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This issue is dedicated to articles from some of the IRG's most loyal authors. The incomparable Janis Rukšāns from Latvia; Dimitri Zubov from Ukraine; and Václav Jošt from Czechia, their longtime companion on their plant travels. Janis Rukšāns lives with his wife, Guna near Cesis. They welcome many hundreds of visitors to their "Crocus, Peonia and Phlox Days" each year. How this pair find the time to engage in these as well as their many other passions is a mystery to me! Guna Rukšāne has two higher educations - in law and as a cultural events director. After marrying Jānis Rukšāns, she turned to gardening and achieved great success in phlox breeding. Her collections of Phlox, hosta and Paeonia are amongst the largest in Latvia, with around 300 varieties in each of those genera and many other perennials.

Dimitri Zubov is another person who manages to live several lives at one time! All this while living in a war-torn invaded country. Working as a researcher in the field of regenerative medicine and cell therapy his additional interests lie in botany. He is author and co-author of several new species of bulbous plants found in numerous expeditions before Russian invasion in Ukraine. His main interests are in the genera *Galanthus* and *Colchicum*.

Václav Jošt, is a plantsman, described by Zdeněk Zvolánek as "the fine explorer". During the communist regime, Václav was the main plant breeder at the Hermanuv Meštec station where his main workload was breeding lilies. He has authored many lily cultivars. In retirement his passion has become a collection of cyclamen species in which he has been recognised as a famous expert worldwide.

Two new species of the *Crocus adamii* species complex (Iridaceae) from Iran

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Summary. Two new species of the *Crocus adamii* species complex growing in Iran, are described and illustrated. Photographs and distribution maps are provided.

Key words. Flora Iranica, geophyte, species complex.

Iran is the well-known *Crocus* speciation and biodiversity hotspot in West Asia. The climate diversity, history of vegetation, geographical isolation, complex tectonic history, special soils and intersection of diverse phytogeographical units lead to the high potential of this region for diversification and make it one of the global centres of diversity for plants (Davis et al., 1994). The diversity of geological structures shapes a broad range of physical conditions that form several phytogeographical zones for speciation and endemism. The main area of *Crocus* L. species distribution is confined to the Mediterranean phytochorion that extends into the Irano-Turanian region.

The taxonomy of the genus *Crocus* has dramatically changed over the past half-century. Iranian *Croci* are not an exception. In the last years of the new millennium, a number of the already known species have been discovered more than twice in Iran.

Back in 1982, when Brian Mathew published his monograph on the genus *Crocus*, he included 80 species and 37 taxa at the subspecies level. Since then, the approach to the *Crocus* taxonomy has undergone significant changes. Harpke *et al.* (2012) created a new phylogeny using 1 plastid and 2 nuclear DNA regions, finding that all *Crocus* taxa regarded as subspecies by Mathew, are genetically distant enough to be recognized at a species rank. Several other subspecies were moved to species by Rukšāns (2014, 2017), who based his decision on morphological characters. Not all botanists, especially the older generation, have agreed with such changes.

At the turn of the century, intensive studies on *Crocus* species began, first in Turkey, then in the Balkans, and later in the Pyrenees. Iran was not left out either. In 2017, total number of recognized *Crocus* species reached 235 entities, six years later (2023) – 262, and after that

the number of recognized species increased by another eight ones. And new discoveries continue enriching our knowledge about *Crocus* biodiversity.

Already in 1886, the author of the first significant and comprehensive monograph on *Crocus*, George Maw, distinguished six centres of *Crocus* distribution and diversity: A – the region of Western Europe (Pyrenees) and North Africa, including a part of France; B – Alps and Italy (Apennines); C – The Balkans and to the north up to the very south of Poland; D – Asia Minor: Turkey and the Caucasus; E – Middle East, and F – Central Asia. The boundaries of this division are quite conditional, but basically it describes well the diversity and mutual kinship of the species distributed within these centres. We would like to distinguish from this division another one – Iranian centre, which includes species growing in the mountains along the southern part of the Caspian Sea, connecting the Greater & the Lesser Caucasus in the north-west, the Zagros Mountains and adjacent regions of eastern Turkey and eastern Iraq in the south-west and south, and the Kopet Dag Range in the north-east of Iran.

In 1975, the 112th volume of Flora Iranica was published, dedicated to the *Iridaceae* Juss. family, including the genus *Crocus* within the *Crocoideae* Burnett subfamily. Wendelbo & Mathew, paying tribute to one's time, included 8 (– 9) *Crocus* species in it, representing both sections – *Crocus* B.Mathew and *Nudiscapus* B.Mathew. Accordingly, the section *Crocus* in Flora Iranica is represented by 2 autumn-flowering species, now it is supplemented with third species – *Crocus hakkariensis* (B. Mathew) Rukšāns, published in 1980. It was described from Hakkari province (Turkey) on the border between Turkey and Iran, and in Iran it was first found in 2018 by Rukšāns. It is not excluded that, as a result of further research, other, new *Crocus* species of the section will be identified. Significant changes have taken place within the section *Nudiscapus*. According to Flora Iranica, it includes 6 species – three blooming in autumn, and three – in spring. The changes affected both groups. *Crocus speciosus* M. Bieb. *s.str.* is not found in Iran, and several related species are hidden under this name, three of which were currently described and published – *Crocus archibaldiorum* (Rukšāns) Rukšāns (2014), *C. zubovii* Rukšāns (2017), and *C. hyrcanus* Rukšāns & Zubov (2025). The biggest changes have affected the spring-flowering species, which are included in Flora Iranica under the common name *C. biflorus* Mill. *Crocus adamii* J. Gay was included within the synonyms of *C. biflorus* (in accordance with the understanding of that time). It allows us to conclude that the authors believed that it was *C. adamii* (in the modern sense) distributed in Iran. In 2021 Tabasi *et al.,* following Flora Iranica approach, ignored that several new *Crocus* species from Iran were recognised and confirmed by researches on molecular level (Maroofi & Assadi, 2002, Rukšāns, 2014, Kerndorff, Pasche & Harpke, 2017). Absence of "*Crocus speciosus*" marks

and abundance of "*C. biflorus*" on their distribution map forced us to presume that Tabasi *et al.* were observing non-flowering plants and judged the differences only by corm tunic morphology. It seems they uncritically attached species epithet to different gatherings (see Fig. 3a in Tabasi *et al.*, 2021). In the same time, the maps in Fig. 2 are more correct and they do not correlate with Fig. 3a. Here described *Crocus* sp. nova (acc. no. 24IRS–039) seems to be the same to the one marked within Eastern Alborz on their Fig. 2b.

Already in the new millennium, several authors (Maroofi & Assadi, 2002, Rukšāns, 2014, 2022, Kerndorff, Pasche & Harpke, 2017, Rukšāns & Zubov, 2021, 2025, Dolatyari & Rukšāns, 2022, Advay & Rukšāns, 2024) have discovered and published 13 new species of spring-flowering *Croci*, 12 of which would be an appropriate epithet for "*C. adamii" sensu* Flora Iranica. It is evident, that Iranian *Crocus* species form a separate centre of *Crocus* speciation, biodiversity and distribution in West Asia. According to Nikolai Vavilov's theory about the centres of species origin (Vavilov, 1935), the greatest diversity of species can be observed in their centres, but their individual ranges are relatively small. The further from the centre, the fewer species, but their distribution areas are larger. This can also be true for the Iranian *Crocus.* The largest number of species have been discovered in the north-west of Iran, but most of them are known only from one or very few restricted localities. It should be noted that this region, Iran, is still very little studied in botanical terms. Towards the east, the number of *Crocus* species gradually decreases, and beyond Almeh valley and up to China, only 4 *Crocus* species are found, 2 of them grow in Iran. Dolatyari *et al.* (2024) published a taxonomic revision of the genus *Crocus* (Iridaceae) in Iran, where they characterised all *Crocus* species discovered and described from Iran up to the end of 2023.

During several expeditions, many *Crocus* specimens have been collected in Iran, several of which have already been recognized as separate species and described under already known species names (see above). Many accessions still require an additional study to clarify their taxonomic status. In researching *Crocus*, it is very important to explore the living plants directly, because many morphological characters are difficult to determine by the herbarium specimens: the colour of the flowers changes significantly, usually fading, although the opposite process is also rarely observed – flowers being white in the wild, turn blue, light blue or even darken to deep blue *in exsiccatae* (Gabrielijan, 2001, Rukšāns, 2022). Moreover, as usual a small number of specimens have been used for herborisation, which does not allow the adequate description of the variability of the species. It is an undeniable fact that the morphological characters of *Crocus* individual plants within the same species can even be very variable and can vary depending on seasonal fluctuations and the phenological phases of the

plants (flowers) observed. Kerndorff *et al.* (2015, 2022) described in detail the essential morphological characters required to distinguish the *Crocus* species, emphasizing the need to observe a sufficient number of randomly selected individuals to characterize the variability of these characters within a population. In case of doubt, molecular and genetic assay should be done to delimitate the sibling species (actually, an option not available to the authors). However, they also cannot always give a decisive conclusion. Kerndorff, Pasche & Harpke (2017) found that *Crocus gunae* Rukšāns is molecularly identical to the morphologically very different *C. zagrosensis* Kerndorff & Pasche. Both species are allopatric and distributed within far distant different mountain ranges. And this is not the only such a case showing that other markers should be used for molecular differentiation of these species.

Mathew regarded the yellow *Crocus almehensis* C.D.Brickell & B.Mathew as the most closely related to *C. chrysanthus* (Herb.) Herb. (*s.l.* – authors' note) which in the wild grows more than 1500 km to the west and further westwards. However, recent molecular and genetic assay has shown that its closest relatives are the blue-flowered species occurring in the wild in the Caucasus, NE Turkey (along the Anatolian Diagonal) and in NW Iran. According to Kerndorff *et al.* (2017), the entire species complex proved to be one of the most distinct genetically and largest in the genus, and it would be later defined as the series *Adamii* ined. (Kerndorff *et al.*, 2017). Mathew & Wendelbo in their treatment of "*Crocus biflorus*" in Flora Iranica had already listed the name *C. adamii* as its synonym. The group is known to have members in the Anatolian Diagonal (Turkey) and in the Caucasus. New findings support the suggestion that it is also widely distributed in Iran.

Kerndorff *et al.* (2017) analysed 9 *Crocus* samples collected over a wide range in Iran from the mountains on the south-eastern coast of the Caspian Sea to western Iran. They conclude that "It is probably a recently evolved group with rapid radiation, which is reflected by the low degree of differences in the used phylogenetic marker and the comparatively large distribution area... However, although the molecular data do not reflect the clear morphological differentiation, it also supports that some of the investigated Iranian populations clearly represent new species". These studies allow us to accept practically without a doubt that the other spring-flowering *Crocus* species with ring-like corm tunics from this region also belong to the *Crocus adamii* complex species. The only exception is yellow-flowered *C. kurdistanicus* (Maroofi & Assadi) Rukšāns related to the *C. danfordiae* Maw group which in turn is not monophyletic and some specimens group with *C. hermoneus* Kotschy ex Maw and *C. cancellatus* Herb., other with annulate species from W Turkey and even from Balkans (Harpke, D., et al., 2012). This research confirms that Rukšāns & Zubov (2023) were right regarding *C. danfordiae* as the only *Crocus* growing to the east of the Anatolian diagonal, but those ones

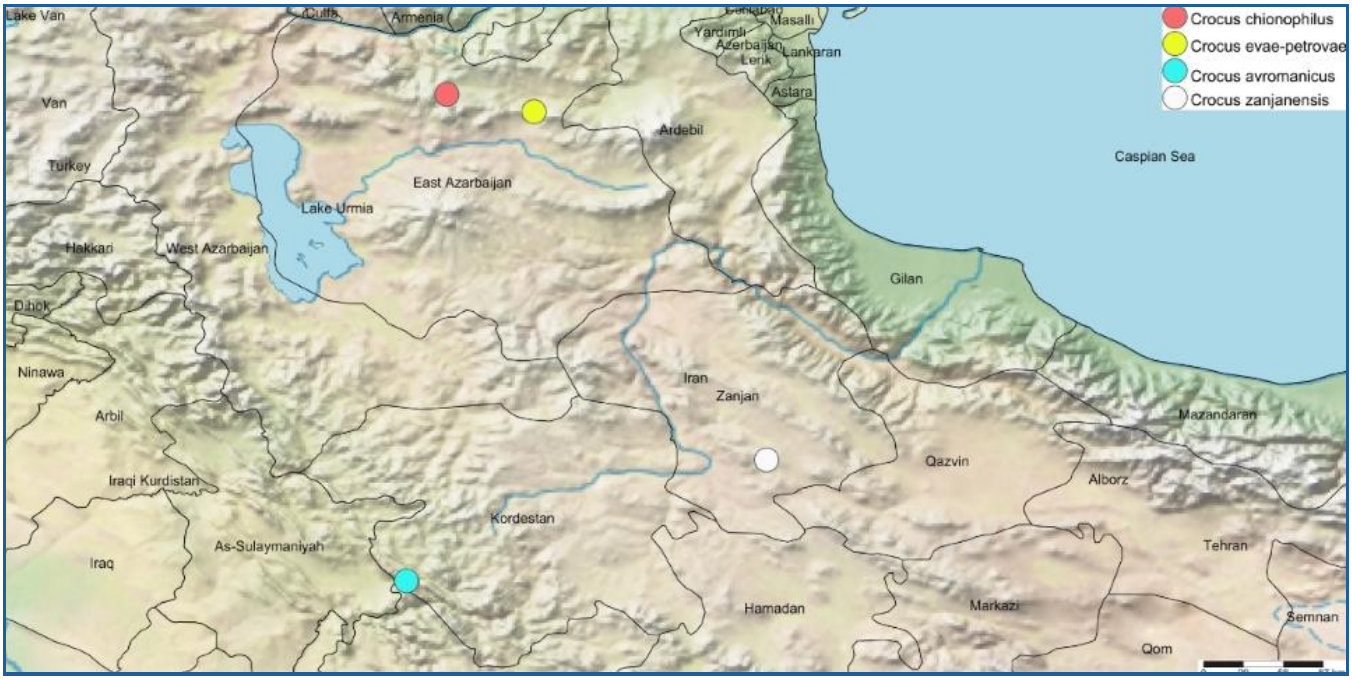
growing to the west of that conditional line belong to several other species, although superficially, they are all looking very similar.

