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Iris bucharica (Iridaceae): A century of confusion is resolved with the description of *I. chrysopetala*, a new species from southern Central Asia

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Plants with golden yellow flowers were originally described from the Pamir-Alai as *Iris orchioides* but subsequently considered a colour form of *I. bucharica*, whereas the name *I. orchioides* was erroneously transferred to a yellow-flowered species of the Tian-Shan. The golden-flowered plants differ from the type of *I. bucharica* (which is prominently bicoloured with yellow falls and white claws and standards) also in the habit and the shape and size of their outer and inner tepals, and should be considered taxonomically separate. Due to nomenclatural reasons this species is described here as new to science, *I. chrysopetala*. The new species occurs in Afghanistan, Tajikistan and Uzbekistan; its occurrence in the neighbouring Turkmenistan is likely. The group of *I. bucharica* s.l. is taxonomically and nomenclaturally revised, and an updated synopsis is provided with descriptions and point maps based on herbarium specimens and documented observations.

Introduction

The Juno (*Iris* sect. *Juno* (Tratt.) Maxim., Iridaceae) is a group of bulbous irises which is highly popular among plant enthusiasts because of its compact growth and showy flowers. Its natural taxonomic diversity (70 species can be accepted in this group worldwide: Crespo et al. 2018) makes this group a good choice for specialised plant collectors. Recent phylogenetic studies (Ikinci et al. 2011; Mavrodiev et al. 2014) confirmed the monophyly of junos, although its taxonomic rank within the group of *Iris* s.l. is still debatable (Mathew 1989; Rodionenko 1994; Hall 2013; Crespo et al. 2015).

Many species of junos are closely related and differ in combinations of minor characters, which indicate recent radiation and reticulate evolution (Ikinci et al. 2011). Interspecific hybrids may occur in nature (Vvedensky 1935) and especially in cultivation (Mathew 1989; Species Group of the British Iris Society 1997; Stebbings 1997; Austin 2005).

Central Asia is a centre of the taxonomic diversity of junos, in which a separate phylogenetic lineage occurs (Ikinci et al. 2011). Vvedensky (1935, 1941, 1963, 1971) shaped the taxonomic concept of junos in Central Asia, having revised this group in Tajikistan, Uzbekistan and the whole region, and influenced the tax-

onomic work of other contemporary botanists in Kazakhstan and Kyrgyzstan (Nikitina 1951; Pavlov & Poliakov 1958).

As many as 32 species of *Iris* sect. *Juno* may be recognised in this large region (Vvedensky 1971; Rukšāns 2007; Khassanov & Rakhimova 2012; Khassanov et al. 2013, 2014; Lazkov & Naumenko 2014; Lazkov et al. 2014; Tojibaev & Turginov 2014; Tojibaev et al. 2014; Lazkov & Sennikov 2017; Sennikov et al. 2022), although a new monographic revision is still lacking. At present, a new taxonomic revision is under way for Uzbekistan (Rakhimova & Khassanov 2012), within the framework of the Flora of Uzbekistan (Sennikov et al. 2016).

The nomenclature of Central Asian *juno* irises has been recently in focus (Boltenkov 2016a, 2016b; Khassanov & Rakhimova 2016). In these studies, type specimens were traced or designated for all plant names pertinent to the group. However, these studies were limited to nomenclatural checklists without a deep revision of the background taxonomy, thus relying on the current knowledge that often required corrections and verifications (Lazkov & Sennikov 2017).

In our present work, a new taxonomic revision of the *Iris bucharica* group, including *I. bucharica* Foster, *I. vicaria* Vved. and *I. warleyensis* Foster of Vvedensky (1971), is presented. This group is generally taller plants with distinctly elongated (at least in the fruiting period) stem internodes, long leaves which are little folded, variable (white and yellow or blue) flower colours, and unwinged claws of the outer tepals. We summarise the plant morphology, distributions, taxonomic history and nomenclature of this plant group in order to develop a new taxonomic synopsis.

Material and methods

Traditional morphology-based and collection-based research has been employed, using dried and living collections and a wealth of taxonomic literature on the *juno* irises. Taxonomic concepts and diagnostic characters were examined and critically evaluated from Foster (1902), Vvedensky (1935, 1941, 1963, 1971) and Wendelbo & Mathew (1975). Herbarium collections were

examined *de visu* or from high-resolution digital images at LE, MW and TASH. Living populations were examined in Uzbekistan. Plant distributions were compiled on the basis of herbarium collections and published observations documented by photographs (www.plantarium.ru; www.inaturalist.org), which were complemented from published sources (Vvedensky 1963; Wendelbo & Mathew 1975). The resulting dataset was made available through GBIF (Sennikov et al. 2021).

Diagnostic characters

In the Central Asian species of *juno* irises (*Iris* sect. *Juno*), the following diagnostic characters have been used at the species level (Vvedensky 1935, 1971): storage root thickness; stem development (internodes abbreviated vs. elongated); leaf sheaths (closed vs. open); leaf shape (falcate vs. flattened), width, colour; shape of outer tepals (lamina: broadly vs. narrowly elliptic; claws: winged vs. unwinged; crest: entire vs. dissected); shape of inner tepals (longer vs. reduced; lamina broad of various shape vs. narrow); flower colour (background colour: white, yellow or blue; bright spot around the crest: indistinct, distinctly gold-en-yellow, distinctly violet).

