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Iris sisianica, a new stoloniferous species (*Hermodactyloides* section, *Iridaceae*), described from Zangezur floral area, Armenia

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Abstract

Iris sisianica, a new stoloniferous species narrowly local endemic to Syunik region, Zangezur floral area, Armenia (Lesser Caucasus) is described and illustrated. Morphological differences between the new species and the closely related species, *I. reticulata*, are discussed. The illustration, photographs, distribution map and conservation status are provided. It is considered as 'Critically Endangered' and known to exist at only a single location (CR B2a).

Key words: Armenia, Zangezur floral area, bulbs, stolons, irises, *Hermodactyloides* section, chestnut soils, monophyletic lineage.

Introduction

The genus *Iris* L., 1753, is a largest genus of geophytes and rhizomatous ornamental perennials of the *Iridaceae* Juss. family, consisting of about 300 species. Irises are common to temperate and arid climates of Northern hemisphere zones from Europe to Asia and within North America [9, 10, 17]. At different times, the prominent botanists W.R. Dykes, J.H.M. Lawrence, G.I. Rodionenko, J.L. Taylor, B. Mathew and C. Wilson have studied the biology, taxonomy, chorology and phylogeny aspects of the genus [3, 8-10, 14-17]. The latest taxonomic and generally accepted systematics are presented in the revision monograph of Brian Mathew, 1989, which also basically formed The Species Group of the British Iris Society account [9, 15]. According to Mathew's treatment, the genus *Iris* includes the following six subgenera: *Iris* B. Mathew, *Limniris* (Tausch) Spach, *Nepalensis* (Dykes) Lawrence, *Xiphium* (Miller) Spach, *Scorpiris* Spach, and *Hermodactyloides* Spach [9].

Actual *Iris* classification is built on the morphological traits such as root system type (e.g., rhizomes, corms, bulbs, tubers, as well as the stolon-like rhizomes, bulb-like rhizomes and tuber-like rhizomes), seed coat structure (with or without an aril), type of sepal crests (ridges), and the presence/absence of sepal beards. But they are not the exhaustive features for the subgenera and sections segregation within defined irises groupings [17].

Currently, four sections belong to the subgenus *Hermodactyloides*: *Brevituba* Mathew, *Monolepsis* (Rodion.) B. Mathew, *Hermodactyloides* Mathew and *Micropogon* Mathew [7].

In turn, *Hermodactyloides* section, according to B. Mathew, 1989 [9], consists of 9 species, (actually 10 species, including the newly described from Armenia *I. sisianica* Zubov & Bondarenko), such as *I. bakeriana* Foster, *I. histrio* Reich., *I. histrioides* (G.F. Wilson) Arnott, *I. reticulata* Bieb., *I. sophenensis* (Foster) B. Mathew & Güner, *I. tuberosa* L., *I. vartanii* Foster, *I. winogradowii* Fomin, and *I. zagrica* Mathew & Zarrei.

Materials and Methods

Field studies of *Iris sisianica* were undertaken in Armenia in May 2013. Herbarium specimens of *I. sisianica* were examined at the herbaria of WI and KWHA (abbreviations after [5]); living material of

this species was examined by us *in situ* and in cultivation between 2013 and 2018. Measurements, colours, and other details given in the descriptions are based on living material, spirit and herbarium specimens and data derived from the field notes. Morphological observations were made using Stemi 508 stereo microscope (Carl Zeiss, Germany). Morphological terminology follows [2]. Distribution map was plotted using specimen collection coordinates and carefully verified and error-corrected with Google Earth Pro (7.3.0.3832 (32-bit); ©2017 Google). The map in Figure 4 was produced using SimpleMappr [12]. The conservation status of *I. sisianica* was assessed using the Red List Category (Version 3.1: IUCN 2001) [1, 6].