During six expeditions to Iran, the authors have collected specimens of the *Crocus adamii* complex from a total of 27 populations, which has resulted in descriptions of 11 new species. Not all of the localities mentioned in Flora Iranica have been identified, several populations mentioned by Kerndorff *et al.* (2017) were not re-found despite repeated searches during several expeditions. A few more *Croci* were found by the photos posted by other travellers or mountain climbers via social networks. This allows us to conclude that there are still new species of *Crocus* in flora of Iran, which have not been studied at all or have been insufficiently studied so far.

Iran: Agh Dash, East Azerbaijan

In 2022 our team travelled through mountains in the western part of Iran. On the mountain pass to the south from vill. Kaqalaq [Kagnalag] on the northern slope of Agh Dash [آق داش] mountain peak (East Azerbaijan Province), we found a large population of *Crocus* species (acc. no. 22IRS–034, 1990 m a.s.l.) with annulate corm tunics just finished blooming; only few specimens with already faded flowers were found. Even those allowed us to suppose that a new *Crocus* species was found due to very dark and prominent striping over the outside of outer flower segments, which was well expressed even on dry flower remnants. It looked quite different from other Iranian *Crocus* species seen earlier by our team. Several *Crocus* specimens were collected for further observation in cultivation. In spring 2024 collected corms bloomed for the first time in a garden, which allowed us making a detailed morphological description of the newly found *Crocus*. Comparing with other already known Iranian *Crocus* species, the new species is mostly similar to *Crocus chionophilus* Dolatyari & Rukšāns and *C. avromanicus* Advay & Rukšāns having similar distinct dark striped segments outside. They were however, sufficiently different, to be regarded as different species. The throat in *C. avromanicus* is distinctly hairy, but in *C. chionophilus* and in here newly-described species (acc. no. 22IRS–034) it is glabrous. *Crocus avromanicus* is also “leafier” (it has 6 – 10 leaves *vs* 3 – 5 in other two species just mentioned above). There are several morphological features allowing easy delimitation of newly described species from superficially similar *C. chionophilus*: even at a brief look a shape of flower segments can reveal that in new species they are obovate to widely obovate with rounded tips and sometimes even with more or less prominent notch at segments' tip (vs lanceolate with narrowly pointed tips in *C. chionophilus*); filaments in a new species are throughout uniformly coloured light yellow (*vs* deep yellow at base turning

almost whitish at junction with anthers in *C. chionophilus*); leaf lamina in newly described species has a margin only minutely downed and outside turned (*vs* almost flat, even slightly convex lamina surface with down and inward turned lamina margin in *C. chionophilus*); in both species, there are also different some corm tunic features and margin of basal rings.



Distribution map 1 of *Croci* species related to *Crocus evae-petrovae*: red pin - *C. chionophilus*: yellow pin - *C. evae-petrovae;* blue pin - *C. avromanicus:* white pin – C. *zanjanensis*.

Crocus evae-petrovae habitat in type locality.

Taxonomic treatment

***Crocus evae-petrovae* Jošt, Rukšāns & Zubov sp. nov.**

Type: Iran, East Azerbaijan Province, on northern slope of thorn-cushion subalpine formations on the northern slope of Agh Dash [آق داش] mountain peak, by rd. to the pass between Kaqalaq [Kagnalag] and Khalaj villages, at elevation of 1990 m a.s.l.; 38°22'N, 47°02'E; cult. (specimen grown in Latvia in the garden of Jānis Rukšāns; specimen originally collected in type locality by Rukšāns, 08 Apr. 2022), fl. 03 March 2024, *Jošt, Rukšāns & Zubov* s.n. (holotype RIG II: BOT–17090!).

Habitat and distribution – only on west-faced slopes of thorn-cushion subalpine formations, within dwarf spiny shrubs at elevation of 1900 – 2000 m a.s.l.

Blooming time – March–April.

Corm – slightly flattened globose, in wild up to 12–14 mm in diameter, in cultivation larger and can reach 20 mm in diameter.

Corm tunics – outer coriaceous, inner thinner, even something papery, at base with irregular 2–6 mm distant splits, subsplits absent.

Tunic necks – up to 7 mm long, formed by threadlike, widely based narrow splits of main tunic.

Basal rings and tunic – mostly 2, rarely 3, edged with very irregular, but densely spaced very small tooth, sometimes teeth are absent and rings edge is minutely roughed. Basal tunic round around 5 mm in diameter, edge uneven, very minutely toothed, tooth not sharp.

Prophyll – absent.

Cataphylls – 3, silvery, slightly brownish toned in upper part, sometimes ending light greenish at very top.

Leaves – 3–5, greyish green, 2–3 mm wide and 20–23 cm long, papillose or with very minute hairs at lamina edges, white stripe narrow – 1/5 or even less (–1/7) of lamina width, lamina slightly "v" shaped to flat with edges slightly down and outside turned, lateral channels widely open with (2)3(4) ribs in each, keel short, straight with rib–like widening at very base, keel's base flat to slightly outside curved.

Perianth tube – white with dirty purple stripes, turning darker below flower segments.

Bract and bracteole – transparent, whitish, bracteole distinctly narrower and longer than bract.

Throat – nude, yellow edged white on upper part, rarely whitish and something greyish shaded with only indistinct yellow flush, upper white edge triangular and mostly starry; from

twenty-five individuals examined, seven had more whitish and only slightly yellow shaded throat colour, whilst eighteen individuals had distinctly yellow edged white throat colour.

Filaments – 4–7 mm long, glabrous, light yellow.

Anthers – 10–**12**–13 mm long, yellow, parallelly edged, only at top narrowing to rounded tip and with short basal lobes;

Connective – white.

Style – light yellow, ending at tips of anthers or lower, rarely (observed in 2 flowers from 25) ends above tips of anthers, stigmatic branches 2–5 mm long, bright orange, around 5 mm long.

Flower segments – obovate to widely obovate, something rhomboid with rounded tips, sometimes tips notched, even markedly, inner distinctly wider than outer segments.

Outer segments – 24–**27**–30 mm long and 9–**11**.**5**–14 mm wide, outside light violet with something diffused dark purple striping over all segment's length, basal blotch dirty lilac striped over greyish white, inside light blue with yellowish, sometimes only light greyish white basal blotch. If segments are notched, then at top with narrow dark purple rim.

Inner segments – 24–**28**–30 mm long and 10–**11.5**–15 mm wide, outside light violet with dark striped basal blotch, inside of same colour, basal blotch mostly bright yellowish with triangular white edge, rarely greyish white with only light yellowish flush. In flowers with notched tips at top is small "v" shape deep purple mark.

Capsule – 2 cm long and 8 mm wide, very light buff, in upper third shaded lilac, positioned 1–2 cm over ground level. Seeds – not seen.

Chromosome number – 2n = 22+10B (Dolatyari, *pers. comm.* 2025.)

Etymology – named after Ing. Eva Petrova, for curator of geophyte collection with special attention to the genus *Crocus* in Průhonice Institute of Ornamental Horticulture (Czech Republic), who died last December at age 90. She was a mentor of Janis Rukšāns in early nineteen-seventies when Janis only began his interest in *Crocus.*



Crocus evae-petrovae in its habitat when it was found in type locality.

It is possible that acc. no. HKEP–1629 found by Kerndorff & Pasche in the same region of Iran (to the south of Ahar city) at elevation of 1850 m a.s.l. could be identical to the species discovered by our team and named here as *Crocus evae-petrovae*. Unfortunately, the locality where acc. no. HKEP–1629 was found is mentioned far too approximately to be sure that they are identical. Although according to the published pictures, there are some similarities between two specimens (acc. no. HKEP–1629 *vs* acc. no. 22IRS–034), but published morphological data are incomplete and insufficient to make some conclusion about identity of both gatherings and there are some discrepancies, too. According to Kerndorff *et al.* (2017) the acc. no. HKEP–1629 might represent a hybrid, probably involving *C. zanjanensis* Kernd. & Pasche, although the localities where both species were found are separated by nearly 300 km and belong to different mountain ranges. Even if *C. evae-petrovae* arose as a result of ancient hybridization event between two ancestral paleo-species, it happened so long ago, that a presumable hybrid quite well established and must be regarded as a true species, and it is fertile and produce seeds. Many species growing now on Earth appeared as a result of hybridization event between two ancestral species million years ago, as it was proved by research for the genus *Tulipa* L. (de Groot, 2024). At the same time, the relatively large variations in petal shape and flower throat colouration allow us to assume that morphological characters of *C. evae-petrovae* have not yet been fully stabilized and the process of speciation and microevolution divergence is still ongoing for it.

Furthermore, during our last trip to Iran in May 2025, it is likely that the same species – *Crocus evae-petrovae* aff. - was also observed higher on the slopes of Agh Dash peak. It grew in a subalpine meadow/plain at an elevation of 2500 m. Although it was found already fruiting with almost ripe seeds, by leaf and corm tunic morphological characters it was looking identical to *C. evae-petrovae,* described here above.

Crocus evae-petrovae in cultivation.



Crocus evae-petrovae in cultivation.

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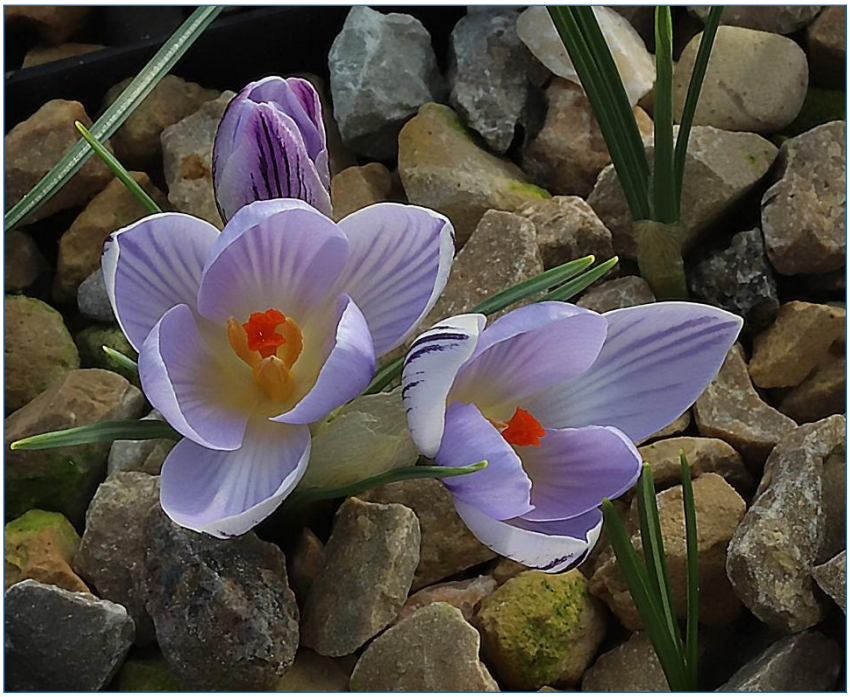


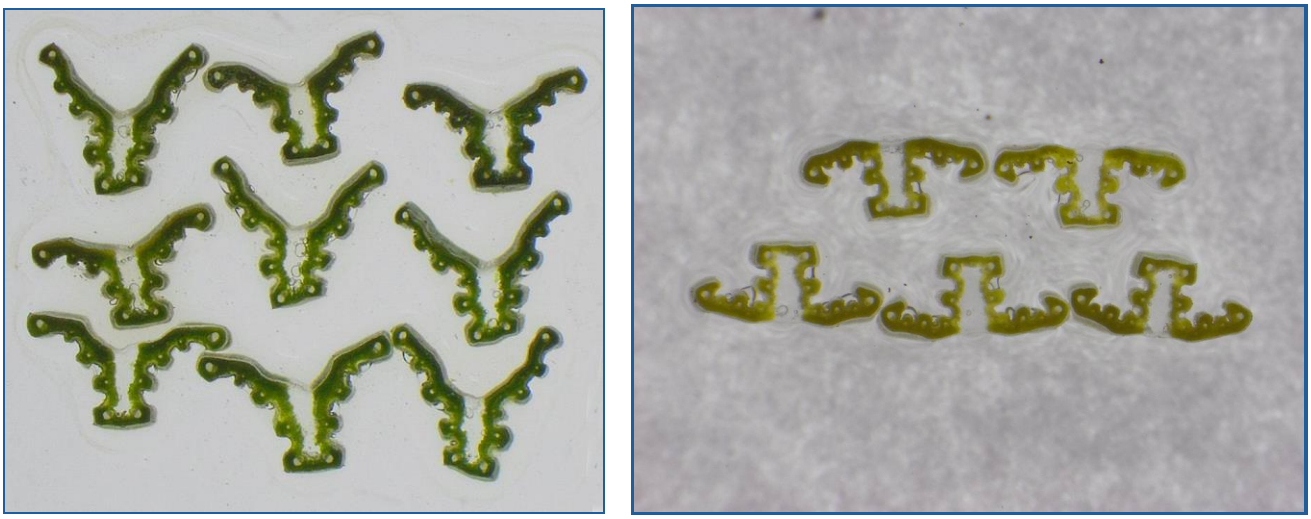
Left and above:
Crocus evae-petrovae in cultivation.

Crocus evae-petrovae (in centre) and its allies with similarly coloured flowers: left – *C. avromanicus,* right – *C. chionophilus.*

Crocus evae-petrovae flower details.

Crocus evae-petrovae corm tunics.

Crocus evae-petrovae basal rings and corm tunic fragment.



Leaf cross-cut sections: left – *Crocus evae-petrovae*, right – *C. chionophilus* (photo A. Dolatyari).

Holotype specimen of *Crocus evae-petrovae* housed at RIG II.