The species of the *Iris bucharica* group have been recognised as very similar and closely related (Foster 1902; Vvedensky 1971). They are characterised by moderately thickened storage roots, longer stems with elongated and clearly recognisable (at least in fruit) internodes, leaf sheaths open, leaf lamina long, broad, bright green, flattened or indistinctly falcate, outer tepals with unwinged claws and entire crest, and inner tepals reduced with minute lamina. The characters considered variable and taxonomically important within the group include shape and direction of the lamina of the outer tepals, background flower colour (white, yellow or blue), colour of the outer tepals and shape of the inner tepals. Three species are currently accepted on the basis of these characters: *I. bucharica* Foster, *I. vicaria* Vved. and *I. warleyensis* Foster (Khassanov & Rakhimova 2012). These species occur in the south-western part of the Pamir-Alai, in the lower and middle mountain belts, at altitudes between 600 and

2300 m a.s.l. (Vvedensky 1971). Populations of these species may occur in a close proximity to each other, and sometimes they hybridise in nature.

Taxonomic history

The taxonomy of the *Iris bucharica* group has been originally developed by Foster (1902), who recognised four very similar taxa on the basis of plants cultivated in European nurseries. He stressed the proximity of the four taxa and the minor character of their differences but, at the same time, their absolute distinction in cultivation that justified their taxonomic recognition and specific rank. We shall discuss the characters and history of studies of each taxon in the group starting from Foster (1902).

Iris orchioides Carrière was the first species of juno irises described from Central Asia but in European cultivation, from France. When originally described (Carrière 1880), it was characterised by the unusual habit (stems with distinct internodes and long flattened leaves), giving the appearance of an orchid (hence the species name), or a *Tradescantia*, or a corn plant, *Zea mays* L. (hence the popular nickname of these irises among horticulturists, the corn leaf iris). The flower colour was described as yellow, and no spots on the outer tepals were mentioned. Although the protologue was rather uninformative and the monochrome illustration in the protologue was not particularly instructive, shortly thereafter the species was nicely illustrated from the British cultivation (Baker 1890; Fig. 1). The species description in Baker (1890) corresponds to the protologue and

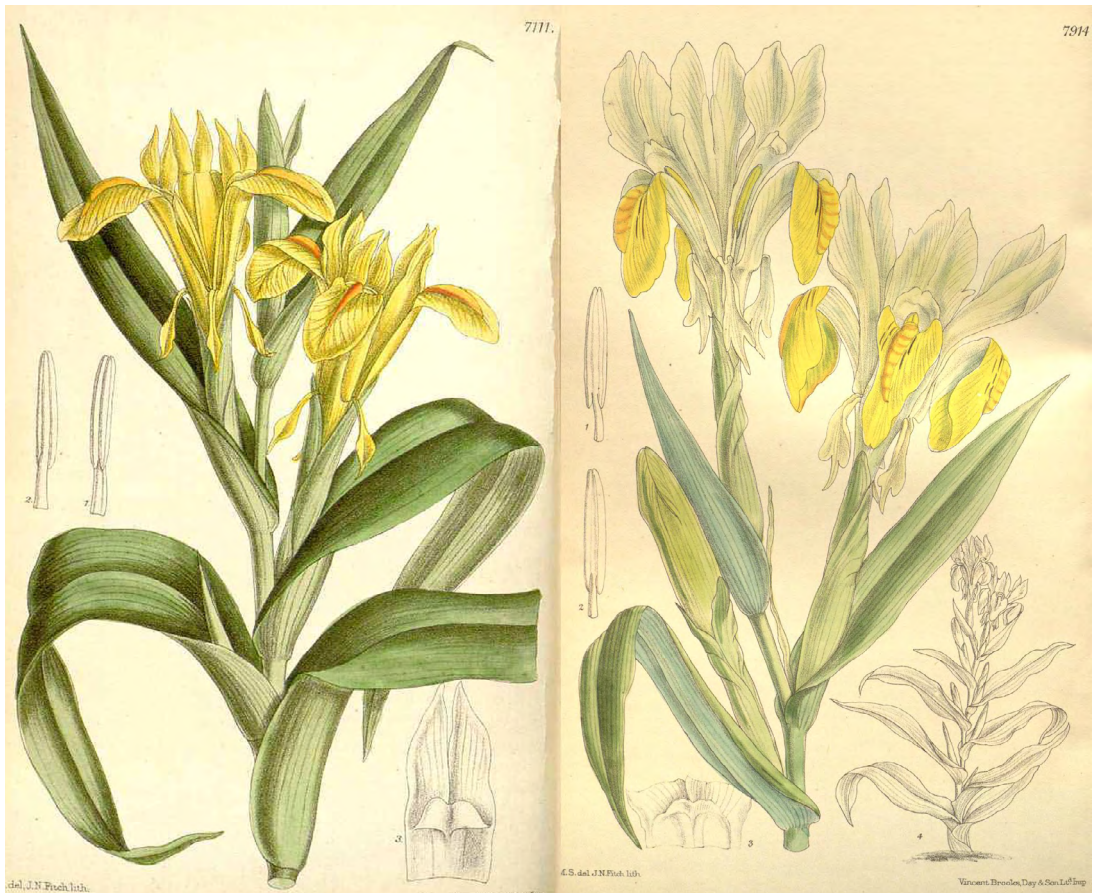


Fig. 1. Historical illustrations. Left: *Iris chrysopetala* (Curtis's Bot. Mag., Tab. 7111, as *Iris orchioides*); Right: *Iris bucharica* (Curtis's Bot. Mag., Tab. 7914).

the colour illustration shows a plant with compact golden-yellow flowers with unwinged claws and unblotched lamina of the outer tepals. The inner tepals were shown with a much reduced lamina, nearly linear in shape, and the crest was painted orange.