Taxonomic Treatment

Iris sisianica* Zubov & Bondarenko *sp. nov. (Figs.1,2 &3)

Holotype: – ARMENIA: border between cultivated field and dry steppe plots around Sisian, chestnut soils, appr. 1600 m, Sisian Basin, Syunik region; coll. in fruit by Zubov & Bondarenko, 08 V 2013 (holotype WI P33602; isotype KWHA).
Diagnosis: – the new species is unique in the genus and differs from close related *I. reticulata* by the mother (main) one-scaled bulb forming extending stolons (stoloniferous one-scaled bulb) ending up with small-sized daughter bulbs. – *I. sisianica a I. reticulatae bulbis stolóniferis (nec bulbis sine stolonórum) differt.*

Bulb, elongate-rounded, consists of one fleshy scale, up to 3.5 cm long and up to 1.7 cm in width, covered with dry netted-fibrous greyish-cream outer scales; mostly with 1-3 thin stolons up to 10-23 cm long with reduced colourless clasping sheaths, or lower leaves (up to 5 on a stolon, up to 0.9 cm long) ended up with a daughter unequally rounded bulb (bulbil) with a pointed apex (up to 1.4 cm wide and 1.7 cm long). Stolons branch out from the basal plate of a mother bulb; very rarely main bulb possesses 1-2 stolonless daughter bulbs; the root initials are numerous, thin, unbranched, up to 6-11 cm long.
Stem, short and reduced at flowering time (underground), one-flowered, with lower leaves, after flowering develops to 7.7-9.4 (-11.4) cm high; brownish with dark-purple longitudinal strips.
Leaves, 2, erect, hollow, unequally quadrangular in section, with white pointed apex (in the middle part up to 2.7 × 2.5 × 2.5 × 2.5 mm in section), up to 1.5-2.5 mm wide and 35-45 (-60) cm high at fruiting, in lower part and along the stem covered with numerous colorless spathe valves (up to 5 per stem) up to 6.6-9.7 cm long and 0.3-0.5 cm wide. The bracteoles are 2, at the base of the flower, membranous and significantly exceeding the ovary (1:2-1:3).
Flower, single, relatively large, with a red-purple six-part corolla-like perianth, with a long (up to 5-11 cm) perianth tube; *the inner segments (petals, or standards)* erect, equally long with the outer ones, slightly waved at margins, up to 6 cm long and 1.1 cm wide, narrowly inversely-lanceolate, with a long narrow nail, concolor both sides; *the outer segments (sepals, or falls)* expand from their narrow upturned base, or claw, into the broadly lanceolate drop-down blade, up to 5.6 cm long and 2.3 cm wide, from the base to mid blade bearing a small orange longitudinal ridge (crest) surrounded by a pattern of white and dark purple strips/strokes/dots adaxially; abaxial side widely yellowish with longitudinal red-purple strips, expanding from center to the upper mid bend and margins; *style* divided to the base into three petal-shaped lobes up to 5.5 cm long and 2.4 cm wide each and ended by bi-lobed reflexed stigma at apex; *anthers* linear, up to 1.0 cm long, attached to the filaments (up to 1.5 cm long) with their base and facing the sacs outward.
Ovary, inferior, three-loculed, cylindrical, with numerous ovules in each locule; the fruit is a trihedral locusticidal capsule, short to elongated-cylindrical, up to 2.1-3.0 (-3.7) cm long and up to 1.2 cm wide, with a considerable tube at the tip up to 2.0-5.4 cm long.
Seeds, 4-8 per capsule, large, rounded, with greyish-brown seed coat and terminal aril, up to 0.5 cm long and 0.3 cm wide when dried.
Chromosome number: unknown.