Iran: Eastern Alborz, Golestan

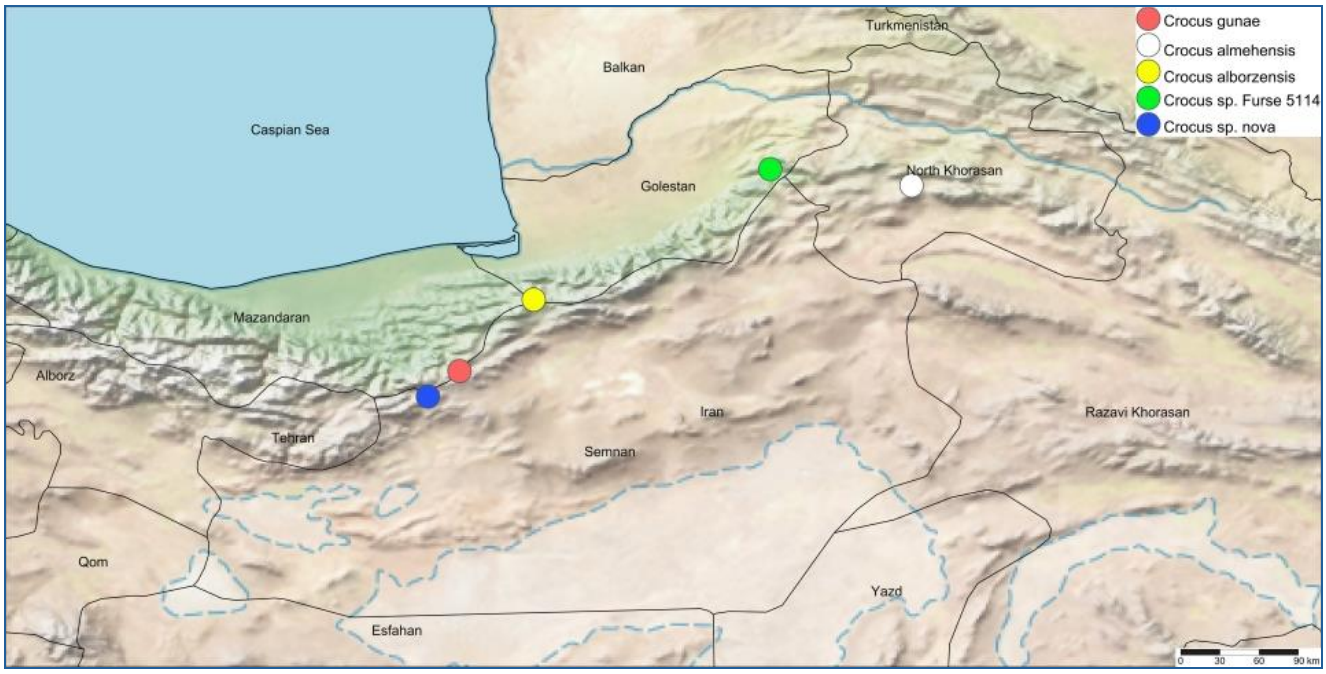
While during previous expeditions, we mainly studied the geophyte flora of the regions to the west of Tehran, in the spring of 2024 our expedition wanted to find out which *Croci* may grow to the east of the Iranian capital. So far, five *Crocus* species have been identified in that region: the autumn-flowering *Crocus caspius* Fisch. & C.A.Mey. ex Hohen. and *C. zubovii*, as well as the spring-flowering *C. michelsonii* B.Fedtsch. from the Kopet Dag Range, *C. almehensis* C.D.Brickell & B.Mathew and *C. gunae* from Alborz (Dolatyari *et al.*, 2024). The latter two belong to the *C. adamii* complex. However, Flora Iranica mentions that in the Golestan Forest, 61 km ENE from Gonbad-e Kavus, 800 m a.s.l., Furse has collected an herbarium specimen of *Crocus* from the *C. adamii* complex (*Furse* 5114), but we didn't succeed in searching for this herbarium specimen. Our group tried to find this *Crocus in situ* already in 2016, but without any success.

We failed to find it during the 2024 expedition either, but to the east of Tehran, near the Siah Khani waterfall, alongside Galugah to Dibaj road, where we were forced to turn back due to heavy fog making further driving in mountains too dangerous, on a south-facing slope, at elevation of 2400 m a.s.l., we came across a large population of a peculiar *Crocus*, which had only recently finished flowering, but we managed to find a few specimens with dried flowers. The collected plants in cultivation have already bloomed in 2025, which allowed us to collect a few herbarium specimens of flowering plants and to discover it was a new, previously unknown *Crocus* species.

That was not only the case when our 2024 expedition had to turn back due to the weather conditions, without reaching our chosen destination. Very intriguing photos of a *Crocus* in full bloom, taken to the north of Semnan, at elevation of more than 2600 m a.s.l., were published in social networks. However, both attempts to reach that place were unsuccessful, simply due to the weather and road conditions. Judging by the photos, that *Crocus* also belongs to the *C. adamii* complex, somewhat resembling *C. iranicus* Rukšāns and similar species from the Zagros Mountain range by its flower colour. The great distance between the two sites allows us to assume without a doubt that it is also a new, still unidentified species, which differs greatly by its flowers from the species described here from the Dibaj area (acc. no. 24IRS–019).

In 2016, the German researchers collected a *Crocus* specimen of this group at elevation of 2090 m a.s.l. under the acc. no. HKEP–1638 (Kerndorff *et al.,* 2017). Unfortunately, the published data on its location (Semnan, north of Damghan) are too uncertain to allow visiting that population. The *Crocus* species described here was also collected to the north of

Damghan, but at higher elevation and, judging by the photographs published by Kerndorf *et al.,* superficially both accessions could be quite similar. The published morphological features of both specimens are also rather similar, and it cannot be ruled out that they represent the one same species. According to the published phylogenetic tree, acc. no. HKEP–1638 is genetically very close to *Crocus reinhardii* Rukšāns, which occurs to the north-east of Zanjan, in nearly 450 km distance and within different mountain range, but by the morphologies of both species, *C. reinhardii* and the new one described here (assuming that specimen 24IRS–019 is identical to HKEP–1638) are enough different.



Distribution map 2 of *Croci* species from the *Crocus adamii* species complex growing to the east of Tehran: red pin –*C. gunae*; white pin - *C. almehensis;* yellow pin - *Crocus alborzensis* (24IRS–019); green pin - *Crocus sp.* '*Furse* 5114'; blue pin – *Crocus* sp.nova.

Habitat of *Crocus alborzensis* in type locality.

Taxonomic treatment

***Crocus alborzensis* Jošt, Rukšāns & Zubov sp. nov.**

Type: Iran, Golestan Province, on grassy slopes of thorn-cushion subalpine formations, Galugah to Dibaj rd., nr. Siah Khani Waterfall, at elevation of 2380 m a.s.l.; 36°31'N, 54°08'E; cult. (specimen grown in Latvia in the garden of Jānis Rukšāns; specimen originally collected in type locality by Rukšāns, 08 Apr. 2024), fl. 07 Feb. 2025, *Jošt, Rukšāns & Zubov* s.n. (holotype RIG II: BOT–17091!).

Habitat and distribution – found only on south-faced slopes covered by sparse grassy vegetation of thorn-cushion subalpine formations, not observed on other expositions; at present known from type locality and its vicinity at elevation of approx. 2400 m a.s.l., but it can't be excluded growing also at lower altitudes.

Flowering time – March–April.

Corm – depressed globose, 15–20 mm in diameter and 10–15 mm in height.

Tunics – variable – with sparsely spaced shallow basal splits or with few long basal splits, subsplits absent; outer tunics hard, inner slightly finer but still hard.

Tunics neck – 5–7 mm long, formed by basally medium wide to wide triangular splits of main tunic.

Basal rings/tunic – basal rings variable: with almost smooth upper edge or with very small saw–like toothed upper edge; basal tunics up to 12 mm in diameter with unevenly toothed and roughed outer edge.

Prophyll – absent.

Cataphylls – 3, white turning brownish at tips.

Leaves – (4)**5**(6) – from 47 observed individuals 1 had 3 leaves and 1 seven, average 5 (4.9), up to 3 mm wide and 13–16 cm long, dark to something greyish green, white stripe around 1/4 of lamina width, lamina surface with sparse papilla, lamina and keel edges with minute papilla, edges down and slightly inward turned, lateral channels open to semi–open with 3 ribs in each, keel short, gradually widening in direction to base, the base flat to slightly inward turned

Perianth tube – light greyish yellow turning darker below flower segments base up to almost blackish grey just below segments.

Bract and bracteole – equal, silvery.

Throat – nude, medium large yellow, at upper part lighter with something starry diffused upper edge.

Filaments – 4–**5**–8 mm long, nude, yellow, in herbarium turns orange.

Anthers – 9–**10**–12 mm long, yellow, parallelly edged, rounded at tip and with short, pointed basal lobes.

Connective – creamy.

Style – light yellow, turning darker yellow to top, split into 3 upright 3–4 mm long branches without subsplits, only slightly diverged and mostly ending at tips of anthers or sometimes only slightly higher or lower tips, but insignificantly.

Flower segments – lanceolate to something obovate, with strong sweet scent.

Outer segments – 29–32 mm long and 9–11 mm wide, obovate, outside light lilac with three dark grey median stripes over yellowish and starry, sometimes quite indistinct, lateral striping to segments edge, basal blotch formed by very dark stripes over yellow, inside light violet with large yellow blotch in throat.

Inner segments – also obovate but slightly wider than outer segments – 27–30 mm long and 11–12 mm wide, outside light lilac, same as inside and outer segments inside with prominent dark grey basal blotch, on sides narrowly edged yellow, throat yellow with triangular top, narrowly edged lighter yellow.

Capsule and seeds – not seen

2n = unknown

Etymology – named after the Alborz Mountain Range where it was found and described.

Crocus alborzensis as it was found in the type locality.

A common feature of the *Crocus* species of this series with blue/white flowers (*cyanic*), which are found in the wild to the east of Tehran (*Crocus gunae* and described here *C. alborzensis*), it is a colour of the outer perianth segments: in the bud these species look almost identical by colour – white, slightly shaded buff with prominent very dark purple stripes over all the outer perianth segment abaxially. They can be distinguished by the corm tunics basal ring margin, which in the case of *C. gunae* is very uneven with a few irregularly spaced longer triangular teeth, but in *C. alborzensis* it is either almost smooth or with very small, distinctly saw-shaped teeth. The colour of the flower throat also differs. Although in both species the basic colour of the throat is bright orange-yellow, in case of *C. gunae* it is surrounded by a narrow, slightly blurred light-yellow upper edge, the throat has a triangular apex, but in *C. alborzensis* the border is wide, starry yellow and with a rounded apex. The ecological preferences of the two species also differ. *Crocus gunae* mostly grows in vernally very wet small depressions or gullies, often blooming through flowing snowmelt waters and the corms are located in the soil at a depth of around 15 cm, sometimes even deeper, while *C. alborzensis* grows on dry south-facing slopes and its corms are positioned much shallower – nearly 7 cm deep, rarely up to 10 cm deep. From *Crocus evae-petrovae* having similar outer perianth segment colour, both species differ by the colour of the flower throat: *C. evae-petrovae* throat is orange-yellow bordered white in the upper part, rarely whitish and somewhat greyish shaded with only indistinct yellow flush, the upper white margin is widely triangular and starry. In *C. alborzensis* the throat is also orange yellow with the rounded upper margin, and in the upper part it turns into wide, yellow (with no white) diffused margin.

From molecularly identical *C. reinhardii* (in case if our *Crocus alborzensis* is the same as acc. no. HKEP–1638, Kerndorff *et al.,* 2017), *C. alborzensis* is easy separable by the corm tunic basal rings: in *C. reinhardii* they are bordered with distinct, evenly spaced, sharp, narrow teeth 3 – 5 mm long, whilst in *C. alborzensis* basal ring margin is almost smooth or with very small saw-like teeth.

Crocus alborzensis corms.

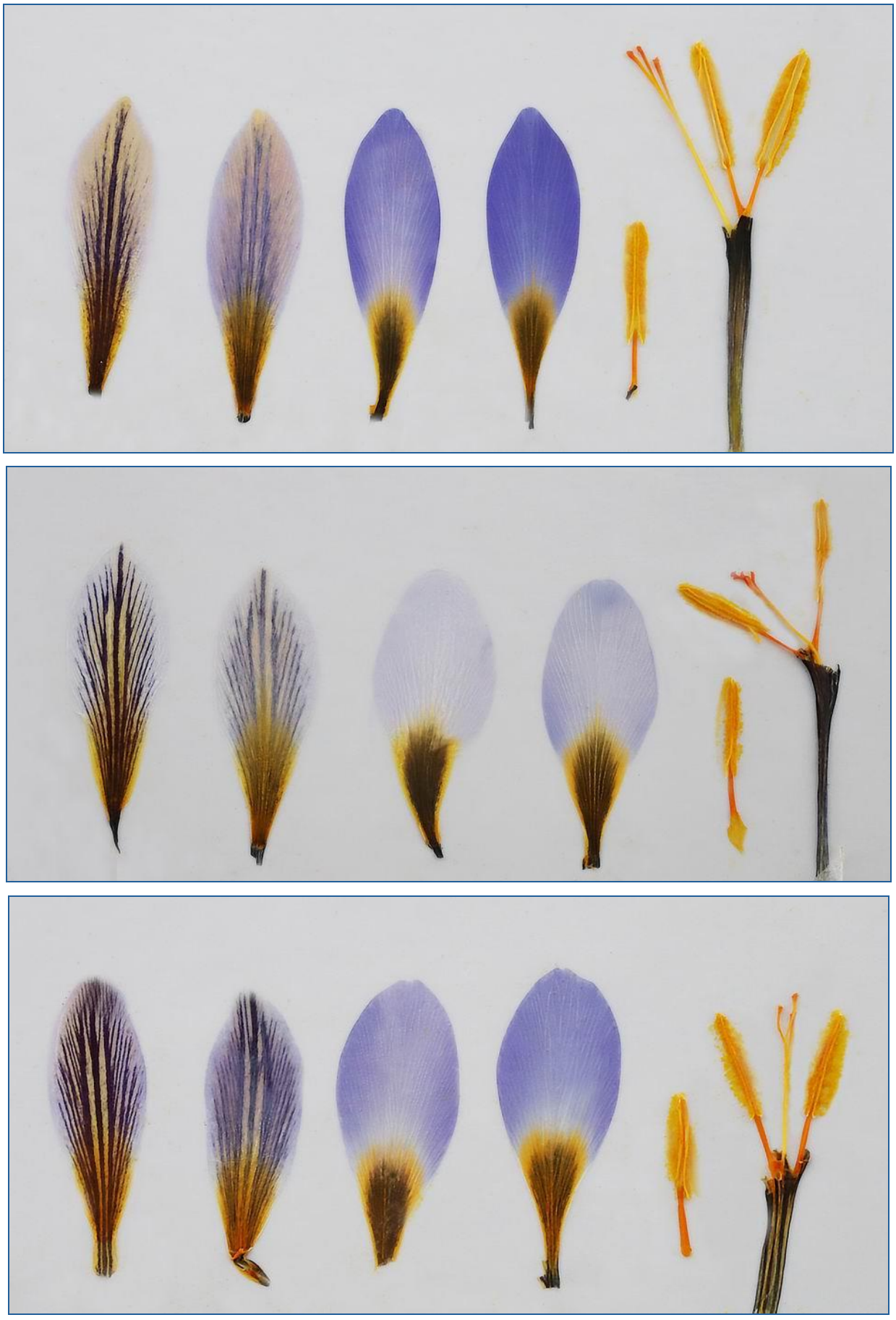
Crocus alborzensis corm.