Carrière (1880) was not aware of the origin of his new species. Sennikov et al. (2022) concluded that its original material was collected in 1875 by N. Maev in the Hissar District, Emirate of Bukhara (now Tajikistan), possibly in the Hisor Valley, or along the Kafirnigan River, or along the Kyzyl-Suu River.

Foster (1902) described the second yellow-flowered species of this group, *Iris bucharica*, which was distinguished from *I. orchioides* by the broader lamina of the outer tepals, which expanded rapidly after a claw, and the prominently bicoloured flowers, which were white in the background with a golden blotch on the lamina of the outer tepals (Lynch 1904). The inner tepals were also broader, either rhombic or elliptic with a prominent mucro at the apex. The plants were collected in 1901 along the Surkhob River (now Tajikistan) for van Tubergen's nursery at Haarlem, Holland, by Paul L. Graeber (van Tubergen 1947), who owned a large garden business at Tashkent. This plant rapidly spread in European cultivation, and was portrayed from the Kew Botanic Gardens shortly after its original description (Hemsley 1903; Fig. 1).

While the knowledge on juno irises progressed on the basis of garden cultivation, taxonomists working with the same plants in their native areas remained much behind in the level of precision. The progress was probably handicapped by the fact that the greatest authorities on the flora of Central Asia who worked with juno irises, K. Maximowicz and E. Regel, recognised only a single variable species within the whole of Central Asia (Maximowicz 1879, 1880; Regel 1884). It was only in the beginning of the 20th century when the actual diversity of the juno irises in Central Asia was partly uncovered (Fedtschenko & Fedtschenko 1905; Fedtschenko 1909, 1924), but their first modern synopsis was produced by Vvedensky (1935) much later, for the Flora of the USSR. In this treatment, a number of new species were recognised and the diagnostic characters used were the same as accepted nowadays.

Vvedensky was familiar with several species occurring in Kazakhstan, Uzbekistan and Tajikistan, which he knew from his personal observations in living populations (Vvedensky 1923, 1935). At the same time, Vvedensky (as well as the other prominent Russian experts in juno irises, Olga and Boris Fedtschenko) apparently had difficulties in interpretation of some early protologues, which described plants from garden cultivation without precise provenance. Due to the brevity of the protologue of *Iris orchioides*, this species was misinterpreted by Vvedensky (1935) and its name was unfortunately transferred from the correct species occurring in the Pamir-Alai to a totally dissimilar plant that is native to the Tian-Shan (Sennikov et al. 2022). In connection with this nomenclatural mistake, the species originally described as *I. orchioides* was considered a colour form of *I. bucharica* (Vvedensky 1935, 1971; Wendelbo & Mathew 1975) and disappeared from the taxonomic stage, thus leaving the group of *I. bucharica* without one of its members.

Iris orchioides var. *coerulea* was treated as a colour form of *I. orchioides*, yet sufficiently distinct as to merit recognition in the same right as the other members of the group (Foster 1902). It was introduced to the British cultivation from the Imperial Botanical Garden in Saint-Petersburg (Foster 1889) and characterised by the same shape of outer tepals which were, however, of the lilac background colour with a yellow blotch on the lamina (Foster 1889, 1902; Lynch 1904). The provenance of the garden plants was not indicated (Foster 1889).

This variety was originally described by Regel (1884) who applied it to some blue-flowered plants of Central Asia. Some of these plants were later described as *Iris kuschakewiczii* B.Fedtsch. (Fedtschenko & Fedtschenko 1905), the others were referable to *I. willmottiana* Foster (Lazkov & Sennikov 2017). Boltenkov (2016b) designated a specimen (LE00050055), collected by A. Regel in 1880 between Zomin (now Uzbekistan) and Istaravshan (now Tajikistan) during his travels along the northern side of the Turkestan Range, as a lectotype of *I. caucasica* var. *coerulea* Regel. Boltenkov left the designated type without a taxonomic assessment; moreover, he neglected that two plants on the type sheet are in different stages (flowering and fruiting) and belong to

completely different taxa. Hereby we narrow the choice to the flowering plant, which logically corresponds to the protologue and to which the label ("18 April") should actually belong (the fruiting plant is likely a later admixture to this gathering). The lectotype is a tall junco iris with well-developed internodes, broad leaves and lateral flowers; its blue flowers have prominently winged claws and may correspond to *I. magnifica* Vved., which was described from the westernmost side of the Zeravshan Range near Samarkand (Vvedensky 1935, 1971). So far, this type population has not been re-sampled.

However, the garden usage of the name *Iris orchioides* var. *coerulea* (Regel) Foster was more restricted. The plants described by Foster (1889, 1902) did not correspond to any material originally used by Regel. Instead, they are in perfect match with *I. vicaria* Vved., a pale blue-flowered species of the *I. bucharica* group which occurs in the south-western part of the Pamir-Alai (Vvedensky 1971). Such plants are very common and easily accessible in the Hisor Valley, from which they could have been introduced into cultivation.

The name *Iris vicaria* was treated as invalidly published by Vvedensky (1935) because of the lack of any descriptive matter in Latin. Vvedensky intended to provide a validating description as part of the exsiccata published by the Central Asian State University, *Herbarium Florae Asiae Mediae*, but this publication was suspended in Tashkent and appeared much later in Leningrad as part of the exsiccata published by the Komarov Botanical Institute (Vvedensky 1975). On this belief, Vvedensky (1963) provided a validating description for his *Juno vicaria* Vved., treated as a new species.