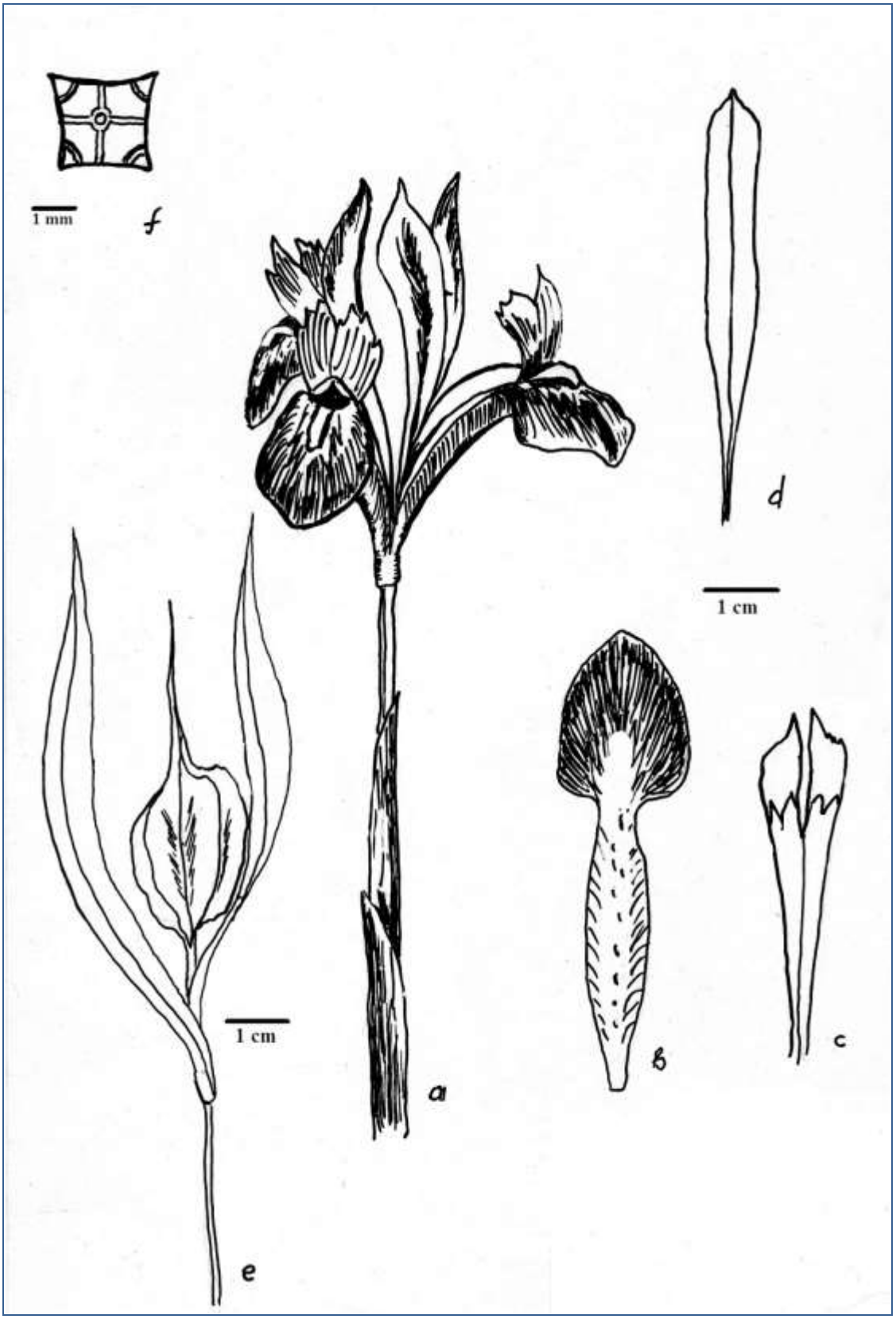

Figure 1. ***Iris sisianica*** (a-f: from Zubov & Bondarenko; by Leonid Bondarenko). a. Scape with a flower and lower leaves; b. Outer perianth segment (fall, abaxial view); c. Petal-shaped lobe ended by bi-lobed stigma at apex of a three-lobed style (abaxial view); d. Inner perianth segment (standard, adaxial view); e. Developed after flowering scape with a seed pod and bracteoles; f. Cross-section view of an unequally quadrangular leaf blade. Scale bar: a-e – 1 cm; f – 1 mm.