Crocus alborzensis corm tunics.

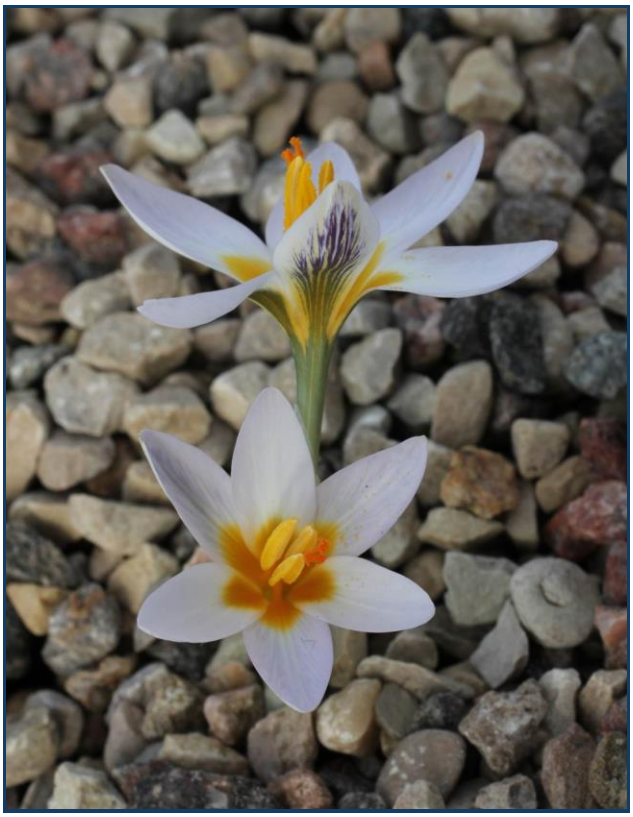
Holotype specimen of *Crocus alborzensis* housed at RIG II.

Crocus alborzensis flowers in cultivation (centre, second row: *C. alborzensis* 24IRS-019 -02).

Crocus alborzensis flowers in cultivation (photo V. Jošt).



Crocus alborzensis flower details.



Crocus gunae.

The accompanying bulb geophytes observed in a type locality of *Crocus alborzensis*:

Below: *Iris cf. reticulata* M.Bieb.

Left: *Corydalis chionophila* Czerniak.

Right: *Colchicum cf. eichleri* (Regel) K.Perss.

Crocus sp. and Ranunculus kochii Ledeb. from 2600 m elevation, Semnan Province: blue mark on Distribution map 2 (photo Hassan Ghelichnia).

Acknowledgments

We would like to thank all our travel partners but especially our co-author Vaclav Jošt who accompanied us during endless trips in search of new plants. We would also like to thank Alireza Dolatyari and Sholeh Jalili Khiabani (Iran) who helped us to organize several trips to Iran. Of course, we cannot forget our families, who always supervised and maintained the collections while we were wandering around the mountains.

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Ing. Eva Petrova.

IN MEMORIAM

Dr. Eva Petrova (01.11.1934 – 26.11.2024) by Janis Rukšāns

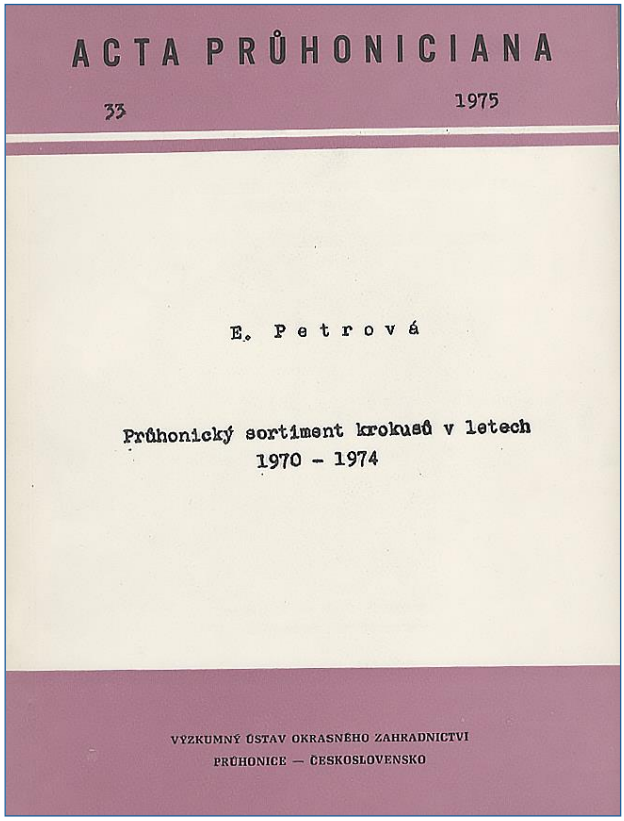
At the end of last year, we received sad news – two weeks after her 90th birthday, the outstanding Czech ornamental plant researcher and breeder Ing. Eva Petrova left us. Her entire working life was connected with the Průhonice Ornamental Plant Research Institute in the Prague area. At the beginning of her career, she worked with Ing. Ondřej Holitscher on ornamental plant breeding, taxonomic processing, and classification systems of ornamental bulbous plants. Together with her colleagues, she worked on the breeding and sustainable propagation programs of ornamental bulbous plants. In her breeding work, she used induced polyploidy with subsequent cloning. In this work, she worked together with specialists from the Heřmanův Městec Ornamental Plant Breeding Station.

Eva has participated in the selection of many widely recognized varieties – initially creating low-growing and miniature *Dahlia* Cav. varieties, later creating the well-known line of Chinese Aster (*Callistephus chinensis* (L.) Nees), called ‘Průhonice Dwarf’. She also created several series of different colours of sweet pea (*Lathyrus odoratus* L.), suitable for cutting – ‘Průhonice Accelerated’.

However, her main passion was ornamental bulbous plants. In this work, in addition to breeding, her work was devoted to preserving the world's assortment. Together with Ing. Otka Plavcova, the tulip variety 'Antarctica' (which is currently the most commercially successful Průhonice tulip variety in the world), 'Jumbo Pink', 'Red Hot', 'Petra', and many others were created. She is the author and co-author of almost 20 significant books and publications on bulbous and tuberous plants as well as many articles in scientific journals, mostly decided just to bulbous plants.

I met Eva Petrova at the very beginning of the seventies of the last century, first – exchanging letters, and then in person, when in 1976 I went on my first trip abroad from the former Soviet Union. It wasn't easy at the time – I was invited by my correspondent in the Czech Republic, with whom I corresponded in Esperanto – and before receiving a foreign passport, I had to undergo countless interviews with the KGB, the Communist Party committee, etc. Since I worked as an editor for the magazine "Dārzs un Drava" (Garden and Beekeeping – in Latvian), I eventually received permission and, although I was only allowed to meet with my correspondent's family, we traveled together around what was then Czechoslovakia, and, of course, also to the Průhonice Institute, where I finally met Eva Petrova in person. At that time, I had already seriously turned to studying *Crocus*, and it was *Crocus* that brought us together.

Thanks to Eva's generosity, my collection was supplemented by many *Crocus* species and varieties, which resulted in my first monograph on *Crocus* – *"*Krokusi*"* (in Latvian), published in 1981.


ACTA PRŮHONICIANA

33 1975

E. Petrová

Průhonický sortiment krokusů v letech 1970 – 1974

VÝZKUMNÝ ÚSTAV OKRASNÉHO ZAHRADNICTVÍ
PRŮHONICE — ČESKOSLOVENSKO

Right: "Acta Průhoniciana", where several important articles by E. Petrova were published.

But, returning to my first trip to Czechoslovakia, I must tell you how I managed to bring the crocus corms that Eva had given me across the border. In the Soviet Union, importing plants, seeds, and planting material was strictly prohibited for private individuals and could result in criminal liability. Eva's husband, Jan Petr, was the supervisor of the Průhonice Arboretum. There I saw the diverse varieties of heather (*Calluna vulgaris* (L.) Hull) for the first time. As a result, I received a package with carefully prepared heather cuttings, which I gave to both botanical gardens in Latvia after arrival. Many things were not available for sale in the Soviet Union at that time. I bought balls of yarn in all sorts of colours in Prague stores. And so, at the bottom of a large bag lay packets with crocus corms and a box of heather cuttings. On top of them, I filled the bag with balls of yarn and other small things. On the train at the border, the customs officer took this bag and started throwing out balls of yarn. My feet turned cold... When there was only the last layer left over the plants, he got tired, and with the words – gather them together, the customs officer left the train cabin...

Our first meeting with Eva turned into a family friendship and later Eva and her family visited me in Latvia many times, and I with my family – visited Eva's family in Czech Republic. Eva also introduced me to Vaclav Jošt, who worked as a leading breeder at the Heřmanův Městec breeding station. Vaclav later became my constant expedition partner and together we have traveled the Balkans, Turkey and many times also Iran and he has actually participated in the discovery of many of my newly discovered species. I have named two jointly discovered *Crocus* species in his honour – *Crocus vaclavii* Rukšāns (from the Athos Peninsula in Greece) and *C. jostii* Rukšāns & Zubov (from North Macedonia and Albania, published together with the Ukrainian researcher and co-author of many of my newly discovered species, Dimitri

Zubov). This year I am fulfilling my debt to Eva by naming the newly discovered *Crocus* species from Iran in her honor as *Crocus evae-petrovae*.

Ing. Eva Petrova in the garden of the Průhonice Institute.

Galanthus golestanicus (Amaryllidaceae), a new nemoral species of snowdrop from the Alborz forests of northern Iran

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Summary. *Galanthus golestanicus* (Amaryllidaceae), a new snowdrop nemoral species, endemic to the Alborz mountain range (N Iran: Gilan, Mazandaran & Golestan Provinces; likely a Tertiary relict), is described and illustrated. Morphological differences between the new species and other possibly related *Galanthi* species (*G. transcaucasicus, G. lagodechianus*, and *G. rizehensis*) are discussed. The species concept of *G. transcaucasicus* has been rethought; its proper description and distribution range is given. Photographs (habitat and morphology), distribution map, key, and an informal conservation assessment are provided for *G. golestanicus* and *G. transcaucasicus*.

Key words. Geophyte, sciophyte, snowdrop, Hyrcanian (Caspian) forests, Omni-Hyrcanian distribution pattern, Euxino-Hyrcanian distribution pattern, Alborz, Talysh, Flora Iranica.

During numerous expeditions of Dr. Janis Rukšāns to northern Iran in search of new species of the genus *Crocus* L., he often came across snowdrops, which were initially attributed without a doubt to *Galanthus transcaucasicus* Fomin [Ref. 1 – 3, 6, 8, 9, 15, 44, 48]. However, Dr. Rukšāns noticed that the plants from the forests of north-eastern Iran (Golestan & Mazandaran Prov.) were noticeably different morphologically: they had long linear leaves and formed numerous clumps, and in cultivation they bloomed from November, which is not typical for the phenology of the common South Caspian *G. transcaucasicus*. The latter usually blooms from January. And then Dr. Rukšāns doubted a new snowdrop affiliation. Due to this discrepancy, he decided to contact Dr. Dimitri Zubov, who has an expertise in the genus *Galanthus* L. [Ref. 34, 48 – 51], to find out what species we are dealing with. Dr. Sajad Alipour also confirmed the existence of “autumn-flowering forms of the omnipresent *G. transcaucasicus*”, which he encountered repeatedly during his field work in NE Iran.

Since 2008 to 2024, Dr. Rukšāns repeatedly found snowdrops growing in different parts of northern Iran and in various habitats: from subalpine meadows of Talysh plains, e.g. Asalem

Shaghayegh Plain, Gilan Prov., to the Persian ironwood forests in Golestan Prov., very close to the border with Turkmenistan. According to actual literature, only *Galanthus transcaucasicus* should grow in the Talysh and Alborz Mountains [Ref. 4, 6, 44]. The holotype specimen of this species is housed in Tbilisi (TBI!), and the plant itself is described from a culture based on living collections from the vicinity of Lerik Dist. in southern Azerbaijan. Dr. Dimitri Zubov and Sergey Banketov visited that region in May 2015 and studied the populations of *G. transcaucasicus* around the villages of Çinar, Khanbulan [Azfilial] and Lerik. In brief, in Azerbaijan *G. transcaucasicus* was found in several limited micro-populations as single plants and rarer small clonal clumps. It is scattered there from within low-montane alderwood communities (*Alnus glutinosa* subsp. *barbata* (C.A. Mey.) Yalt.) by valleys at nearly 50 m, then in montane mixed forests with the Persian ironwood prevalence at elevation of 200 – 600 m, and higher within the montane-xerophytic vegetation at nearly 1200 m, where it grows exclusively in scrub formations under canopy of *Crataegus microphylla* K.Koch.

