International Rock Gardener

ISSN 2053-7557

Number 182 The Scottish Rock Garden Club March 2025

---International Rock Gardener---

March 2025

Alan Ayton from Australian contributes a photo essay on *Pimelea alpina*, also known *as* the Alpine Rice Flower, a species of flowering plant in the family Thymelaeaceae, endemic to south-eastern continental Australia. Alan has recently suffered a period of ill health, and we wish him well in his recovery.

Jānis Rukšāns and Dimitri Zubov combine their efforts once more to discuss the Series Speciosi of Crocus, as defined in the 1982 monograph by Brian Mathew – and describe three new species from their expeditions over the years.
Jānis and Dimitri have made many expeditions together to research plants in the wild. They have been very generous in sharing their findings with the International Rock Gardener, over some years, for which we are most grateful.

Here is the team of their 2016 expedition in Iran:

The Team: standing on left – Jānis Rukšāns; sitting in front from left side – Henrik Zetterlund (Sweden), Jill White (UK), Patricia Toolan (UK), Arnis Seisums (Latvia); in background – their Iranian driver and Dimitri Zubov (Ukraine).

Cover image: *Crocus zuvandicus* in its habitat. Photo S. Banketov.

---International Rock Gardener---
--- Addendum to IRG 181 ---

Corydalis pskemensis at its habitat - photo Orzimat Turginov.

Note re *Corydalis pskemensis* – published in IRG last month.

A month ago, a new species of *Corydalis* DC. from Uzbekistan was published in this journal – *Corydalis pskemensis* Rukšāns. After this publication, Dr. Dimitri Zubov from Ukraine wrote to us: “The newly published *C. pskemensis* grows in a much wider area than its author Jānis Rukšāns reported. I managed to find the same species also in Kyrgyzstan during our expedition in May 2015 leaded by Sergey Zenin. We were searching for *Iris winkleri* Regel in the Fergana mountain range at the Yassy Pass area, but found this *Corydalis* sp. nova amongst the alpine meadow at an elevation of 2200 m growing side by side with *Prunus ulmifolia* Franch., *C. ledebouriana* Kar. & Kir., *Eremurus tianschanicus* Pazij & Vved. ex Pavlov, *Fessia puschkinioides* (Regel) Speta, *Iris* cf. *kolpakowskiana* Regel, *Pulsatilla campanella* (Regel & Tiling) Fisch. ex Krylov, *Colchicum kesselringii* Regel, *Gagea* Salisb. spp. Also, *C. pskemensis* settled well in my collection and self-seeds (see picture)”.

Corydalis pskemensis in the garden of Dimitri Zubov.

Dr. Arnis Seisums, who collected *Corydalis* in the Pskem valley together with Jānis Rukšāns, writes that *C. pskemensis* also settled well in his garden, where it reproduces by self-sowing. He has not observed any hybrids in his collection. Eugenius Dambrauskas from Lithuania writes that in his collection *C. pskemensis* also hybridizes with *C. nudicaulis* Regel and in hybrids the flower colour of *C. nudicaulis* is combined with the leaf shape of *C. pskemensis*.

Only after this publication, we learned that 20 years later (in 2023) the same species but from a different habitat (in fine earth-rocky screes, 41.6828°N, 70.2187°E, 2300 m a.s.l., much closer to Chimgan), was also discovered by Uzbek botanists, who were already ready to publish it, but our publication preceded their paper. Interestingly, this group of researchers also intended to give this species the same name - *Corydalis pskemensis* Turginov, I.I.Malzev, J.F.Xiao & C.L.Xiang *nom. tantum.* Rukšāns compared the new species only with *C. glaucescens* Regel. Uzbek researchers also compared it with *C. ruksansii* Lidén and *C. schanginii* (Pall.) B.Fedtsch., and characterized their differences. Together with Chinese researchers, they also examined the genetic differences between those species. After our publication their article was recalled.

Corydalis pskemensis habitat on Yassy Mountain Pass – photo D. Zubov

The habitat of *Corydalis pskemensis* - photo Orzimat Turginov.

Pimelea alpina **- a photo essay from Alan Ayton.**

The Alpine Rice Flower*, Pimelea alpina ,* can be prostrate and mat forming or a low and spreading subshrub to 15 cm tall. Leaves are generally crowded at ends of branches, opposite in arrangement, narrowly elliptic in shape and 3-13 mm x 1-5 mm in size.

Inflorescence is terminal and contains between 5-18 flowers consisting of 4 petals, reddish pink to white in colour and flowering November through February. This can be seen in alpine and subalpine heathlands, woodland or grasslands in the Victorian Alps, also NSW.

Pimelea alpina F.Muell. ex Meisn. (Thymelaeaceae)

Pimelea alpina

Pimelea alpina

Close up – showing the dainty, crystalline flowers.

Last four photos show it scrambling through heathlands and grasslands. *Pimelea alpina* is a beautiful alpine species that deserves more attention.

Pimelea alpina

Three new *Crocus* taxa (Iridaceae) described from the Series *Speciosi*

Jānis Rukšāns, Dr. biol.

janis.bulb@hawk.lv

Dimitri Zubov, Dr. biol.

zoubov77@yahoo.com

Summary. Three new *Crocus* taxa of the Series *Speciosi* from Azerbaijan, Greece and Iran, are discovered, described and illustrated. Morphological differences between the new species and subspecies, and other related species are discussed. Photographs and distribution maps are provided.

Key words. *Crocus,* flora of Talysh, the Irano-Turanian Region, the Balkan flora, the Greek flora, Flora Iranica, the Hyrcanian ecoregion, geophytes, sibling species, cryptic species.

The taxonomy of the genus *Crocus* L. has dramatically changed over the past half-century. In new millennium the number of the already recognized species significantly increased comparing with time, when Brian Mathew published his monograph on *Crocus* (1982) based on principles of plant taxonomy at that time.

Back in 1982, Brian Mathew included 80 species and 37 taxa at subspecies rank. Since then, the approach to *Crocus* taxonomy has undergone significant changes. Harpke *et al.* (2012, 2016) created a new phylogeny using 1 plastid and 2 nuclear DNA regions, finding that all *Crocus* taxa regarded as subspecies by Brian Mathew, are genetically distant enough to be recognized at species level. Several other subspecies were moved to species rank by Rukšāns (2017), who based his decision on morphological differences. Not all botanists, especially the older generation, agreed with such changes and some taxa still remained at subspecies rank (e.g., *C. antalyensis* subsp. *gemicii* Şik & Erol and *C. antalyensis* subsp. *striatus* Erol & Koçyiğit; *C. hadriaticus* subsp. *parnassicus* (B.Mathew) B.Mathew and *C. hadriaticus* subsp. *parnonicus* B.Mathew; *C. veneris* Tapp. ex Poech subsp. *carmeliensis* auct., nom sched., *in press*) due to the minor differences between them.

When Brian Mathew published his monograph on the genus *Crocus* in 1982, all the species known at that time were divided into 15 series based on their morphological characteristics. Genetic studies of the origin and mutual kinship of species had not yet begun at that time, only the number of chromosomes and their morphology were usually determined. Intensive research projects on the genus *Crocus* began at the turn of the century, first in Turkey

(Türkiye), then in the Balkans, the Pyrenees, and Iran. In 2008, Petersen *et al.* published the first comprehensive study on the phylogeny of species in the genus *Crocus*, which proved that morphological characteristics can be misleading and do not always reflect the true kinship of species in *Crocus*. This is also confirmed by later studies (Harpke *et al.,* 2012).

Crocus pulchellus (acc. no. KJGR-016) from Chios Island, Greece.

In the *Crocus* series *Speciosi* B. Mathew includes two species – *C. pulchellus* Herb., distributed in the Balkans and NW Turkey, and *C. speciosus* M.Bieb with two subspecies and a wide distribution area starting from the Crimean Peninsula (Ukraine), the Caucasus and Transcaucasia, Iran (to the east of the Gorgan Province) and in northern and central Turkey. In 1983, Mathew expanded the range, indicating that *C. speciosus* was also found in the Epiros region, NW Greece. It is quite doubtful that only one species would be distributed in such an extensive area and different ecological conditions. In fact, the first blow to such an approach had already been made in 1936, when Alexander Grossheim described *C. polyanthus* Grossh.

from Gosmalijion vill. vic. in Zuvand (now Lerik) District (Talysh, Azerbaijan). To distinguish it from the typical *C. speciosus,* he noted that the new species has smaller flowers and narrower leaves (Grossheim, 1936, 1940). However, Grossheim, when describing the new species, did not follow the rules of the International Code of Nomenclature for algae, fungi, and plants (2025), and therefore the name is not accepted, and regarded as a "*nom. illeg.*". The description of the species was also incomplete.