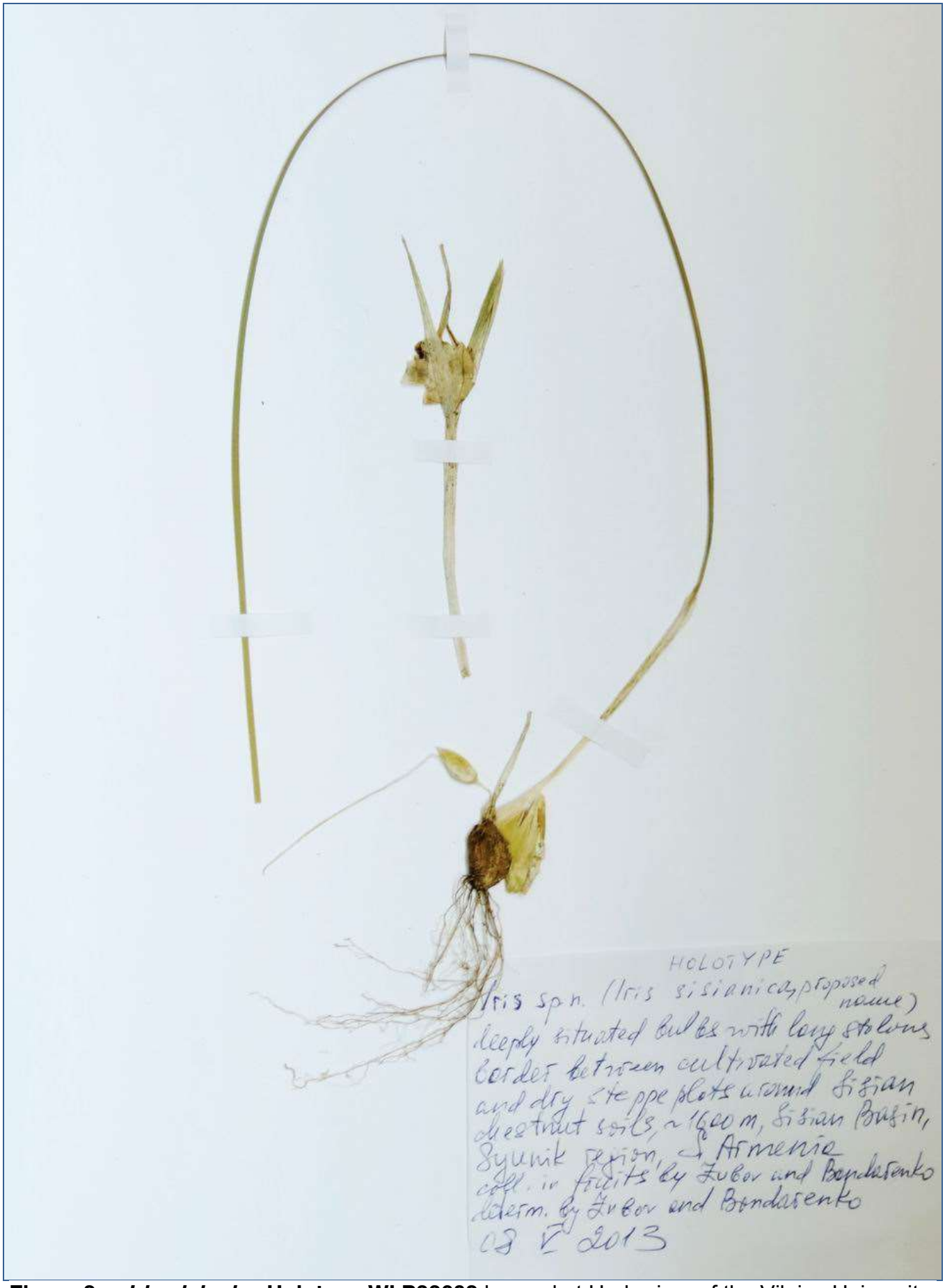

Figure 2a. ***Iris sisianica*** **Holotype WI P33602** housed at Herbarium of the Vilnius University, Lithuania.

Figure 2b. *Iris sisianica* type and living plants: Freshly collected seeds.

Figure 2c. *Iris sisianica* living plants: Cultivated plants flowering in Ukraine.

Figure 2d. *Iris sisianica* living plants: Cultivated plants flowering in Lithuania

Figure 3a. Stoloniferous bulbs of *Iris sisianica*: Mature bulbs as lifted from soil.

Figure 3b. Stoloniferous bulbs of *Iris sisianica*: View of fruiting plants.

Figure 3c. Stoloniferous bulbs of *Iris sisianica*: *I. sisianica* mother (main) bulbs with thin stolons terminated by daughter bulbs; *ex locus classicus* (left), and *I. reticulata* mother (main) and daughter bulbs (right); Vanadzor, N. Armenia.