Furthermore, according to the observations of Rukšāns, Alipour and Zubov, this snowdrop grew in various biotopes in Iran, from the Persian ironwood low-montane forests at elevation of 50 – 200 m (up to 1300 m) to open passes and high-montane plains (subalpine zone) in Iranian Talysh at 1800 – 2100 m – subalpine meadows and plain edges bordered with upper-montane open canopy forest co-dominated by *Fagus orientalis* L. and *Quercus macranthera* Fisch. & C.A. Mey. ex Hohen., and in Alborz highlands, e.g. in Olang Forest and Pass at nearly 700 – 2240 m in Golestan Prov. (Hyrcanian (Caspian) vegetation communities (alliances and associations) given in accordance to Gholizadeh *et al.,* 2020, Hamzeh'ee *et al.,* 2008, Noroozi *et al.,* 2008).

Studying the Soviet and post-Soviet literature on snowdrops of the Ciscaucasia, Greater Caucasus, Transcaucasia and Talysh, we noticed a vivid discussion of that time regarding the identity of snowdrop species distributed within Soviet Armenia and Azerbaijan [Ref. 2, 3, 8, 9, 15 – 17, 21, 23, 29, 33, 37 – 39]. Particular confusion arose with green-leaved snowdrops having wide and narrow leaf blades. Thus, different authors cite *Galanthus transcaucasicus* for S Azerbaijan, Talysh and S Armenia [Ref. 1 – 3, 6, 11, 16, 17, 23, 29]. Also, for that region, the following *Galanthus* taxa are currently cited: *Galanthus alpinus* Sosn. (aka *G. caucasicus* (Baker) Grossh.) – N Azerbaijan and N Armenia [Ref. 1, 6, 11], *G. artjuschenkoae* Gabrieljan – N & S Armenia, S Azerbaijan [Ref. 1, 11, 12], *G. kemulariae* Kuth. – E Georgia and N Armenia [Ref. 1, 10, 11, 28], *G. caspius* (Rupr.) Grossh. – W & S Azerbaijan: Nagorno-Karabakh and Talysh [Ref. 16, 17, 33], *G. nivalis* var. *caspius* Rupr. – S Azerbaijan: Talysh, Lankaran [Ref. 35]. Due to such a complicated polytaxonomic issue, we undertook several expeditions to Armenia (Zangezur, Ijevan), northern Iran, and Azerbaijan. We also received snowdrop

specimens from northern Azerbaijan – Zagatala Dist. (*leg.* Ruslan Mishustin, Kherson State University, Ukraine), and Quba and Qusar Dist. (*leg.* Dr. Arnis Seisums, the National Botanic Garden of Latvia).

As a result of our expeditions and studying a vast wild material obtained from collectors, we found out that *Galanthus transcaucasicus* is distributed only in the Talysh and Alborz Mountains (S Azerbaijan and N Iran), and all the other above-mentioned green-leaved snowdrop taxa turned out to be *G. lagodechianus* Kem.-Nath., a hexaploid post-glacial nemoral neo-species with a very wide range stretching from the E Ciscaucasia, E & C Caucasus (as conspecific *G. cabardensis* Koss [Ref. 27]) to Nagorno-Karabakh and E & S Transcaucasia (S Russia, E Georgia, N & W Azerbaijan, N & S Armenia) [Ref. 1, 2, 3, 6, 22, 28, 34]. We also think it is necessary to note that in the type locality of *G. artjuschenkoae* on Khustup Mt. nr. Kapan (S Armenia), we found only *G. lagodechianus* of various morphology, incl. common- and narrow-leaved plant clumps with applanate vernation and rarely occurred broad-leaved clones with subrevolute/supervolute vernation. Therefore, it is evident that *G. artjuschenkoae* is conspecific with *G. lagodechianus,* but not *G. transcaucasicus.* Moreover, Gabrieljan and Nazarova (2002) themselves determined that *G. artjuschenkoae* is hexaploid, based on karyotype analysis of snowdrops from the type locality [Ref. 10]. Also, in the localities indicated for *G. transcaucasicus* in the Flora of Armenia (Ijevan, Tsav, Shikahogh) [Ref. 11], we found *in situ* exclusively *G. lagodechianus* populations as well.

Moreover, the introduced specimens obtained from N Azerbaijan and Nagorno-Karabakh (SW Azerbaijan) undoubtedly belong to *Galanthus lagodechianus*, which seems quite logical to us. This wide range hexaploid neo-species enters N Azerbaijan along the ridges from E Georgia (E Caucasian geographical race). Also, from E Georgia *G. lagodechianus* reached Nagorno-Karabakh along the ridges from N Armenia. Then along the western edge of the Lake Sevan area and Nagorno-Karabakh, it further went to the Zangezur Range in S Armenia (S Transcaucasian geographical race). Thus, we assume that in Azerbaijan *G. transcaucasicus* grows only in Talysh.

In other words, only *Galanthus alpinus* and *G. lagodechianus* are distributed in Armenia; but in Azerbaijan there are only *G. lagodechianus* and *G. transcaucasicus*.

When visiting the Kew Herbarium in Feb. 2016 to study the actual collections of the genera *Galanthus* and *Sternbergia* Waldst. & Kit., Dr. Zubov noticed in the *G. transcaucasicus* folder a few specimens collected by Paul Furse from N Iran and determined by him as *G. rizehensis* Stern (fruiting plants with long linear leaves up to 30 cm; March 1964, *Furse* 5044, 5083, 5086). Such a snowdrop species determination raised doubts, since *G. rizehensis* was found only in W Transcaucasia (S Russia, W Georgia) and the Pontic Mountains (NE Turkey) [Ref. 1,

6, 7, 24 – 26, 30, 41, 43, 46 – 48]. Taking into account the literature and our field data, it can be said with confidence that the Furse's specimens in question undoubtedly belong to a new not known species found by Dr. Rukšāns in Golestan Prov., NE Iran.

The morphological differences between *Galanthus transcaucasicus* and *G. golestanicus* snowdrops are already visible at the start of vegetation. The new species has narrow linear leaves (0.7 – 1.1 cm width) that lie flat when they appear near the ground (or look fully erect in a deep shade of the Persian ironwood forests), but underground, towards the top of the bulb, the leaves envelop each other to varying degrees – subrevolute to supervolute vernation (at the same time, *G. lagodechianus* and *G. rizehensis* leaf vernation is clearly applanate both at the aboveground and underground parts). The Talysh and Alborz *G. transcaucasicus* clearly show a supervolute vernation already at the soil level due to the more or less wide leaf blade (1.2 – 2.7 cm width), which has often two longitudinal furrows, usually absent in *G. golestanicus* (see Table 1).

The Golestan snowdrops were collected in fruit in April in Iran, and they bloomed in cultivation (Latvia and Ukraine) from November. These new snowdrop specimens were morphologically different from the typical *Galanthus transcaucasicus*. Moreover, the introduced Talysh (accs. ex Lerik, Khanbulan, Çinar and Asalem) and Alborz (accs. ex Javaher Deh and Olang) accessions of *G. transcaucasicus* began to bloom from the end of January. It seems that newly described Iranian snowdrops are confined to the lowland belt (up to 50 m) and Hyrcanian submontane up to montane mixed forests with the Persian ironwood prevalence. They were found within an alliance of *Parrotio persicae-Carpinion betuli* (20 – 2250 m, avg. 700 m [Ref. 13]) and *Parrotio persicae-Fagetum orientalis* (250 – 1100 m, avg. 500 m [Ref. 13]). These communities are notable for the Tertiary relict Hyrcanian endemic trees *Parrotia persica* (DC.) C.A. Mey., *Quercus castaneifolia* C.A. Mey., *Alnus subcordata* C.A. Mey., *Acer velutinum* Boiss. (100-1200 m – Omni-Hyrcanian distribution pattern) [Ref. 14]. The plants of a new snowdrop species have a distinct autumn-winter flowering period (Nov. – Feb.), linear (strap-shaped), erecto-patent to erect leaves during flowering, subrevolute to supervolute vernation, but in juveniles plants the vernation is applanate. Leaves are medium to dark green, papillose both sides, sometimes glaucescent, 20 – 35 cm long at fruiting; outer perianth segments had noticeable margin slightly reflexed c. 1 mm throughout the perimeter; inner perianth segment sinus margin curled upwards (flared) and distinctly undulate-dentate; it has contrasting bright orange anthers and a strong pleasant smell. Also, *G. golestanicus* plants have significant colony-forming ability (an active vegetative reproduction, clumping: Fig. 1E).

Considering such different morphology and phenology within studied populations of the South Caspian snowdrops, we decided to describe a new snowdrop species from Golestan Prov. of NE Iran as *Galanthus golestanicus* sp. nova.

Moreover, since there is big confusion in modern literature regarding the appropriate description and typification of *Galanthus transcaucasicus*, and considered it is to be conspecific to other related taxa, e.g. *G. caspius, G. lagodechianus, G. nivalis, G. artjuschenkoae* at different times and by different authors [Ref. 1 – 3, 6, 10 – 12, 16, 17, 21, 23, 29, 33, 35, 37, 38, 40, 44], we decided to give in this article an exhaustive description for *G. transcaucasicus* based on living plant wild accessions from the vicinities of Lerik (1200 m, Talysh, S Azerbaijan), Asalem Shaghayegh Plain (2080 m, Talysh, Gilan Prov., NW Iran), and from Olang Pass (2240 m, E Alborz, Golestan Prov., NE Iran). *Galanthus golestanicus* description was based on wild accessions of plants from the environs of Minudasht and Aliabad (980 m and 400 m, respectively, E Alborz, Golestan Prov., NE Iran; see Table 1).

Materials and methods

Field studies for *Galanthus transcaucasicus* and *G. golestanicus* snowdrops were undertaken in S Azerbaijan in May 2015, and in N Iran – in April and May 2016, 2018, 2022, and 2024. Herbarium specimens of other related snowdrop species were examined at K, KW, KWHA, RIG, BAC, ERE, TBI, LE herbaria (abbreviations after Thiers 2025 [42]). Measurements, colours, and other details are based on living material and herbarium specimens, and data derived from field notes. Morphological and anatomical examinations were made using a zoom stereomicroscope SMZ800N (Nikon Instruments Inc., Japan). Morphological terminology follows Beentje 2010 [5] and Davis 1999 [6]. A distribution map (Map 1) was plotted using recorded coordinates from the field notes, herbaria, iNaturalist community mapping, and from the literature [Ref. 4, 19], verified by Google Earth Pro 7.3 (©2017 Google), and produced using SimpleMappr on-line tool for creating maps [Ref. 36]. A preliminary conservation status of *G. golestanicus* and *G. transcaucasicus* was informally assessed following the IUCN's Red List Categories and Criteria (IUCN 2024 [20]). Extent of occurrence (EOO) and area of occupancy (AOO) were calculated using ground point data and ShinyGeoCAT for geospatial analysis for Red List assessment [Ref. 31] based on the recommended grid size of 2×2 km.

Taxonomic Treatment

Galanthus golestanicus *Zubov, Rukšāns, Alipour & Kazemi* sp. nov. Type: Iran, Golestan Province, Persian ironwood forest in mountains above Minudasht, at elevation of 980 m; cult. (specimen grown in Latvia in the garden of Jānis Rukšāns; specimen originally collected in type locality by Rukšāns on 09 Apr. 2024), fl. 01 Feb. 2025; *Zubov, Rukšāns, Alipour & Kazemi* s.n. (holotype RIG II: BOT-17089!).

Bulb c. 2 × 2 cm, ovoid, bulb scales whitish, bulb covered with a dark brown papery tunic with ribbed longitudinal veins; adventitious roots whitish. *Basal sheath* 3.5 – 4 × 0.5 – 0.6 cm, ± tubular, tubular-conical, circular or oval in cross section, membranous, whitish. *Leaves* 2, 6 – 17 cm long at flowering time (anthesis), synanthous (± subhysteranthous in a deep shade), in vernation applanate at soil level and supervolute to subrevolute underground (but applanate in juvenile plants), erect to erecto-patent; leaf blade 20 – 25 (– 35) × 0.7 – 1.1 cm at maturity (shorter a scape, sometimes 2 – 3 times shorter a scape in a deep shade at anthesis), narrowly linear to linear (strap-shaped), plane, bearing noticeable lighter coloured 14 – 15 veins, minutely papillose and puckered both sides, mid to dark green base-colour, occasionally glaucescent adaxially, matt to oily, with a distinct lighter coloured middle stripe adaxially; abaxial surface with a prominent keel; margin entire; apex acute, slightly narrowly cucullate to flat, with an indistinct white point at the tip. *Scape* 1, 8.5 – 12 cm long at anthesis, 15 – 22 cm long at fruiting (± shorter or equal to leaves at fruiting), c. 2 mm in diam., ± erect, cylindrical, smooth, bright green. *Pedicel* 2.5 – 3 cm long, less 1 mm in diam., light green, minutely papillose, ± equal or 1/2 shorter a spathe. *Spathe* 28 – 35 × 4 – 9 mm, papery, whitish, erect to arcuate, with 2 thick, bright green, minutely papillose ribs (up to 1.5 mm in diam.) by margin. *Flower* 1, c. 3.5 cm in diam., narrowly ovoid to pyriform when closed (i.e. in outline shape), fragrant; perianth segments 6, separated, in two whorls; outer perianth segments 3, 17 – 22 × 9 – 12 mm, white, obovate to oval, ± puckered, indistinctly ribbed with c. 12 prominent veins, base unguiculate, claw 2 – 5 × 3 mm, apex obtuse, slightly notched, margin slightly recurved c. 1 mm (flared) along the entire perimeter; inner perianth segments 3, 8 – 10 × 5 – 6 mm, ± 1/2 the size of the outer perianth segments, obovoid (cuneate), white, each segment with an apical sinus (notch) and one apical narrowly to broadly hippocrepiform to fabiform and ± Λ-shaped green mark abaxially, sinus margin curled upwards (flared) and distinctly undulate-dentate; adaxial surface with 5 – 8 coaxial green lines, forming blurred apical mark 1/3 – 1/4 the size of a segment, and interspaced with 4 – 7 white coaxial grooves. *Androecium:* stamens 6, in two whorls; anthers 4 – 5 mm long and c. 1 mm in diam. at base, basifixed, ± sagittate, contrast deep orange, anthers sacs 4 per anther, latrorse in the middle part and introrse to the recurved

styloid whitish apex; filaments 1.5 – 2 mm long, white; *pollen* yellow, microsporangia ± oval; *pollination syndrome* bimodal: mellitophyllous and wind-induced autogamy. *Gynoecium* (ovary and receptacle) syncarpous, tricarpellate; ovary superior 7 – 8 mm long, 5 – 6 mm in diam., globose, or ellipsoid to narrowly ellipsoid, indistinctly triangular in cross section, olive- to dark green, matt, minutely papillose; placentation axile, ovules ± oval with elaiosome, numerous by 2 rows per locule; pistil filiform: style 7.5 – 9 mm long, whitish; stigma capitate, papillose, c. 0.3 mm in diam. *Fruit* (capsule) at maturity indistinctly triangular in cross section, globose to ovate, at maturity 12 – 15 × 9 – 12 mm, dark to olive-green; seeds not seen. (Figs. 1 & 2)

The habitats and flowering plants of *Galanthus golestanicus in situ*:

1A An alliance of *Parrotio persicae-Carpinion betuli* in a submontane forest in E Alborz at elevation of 980 m above Minudasht, Golestan Prov., NE Iran, 09 Apr. 2024 (photo J.Rukšāns)

Left and right: 1B - C *Galanthus golestanicus* flowering in the lowland habitat; Alborz, Chaboksar vicinities, 40 m Gilan Prov., N Iran. 21 Nov. 2024 (photo Farshad Kazemi).