However, in the first publication Vvedensky (1935) cited a synonym for *Iris vicaria*, "*I. orchioides* var. *coerulea* Baker, Handb. Irid. (1892) 46". In his treatment of *I. orchioides* var. *coerulea*, Baker (1892) briefly but clearly described a plant with lilac flowers with a yellow blotch on the lamina of the outer tepals, which corresponds to *I. vicaria*. Although this treatment and nomenclature were undoubtedly inspired by the original variety published by Regel (1884), Baker was much more specific in the diagnostic characters and made no reference to Regel, apparently by intention because the other varieties accepted in his

work were referenced to the original authors or protologues. For this reason, his variety, ascribed to "hort." and based on the living material in the British cultivation, should be treated as a separate taxon and a later homonym of *I. orchioides* var. *coerulea* (Regel) Foster which was based on dried plants collected in the wild.

Although Vvedensky (1935) provided no descriptive matter that may be counted as a validating description or diagnosis of *Iris vicaria*, his reference to Baker (1892) makes his new species being nomenclaturally based on *I. orchioides* var. *coerulea* Baker. This conclusion agrees with intentions and taxonomic assessments of Vvedensky and affects the nomenclatural history and typification of the taxon. With this replaced synonym, *I. vicaria* was validly published in Vvedensky (1935), and *Juno vicaria* (Vved.) Vved. was validly published in Vvedensky (1941). The species-level combination in *Iris* published by T.Hall & Seisums in Ikinici et al. (2011) is an isonym. Vvedensky's type indication of "Herb. Fl. As. Med. no. 666; type in Tashkent" (Vvedensky 1935) was specified in Vvedensky (1975), where a certain gathering was cited in full. This type designation is effective and constitutes a neotypification of Baker's variety.

The last member of the *Iris bucharica* group is *I. warleyensis* Foster. It was described in the same work, where the species composition and the diagnostic characters in the group were developed (Foster 1902). These plants are characterised by the blue background colour of the flowers, which is more expressed on style branches and less so on the tepals. The lamina of the outer tepals is deeply violet-coloured except for the central blotch and the back side of the margins; the crest is pale blue, and the central blotch around the crest is golden-yellow with an orange tint. The shape of the lamina is also different in the two species, being elliptic and gradually expanded from the claw in *I. vicaria* (as in *I. orchioides*) or broadly elliptic and abruptly expanded from the claw in *I. warleyensis* (as in *I. bucharica*). The provenance of the plants was not specified.

These morphological differences are stable in native populations and in cultivation, thus warranting the recognition of four species as proposed by Foster (1902). Although all the four species have been described and legitimately named