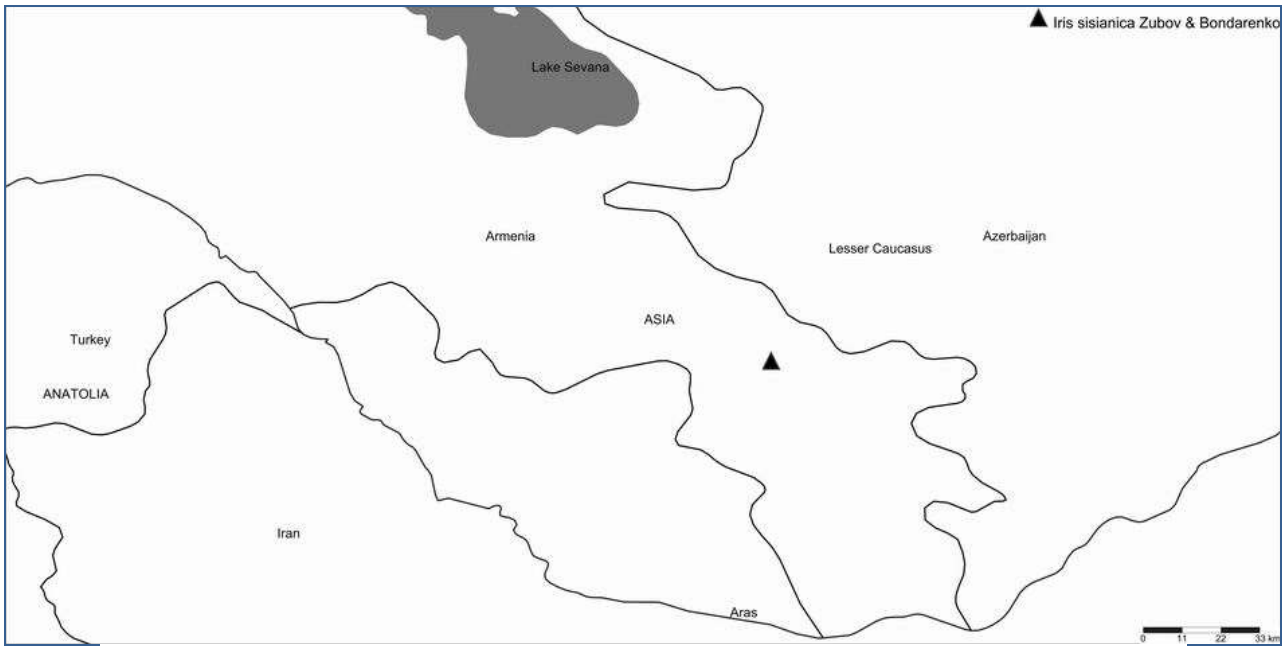

Figure 4. Distribution of *Iris sisianica* (▲) based on collection localities.

Distribution: **– Lesser Caucasus, Zangezur floral area (Sisian Basin – Syunik region); a narrowly local Sisian Basin endemic (Fig. 4, above).**

Habitat and Ecology: described from the border of cultivated field and dry steppe plots at appr. 1600 m elevation, accompanied by the mid-spring synusia species: *Amygdalus nana* L.*, Colchicum trigynum* (Steven ex Adam) Stearn*, Iris caucasica* Hoff.*, Leopoldia caucasica* (Griseb.) Losinsk.; growing on chestnut soils of the dry steppe belt of Armenia (1250-1950 m), characterized by average content of humus 2-4%, stoniness, the presence of partially cemented and significant illuvial-carbonaceous horizon, have a slightly alkaline reaction (pH=7.4-8.5). Heliophyte, mesophyte.

Phenology: Flowering: March-April; fruiting period: May.

Specimens examined: – Lesser Caucasus: **Armenia** – Sisian vicinities, 1600 m, 08 May 2013 (fr.), *Zubov & Bondarenko s.n.* (holotype: WI P33602!; isotype: KWHA!).

Conservation assessment: Considered 'Critically Endangered' (CR; Version 3.1: IUCN 2001). CR B2a: CR – A taxon is Critically Endangered when the best available evidence indicates that it meets any of the following criteria (e.g., B criterion), and it is therefore considered to be facing an extremely high risk of extinction in the wild; B2 – Geographic range in the form of area of occupancy (AOO) estimated to be less than 10 km^2 (AOO for *I. sisianica* – 7.07 km^2), and estimates as: – a. Severely fragmented or known to exist at only a single location (*Iris sisianica* is known from only one location based on one user point).