1D *Galanthus golestanicus* flowering in the lowland habitat; Alborz, Chaboksar vicinities, 40 m Gilan Prov., N Iran, 21 Nov. 2024 (photo Farshad Kazemi).

1E A bulb clump of *Galanthus golestanicus*; a submontane forest in E Alborz at elevation of 980 m above Minudasht, Golestan Prov., NE Iran, 09 Apr. 2024 (photo J. Rukšāns).

Comparative morphological study of cultivated *Galanthus golestanicus* plants (Jan. – Apr. 2025):

2A A whole plant general habit; scale bar = 2 cm (acc. no. T4Z.1163, E Alborz, 400 m, Aliabad vicinities, Golestan Prov., NE Iran; photo D. Zubov)

2B Flower details; scale bar = 2 cm (acc. no. 24IRS-031, E Alborz, 980 m, Minudasht vicinities, Golestan Prov., NE Iran; photo J. Rukšāns)

2C Papillose leaf blade adaxial side close-up view with visible glandular trichomes (acc. no. 24IRS-012, Alborz, 260 m, Imam Reza Forest, Golestan Prov., NE Iran; photo J. Rukšāns)

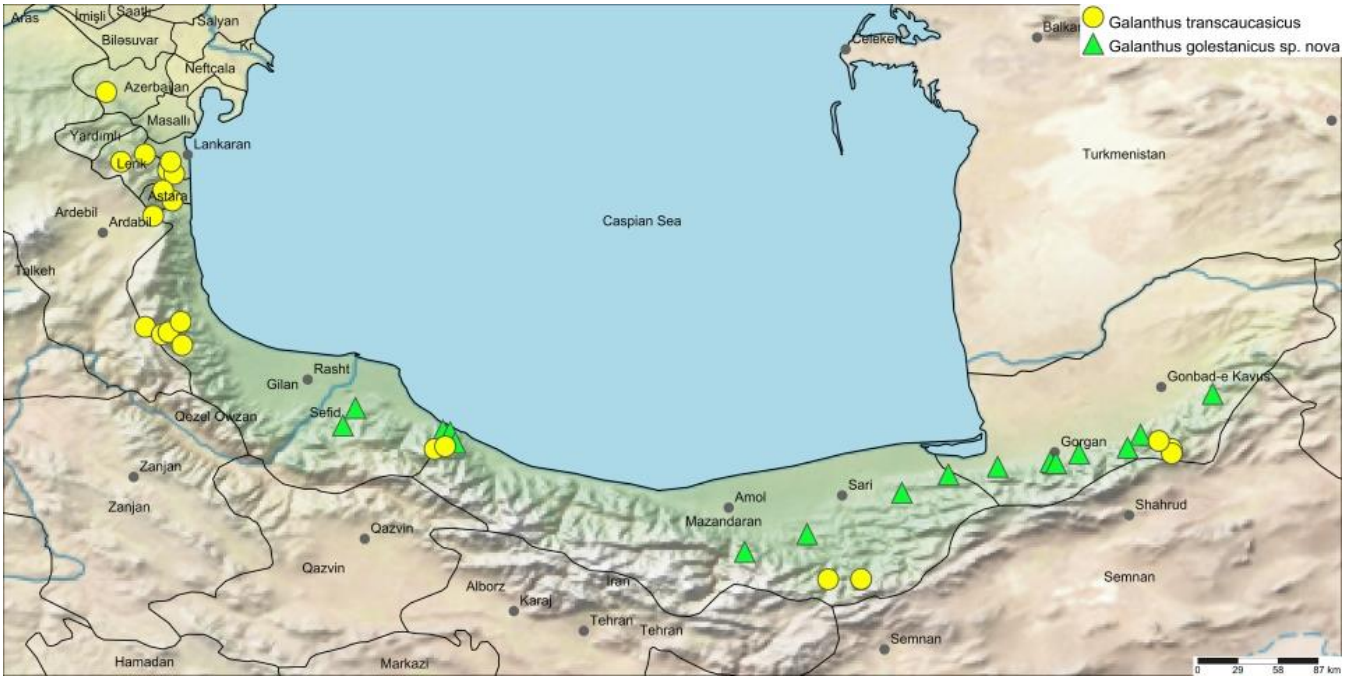
2D A view of supervolute to subrevolute leaf vernation in *G. golestanicus* plants (acc. no. 24IRS-031, E Alborz, 980 m, Minudasht vicinities, Golestan Prov., NE Iran; photo J. Rukšāns)

2E A cultivated clump of *G. golestanicus* in Ukraine, 28 Jan. 2025 (acc. no. T4Z.1163, E Alborz, 400 m, Aliabad vicinities, Golestan Prov., NE Iran; photo D. Zubov)

2F A holotype specimen of *G. golestanicus* (RIG II: BOT-17089; photo J. Rukšāns)

RECOGNITION. Possibly related to *G. transcaucasicus* but differs by having leaves linear (strap-shaped), vernation supervolute to subrevolute (applanate in juvenile plants), and flowering period from late autumn to winter (*vs.* leaves narrowly oblanceolate to lorate, vernation supervolute, and flowering period from winter to spring). Possibly related to *G. lagodechianus* and *G. rizehensis* but differs by having vernation supervolute to subrevolute (applanate in juvenile plants), flowering period from late autumn to winter, and distribution range in Alborz (*vs.* vernation applanate, flowering period from winter to spring, and distribution range in Ciscaucasia, Caucasus, Transcaucasia and The Pontic Mountains (NE Turkey).

DISTRIBUTION. West Asia: The Alborz mountain range – northern Iran: Gilan, Mazandaran and Golestan Provinces; a local Alborz endemic; possibly a Tertiary relict (Map 1, below).



Map 1. Distribution of the South Caspian snowdrop species in S Azerbaijan and N Iran – *Galanthus golestanicus* and *G. transcaucasicus* based on collection and observed localities; *Galanthus golestanicus* typically grows in lowlands, submontane to montane forests in Alborz, (20 –) 100 – 1100 m, but *G. transcaucasicus* has its main range in Talysh (from lowland to upper-montane forests and high-montane scrub formations, plains/subalpine zone, 50 – 2100 m) with observed exclaves of its range in montane, upper-montane forests and high-montane plains/subalpine zone in Alborz, 600 – 2240 m.

ADDITIONAL SPECIMENS EXAMINED. <u>*Galanthus golestanicus* sp. nov., IRAN:</u>

G. golestanicus: Iran, Golestan Province, Persian ironwood forest in mountains above Minudasht, at elevation of 980 m; cult. (specimen grown in Latvia in the garden of Jānis Rukšāns; specimen originally collected in type locality by Rukšāns on 09 Apr. 2024), fl. 01 Feb. 2025; *Zubov, Rukšāns, Alipour & Kazemi* s.n. (holotype RIG II: BOT-17089!);
G. cf. caucasicus: Iran, Mazandaran Prov., Ramsar, among shaded boulders, grows in thick clumps, 300' alt.; *Furse* 5044, fr. 20 Mar. 1964 (specimen K000501267!);
G. nivalis L. var. *Redoutei* Regl.: Iran, Golestan Prov., Persia borealis, prov. Asterabad, Bender Ges, in sylvis primaevis; *Sintenis* 1365, fl. 07 Dec. 1900 & fr. 24 Mar. 1901 (specimen K000501270!);
G. nivalis L. var. *Redoutei* Regl.: Iran, Golestan Province, Persia borealis, prov. Asterabad, Bender Ges, in sylvis primaevis; *Sintenis* 1365, fl. 07 Dec. 1900 & fr. 24 Mar. 1901 (specimen E00338236!);
G. nivalis L. var. *Redoutei* Regl.: Iran, Golestan Province, Persia borealis, prov. Asterabad, Bender Ges, in sylvis primaevis; *Sintenis* 1365, fl. 07 Dec. 1900 (specimen K000501269!);

G. rizehensis Stern: Iran, Golestan Prov., 20 M. W. of Gorgan, under tall trees hornbeam thickets, sea level; *Furse* 5086, fr. 28 Mar. 1964 (specimen K000501265!);
G. rizehensis Stern: Iran, Golestan Prov., 20 M. W. of Gorgan, under tall trees hornbeam thickets, sea level; *Furse* 5086, fr. 28 Mar. 1964 (specimen K000501266!);
G. rizehensis Stern: Iran, Golestan Prov., 40 M. W. of Gorgan, under tall trees and hornbeam scrub, where grazed, sea level; *Furse* 5083, fr. 27 Mar. 1964 (specimen K000501271!);
G. rizehensis Stern: Iran, Golestan Prov., 40 M. W. of Gorgan, under tall trees and hornbeam scrub, where grazed, sea level; *Furse* 5083, fr. 27 Mar. 1964 (specimen K000501272!);
G. rizehensis Stern: Iran, Mazandaran Prov., Ramsar; *Furse* 5044 (coll. 20 Mar. 1964), fl. cult. 26 Nov. 1964 (specimen K000501285!).

HABITAT. Described from Golestan forests of the Alborz mountain range; mainly growing within Omni-Hyrcanian distribution pattern [Ref. 14] – in lowlands (*Querco-Buxetum* community [Ref. 18]), and Hyrcanian (Caspian) submontane and montane mixed forests dominated or co-dominated by the Tertiary relict Hyrcanian endemic trees: *Parrotia persica*, *Acer velutinum*, *Alnus subcordata*, *Quercus castaneifolia* (an alliance of *Parrotio persicae-Carpinion betuli* [Ref.13]) at elevation of (20 –) 100 – 1100 m. Mesophyte, sciophyte, thermophile. Phytocenosis indicators included the woody species *Carpinus betulus* L., *Fagus orientalis* Lipsky, and in the understory observed *Buxus sempervirens* subsp. *hyrcana* (Pojark.) Takht., *Zelkova carpinifolia* (Pall.) K.Koch, *Euonymus latifolius* (L.) Mill., *Taxus baccata* L., *Frangula grandifolia* (Fisch. & C.A. Mey.) Grubov, *Ilex spinigera* (Loes.) Loes.; and herbaceous species *Carex digitata* L., *Euphorbia amygdaloides* L., *Viola caspia* (Rupr.) Freyn, *Ruscus hyrcanus* Woronow, *Hypericum androsaemum* L., *Primula heterochroma* Stapf., *Solanum kieseritzkii* C.A. Mey., *Digitalis nervosa* Steud. & Hochst. ex Benth., *Scutellaria tournefortii* Benth.

CONSERVATION STATUS. *Galanthus golestanicus* is endemic to Iran and it is restricted to the lowlands, submontane and montane mixed forests of the Alborz Mountain range. Extent of Occurrence (EOO) was estimated to be 30,932 km^2 and Area of Occupancy (AOO) to be 64 km^2. Due to the limited AOO and the range of threats, this species is assessed as Endangered (EN) under IUCN Red List Categories and Criteria (IUCN 2024 [20]): [EN B2ab(iii)] – Geographic range in the form of AOO estimated to be 64 km^2 and: – a. Known to exist in 16 locations; and b. Continuing decline observed (Map 1). The habitat could decline rapidly due to local anthropogenic pressure, such as overgrazing, deforestation, large-scale agriculture ploughing, and quarrying for the procurement of freestone; there is also the threat of small-scale collection of flowering plants and bulbs by local people, what could cause a slow, long-term continuing decline.

PHENOLOGY. Flowering: Nov. – Feb. (– March) in the wild; Nov. – Feb. in cultivation; fruiting (wild and cultivated): April – May.

ETYMOLOGY. Named after Golestan Province in NE Iran from where it was described; *Gulistan, Golestan,* or *Golastan* translates to *"gul-"* meaning "flower" and *"-stan"* meaning "land". Golestan literally means *"land of flowers"* in Irani dialects.

Different Azerbaijani and Iranian habitats and flowering plants of *Galanthus transcaucasicus* in situ:

3A An alliance of *Fago orientalis-Quercetum macranthera* with fruiting *Colchicum speciosum* and *G. transcaucasicus* aspect in an upper-montane forest/plain (subalpine zone) ecotone; Talysh, Asalem Shaghayegh Plain, Gilan Prov., NW Iran; photo D. Zubov, 2080 m, 11 May 2018).

3B An alliance of *Fago orientalis-Quercetum macranthera* with fruiting *Colchicum speciosum* and *G. transcaucasicus* aspect in an upper-montane forest/plain (subalpine zone) ecotone; Talysh, Asalem Shaghayegh Plain, Gilan Prov., NW Iran (photo J. Rukšāns, 1920 m, 27 Apr. 2008).

