Nauk Kazakhskoj SSR* 8: 127–135. (In Russian)
- Pavlov, N. V. 1956: *Polypodiaceae* R.Br. — In: Pavlov, N. V. (ed.), *Flora of Kazakhstan* 1: 36–53. Academy of Sciences of the Kazakh SSR, Alma-Ata. (In Russian)
- Pavlov, N. V. & Poliakov, P. P. 1958: *Allium* L. — In: Pavlov, N. V. (ed.), *Flora of Kazakhstan* 2: 134–193. Academy of Sciences of the Kazakh SSR, Alma-Ata. (In Russian)
- Peel, M. C., Finlayson, B. L. & McMahon, T. A. 2007: Updated world map of the Köppen-Geiger climate classification. — *Hydrology and Earth System Sciences* 11: 1633–1644.
- Peshkova, G. A. 1994: *Fumariaceae*. — In: Malyshev, L. I. & Peshkova, G. A. (eds.), *Flora of Siberia* 7: 32–43. Science Publishers, Novosibirsk. (In Russian)
- Popova, L. I. 1960: *Nepeta* L. — In: Vvedensky, A. I. (ed.), *Flora of the Kirghiz SSR* 9: 41–56. Academy of Sciences of the Kirghiz SSR, Frunze. (In Russian)
- PPG I (2016) A community-derived classification for extant lycophytes and ferns. — *Journal of Systematics and Evolution* 54(6): 563–603.
- Pratov, U. P. 1974: *Crassulaceae*. — In: Pakhomova, M. G. (ed.), *Conspectus Florae Asiae Mediae* 4: 219–232. Science Publishers, Tashkent. (In Russian)
- Priszter, Sz. 1976: Über einige Pflanzen des Westlichen Tienschan, II. — *Acta Botanica Academiae Scientiarum Hungaricae* 22(1–2): 201–208.
- Rukšāns, J. 2007: *Buried treasures*. — Timber Press, Portland, Oregon.
- Ruprecht, F. 1869: *Sertum Tianschanicum*. — *Mémoires de l'Académie Impériale des Sciences de St.-Pétersbourg*, 7 série 14(4): 33–74.
- Sennikov, A. N. & Lazkov, G. A. 2012 (continuously updated): Distribution records in vascular plants of Kyrgyzstan. — Published on the Internet: <http://archive.org/details/DistributionRecordsOfVascularPlantsInKyrgyzstan> (accessed 30.08.2017)
- Sennikov, A. N. & Lazkov, G. A. 2013: Taxonomic corrections and new records in vascular plants of Kyrgyzstan, 2. — *Memoranda Societatis pro Fauna et Flora Fennica* 89: 125–138.
- Sennikov, A. N., Lazkov, G. A., Uotila, P. & Weber, H. 2011: Taxonomic corrections and new records in vascular plants of Kyrgyzstan. — *Memoranda Societatis pro Fauna et Flora Fennica* 87: 41–64.
- Shermatov, G. S. 1974: *Berteroa* DC. — In: Pakhomova, M. G. (ed.), *Conspectus Florae Asiae Mediae* 4: 160. Science Publishers, Tashkent. (In Russian)
- Smirnov, S. V., German, D. A., Kosachev, P. A. & Diachenko, S. A. 2003: Additions to the flora of Mongolia. — *Turczanianowia* 6(4): 11–21. (In Russian)
- Smoljaninova, L. A. 1959: *Filago* L. — In: Schischkin, B. K. (ed.), *Flora of the USSR* 25: 314–326. Academy of Sciences of the USSR, Moscow & Leningrad. (In Russian)
- Sobolev, L. N. 1972: Vegetation of the Ysyk-Köl Depression. — *Ilim*, Frunze. (In Russian)
- Tojibaev, K. Sh. 2010: Flora of the south-western Tian-Shan (within the Republic of Uzbekistan). — Science Publishers, Tashkent. (In Russian)
- Tojibaev, K. Sh. & Karimov, F. I. 2012: Monocotyledonous geophytes endemic to the Fergana Depression. — *Rastitelnyj Mir Aziatskoj Rossii* 1(9): 55–59. (In Russian)
- Tojibaev, K. Sh., Turginov, O. & Karimov, F. I. 2014: A new species and new records of *Allium* (Amaryllidaceae) from Uzbekistan (Central Asia). — *Phytotaxa* 177: 291–297.