Discussion

In May, 01-12, 2013, we made an expedition to Armenia with the aim to explore the snowdrop populations and to delimit finally *Galanthus lagodechianus* Kem.-Nath. (synonyms: *G. artjuschenkoae* Gabrieljan [nom. illeg.], *G. cabardensis* Koss, *G. kemulariae* Kuth., and *G. ketzkhovelii* Kem.-Nath.) distribution in Armenia, as D. Zubov et al. are studying the phylogeny and micro-evolutionary divergence of the genus *Galanthus* L. [11, 18, 19]. There, in the area of the city of Sisian (Syunik region of Armenia) in dry steppe slopes along the border of the cultivated field, we noticed the leaves and seed pods of *reticulata*-type iris. *Amygdalus nana* L.*, Colchicum trigynum* (Steven ex Adam) Stearn*, Iris caucasica* Hoff.*, Leopoldia caucasica* (Griseb.) Losinsk. were also dominant in the mid-spring synusia (Fig. 5). The iris plants were in the fruiting phase and were tentatively identified by us as *I. reticulata* aff. However, when collecting the herbarium material, we immediately noticed the presence of small sized bulbils which were on the end of the thin threadlike stolons going out of the basal plate of a mother bulb, which was extremely atypical for true *I. reticulata* bulb structure. As it is known, *I. reticulata* distribution is prevalent throughout the Caucasus (E Caucasus; C, W, E, SW and S Transcaucasus; Talysh-Zuvand), E Anatolia (Turkey), Iranian Plateau and Alborz mountains (NE Iraq, N and W Iran) [4, 13]. According to the genus *Iris* treatment in Flora of Armenia (vol. 10, 2001) made by Eleonora Gabrielyan, it is distributed elsewhere in Armenia from northern to southern floral areas [4, 13]. However, individual plants of *I. reticulata* collected earlier in the north part of Armenia (Vanadzor vicinities, Lori Province), were typical, represented by the maternal bulb and multiple stolonless daughter ones around its basal plate (Fig. 3c). Such a stoloniferous habit of a true bulb phenomenon is not characteristic for any known species from *Hermodactyloides* section as well as for other true bulb irises actual groupings (subgen. *Scorpiris, Hermodactyloides* and *Xiphium*). Of note, it was found in one phylogenetic study by C. Wilson, that the type of geophytic organ in irises is useful in defining monophyletic groups and that the irises ancestral organ type is likely to be the rhizome, but not a bulb [9, 17]. When *Iris sisianica* was flowering in cultivation in 2014-2017 at the garden site in the vicinities of Vilnius (Lithuania) and in Donetsk (Ukraine), all plants were uniformly coloured, being deep red purple and maintaining this stoloniferous bulb pattern.

In conclusion, we are still in hope to make phylogenetic analysis of our new taxon described here to see its exact position by nuclear and plastid datasets within other actually known members of *Hermodactyloides* section. Moreover, as Carol Wilson states in her paper [17], the DNA sequencing datasets potentially can resolve relationships within *Iris,* and she has revealed that some of the subgenus, section and series artificially assembled and currently recognized groups are really not

monophyletic, according to her studies. In other words, the morphological traits that have historically defined groupings turned to be unequal to separate the monophyletic irises groups. So, there is a need to define the morphological characters (e.g., bulb/rhizome structure, pollen type, petal reduction, seed coat structure, etc.) for *Iris* groups that could be the potential synapomorphies (the characteristics present in an ancestral species and shared exclusively, in more or less modified form, by its evolutionary descendants) for monophyletic lineages [17]. For the monophyletic *Hermodactyloides* section bulbous species such synapomorphies are likely the single-scaled bulb, terminal aril of a seed and simple crest of a sepal (a raised area along the sepal midvein).