Galanthus transcaucasicus *Fomin*, 1909, in Fomin & Woronow, Opred. rast. Cauc. i Kryma 1: 281; Filippov 1916, in Kuzn., Bush, Fomin, Fl. cauc. critica II 5(44): 8; Grossh. 1928, Fl. Cauc. 1: 244; Losinsk. 1935, in Komarov, Fl. SSSR 4: 478, p.p.; Artjush. 1966, in Bot. Journ. (Moscow & Leningrad) 51, 10: 1449, p.p.; Artjush. 1967, in Daffodil Tulip Year Book, 76, 81, p.p.; Artjush. 1970, Amaryll. SSSR: 81, p.p.; Wendelbo 1970, in Rech. f., Fl. Iran., (67): 7, p.p.; Kem.-Nath. 1977, Zam. syst. geogr. rast. (Tbilisi) 34: 34 – 37, p.p.; A.P. Davis 1999, in The Genus Galanthus: 174, Pls. 15, 48, p.p.; Zubov 2020, in IRG 123: 20 – 22, figs. 30 – 33, p.p. – *G. caspius* (Rupr.) Grossh. 1940, Fl. Cauc., ed. 2, 2: 193, *nom. illeg.*, p.p.; Grossh. 1949, Opred. rast. Cauc.: 631, p.p.; Prilip. 1952, in Sosn., Fl. Azerb. 2: 205, p.p. – *G. nivalis* L. var. *caspius* Rupr. 1868, in Gartenflora 17: 132. Ind. loc.: Talysh, in the lower zone forests. Type: Prov. Baku. Prope pag. Lenkoran, cult. in sect. Cauc., 24 II 1910, *Koenig s.n.* (holotype TBI!).

Bulb 2 – 3 × 1 – 2 cm, globose to flattened-globose and ovoid, bulb scales yellowish, with strong and unpleasant smell when damaged, bulb covered with a pale brown papery tunic; adventitious roots whitish. *Basal sheath* 5.5 – 6 × 0.5 – 0.8 cm, ± tubular, circular or oval in cross section, sometimes once wedge-shaped short-cut at the margin, membranous, whitish. *Leaves* 2, 6 – 12 cm long at flowering time (anthesis), synanthous, in vernation obviously supervolute (but applanate in juvenile plants), erecto-patent, ± arcuate; leaf blade 12 – 18 × 1.1 – 2.7 (– 3.5) cm at maturity (± shorter or equal a scape at anthesis), narrowly oblanceolate to lorate, usually sharply recurved at the top, flat, bearing noticeable lighter coloured 22 – 25 veins, minutely puckered both sides, mid to dark green and olive-green base-colour, occasionally glaucescent (rarely ± glaucous) adaxially, matt to oily, plane or with two longitudinal furrows, with ± distinct pale middle stripe adaxially; abaxial surface with a prominent keel; margin entire; apex obtuse to acute, slightly cucullate, with an indistinct white point at the tip. *Scape* 1, 10 – 15 cm long at anthesis, 13 – 18 cm long at fruiting (± shorter or equal to leaves at fruiting), c. 2 mm in diam., erecto-patent to patent, cylindrical, smooth, bright to olive-green. *Pedicel* 2.5 – 3 cm long, c. 2 mm in diam., light green, ± equal, shorter or longer a spathe. *Spathe* c. 30 × 4 mm, longer a pedicel, papery, whitish, erect to arcuate, with 2 thick, bright green, minutely papillose ribs (c. 1 mm in diam.) by margin. *Flower* 1, 3.5 – 4.6 cm in diam., ± ovoid to pyriform and globose when closed (i.e. in outline shape), insignificantly fragrant; perianth segments 6, separated, in two whorls; outer perianth segments 3, 20 – 25 × 10 – 12 mm, white, oval to oblanceolate, base unguiculate, claw 3 × 2.5 mm, apex obtuse; inner perianth segments 3, 10 – 12 × 6 – 7 mm, ± 1/2 the size of the outer perianth segments, ± narrowly obtriangular (cuneate), white, each segment with an apical sinus (notch) and one apical Λ-shaped, occasionally ± hippocrepiform, and very rarely as two commas green mark abaxially, sinus margin curled upwards (flared), ± entire; adaxial surface with 4 coaxial green lines, forming blurred apical mark 1/2 the size of a segment, and interspaced with 3 – 4 white coaxial grooves. *Androecium:* stamens 6, in two whorls; anthers 5.5 – 6 mm long and c. 1 mm in diam. at base, basifixed, ± sagittate, yellow-orange, anthers sacs 4 per anther, latrorse in

the middle part and introrse to the recurved styloid apex; filaments c. 2.5 mm long, white; *pollen* yellow, microsporangia ± fabiform; *pollination syndrome* bimodal: mellitophyllous and wind-induced autogamy. *Gynoecium* (ovary and receptacle) syncarpous, tricarpellate; ovary superior 7 – 8 mm long, c. 6 mm in diam., globose, or ellipsoid to narrowly ellipsoid, cask-shaped, indistinctly triangular in cross section, bright to mid-green; placentation axile, ovules ± globose to oval with elaiosome, numerous by 2 rows per locule; pistil filiform: style c. 9 mm long, white, greenish in very upper part; stigma capitate, papillose, white, c. 0.3 mm in diam. *Fruit* (capsule) at maturity indistinctly triangular in cross section, ellipsoid to globose, pyriform and cask-shaped, at maturity 15 – 22 × 10 – 15 mm, olive-green, matt to oily; seeds ± orbicular to ovate, 3 – 4 × 2 – 2.3 mm, with shiny light to dark brown seed coat and ± developed whitish, comma-shaped elaiosome, c. 2 mm long (myrmecochory). (Figs 3 & 4)

3C *Galanthus transcaucasicus* flowering in the upper-montane ecotone habitat; Talysh, 2080 m, Asalem Shaghayegh Plain, Gilan Prov., NW Iran, 12 Apr. 2017 (photo J. Rukšāns).

3D *Galanthus transcaucasicus* flowering in the upper-montane ecotone habitat; Talysh, 2080 m, Asalem Shaghayegh Plain, Gilan Prov., NW Iran, 01 May 2017 (photo H. Jans).

3E Faded foliage of *Galanthus transcaucasicus* observed in the upper-montane ecotone habitat; Talysh, 2080 m, Asalem Shaghayegh Plain, Gilan Prov., NW Iran, 11 May 2018 (photo D. Zubov).

3F Azerbaijani habitat with *Crataegus microphylla* shurbland serving as the only suitable shelter for the *Galanthus transcaucasicus* plants within the montane-xerophytic vegetation at elevation of 1270 m near Lerik, Lerik Dist., S Azerbaijan, 16 Feb. 2016 (photo T. Mitchell).

3G An alliance of *Parrotio persicae-Carpinion betuli* with other woody species in a submontane forest in Azerbaijani Talysh at elevation of 500 m near Khanbulan, Lankaran Dist., S Azerbaijan, 17 Feb. 2016 (photo T. Mitchell).

3H A typical growing pattern of the *Galanthus transcaucasicus* plants scattered within Azerbaijani populations in the submontane forest habitat; Talysh, 500 m, near Khanbulan, Lankaran Dist., S Azerbaijan, 17 Feb. 2016 (photo T. Mitchell).

3I

3I, J An alliance of *Fago orientalis-Quercetum macranthera* with fruiting *Galanthus transcaucasicus* within a plain (subalpine zone)/upper-montane forest ecotone at elevation of 2240 m, E Alborz, Olang Pass, Golestan Prov., NE Iran, 26 Apr. 2016 (photo D. Zubov).

3K A habitat with the shrubby species and thorn-cushion subalpine formation in Alborz, 2073 m, above Javaher Deh village, Mazandaran Prov., N Iran, 20 Apr. 2016 (photo D. Zubov).

RECOGNITION. Possibly related to *G. lagodechianus* and *G. rizehensis* but differs by having leaves narrowly oblanceolate to lorate and vernation supervolute (*vs.* leaves linear (strap-shaped) and vernation applanate). Possibly related to *G. golestanicus*, but differs by having leaves narrowly oblanceolate to lorate, vernation supervolute (applanate in juvenile plants), and flowering period from winter to spring (*vs.* leaves linear (strap-shaped), vernation supervolute to subrevolute (applanate in juvenile plants), and flowering period from late autumn to winter).

DISTRIBUTION. West Asia: The Talysh Mountains – southern Azerbaijan: Jalilabad, Lankaran, Lerik, Masally, Yardimli and Astara Districts, northern Iran: Ardabil and Gilan Provinces; the Alborz mountain range – northern Iran: Mazandaran and Golestan Provinces. (see Map 1).

ADDITIONAL SPECIMENS EXAMINED. *Galanthus transcaucasicus,* IRAN:

G. ikariae Bak. ssp. *latifolius* Stern: Iran, Ardabil Prov., Talysh, lower edge of sandy slopes and spreading decreasingly upwards, widespread and common, moist soil, alt. 5,000 ft.; *Bowles* 549, fl. 23 Mar. 1963 (specimen K000501268!);
Galanthus transcaucasicus, AZERBAIJAN:
G. nivalis var. *caspius* Rupr.: Azerbaijan, Lankaran Dist., in den Waldniederungen am Caspischen Meere; *Hohenacker*, fl. Mar. 1836 (LE!);
G. plicatus Bbrst.: Azerbaijan, Lankaran Dist., in sylvis prope Lankoran; *Hohenacker*, fl. Mar. 1836 (specimen K000501296!);
G. plicatus Bbrst.: Azerbaijan, Lankaran Dist., in sylvis prope Lankoran; *Hohenacker*, fl. Mar. 1836 (specimen K000501294!);
G. plicatus Bbrst.: Azerbaijan, Lankaran Dist., in sylvis prope Lankoran; *Hohenacker*, fl. Mar. 1836 (specimen K000501295!);
G. transcaucasicus Fomin: Azerbaijan, Lankaran Dist., Prov. Baku, prope pag. Lenkoran; cult. in sect. Cauc.; *Koenig,* fl. 24 Feb. 1910 (holotype TBI!);
G. transcaucasicus Fomin: Azerbaijan, Lankaran Dist., prov. Baku, dist. Lenkoran, inter p.p. Alekseevka [Daştatük] et Said-Turba; *Prilipko,* fl. 26 Mar. 1926 (BAK!).

HABITAT. Discovered within Omni-Hyrcanian and Euxino-Hyrcanian distribution patterns [Ref. 14]; growing in Hyrcanian (Caspian) lowland forests (the alderwood communities of *Ulmo minoris-Alnetum barbatae, Pterocaryo fraxinifoliae-Alnetum barbatae, Pterido dentatae-Alnetum barbatae* [Ref. 18]), and in the Persian ironwood submontane and montane forests (*Parrotio persicae-Carpinion betuli* with other woody species *Zelkova carpinifolia*, *Acer velutinum*, *Quercus castaneifolia, Pterocarya fraxinifolia* (Lam.) Spach, *Ulmus minor* Mill., *Alnus glutinosa* subsp. *barbata*) at elevation of (50 –) 100 – 600 m, with accompanying herbaceous species *Carex sylvatica* Huds., *C. digitata*, *Euphorbia amygdaloides*, *Viola caspia*, *Pteris dentata* Forssk., *Ruscus hyrcanus*, *Hypericum androsaemum*, *Primula heterochroma*,

Fessia hohenackeri (Fisch. & C.A. Mey.) Speta, *Scilla siberica* subsp. *caucasica* (Miscz.) Mordak, *Cyclamen elegans* Boiss. & Buhse, *Lilium ledebourii* (Baker) Boiss., and in scrub formations (e.g., shrublands of *Crataegus microphylla*) within the montane-xerophytic vegetation at elevation of 1100 – 1400 m (mostly in S Azerbaijan), to upper-montane forests (*Fago orientalis-Quercetum macranthera* [Ref. 13]) and open passes at subalpine zone and high-montane plains in Talysh and Alborz at 1500 – 2240 m – subalpine meadows and plain edges bordered with upper-montane open canopy forest co-dominated by *Fagus orientalis* and *Quercus macranthera*, and other woody species *Carpinus orientalis* subsp. *macrocarpa* (Willk.) Browicz, *Acer hyrcanum* Fisch. & C.A. Mey., *Picea orientalis* (L.) Link, *Viburnum lantana* L., *Crataegus microphylla*, *Berberis crataegina* DC., accompanied by herbaceous species *Solanum kieseritzkii*, *Salvia glutinosa* L., *Myosotis asiatica* (Vestergr.) Schischk. & Serg., *Vicia abbreviata* Fisch. ex Spreng., *Fritillaria kotschyana* Herb., *Colchicum speciosum* Steven, *Scilla siberica* subsp. *armena* (Grossh.) Mordak, *Anemone caucasica* Willd. ex Rupr., *Primula heterochroma*, *Paeonia tomentosa* (Lomak.) N.Busch ex Grossh., *P. archibaldii* Rukšāns, *Fessia gorganica* (Speta) Speta, *F. olangensis* Zubov & Rukšāns, *Iris reticulata* M.Bieb. *s.l.*; also found along the thalwegs at the bottom of the ravines within the *Cotoneaster kotschyi* (C.K.Schneid.) G.Klotz shrublands with other shrubby species *Rhamnus pallasii* Fisch. & C.A. Mey., *Prunus microcarpa* C.A. Mey., *P. lycioides* (Spach) C.K.Schneid., *Juniperus sabina* L., and thorn-cushion subalpine formations in Alborz [Ref. 32] – in grass, accompanied by herbaceous species *Veronica hispidula* Boiss. & A.Huet, *Crocus gilanicus* B.Mathew, *C. hyrcanus* Rukšāns & Zubov, *Ornithogalum sintenisii* Freyn, *Iris reticulata s.l.,*, *Ranunculus kochii* Ledeb., *Anemone caucasica, Corydalis cava* subsp. *marschalliana* (Willd.) Hayek, *Muscari neglectum* Guss. ex Ten. & Sangiov., *Primula auriculata* Lam., *P. heterochroma.*

CONSERVATION STATUS. *Galanthus transcaucasicus* is widely distributed in lowland to upper-montane Hyrcanian forests and high-montane scrub formations and plains in the subalpine zone of the Talysh and Alborz Mountains. EOO was estimated to be 89,039 km^2 and AOO to be 88 km^2. Due to the limited AOO and the range of threats, this species is assessed as Endangered (EN) under IUCN Red List Categories and Criteria (IUCN 2024 [20]): [EN B2ab(iii)] – a. Known to exist in 24 locations; and b. Continuing decline observed (Map 1). The habitat could decline rapidly due to local anthropogenic pressure, such as overgrazing, deforestation, large-scale agriculture ploughing, and quarrying for the procurement of freestone; there is also the threat of small-scale collection of flowering plants and bulbs by local people, what could cause a slow, long-term continuing decline.