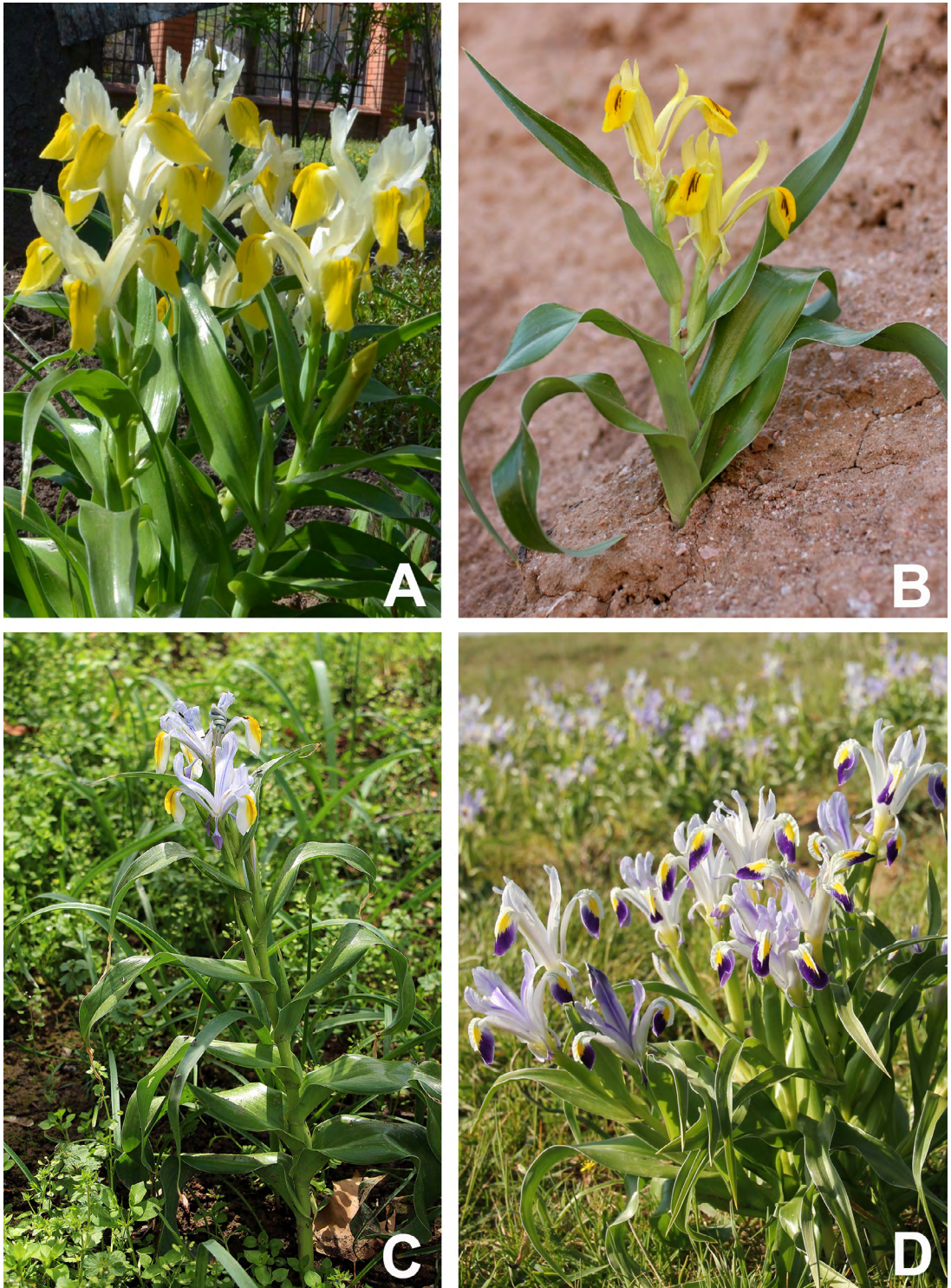


Fig. 2. Four species of the *Iris bucharica* group. A. *Iris bucharica* (cultivated in Sympheropol, 16 April 2017, L. Saplitkaya); B. *Iris chrysopetala* (Luchob, 21 April 2011, E. Davkaev); C. *Iris vicaria* (cultivated in Tashkent, 5 April 2021, A. Gaziev); D. *Iris warleyensis* (Aman-Kutan Pass, 2 May 2017, N. Beshko).

in their history, *Iris orchioides* has lost its name due to a nomenclatural confusion (Sennikov et al. 2022). Since its current application has been established in the sense of a species from the Western Tian-Shan, which is otherwise unnamed, the name *I. orchioides* should be retained for that species (Sennikov et al. 2022). For this reason, the plant originally known as *I. orchioides* is re-described here as new to science.

Taxonomic synopsis

1. *Iris chrysopetala* Sennikov, F.O.Khass. & Pulatov, sp. nova.

Type: Uzbekistan. Surxondaryo Region: Bobotog' Range, north of Oqmachit Village, 735 m a.s.l., 8 March 2021, O. Turginov & S. Pulatov (TASH, holotype; isotypes H, LE).

This species is most similar to *Iris bucharica*, from which it differs in a more compact habit, yellow (vs. white) background colour of flowers, and broadly (vs. narrowly) elliptic lamina of the outer tepals.

Plants up to 30(40) cm tall. Bulbs 1.5–2 cm in diam., storage roots thickened. Stem with short (sometimes barely visible) internodes during the period of flowering, usually elongated at the fruiting time. Leaves 6–8, glossy green above, slightly greyish-green beneath, 1.5–3 cm wide, carinate, undulate, gradually tapering to the apex, margins narrowly cartilaginous and ciliate. Flowers 1–4(5). Flower tube 3.5–5 cm long, greenish-yellow. Outer tepals 3.5–4.5 cm long, claw unwinged but gradually broadening towards the lamina, 7–10 mm wide, pale or bright yellow, lamina reflexed downwards, narrowly elliptic, gradually expanded from the claw, 1.2–1.8 cm long, 1–1.5 cm wide, almost completely golden yellow except for the back side, usually with prominent violet stripes along the golden-coloured, entire crest. Inner tepals 1–2.5 cm long, reflexed downwards, lamina narrowly rhombic, often mucronate, pale yellow. Style branches 1–1.5 cm long, 0.4–0.7 mm wide, pale or bright yellow. Anthers and pollen whitish. Fig. 2B, 3.

Ecology. Grasslands and shrublands in the lower mountain belt, at altitudes between 600 and 1 200 m a.s.l.

Distribution. Afghanistan (Wendelbo & Mathew 1975, included in *Iris bucharica* s.l.), Tajikistan, Turkmenistan (possible occurrence), Uzbekistan (Fig. 4). The species probably occupies the western and southern parts of the distribution area of *I. bucharica* s.l., generally at lower altitudes. Its precise distribution cannot be ascertained yet due to the temporal unavailability of material for revision; only some collections and documented observations were examined and have been listed here, whereas many older records from literature (Vvedensky 1963; Wendelbo & Mathew 1975) and some herbarium collections (LE) were inaccessible to us and have been mapped as a collective species (*I. bucharica* s.l.).

Other specimens examined (paratypes) and documented observations. Tajikistan. 1 km north of Dushanbe, 20 March 1957, Grigoriev (TASH); Gardani-Uшти Mts., 18 March 1947, Varivtseva & Nepli (LE01119880, LE01119917, LE0119707, LE0119708) & 24 March 1947, Varivtseva & Nepli (LE0119915, LE0119916); Samanchi, 30 April 1939, Tazba (LE01119904, LE01119912, LE01119913); Tomchi, 17 April 1940, Gontcharov (LE); Luchob, 21 April 2011, Davkaev (www.plantarium.ru).

2. *Iris bucharica* Foster, Gard. Chron., ser. 3, 31: 385. 1902 — *Juno bucharica* (Foster) Vved. in Kudriashev, Fl. Uzbekistan 1: 517. 1941.

Type: [icon] "*Iris bucharica*" in Foster, Gard. Chron., ser. 3, 31: 387, f. 135. 1902 (lectotype designated by Boltenkov (2016b: 224)).