- Tulaganova, M. 1987: *Galeopsis* L. — In: Adylov, T. A. (ed.), *Conspectus Florae Asiae Mediae* 9: 115. Science Publishers, Tashkent. (In Russian)
- Tulaganova, M. 1993: *Picnomon* Adans. — In: Adylov, T. A. & Zuckerwanik, T. I. (eds.), *Conspectus Florae Asiae Mediae* 10: 248. Academy of Sciences of the Uzbek Republic, Tashkent. (In Russian)
- Tzagolova, V. G. 1964: *Nepeta* L. — In: Pavlov, V. N. (ed.), *Flora of Kazakhstan* 7: 331–345. Academy of Sciences of the Kazakh SSR, Alma-Ata. (In Russian)
- Tzvelev, N. N. 1976: Grasses of the USSR. — Science Publishers, Leningrad. (In Russian)
- Umralina, A. R. & Lazkov, G. A. 2008: Endemic and rare plant species of Kyrgyzstan (Atlas). — Institute of Biotechnology of the National Academy of Sciences of Kyrgyzstan, Bishkek. (In Russian and English)
- Vvedensky, A. I. 1924: *Decas Alliorum novorum ex Asia Media*. — *Notulae Systematicae ex Herbario Horti Botanici Reipublicae Rossicae* 5: 89–96.
- Vvedensky, A. I. 1941: *Liliaceae*. — In: Schreder, R. R. (ed.), *Flora of Uzbekistan* 1: 394–495, 540–544. Uzbek Branch of the Academy of Sciences of the USSR, Tashkent. (In Russian)
- Vvedensky, A. I. 1955: *Pedicularis* L. — In: Schischkin, B. K. & Bobrov, E. G. (eds.), *Flora of the USSR* 22: 687–795. Academy of Sciences of the USSR, Moscow & Leningrad. (In Russian)
- Vvedensky, A. I. 1963: *Amaryllidaceae* Lindl. — In: Ovchinnikov, P. N. (ed.), *Flora of the Tajik SSR* 2: 290–370, 424–425. Academy of Sciences of the USSR, Moscow & Leningrad. (In Russian)
- Vvedensky, A. I. 1971: *Allium* L. — In: Vvedensky, A. I. (ed.), *Conspectus Florae Asiae Mediae* 2: 39–89. Academy of Sciences of the Uzbek Republic, Tashkent. (In Russian)
- Vvedensky, A. I. & Kovalevskaya, S. S. 1971: *Eremurus* MB. — In: Kovalevskaya, S. S. (ed.), *Conspectus florae Asiae Mediae* 2: 14–27, 311–312. Academy of Sciences of the Uzbek SSR, Tashkent. (In Russian)
- Vvedensky, A. I. & Puchkova, E. G. 1968: *Pteridophyta*. — In: Kovalevskaya, S. S. (ed.), *Conspectus Florae Asiae Mediae* 1: 7–19. Science Publishers, Tashkent. (In Russian)
- Wagenitz, G. 1968: *Filago desertorum* Pomel und *F. hurdwarica* (DC.) Wagenitz, zwei verkannte Arten der "Filago germanica"-Gruppe aus Nordafrika, Vorder- und Zentralasien. — *Willdenowia* 4(3): 283–298.
- Yang, H.-B., Holmgren, N. H. & Mill, R. R. 1998: *Pedicularis* L. — In: Wu, Z. & Raven, P. H. (eds.), *Flora of China* 18: 97–209. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis.
- Zhang, M., Su, Z. & Lidén, M. 2008: *Corydalis* Candolle. — In: Wu, Z. & Raven, P. H. (eds.), *Flora of China* 7: 295–428. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis.
- Zuckerwanik, T. I. 1987: *Nepeta* L. — In: Adylov, T. A. (ed.), *Conspectus Florae Asiae Mediae* 9: 44–58. Science Publishers, Tashkent. (In Russian)