PHENOLOGY. Flowering: Jan. – May in the wild; Jan. – April in cultivation; fruiting: April – June in the wild; April – May in cultivation.

ETYMOLOGY. Named for the snowdrop's association with the forests of the lower zone of Transcaucasia (although, according to the modern botanical and geographical zoning of the Caucasus [Ref. 39], this species is not distributed in Transcaucasia, but in Talysh and Alborz) by the Ukrainian botanist Oleksandr Fomin (since 1931 – Director of the Institute of Botany of the Academy of Sciences of the Ukrainian SSR). The works of O. Fomin are devoted to the issues of morphology, systematics and flora of the Caucasus, Crimea, Siberia, the Far East and Ukraine. Fomin developed the first botanical zoning of Ukraine and the systematic study of spore plants of the Ukrainian SSR, studied sphagnum mosses in the vicinity of Kyiv and Kharkiv regions, ferns, etc. With the participation of Fomin, the monumental publication "Flora of the Ukrainian SSR" was started, part of the first volume of which he wrote himself in 1926. In 1935, the Botanical Garden in Kyiv was named after Oleksandr Fomin. In 2009, the M.G. Kholodny Institute of Botany of the National Academy of Sciences of Ukraine and the Institute's Herbarium (KW) began publishing a periodical named in honor of O. Fomin – *“Fominia”* [Ref. 45].

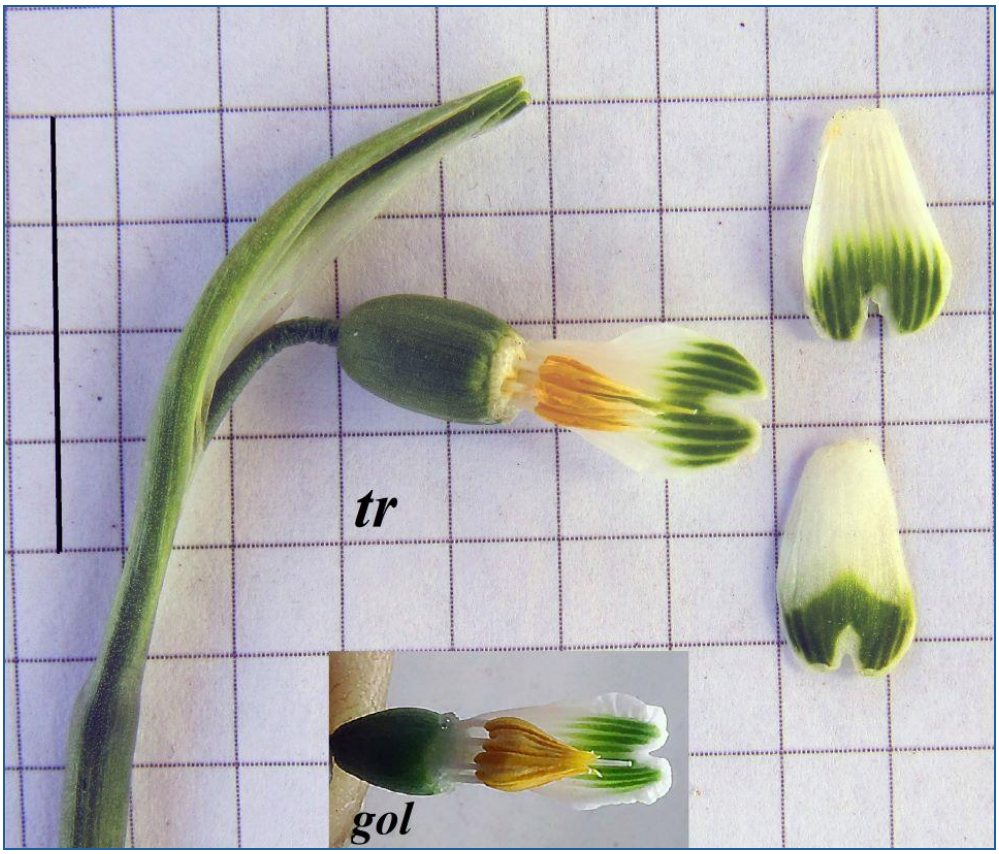
NOTES. In general, it can be assumed that *Galanthus transcaucasicus* is distributed in the Hyrcanian montane forests, high-montane shrublands and plains (subalpine zone) of the Talysh and Alborz Mountains – S Azerbaijan: Jalilabad, Lankaran, Lerik, Masally, Yardimli and Astara Districts, and N Iran: Ardabil, Gilan, Mazandaran and Golestan Provinces, but nemoral *G. golestanicus* sp. nova grows exclusively in lowlands, submontane and montane mixed forests of the Alborz mountain range – N Iran: Gilan, Mazandaran and Golestan Provinces. It seems that the distribution range of *G. golestanicus* is restricted by the natural watershed between the Talysh and Alborz Mountains – the Sefid-Rud River [White River] flowing into the Caspian Sea between Rasht and Lahijan (Map 1). As can be seen on the Map 1, the distribution range of *G. golestanicus* was actually clustered into three disjunctive areas from west to east: (1) Lahijan (Gilan), (2) Ramsar (Gilan), and (3) the entire continuous cluster of populations from the Amol area to Gonbad-e Kavus (Mazandaran & Golestan). Moreover, the Minudasht type locality is the easternmost known habitat for *G. golestanicus*, and at the same time this is the easternmost limit reached by members of the genus *Galanthus* in general. According to the studied locations for *G. transcaucasicus*, its distribution range extends from the compact and densely populated clusters (in the direction from west to east) of (1) Lankaran-Lerik-Astara in S Azerbaijan, and (2) Khalkhal-Asalem Plain in NW Iran (Ardabil,

Gilan), and further stretches by separate exclaves to the areas of (3) Javaher Deh (Mazandaran), (4) Savadkuh (Mazandaran), and (5) Olang Forest and Pass (Golestan) (Map 1). In our actual study we leave the Fomin's taxon as an accepted one by IPNI in the understanding of the *G. transcaucasicus* species concept according to the Davis latest genus *Galanthus* revision [Ref.6], but *pro parte*, given that the newly described *G. golestanicus* was permanently absorbed by the *G. transcaucasicus* species concept. However, there are all the formal prerequisites for changing the name of *G. transcaucasicus* in favor of *G. caspius* (Rupr.) Grossh. (basionym: *G. nivalis* L. var. *caspius* Rupr. 1868, in Gartenflora 17: 132), since the holotype specimen (*Koenig,* TBI!) of *G. transcaucasicus* is highly probable represented by a plant that, when dried, does not correspond morphologically to the Lankaran snowdrops. At the same time, the Talysh snowdrops from the forests of Lankaran Dist. (contemporary Azerbaijan) are presented by a well-preserved herbarium specimen of the Ruprecht's taxon (*Hohenacker*, LE!) with appropriate plants showing morphology clearly recognizable even *in exsiccatae*.

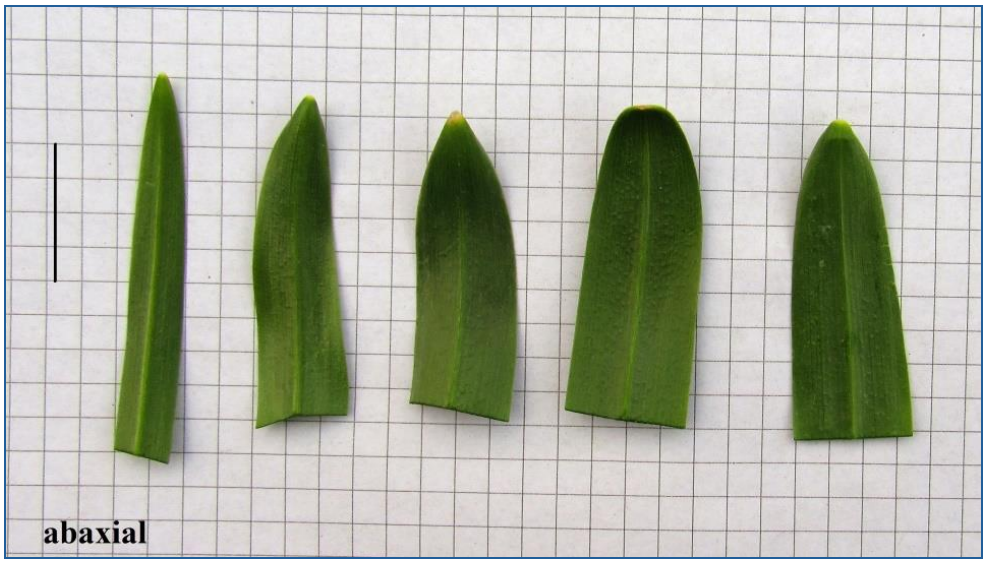
Comparative morphological study of cultivated *Galanthus transcaucasicus* plants (Feb. – Apr. 2025):

4A A whole plant general habit; scale bar = 2 cm (acc. no. 18IRS-083, Talysh, 2080 m, Asalem Shaghayegh Plain, Gilan Prov., NW Iran; photo D. Zubov).

4B Flower details; scale bar = 2 cm (acc. no. 16IRS-146, E Alborz, 2240 m, Olang Pass, Golestan Prov., NE Iran; photo D. Zubov).



4C Flower details of *G. transcaucasicus* (*tr* acc. no. 16IRS-146, E Alborz, 2240 m, Olang Pass, Golestan Prov., NE Iran) vs *G. golestanicus* (*gol* in the insert below, acc. no. 24IRS-031, E Alborz, 980 m, Minudasht vicinities, Golestan Prov., NE Iran); scale bar = 2 cm (photo D. Zubov, J. Rukšāns).



4D, E The morphology of the upper parts of a mature leaf blade of the South Caspian snowdrop species; abaxial and adaxial side view (from left to right, respectively): *G. golestanicus* – Aliabad, *G. transcaucasicus* – Asalem, Javaher Deh, Lerik, and Olang; scale bar = 2 cm (photo D. Zubov)

4F A view of supervolute leaf vernation in *G. transcaucasicus* plants (acc. no. 18IRS-083, Talysh, 2080 m, Asalem Shaghayegh Plain, Gilan Prov., NW Iran; photo D. Zubov).

4G A cultivated clump of *G. transcaucasicus* in Ukraine, 23 March 2024 (acc. no. WHIR-2008-124, Talysh, 1920 m, Asalem Shaghayegh Plain, Gilan Prov., NW Iran; photo D. Zubov).

4H Cultivated plants of *G. transcaucasicus* in Ukraine, 24 Feb. 2022 (acc. no. DZSB-2015, Talysh, 340 m, nr. Çinar village, Jalilabad Dist., S Azerbaijan; photo D. Zubov).

4I Cultivated plants of *G. transcaucasicus* in Ukraine, 27 Feb. 2024 (acc. no. 16IRS-058, Alborz, 2073 m, above Javaher Deh village, Mazandaran Prov., N Iran; photo D. Zubov).

4J Cultivated plants of *G. transcaucasicus* in Ukraine, 26 March 2025 (acc. no. 16IRS-146, E Alborz, 2240 m, Olang Pass, Golestan Prov., NE Iran; photo D. Zubov).

Table 1. Comparative table of distinguishing features for *Galanthus golestanicus* and *G. transcaucasicus*

Character	***G. golestanicus***	***G. transcaucasicus***
Bulb scale colour	whitish	yellowish
Leaf blade shape	narrowly linear to linear (strap-shaped), mainly plane	narrowly oblanceolate to lorate, usually with two longitudinal furrows
Leaf blade 'length × width' at maturity	20 – 25 (– 35) × 0.7 – 1.1 cm	12 – 18 × 1.1 – 2.7 (– 3.5) cm
Leaf vernation	supervolute to subrevolute, applanate in juvenile plants	supervolute (convolute), applanate in juvenile plants
Apical green mark shape of the inner perianth segment	narrowly to broadly hippocrepiform to fabiform	Λ-shaped to ± hippocrepiform
Sinus margin shape of the inner perianth segment	curled upwards (flared), distinctly undulate-dentate	curled upwards (flared), ± entire
Flowering time in the wild	Nov. – Feb. (– March)	Jan. – May
Habitat and distribution range	in lowlands, submontane to montane mixed forests of Alborz (N Iran), (20 –) 100 – 1100 m	in montane mixed forests, high-montane shrublands and plains/subalpine zone of Talysh and Alborz (S Azerbaijan, N Iran), 50 – 2240 m

Key to the identification of the green-leaved *Galanthus golestanicus, G. transcaucasicus, G. lagodechianus,* and *G. rizehensis*

1. Autumn- to winter-flowering plants, subrevolute to supervolute (applanate in juvenile plants) vernation, leaves linear (strap-shaped) ……..……..……***G. golestanicus*** (only in Alborz)

1. Winter- to spring-flowering plants, vernation and leaves other……..……..…..**2.**

2. Applanate vernation, leaves linear (strap-shaped) ……..……..…..……..**3.**

2. Supervolute vernation, leaves narrowly oblanceolate to lorate ……..……***G. transcaucasicus*** (in Talysh & Alborz)

3. Leaves medium to bright green and shiny ……..... ……..……***G. lagodechianus*** (in Ciscaucasia, Caucasus & Transcaucasia)

3. Leaves dark green, matt, ± glaucescent, with a distinct light green middle stripe adaxially …….… ***G. rizehensis*** (in W Transcaucasia & The Pontic Mountains)

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G. golestanicus

G. transcaucasicus