Typical *Crocus speciosus s.s*. (acc. no. BAR-003) from undergrowth of *Pinus brutia* pine forest near Kus Tba Lake at the outskirts of Tbilisi, Georgia.

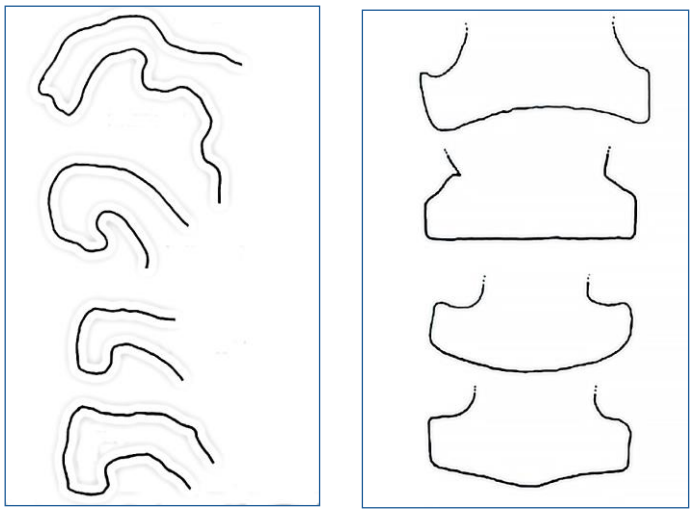
In his monograph, Mathew distinguishes two subspecies of *C. speciosus* – subsp. *ilgazensis* B.Mathew and subsp. *xantholaimos* B.Mathew. One year later, Brighton *et al.* (1983) published the results of a study on the chromosome number and morphology of *C.* ser. *Speciosi* specimens.

Left: *Crocus ilgazensis* (acc. no. 12TUA-146) from locus classicus, Ilgaz Dağı, N Turkey.

This study proves that under the name of *C. speciosus* there are forms with at least 6 different cytotypes, and they differ not only by chromosome count, but also chromosome morphology. This leads to the conclusion that we are talking about at least 6 different species or subspecies. Unfortunately, the authors of the study did not go further than determining the chromosome numbers and morphology of specimens of this group, limiting themselves to the two subspecies previously published by Mathew (Brighton *et al.,* 1983). This study suggested that we focused specifically on this *Crocus* group and several expeditions were organized to collect and study specimens of this group throughout their entire distribution area, from NW Greece to the eastern coast of the Caspian Sea in Iran, from Crimea (Ukraine) in the north and southward to the Mediterranean Sea. As a result, 77 *C.* ser. *Speciosi* specimens were concentrated in our collections, most of them gathered by us, several came from the collection of the Gothenburg Botanical Garden, Sweden, and a few of the known wild origin from the plant enthusiasts.

Above: *Crocus xantholaimos* (acc. no. 12TUA-147) from locus classicus, a pass between Boyabat and Kabali by old road, N Turkey.

A major role in these researches was also played by Kerndorff *et al.* (2015) publication on the morphology of the genus *Crocus* and taxonomically relevant parameters, where many taxonomically significant characters were described for the first time, allowing distinguishing quite similar sibling and cryptic *Crocus* species (Sigovini *et al.*, 2016) and which had been ignored or considered insignificant by Mathew (1982). In subsequent publications, other morphological characters (seeds, basal integument, etc.) were also analyzed and classified (Kerndorff *et al.,* 2015, 2016, Kerndorff & Harpke, 2021). Examining the *Croci* of the Iberian Peninsula, Kerndorff & Harpke (2022) used additional characters, such as the branching point of the style in relation to the length of the anthers, the angle of inclination of the leaf margin and the shape of the leaf keel base. The usefulness of the last two characters must be questioned to some extent, because our observations of the *Croci* of the Iberian Peninsula show that their leaf keel base shape is quite variable within the same stock. Comparing the cross-sectional leaf blade shape of 10 individuals of *C. serotinus* Salisb. specimen (acc. no. 19PTS-005B, Cabo de São Vicente, Portugal), we found that the lamina edges were down and outward (+45°) turned, only one had slightly inward turned edges (temperature in greenhouse +4°C), while in the aforementioned publication the leaf edge of the same species was described as inward (-40°) turned. During examining the same leaves an hour later under laboratory conditions (ambient temperature +18°C), all leaves had lamina edges inward turned. When repeating the examination in the greenhouse on a sunny day, when the air temperature was +20°C, the edge of all examined leaves was down and inward turned. This shows that the cross-sectional shape of leaves is greatly influenced by the ambient temperature – leaves tend to curl at low humidity and elevated temperatures and as a result lamina edges curls inside. A less variable feature is the length of the leaf keel and its broadening/narrowing rate at the base, which Kerndorff & Harpke (2022) did not analyze in the cited publication.



Morphological variability of a *Crocus* leaf: leaf arms and keel base shape (from Kerndorff & Harpke, 2022).

While exploring the growth conditions of *C.* ser. *Speciosi* members in the wild, we found that different specimens have different ecological preferences. For example, in Armenia, where both the typical *Crocus speciosus* and the *C. armeniensis* Rukšāns grow sympatrically, the two species showed a clear commitment to one habitat or another. The typical *C. speciosus* was found only in partially shaded places, in the undergrowth, among bushes, and only individual specimens were observed ~1-2 m outside the tree's canopy. *C. speciosus* has been described from E Caucasus, [in prov. Casp. Terek, Kour]; the location of the type material is unknown (Takhtajan, 2006), and there this species was also found only among bushes and in the undergrowth. Similar preferences were observed also for *C. puringii* Rukšāns, described from Crimea, Ukraine. In contrast, *C. armeniensis* grows only in open places, in meadows, and penetrates into the adjacent bushes as a few individuals in the ecotones. Similarly, also *C. archibaldiorum* (Rukšāns) Rukšāns from Iran was observed only in meadows. All of the above suggests that we are dealing with different siblings or cryptic species in this case.

Above left: *Crocus armeniensis* (acc. no. 13ARM-067) from locus classicus, a meadow near Goris, S Armenia.

Above right: *Crocus puringii* (acc. no. CRIM-06) from locus classicus, a forest below the Chatyr-Dag yayla, Crimea, Ukraine.

Right: *Crocus archibaldiorum* (acc. no. WHIR-129) from locus classicus, a meadow in the Talysh Mountains, between Nav and Khalkhal, W Iran.

Left: *Crocus bolensis* (acc. no. JATU-080) from locus classicus, sparse forest above Abant Lake, Bolu, N Turkey.

Right: *Crocus sakariensis* (acc. no. 12TUA-142) from locus classicus, a sea level species, in hazelnut orchard near Kuzuluk, NW Turkey.

Crocus striatulus (acc. no. JRRK-006) collected from a landslide some distance from locus classicus in NE Turkey.

So far, a total of 14 species of *Croci* of this series have been identified, one of them under a *nomen nudum*. Three of them [*Crocus bolensis* (Rukšāns) Rukšāns, *C. sakariensis* (Rukšāns) Rukšāns, *C. striatulus* Kernd. & Pasche] are placed by Adil Güner (2022) in "The Illustrated Flora of Turkey" among the synonyms of *C. speciosus*, although *C.* ser. *Speciosi* members growing in northern Turkey are both morphologically and cytologically well distinguishable from the typical *C. speciosus* growing wild in the Transcaucasus – Georgia and Armenia. At the same time, morphologically and cytologically different *C. ilgazensis* (B.Mathew) Rukšāns and *C. xantholaimos* (B.Mathew) Rukšāns from northern Turkey are ranked by A. Guner in the above mentioned work among the recognized species, as well as *C. brachyfilus* I.Schneid. from southern Turkey. Analyzing the specimens represented in our actual collections, we are still growing another 19-20 specimens of *C.* cf. *speciosus* whose taxonomic identity has not been yet clarified: one from Armenia, one from Abkhazia, Georgia, one described by Grossheim from S Azerbaijan, two from Greece, three from Turkey, and 12 from Iran. In this study we justify three specimens of *C.* ser. *Speciosi* discovered in Azerbaijan (1 accession), Greece (2 accessions) and Iran (1 accession), in species and subspecies ranks.