Plants up to 40 cm tall. Bulbs 1.5–2.5 cm in diam., storage roots thickened. Stem with prominently elongated internodes during the whole period of flowering and fruiting. Leaves 7–12, glossy green above, slightly greyish-green beneath, 1.5–3 cm wide, carinate, undulate, gradually tapering to the apex, margins narrowly cartilaginous and ciliate. Flowers 3–6. Flower tube 3.5–5 cm long, greenish-yellow. Outer tepals 3.5–4.5 cm long, claw unwinged but gradually broadening towards the lamina, 6–10 mm wide, white, lamina reflexed downwards, broadly elliptic, 1–2 cm long, 0.8–2 cm wide, abruptly expanded from the claw, almost completely bright yellow except for the back side, with a few violet stripes along the golden-coloured, entire crest. Inner tepals 1–2 cm long, obliquely reflexed downwards, lamina rhombic or elliptic, often mucronate, white. Style

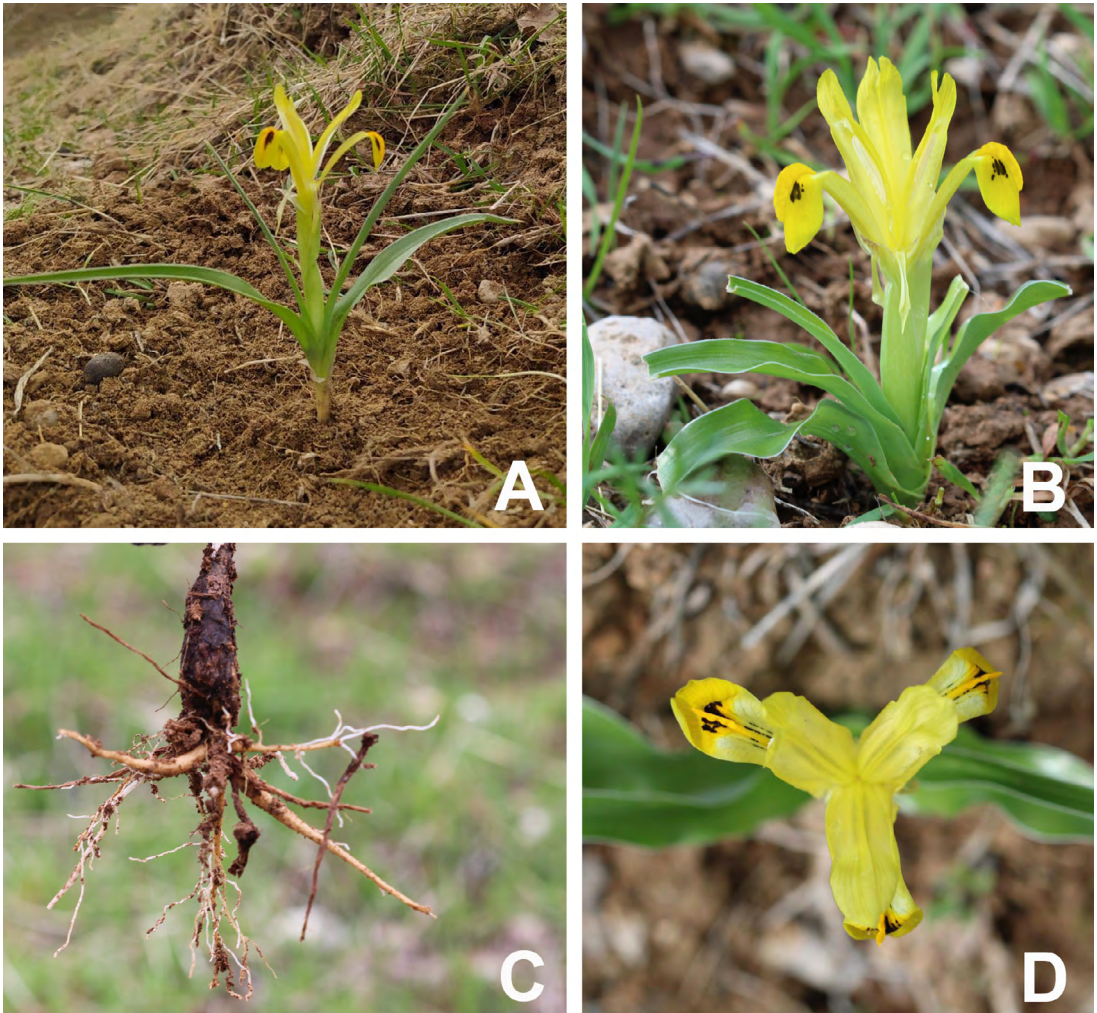


Fig. 3. *Iris chrysopetala* in the Bobotog' Mts., Uzbekistan. A. Plant habit; B. Flower (side view); C. Root system; D. Flower (top view). Photo: 6 March 2021, O. Turginov.

branches 1–1.5 cm long, 0.4–0.7 mm wide, white. Anthers and pollen white. Fig. 2A.

Ecology. Grasslands and shrublands in the lower and middle mountain belts, at altitudes between 800 and 1800 m a.s.l.

Distribution. Afghanistan, Tajikistan, Turkmenistan (Kuhitang: Nikitin & Geldykhonov 1988), Uzbekistan (Fig. 4).

3. *Iris vicaria* Vved. in Komarov, Fl. USSR 4: 569. 1935 — *Iris orchioides* var. *coerulea* Baker, Handb. Irid.: 46. 1892 — *Juno vicaria* (Vved.) Vved. in Kudriashev, Fl. Uzbekistan 1: 569. 1941.

Type: Uzbekistan. Surxondaryo Region: "Inter lapides ad declivia saxosa in montibus Hissaricis supra p. Schargun, alt. ca. 1250 m", 14 April 1928, A.I. Vvedensky [= Herbarium Florae URSS no. 5449] (TASH0000322, neotype designated by Vvedensky (1935: 570, 1975: 61); isoneotypes BM000832580, E00705955, LE0050124, LE0050125, MW0021782 etc.).