Figure 5a. Zangezur floral area landscapes – Lesser Caucasus; **Armenia, May 2013**. **Kapan vicinities: Slopes of Khustup Mt., 1800 m, covered with fruiting *Galanthus lagodechianus* aspect under the hornbeam forest canopy.**

Figure 5d. Zangezur floral area landscapes – Lesser Caucasus; Armenia, May 2013. Sisian vicinities: ***Iris caucasica*** **in flower.**

References

1. Bachman, S., Moat, J., Hill, A., de la Torre, J., & Scott, B. (2011) Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. ZooKeys 150: 117–126 [doi: 10.3897/zookeys.150.2109]
2. Beentje, H. (2010) The Kew plant glossary. Kew Publishing, Richmond. 160 pp.
3. Dykes, W.R. (1913) The Genus *Iris*. University Press, Cambridge. 245 pp.
4. Gabrielyan, E.Ts. (2001) *Iris* L. pp. 115-146. In: Takhtajan, A.L (ed.-in-ch.), Flora of Armenia, Vol. 10 Monocotyledones. Ruggell / Liechtenstein: A.R.G. Gantner Verlag KG. [In Russian].
5. Holmgren, P.K., Holmgren, N.H., & Barnett, L.C. (1990) Index herbariorum. Part 1: the herbaria of the world, 8th edn. Regnum Vegetabile. New York Botanical Garden, New York. 693 pp.
6. IUCN. (2001) IUCN red list categories, Version 3.1. Gland, Switzerland and Cambridge, UK: IUCN Species Survival Commission. 33 pp.
7. Kit, T., Davis, P.H., & Hedge, I.C. (1989) The Davis & Hedge Festschrift, commemorating the seventieth birthday of Peter Hadland Davis and the sixtieth birthday of Ian Charleson Hedge: plant taxonomy, phytogeography, and related subjects. Edinburgh: Edinburgh University Press, Print. 84 pp.
8. Lawrence, G.H.M. (1953) A Reclassification of the Genus *Iris*. Gentes Herb 8: 346-371.
9. Mathew, B. (1989) The *Iris*. Batsford, London. 256 pp.
10. Rodionenko, G.I. (1987) The Genus *Iris* L. (Questions of Morphology, Biology, Evolution and Systematics). British Iris Society, London. 222 pp.
11. Rønsted, N., Zubov, D.A., Bruun-Lund, S., & Davis, A.P. (2013) Snowdrops falling slowly into place: an improved phylogeny for *Galanthus* (*Amaryllidaceae*). Molecular Phylogenetics and Evolution 69: 205-217.
12. Shorthouse, D.P. (2010) SimpleMappr, an online tool to produce publication-quality point maps. [Retrieved from http://www.simplemappr.net. Accessed 2018-02-08].
13. Takhtajan, A.L (ed.-in-ch.), Menitsky, Y.L., & Popova, T.N. (eds.) (2006) Caucasian flora conspectus. Vol.II. St. Petersburg University Press, St.-Petersburg [Izdatel'stvo Sankt-Peterburgskogo Universiteta, St.-Peterburg]. 467 pp. [In Russian].
14. Taylor, J.L. (1976) A reclassification of *Iris* species bearing arilate seeds. Proc. Biol. Soc. Washington 89: 411-420.
15. The species group of the British Iris Society. (1997) A guide to species irises. Cambridge University Press, Cambridge, UK. 371 p.
16. Wilson, C.A. (2004) Phylogeny of *Iris* based on chloroplast matK gene and trnK intron sequence data. Molecular Phylogenetics and Evolution 33: 402-412.
17. Wilson, C.A. (2006) Patterns in evolution in characters that define *Iris* subgenera and sections. Aliso: A Journal of Systematic and Evolutionary Botany 22: Iss. 1, Article 34: 425-433.
18. Zubov, D.A., & Didenko, S.Y. (2011) Genus *Galanthus* L. (*Amaryllidaceae* J. St.-Hil.): systematic composition, chorology, phenology and microevolutionary divergence. Florology & Phytosozology (Ukraine) 1: 215–236. [In Russian].
19. Zubov, D.A., & Davis, A.P. (2012) *Galanthus panjutinii* sp. nov.: a new name for an invalidly published species of *Galanthus* (*Amaryllidaceae*) from the northern Colchis area of Western Transcaucasia. Phytotaxa 50: 55–63.

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