Left: *Crocus brachyfilus* from locus classicus, sparse forest to the north of Akseki, S Turkey.

Right: *Crocus hellenicus* (acc. no. 12GRA-002) from locus classicus, under trees on yayla edge at Vikos Canyon, NW Greece.

Left: *Crocus hellenicus* cataphylls look the same as in *C. zubovii.*

Right: *Crocus zubovii* (acc. no. 16IRS-154) from near locus classicus, under trees just below Olang Pass, Golestan Province, NE Iran.

Crocus ibrahimii from East Thrace, in the clearings of mixed forest, NW Turkey.

Azerbaijan: The Talysh Mountains, Zuvand

The Talysh *Crocus* sp. nova is represented in our collections by 4 accessions. All of them were collected initially as *C.* cf. *speciosus* in the Talysh Mountains, Azerbaijan, in the vicinity of Lerik (about 10 km from the locus classicus of the Grossheim's *C. polyanthus*). The oldest specimen dates back to 1987 (acc. no. RSZ-8792, at elevation of 1500 m; 38°45'N, 48°24'E), but since the possibility of unwanted hybridization during prolonged *ex situ* cultivation and propagation cannot be ruled out, this specimen was excluded from the observations. The species was described using specimens relatively recently collected by Sergey Banketov (Russia), Frederic Depalle (France) and Dimitri Zubov (Ukraine). All of them were collected in fallow crop fields and on slopes, where they grew among grasses.

<u>Right and below:</u>

Crocus zuvandicus habitat in a type locality near Lerik, Zuvand, the Talysh Mountains, S Azerbaijan; photos by S. Banketov.

Left and below:

Crocus zuvandicus flowering on 19 Sept. 2012 in a type locality near Lerik, Zuvand, the Talysh Mountains, S Azerbaijan; photos by S. Banketov.

***Crocus zuvandicus* Rukšāns & Zubov sp. nov.**

Type: Azerbaijan, the Talysh Mountains, Lerik vic., in fallow crop fields, at elevation of 1100 m; 38°45'52.7"N, 48°24'54.3"E; cult. (specimen grown in Latvia in the garden of Jānis Rukšāns; specimen originally collected in type locality by D. Zubov in May 2015), fl. 19 Sept. 2024, *Rukšāns & Zubov* s.n. (holotype RIG II: BOT-17088!); syn. *Crocus polyanthus* Grossh. in Trudy Bot. Inst. (Baku) 2: 251 (1936), *nom. illeg.*

Habitat and distribution – fallow crop fields and on slopes in the Talysh Mountains.
Flowering time – September - October.
Corm – up to 15 mm in diam., round to slightly elongated round, not stoloniferous, forming a lot of grain-like cormlets, sometimes not.
Tunics – outer tunic hard, inner thinner, with distant basal splits and numerous short subsplits.
Tunic neck – variable in length, mostly up to 5 mm long, rarely longer.
Basal rings/tunic – rings usually 2 but mostly indistinct, very brittle, with smooth to unevenly roughed upper edge, basal tunics formed by 2-3 layers, central around 5 mm in diameter, upper up to 17 mm and seem that they replace(?) basal rings, but are strongly attached to corm.
Prophyll – absent.
Cataphylls – 4, white at tips slightly greenish yellow tinted, upper ends around ground level.
Leaves – appears in spring, usually three, rarely 2 or 4, dark green, nude, white stripe 1/4-1/3 of lamina width, lamina edges narrow, down and slightly inward turned, lateral channels widely open, without ribs, keel short, narrowing in direction to base, keel base flat to slightly outward curved.
Perianth tube – greenish white to creamy.
Bract and bracteole – subequal, very narrow, hidden between cataphylls or only tips are visible, ends mostly at ground level.
Throat – light yellow with diffused upper edge, distinctly more or less densely hairy.
Filaments – 8-**9**-12 mm long, pale yellow, with minute hairs or papilla more densely in basal half.
Anthers – 12-**14.5**-20 mm long, deep yellow, arrow shaped with pointed tips and short basal lobes.
Connective – creamy or less often pale yellow.
Style – yellow turning orange to tip, split at upper third or tips of anthers into many branches and mostly well overtop them, only very rarely ends below tips, tips of the secondary branches mostly are more or less downward turned and looks arched, although not always.

Flower segments – outer lanceolate, inner wider.

Outer segments – 41-**50**-60 mm long and 12-**16.5**-19(27) mm wide, outside pale blue with very indistinct veining, inside darker with something more prominent 3 veins, basal blotch small, diffused, creamy yellow with greyish bloom.

Inner segments – 35-**45.5**-50(56) mm long and 16-**17.5**-22 mm wide, same on both sides and distinctly darker than outer segments with 3 prominent medial veins and slightly less distinct lateral veining.

Capsule – buff to light brown, 12-17 mm long and up to 8 mm wide with small peak at top, positioned 7-10 cm over ground level.

Seeds – dark reddish brown, round to slightly elongated, 3-4 mm long and 3-3.5 mm wide with small caruncle and quite indistinct raphe.

2n = unknown.

Etymology – The species was named after an old name of the Lerik dist. – Zuvand (Diabar), valid at time when Grossheim originally published his new species as *C. polyanthus*, but with an absent holotype specimen. Zuvand depression is located between the Talysh and Buddhist ridges. The Komurgoy (2492 m) and Qızyurdu (2433 m) are the highest peaks in the Talysh Range. It mostly consists of Paleogene volcanogenic-sedimentary rocks. The region is covered by 40.3 thousand hectares of the Caspian Hyrcanian mixed forests (the Hyrcanian ecoregion).

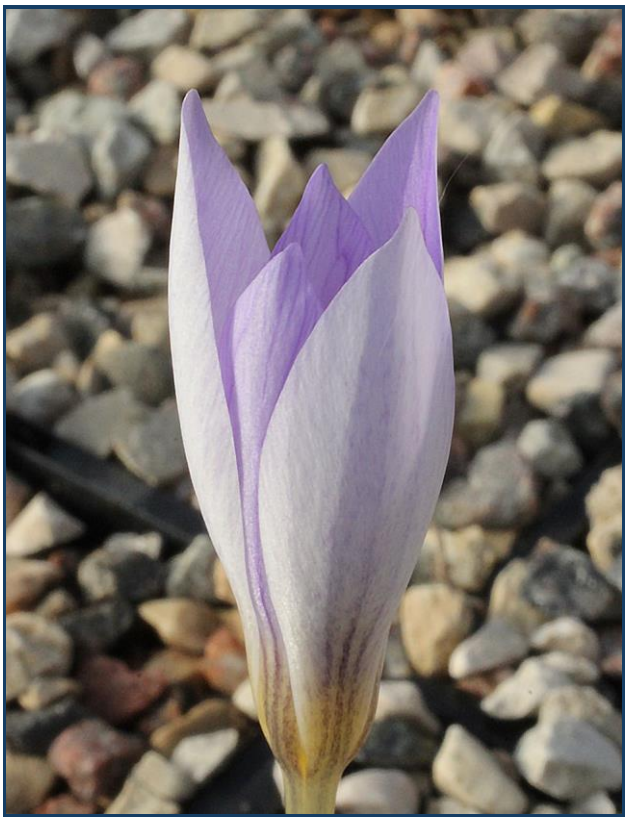
Specimens examined: RIG II: Bot-17086!, 17087!, 17164!.

We collected *C. zuvandicus* first in 1987 [acc. no. RSZ-8792, by Ruksans, Seisums & Zobova (National Botanic Garden, Latvia)], and again in 2012 by Banketov (Russia), Depalle (France), in 2015 by Zubov (Ukraine).