Plants up to 40 cm tall. Bulbs 1–3 cm in diam., storage roots thickened. Stem with prominently elongated internodes during the whole period of flowering and fruiting. Leaves 8–12, glossy green above, slightly greyish-green beneath, 1.5–3 cm wide, carinate, undulate, gradually tapering

to the apex, margins narrowly cartilaginous and ciliate. Flowers 3–6. Flower tube 4–4.5 cm long, pale violet. Outer tepals 4–5.5 cm long, claw unwinged but gradually broadening towards the lamina, 5–10 mm wide, pale violet, lamina reflexed downwards, narrowly elliptic, gradually expanded from the claw, 1.2–1.7 cm long, 0.8–1.4 cm wide, pale violet (sometimes nearly white) along margins, bright yellow blotched with barely recognizable violet stripes along the whitish, entire crest. Inner tepals 2–2.5 cm long, obliquely reflexed downwards, lamina narrowly rhombic or elliptic, often mucronate, pale violet. Style branches 1–2 cm long, 0.4–0.6 mm wide, pale violet. Anthers and pollen whitish. Fig. 2C.

Ecology. Grasslands and shrublands, on denudated slopes, in the lower to middle and upper mountain belts, at altitudes between 700 and 3000 m a.s.l.

Distribution. Tajikistan, Turkmenistan (Kuhitang: Nikitin & Geldykhonov, 1988, as *I. warleyensis*), Uzbekistan (Fig. 5).

4. *Iris warleyensis* Foster, Gard. Chron., ser. 3, 31: 386. 1902 — *Juno warleyensis* (Foster) Vved. in Kudriashev, Fl. Uzbekistan 1: 517. 1941.

Type: [icon] "*Iris warleyensis*" in Foster, Gard. Chron., ser. 3, 31: 386, f. 134. 1902 (lectotype designated by Boltenkov (2016b: 231)).

Plants up to 35 cm tall. Bulbs 1.5–3 cm in diam., storage roots slightly thickened. Stem with prominently elongated internodes during the whole period of flowering and fruiting. Leaves 7–10, glossy green above, slightly greyish-green beneath, 1.5–3 cm wide, carinate, undulate, gradually tapering to the apex, margins narrowly cartilaginous and ciliate. Flowers 2–4. Flower tube 4–4.5 cm long, greenish violet. Outer tepals 4–5.5 cm long, claw unwinged but gradually broadening towards the lamina, 7–12 mm wide, pale violet, lamina reflexed downwards, broadly elliptic, abruptly expanded from the claw, 1–1.5 cm long, 1.5–2 cm wide, broadly dark violet along margins, bright yellow blotched without violet stripes along the whitish, entire crest. Inner tepals 1.2–

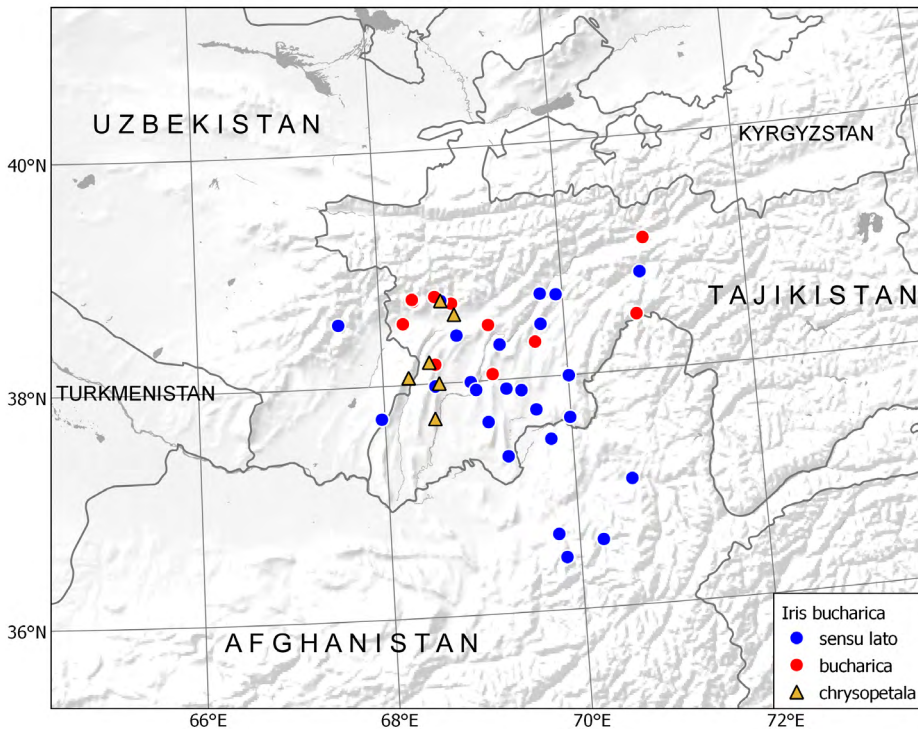


Fig. 4. Distribution of *Iris bucharica* s.l. according to the specimens and observations examined, and reliable literature. Verified localities of *Iris bucharica* s.str. and *Iris chrysopetala* are mapped separately.