Crocus zuvandicus is something similar to *C. archibaldiorum*, but outside segments are plain lilac and stigma well (in most cases prominently) overtops anthers, and leaves are produced only in spring. Our attention was especially drawn to the unusual arched, downward-pointing shape of the stigmatic branches, which we had not observed in other *Crocus* species of this series. For separating *C. polyanthus* from allied species (*C. speciosus, C. pulchellus, C. autranii* Albov), Grossheim gives the following characters: smaller flower size, different flower colour, other shape of flower segments and more floriferous habit. We can add as well that typical *C. speciosus* s.s. belongs to the nemoral species whilst *C. zuvandicus* is a plant from open habitats.

Crocus zuvandicus is very easy in cultivation and a good grower both in greenhouse and garden, it sets seeds well. Our first stock of it of 1987 was almost completely destroyed by

rodents, but very well recovered from few small corms which were left untouched and from their seedlings.

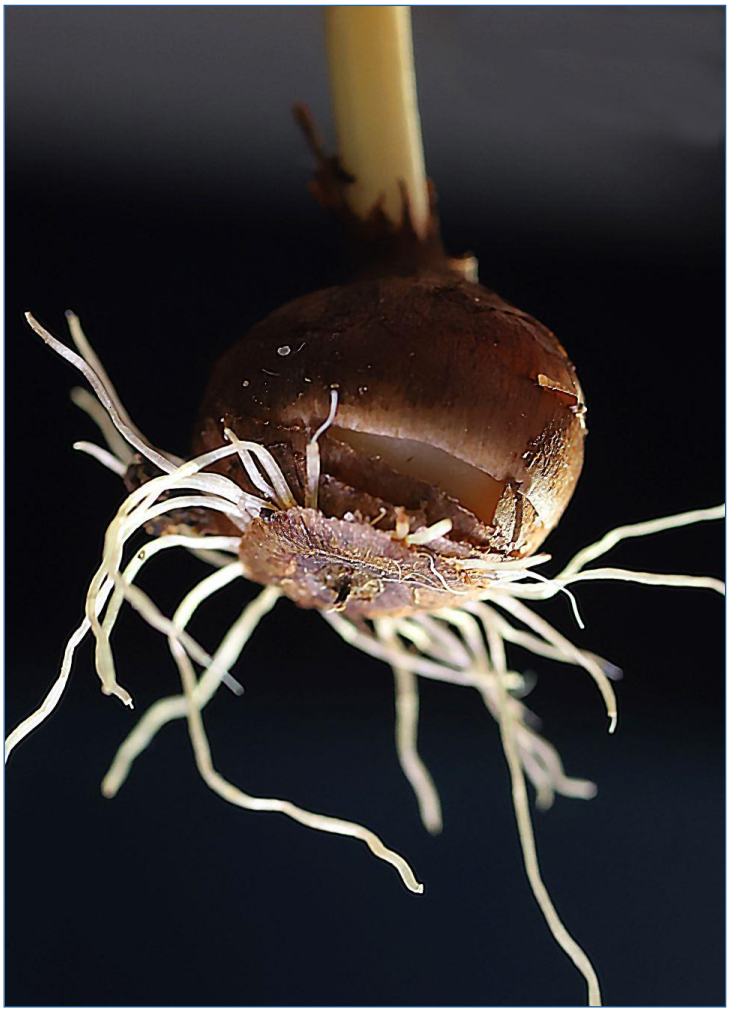


This page: *Crocus zuvandicus*, cultivated plants.

Crocus zuvandicus flower showing the curved stigmatic branches.

Crocus zuvandicus holotype specimen RIG II: BOT-17088.

Crocus zuvandicus corms and tunics.



Left: *Crocus zuvandicus* basal tunic.

Above: *Crocus zuvandicus* cross-section leaf cut.

Crocus zuvandicus flower details.

Crocus zuvandicus seedpods and seeds.

 ISSN 2053-7557

Greece: Western Greece, Aetolia-Acarnania

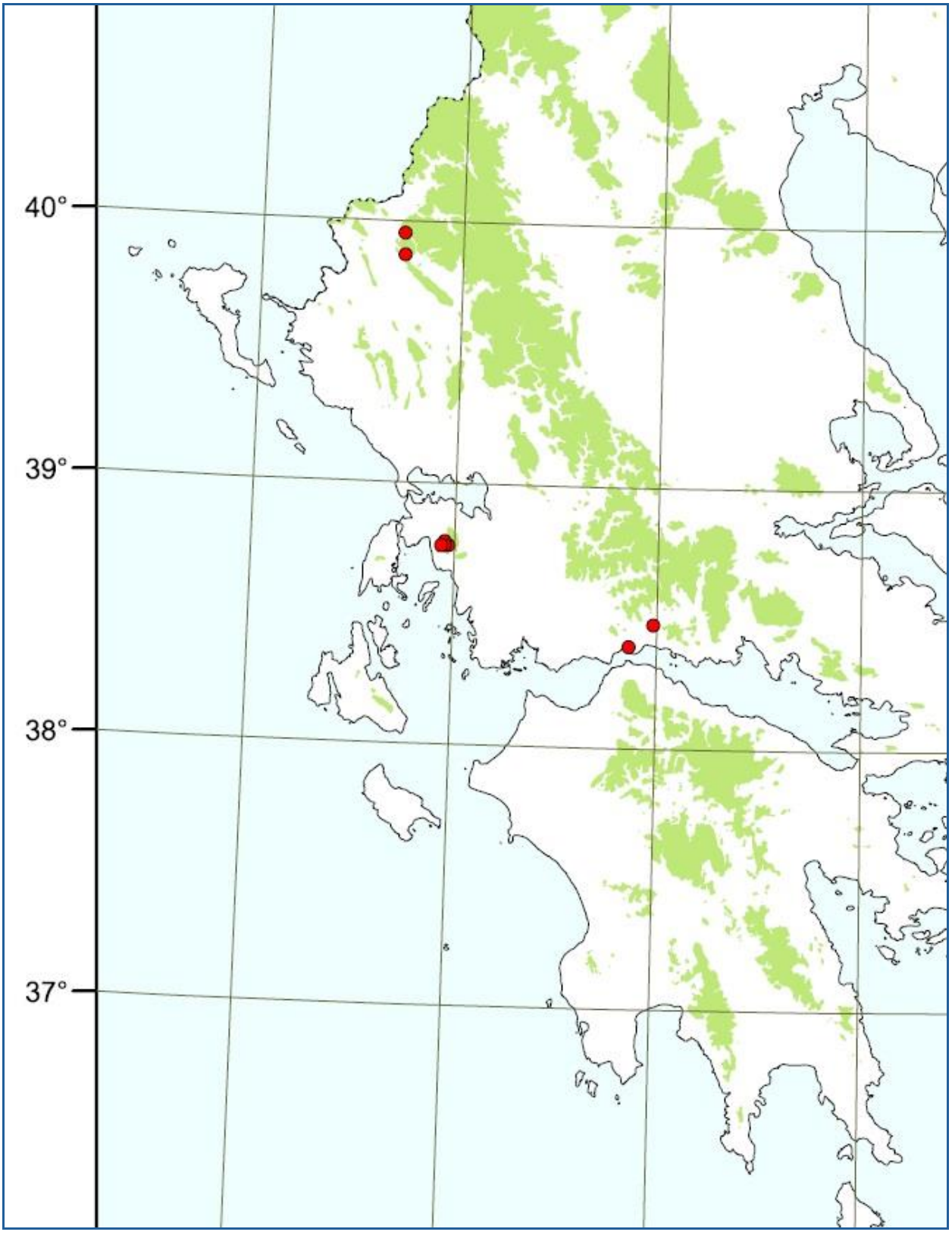
In 1982, when Mathew's monograph was published, the distribution area for *C. speciosus* s.l. was indicated as the Caucasus, Turkey and Iran. The monograph indicated that the information about the finds of this species in the Balkans and the European part of Turkey should be attributed to *C. pulchellus*. The same was also stated in the Flora of Turkey (Davis, 1984). However, this assumption turned out to be erroneous and in 2014 a new species of the series *Speciosi* from European part of Turkey was described – *C. ibrahimii* (Rukšāns) Rukšāns. Further research showed that it is distributed also in SE Bulgaria (as *C. speciosus* subsp. *ibrahimii*; Stoyanov & Raycheva, 2024). Earlier, researchers guided only by the white-coloured anthers and ignoring other features, erroneously considered *C. ibrahimii* to be *C. pulchellus*, although the two species are easily distinguishable. One year later, Mathew (1983) also mentioned the finding of *C. speciosus* in the Ipiros region, in north-western Greece, but still did not include this species in the key to the Greek *Crocus* species. While working on the monograph “The World of Crocuses” prof. Arne Strid sent to Rukšāns the materials of the Flora of Greece with a register of all known *Crocus* localities (Strid, *pers. comm.*, 2012), which lists eight populations of *C. speciosus* s.l. in Greece. The attached map shows that two of them are located in the Tymfi massif, north-western Greece (near the Vikos canyon, Monodendri and Papingo villages, 960-1200 m). The rest of specimens were from the Aetolia-Acarnania regional unit in Western Greece Region: four populations near the Acarnanian Mountains and two specimens came from the south-eastern border of this region in the north of Nafpaktos. One of these collections (acc. no. JP 87-104) was cultivated in the Gothenburg Botanical Garden, from where we also obtained the first specimen of this taxon. Another specimen (acc. no. PB-359) from the same region was sent to us by David Stephens from the UK. The last two specimens (accs. no. JP 87-104 and PB-359) turned out to be morphologically identical and superficially similar to the species of this series from southern Turkey, which was first discovered north of Akseki by Osman Erol. He suggested naming it *C. elegantissimus* nom. sched. (Erol, *pers. comm.,* 2018), although the use of superlatives is not recommended by the nomenclature code. A few years later, Rukšāns also found this population and described it as *C. speciosus* subsp. *elegans* Rukšāns (2013), later changing its status to *C. elegans* (Rukšāns) Rukšāns – published on April 25, 2014. On March 13 of the same year, I. Schneider had already published this species as *C. brachyfilus* I.Schneid., thus the priority belongs to Schneider’s name and the name of *C. elegans* becomes its synonym. *Crocus brachyfilus* from south of Turkey is a nemoral plant (characteristic of or pertaining to the nature of woods or groves), but both specimens from the vicinity of Nafpaktos were collected in open fields.

The obvious morphological similarity of the plants received prompted our group to search for wild specimens to determine the plant variability in these populations, as the cultivated specimens were very homogenous. We visited the region north of Nafpaktos five times in different years, in autumn (during the potential flowering period) and in spring (for foliage search) and three times to the Acarnanian Mountains, but we were always unsuccessful. Our searches in the vicinity of the Vikos Canyon in north-western Greece turned out to be much more successful, right away on the first expedition we managed to find flowering specimens in the undergrowth near the village of Monodendri. We gathered a few plants for a herbarium and conducted detailed morphological field studies. Superficially, a habitus of these plants formed an idea that we are dealing with a typical *C. speciosus* than with cultivated specimens from the Nafpaktos area far to the south. However, differences from the typical *C. speciosus*, which occurs in the wild in Georgia, Armenia and possibly also extends into central Azerbaijan, as well as the obvious geographical isolation, led to the belief that another species of *C.* ser. *Speciosi* occurs in Greece. And finally, it was described and published in 2014 as *C. hellenicus* Rukšāns.

Only in the autumn 2024, our group managed to find both populations occurring in the south. We collected plants of authentic wild material for a herbarium and carried out the morphological field studies. The plants from two southern sites - in the Acarnanian Mountains (2 populations were observed) and north of Nafpaktos (1 population was observed) - turned out to be practically identical, having a minimal infra- and interpopulation variability. They were identical to the cultivated specimens from the Nafpaktos area as well. The only difference from the cultivated plants was in the size of the flower parts: in the wild the flowers were something smaller than in cultivation.

Crocus hellenicus at Vikos (the northern populations) was found growing under trees and in ecotone with meadow, but still in the shade; at Nafpaktos and Moni Romvou (the southern populations) it was found only in meadows, not even one in the shade. The second difference was in the appearance of the flowers: the flower tube was pure white, and the flower segments had more or less pronounced veining (weakly expressed in living plants, but much more pronounced in exsiccata). As in typical *C. hellenicus* specimens from the north-west, the cataphylls in plants of the southern populations at blooming time are white with purple stripes, but the stripes were not strongly pronounced. This allows us to distinguish the Greek species from the other species of this series, since similar stripes on the cataphylls have been observed only in *C. zubovii* Rukšāns growing in Iran, in mountains near east coast of Caspian Sea. However, considering the rather high similarity of the populations, as well as the geographical and orographic distance between them, we decided to describe the plants of *C.*

ser. *Speciosi* from the Aetolia-Acarnania regional unit of Western Greece Region as a subspecies of *C. hellenicus* subsp. *hellenicoides* Rukšāns & Zubov subsp. nova.



Crocus hellenicus localities in Greece: two top dots – subsp. *hellenicus*; bottom dots below the northern latitude 39° – subsp. *hellenicoides* (a map from Arne Strid).

Crocus hellenicus subsp. *hellenicoides* habitat in the Acarnanian Mountains, W Greece.

Crocus hellenicus subsp. *hellenicoides* blooming in the Acarnanian Mountains, W Greece.

Crocus hellenicus subsp. *hellenicoides* blooming in the Acarnanian Mountains, W Greece.

Crocus hellenicus subsp. *hellenicoides* in the north of Nafpaktos, W Greece.

***Crocus hellenicus* Rukšāns subsp. *hellenicoides* Rukšāns & Zubov subsp. nov.**

Type: Greece, Western Greece Region, Aetolia-Acarnania regional unit, open foot pass and meadows on steep mountain slope between sparse grass, at elevation of 830 m; fl., 24 Nov. 2024, *Rukšāns & Zubov* s.n. (holotype: RIG II: BOT-17079!).

Habitat and distribution – Open foot pass and meadows on steep mountain slope between sparse grass, soil of small stone chips with clay, pH 6.6; at elevation of 800-1200 m, known from several localities in Aetolia-Acarnania regional unit in Western Greece in the Acarnanian Mountains and the north of Nafpaktos; due to small size of observed populations and danger of over-collecting, the exact coordinates are not mentioned here, but registered on the holotype specimen.

Flowering time – October-November.

Corm – in wild small, around 10 mm in diam., not stoloniferous (vs *C. hellenicus* which is stoloniferous) but forming few cormlets at mother corms base.

Tunics – thin, almost papery, basal edge with very few splits, subsplits absent.

Tunics neck – narrowly based triangular, adpressed to flower tube, 3-5 mm long.

Basal rings/tunic – rings two, week, wide with almost smooth upper edge or with very short densely spaced tooth with occasional, sparse longer teeth, basal plate 4-8 mm in diameter with very irregularly roughed but not toothed upper edge.

Prophyll – absent.

Cataphylls – 2-3, yellowish white, indistinctly purple striped at very top but not always.

Leaves – (2)3(4), nude or papillose along the margins and keel and very sparsely on the lamina, dark greyish green, 2 mm wide, the white stripe 1/3 of the leaf width or something wider, lamina edges narrow, down and inward turned, lateral channels open and without ribs, keel distinctly narrowing in direction to base, at very base prominently wider with outward curved base.

Perianth tube – white or very slightly creamy shaded.

Bract and bracteole – membranous, white, ligulate, bracteole smaller, both hidden by the cataphylls.

Throat – nude, small, very light yellowish white to slightly greenish creamy with diffused upper edge

Filaments – in wild 4-**6**-8 mm long (in cultivation 5-**5.5**-8 mm) long, light creamy to greenish white, minutely hairy or papillose, sometimes very sparsely or rarely even nude.

Anthers – in wild 12-**13**-15 mm long, in cultivation 11-**13**-14 mm long, yellow, arrow shaped, basal lobes long, pointed with something orange red tips.

Connective – white to very pale yellowish.

Style – many branched, at base yellow, gradually turning to orange and after branching to red, split into branches at upper third of anthers or over them into many short branches with many short subsplits, always overtop anthers although occasionally only slightly.

Flower segments – lanceolate or something obovate, but almost always with acute tips, inner segments shorter and slightly wider than outer.