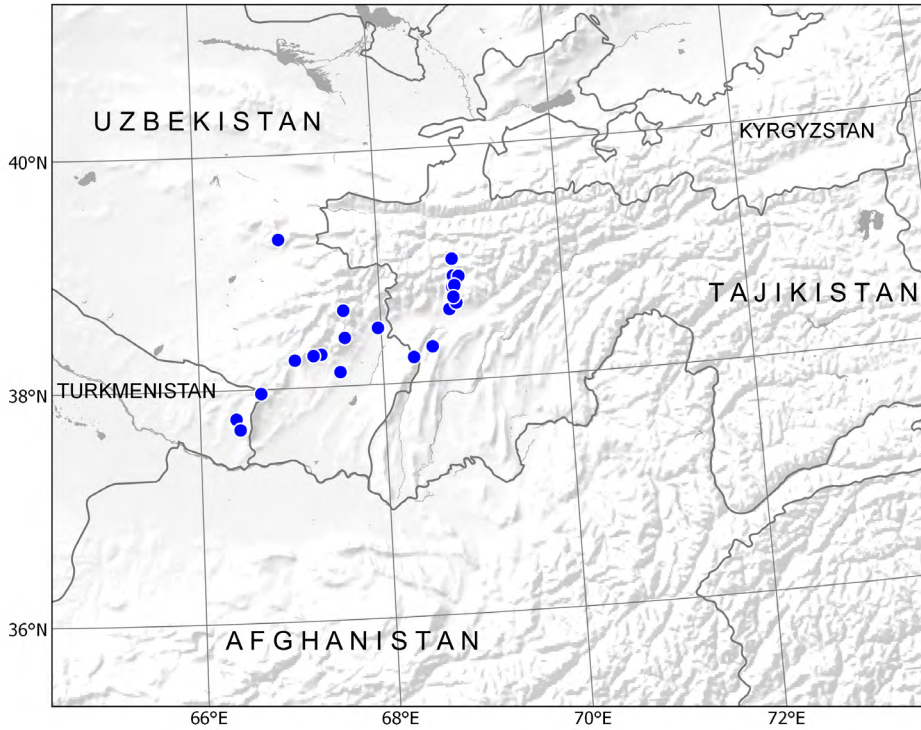


Fig. 5. Distribution of *Iris vicaria* according to the specimens and observations examined.

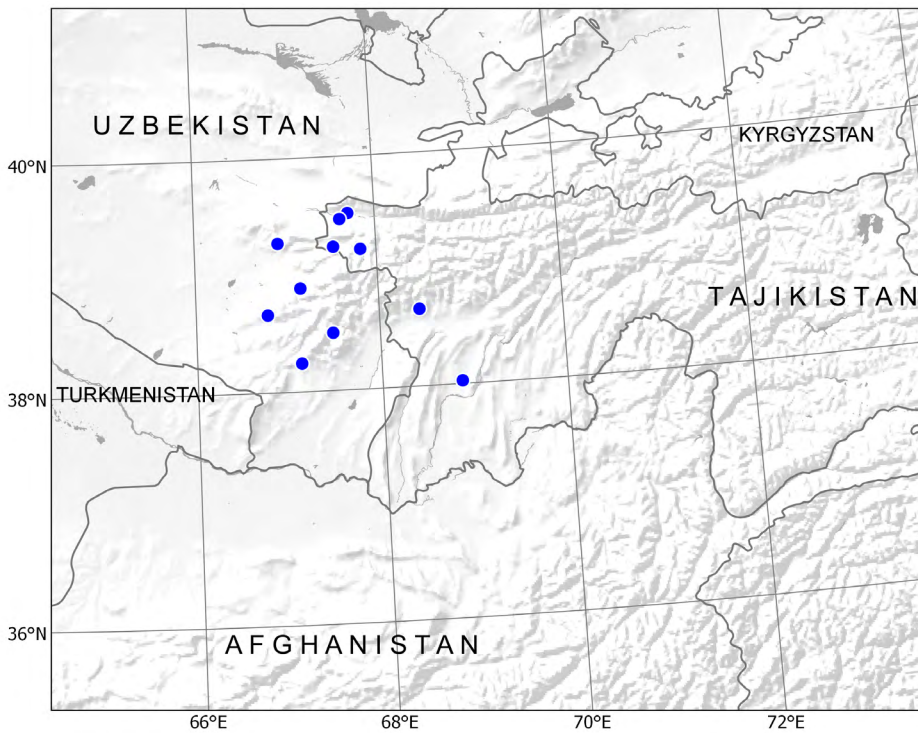


Fig. 6. Distribution of *Iris warleyensis* according to the specimens and observations examined.

2 cm long, obliquely reflexed downwards, lamina narrowly rhombic or elliptic, often mucronate, dark violet. Style branches 1–1.5 cm long, 0.4–0.7 mm wide, pale or intensely violet. Anthers and pollen whitish. Fig. 2D.

Ecology. Grasslands, shrublands and sparse juniper forests, in the middle mountain belt, at altitudes between 1 200 and 1 800 m a.s.l.

Distribution. Tajikistan, Uzbekistan (Fig. 6). Unlikely occurs in Turkmenistan in spite of the records in Nikitin & Geldykanov (1988), which seem to be referable to *I. vicaria*.

Identification key

- 1 Flowers white and yellow2
- 1 Flowers lilac and violet, with a bright yellow blotch.3
- 2 Flowers with the pale or bright yellow background; lamina of the outer tepals narrowly elliptic, golden yellow, with prominent violet stripes along the crest. *Iris chrysopetala*
- 2 Flowers with the white background; lamina of the outer tepals broadly elliptic, bright yellow, with faint violet stripes along the crest *Iris bucharica*
- 3 Flowers with the pale lilac background; lamina of the outer tepals narrowly elliptic, with pale lilac margin *Iris vicaria*
- 3 Flowers with the pale violet background; lamina of the outer tepals broadly elliptic, with dark violet margin *Iris warleyensis*

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