Outer segments – in wild plants 28-**31.5**-39 mm long and 7-**9.5**-12 mm wide, in cultivated 37-**44**-49 mm long and 9-**14.5**-18 mm wide, outside very light lilac shaded, almost white with indistinct median stripe, at base greyish creamy white, sometimes slightly stippled greyish with insignificant veins in basal part; inside slightly darker with 3 darker lilac median veins and almost indistinct lateral veining on sides. In herbarium veining looks more prominent.

Inner segments – in wild plants 27-**30.5**-37 mm long and 8-**10.5**-13 mm wide, in cultivated – 33-**41**-48 mm long and 11-**16.5**-20 mm wide, outside same as on outer segments but with something more prominent veining, light lilac with darker median vein and more prominent lateral veins, inside of same colour as outside only veining more prominent, in general slightly lighter than outer segments inside.

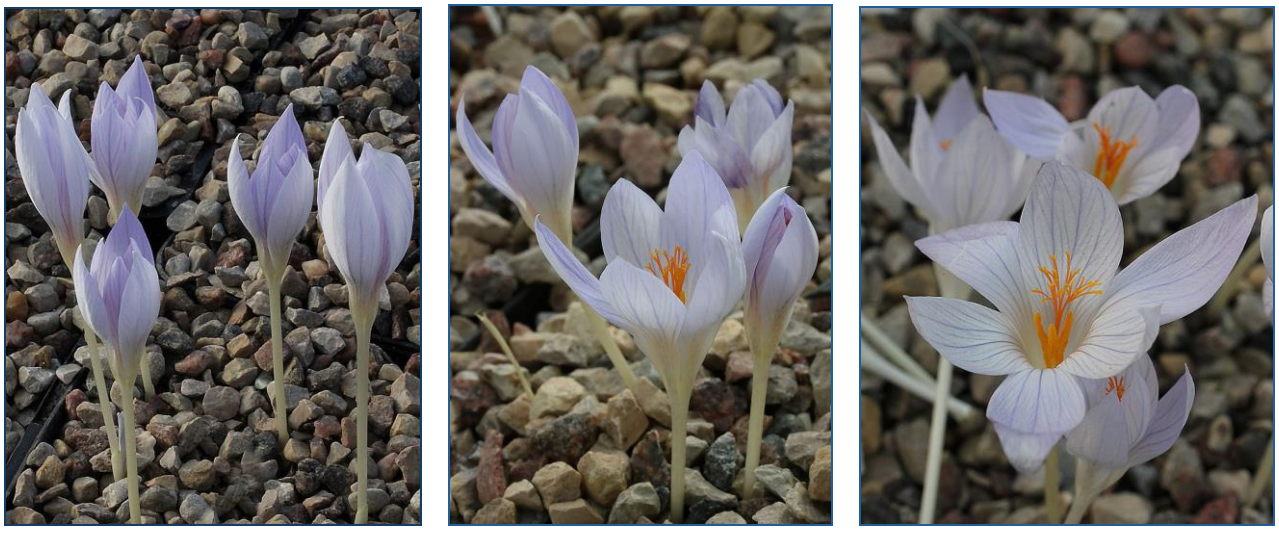
Capsule – brown, with peak at top, 20-25 mm long and 8-10 mm wide, in cultivated plants positioned variably – from ground level up to 5 cm higher, in wild plants not seen.

Seeds – dark reddish brown, drying darkens to almost blackish brown, round, approximately 2 mm in diameter, with small black caruncle and less pronounced blackish raphe.

2n = unknown.

Etymology – the name highlights the similarity with *C. hellenicus*.

Specimens examined: RIGII: BOT-17080!, -17081!, -17082!, -17134!, -17135!.



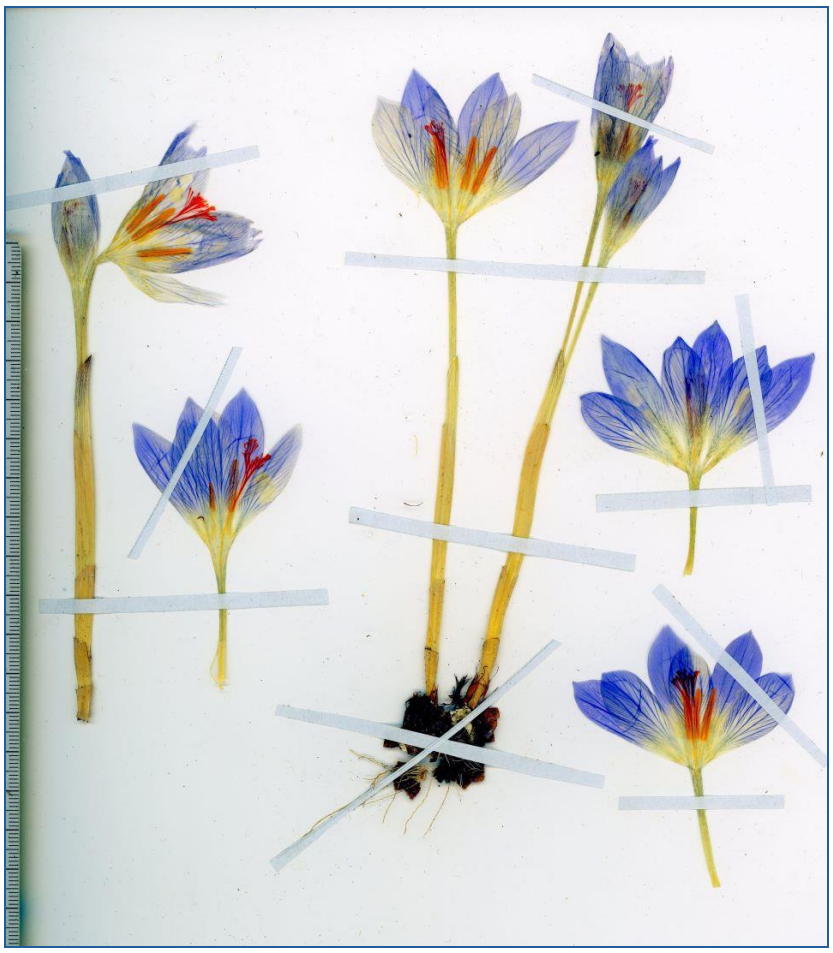
Crocus hellenicus subsp. *hellenicoides*, cultivated plants.

In cultivation this *Crocus* is not difficult, although flowering size corms have a tendency to split into several small ones and to form numerous cormlets. So sometimes there is need for 1-2 years of cultivation before they reach flowering size again. But its exceptional beauty compensates this “fault” very well.

Crocus hellenicus subsp. *hellenicoides* cultivated plants (acc. no. PB-359).

Crocus hellenicus subsp. *hellenicoides* cultivated plants (acc. no. JP 87-104).

Crocus hellenicus subsp. *hellenicoides* holotype specimen RIG II: BOT-17079.



Crocus hellenicus subsp. *hellenicoides* herbarium specimens of cultivated plants.

Crocus hellenicus subsp. *hellenicoides* corm tunics.

Crocus hellenicus subsp. *hellenicoides* cross-section leaf cut.

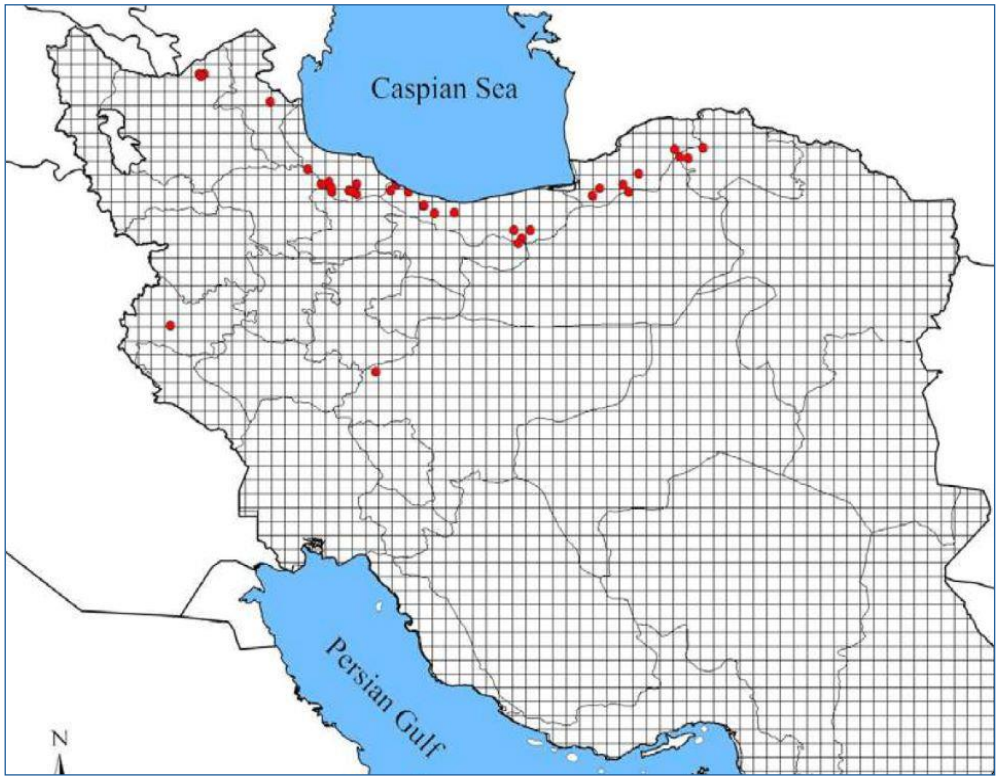
Crocus hellenicus subsp. *hellenicoides* seed capsule with seeds.

Crocus hellenicus subsp. *hellenicoides* flower details.

Iran: The Alborz mountain range, Mazandaran

Generally, the autumn flowering *Crocus* species discovered in Iran are represented by the section *Crocus* B.Mathew with three species, namely *C. haussknechtii* (Boiss. & Reut. ex Maw) Boiss. s.l. from the series *Crocus*, and *C. gilanicus* B.Mathew and *C. hakkariensis* (B.Mathew) Rukšāns from the series *Kotschyani* B.Mathew; and the section *Nudiscapus* B.Mathew represented by *C. damascenus* Herb. s.l. from the series *Reticulati* B.Mathew, *C. caspius* Fischer & C.A.Meyer ex Hohen. from the series *Biflori* B.Mathew and *C. speciosus* s.l. from the series *Speciosi* (Dolatyari *et al.,* 2024)*.

Iranian *Croci* from the series *Speciosi* are distributed over a wide area in the mountains along the southern coast of the Caspian Sea from Azerbaijan in the west up to the east of Gorgan Province and they are found both in open places and in the forested areas. There are only few gatherings of *C. speciosus* s.l. listed in Flora Iranica (Wendelbo & Mathew, 1975). All of them comes from Caspian coastal regions in North Iran and was found at elevations of 1200 m - 2000 m (Tabasi *et al.*, 2021). As it is marked on the map following, there are approx. 32 points where *C. speciosus* s.l. were observed in Iran at elevations of 250 m -2500 m, between the northern latitude 33° and 39°. Two of the points are marked far to the south of the general distribution area of this *Crocus* species, and most likely, these two points represent the misidentified members of the *Crocus* species from the series *Biflori* B.Mathew.



Iranian localities where *C. speciosus* aff. plants were observed by Iranian botanists (after Tabasi *et al.,* 2021).

**Before the publication of a new Crocus phylogeny we were using the classification applied by Mathew in his monograph (1982).*

It is known that a few specimens of *C.* ser. *Biflori* observed in bloom were found much further south by local Iranian plantaholics. According to Brighton *et al.* (1983), all checked specimens from Iran had 2n = 12 chromosome number, but specimens considered by us as typical *C. speciosus* (from Georgia and Armenia) had 2n = 14.

In our collections, Iranian *C.* ser. *Speciosi* members are represented by specimens from 22 populations distributed at elevation of 700 m – 2250 m, including *Crocus archibaldiorum*, which belongs to the meadow species group and represented by specimens from 6 populations, and *C. zubovii*, which is a nemoral species with specimens from 7 populations. *Croci* of this series from 9 populations are still under study; most likely, three of them deserve a proper name.

According to Tabasi *et al.* (2021), the most remote point in direction to the east, where *C. speciosus* s.l. was observed, is marked at ~57° of the eastern longitude. We've never found it this far. In our collections, the most eastern growing species of *C.* ser. *Speciosi* is *C. zubovii* observed at 55° of the eastern longitude.

Here we give a description and name for a distinct new nemoral *Crocus* species collected in 2016 in a relatively sparse forest at elevation of 1190 m by the road from Javaher Deh village at the border between Mazandaran and Gilan Provinces to the south-west of Ramsar (acc. no. 16IRS-065).

Crocus hyrcanus habitat, Mazandaran and Gilan Provinces border, N Iran (standing – the Iranian guide of our group).

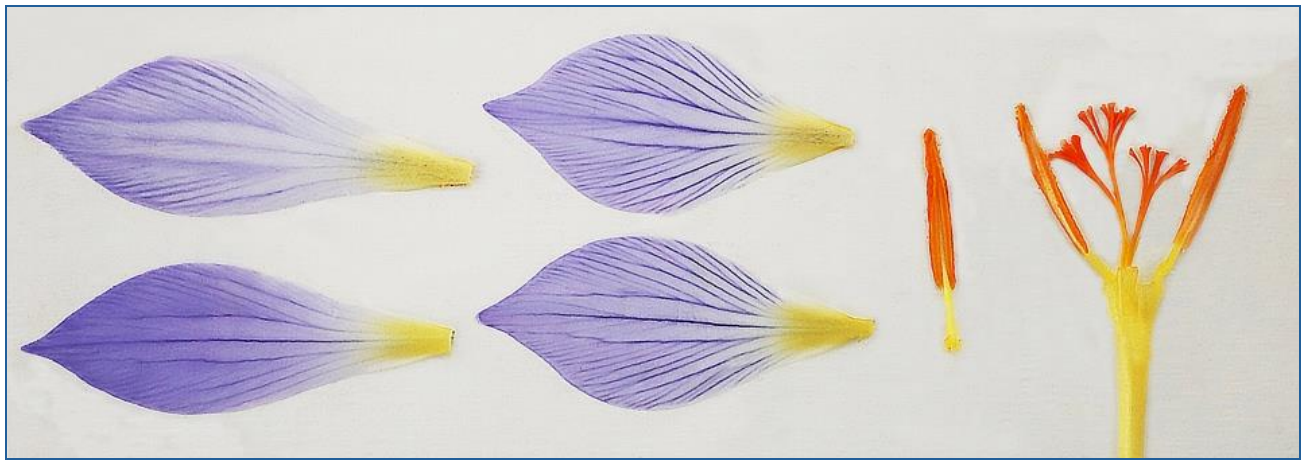
Crocus hyrcanus habitat, Mazandaran and Gilan Provinces border, N Iran.

The Hyrcanian *Parrotia persica* deciduous forest at elevation of 1190 m, Mazandaran and Gilan Provinces border, N Iran,

One of the features used by Mathew to distinguish *C.* ser. *Speciosi* species, when publishing *C. ilgazensis*, was the position of the stigma to the anthers. Similar to *C. ilgazensis*, the species described here also has the stigma positioned below the tips of the anthers, and this feature is significantly pronounced in the new Iranian species. In *C. archibaldiorum* from the west of Iran, the stigma is usually located at the tips of the anthers. The colour of the perianth segments of the two species also differs, especially a pattern of outer perianth segments abaxially: whitish, with minutely branched comparatively wide diffused lilac stripes from bottom to top, without prominent lateral veining in *C. archibaldiorum vs* a lower part significantly light bluish violet with 3 narrow slightly darker veins to the top and many fine lateral veins on both sides in *sp. nova*. The leaves of *C. archibaldiorum* are developing in autumn (synanthous foliage), simultaneously to the end of flowering, while in the new species they were developing only in spring (hysteranthous foliage). In nemoral *C. zubovii*, which grows more than 400 km to the east of the *sp. nova* type locality, the stigma usually significantly exceeds the anthers.

This page: *Crocus hyrcanus,* cultivated plants.

Crocus hyrcanus, cultivated plants.



Crocus hyrcanus – flower details

 Charity registered in Scotland SC000942 ISSN 2053-7557

Crocus hyrcanus holotype specimen RIG II: BOT-17083.

***Crocus hyrcanus* Rukšāns & Zubov sp. nov.**

Type: Iran, the Alborz mountain range, Mazandaran and Gilan Provinces border, by Ramsar-Javaher Deh rd., in forest, at elevation of 1190 m; 36°52.134'N, 50°31.598'E; cult. (specimen grown in Latvia in the garden of Jānis Rukšāns; specimen originally collected in type locality by Rukšāns, 20 Apr. 2016), fl. 10 Oct. 2024, *Rukšāns & Zubov* s.n. (holotype RIG II: BOT-17083!).

Habitat and distribution – in *Parrotia persica* (DC.) C.A.Mey. deciduous forest, accompanied by *Corydalis cava* subsp. *marschalliana* (Willd.) Hayek, *Galanthus transcaucasicus* Fomin and *Fessia hohenackeri* (Fisch. & C.A.Mey.) Speta (the Caspian Hyrcanian mixed forests ecoregion).

Flowering time – unknown in the wild, in cultivation – October; it is one of the latest blooming Iranian members of *C.* ser. *Speciosi.*

Corm – distinctly stoloniferous and forming a lot of cormlets at base of new corm.

Tunics – very thin, papery, even silky.

Tunics neck –short, only 4-5 mm long, adpressed to flower tube, formed by widely based triangular splits of main tunic.

Basal rings/tunic – rings usually 2(3), thin, upper edge almost smooth (very minutely roughed), basal tunic up to 6 mm in diameter, deeply split or fringed on edge.

Prophyll – absent.

Cataphylls – usually 4, silvery, without markings, turning brownish in upper part and light brown at end of vegetation.

Leaves - 3-4, hysteranthous, formed only in spring, 2.5-3 mm wide, dark green, ciliate on margins and sparsely on surface, white stripe wide -1/3 to 1/2 of lamina width, lateral channels without ribs, almost closed by down and inward turned lamina margins, keel short, slightly narrowing in direction to base, ciliated on margins.

Perianth tube – creamy to light yellowish.

Bract and bracteole – subequal, narrow, ends well below flowers base and at blooming time only slightly exerting from cataphylls.

Throat – hairy, light creamy white (pale yellow) with diffused to something starry upper edge.

Filaments – 5-**6-**8 mm long, hairy, light creamy yellow.

Anthers – 14-**17-**19 mm long, deep yellow, arrow shaped with long basal lobes.

Connective – white.

Style – light yellow turning orange below splitting, divided at base or bottom third of anthers, ends well below tips of anthers, occasionally closer to tips, but **always** below them.

Flower segments – lanceolate turning deltoid in upper third, more prominent on inner segments which are shorter and proportionally wider with something attenuate, pointed tips.
Outer segments – 48-**53.5**-59 mm long and 15-**16**-18 mm wide, outside very light bluish violet with 3 slightly darker veins to top and many fine lateral veins on both sides, base light greenish white with indistinct speckling, inside darker lilac with something more prominent, darker veining.
Inner segments – 40-**46**-51 mm long and 16-**19**-21 mm wide, on both sides of same colour with outer segments inside - light lilac with darker veining, outer basal blotch same as on outer segments, diffused at top, inside blotch starry at edge.
Capsule and **seeds** – not seen.
Etymology – named after Hyrcanian forests of the ancient region of Hyrcania composed of the area south of the Caspian Sea, incl. the Alborz mountain range and the Kopet-Dag range (modern Iran and Turkmenistan territories).
Specimens examined: RIGII: BOT-17083, -17138!

Crocus hyrcanus corms with cormlets and stolons.

In cultivation *C. hyrcanus* is very easy and well grown both in pots under cover and in open garden. It increases prolifically by corm splitting; the basal cormlets are sometimes produced abundantly. In some cases, the cormlets appear at tips of underground stolons, but this feature is not prominent. This is one of the latest blooming species of *C.* ser. *Speciosi.*

Crocus hyrcanus corm basal tunics.

Crocus hyrcanus cross-section leaf cut.

Crocus hyrcanus flower details: centre row - inner whorl segments, bottom row - outer whorl segments.

Cultivation impact on the Crocus plant morphological parameters

Of the three new *Crocus* taxa, two – *C. zuvandicus* (any herbarium specimens were not collected *in situ* during flowering) and *C. hyrcanus* (a type specimen in foliage was collected in spring), have been described based on cultivated plants available for the characterization of their morphological parameters. For comparing how cultivation conditions may change the sizes of the plant organs, we were studying the plants of third new taxon – *C. hellenicus* subsp. *hellenicoides*. It was observed during flowering *in situ,* and also we explored its plants previously collected by other collectors (accs. no. JP 87-104 and PB-359), which were cultivated in the authors' collections. The position of the stamens to the anthers was least affected under cultivation conditions. In practically all cases, both in the wild and in cultivation, the stigmatic branches arose above the anthers. Of the twenty-two cultivated specimens observed, only in one case was a stigma observed at the same height as the tops of the anthers, and in this case the branching point of the style was in the lower third of the anthers. In specimens observed in the wild, the branching point of the style was invariably towards the middle of the anthers, in cultivated plants – in half approximately towards the middle of the anthers, and in half towards the upper third. The flower sizes changed more significantly under cultivation conditions – they were distinctly larger than in plants observed in the wild. At the same time, the size index of the length/width of the flower segments, as well as the index of the length of the anthers to the filaments, although slightly different, but this difference is unlikely to be significant.

Acknowledgments

We would like to thank our long-time travel partner Vaclav Jošt (Czech Republic), who accompanied us during endless trips in search of new plants. Special thanks go to Sergey Banketov for sharing his photographs from the Talysh Mountains, Henrik Zetterlund (The Gothenburg Botanical Garden, Sweden), David Stephens (UK), Frederik Depalle (France), Theodoros Samaras (Greece) for sharing living plants used for description of the new species. We would also like to thank Jill White (UK) for arranging of several trips to Iran and to our Iranian guides who accompanied us during those trips. Of course, we cannot forget our families, who always supervised and maintained the collections while we were wandering around in the mountains.

References

Brighton, C.A., Mathew, B., and Rudall, P. 1983. A detailed study of *Crocus speciosus* and its ally *C. pulchellus (Iridaceae)*. Plant Systematics and Evolution, 142: 187 – 206.

Davis, P.H., ed. 1984. Flora of Turkey and the East Aegean Islands. Vol. 8. Edinburgh: University Press.

Dolatyari, A., Abolhasani T., M., Ardalani, F., and Rukšāns, J. 2024. A taxonomic revision of the genus Crocus (Iridaceae) in Iran. Nordic Journal of Botany, 2024(6), p.e04270.

Grossheim, A.A., ed. 1936. New plant species from Azerbaijan. 9. Crocus polyanthus sp. nova (Annulati Boiss.). Tr. BIN AzFAN, vol. II. Baku: AzFAN: 251 – 252. [in Russian].

Grossheim, A.A., ed. 1940. Flora Caucasica. Vol. 2, 2d ed. Baku: AzFAN. [in Russian].

Güner, A., ed. 2022. The Illustrated Flora of Turkey (Resimli Türkiye Florası). Crocus L. (Çiğdem). Retrieved from https://www.turkiyeflorasi.org.tr/pdf-kutuphanesi.html [Accessed 18 Feb. 2025]. [in Turkish].

Harpke, D., Meng, S., Rutten, T., Kerndorff, H., and Blattner, F.R. 2012. Phylogeny of Crocus (Iridaceae) based on one chloroplast and two nuclear loci: ancient hybridization and chromosome number evolution. Molecular phylogenetics and evolution, 66(3); 617 – 627. http://dx.doi.org/10.1016/j.ympev.2012.10.007

Harpke, D., Kerndorff, H., Pasche, E., and Peruzzi, L. 2016. Neotypification of the name *Crocus biflorus* Mill. (Iridaceae) and its consequences in the taxonomy of the genus. Phytotaxa, 260 (2): 131 – 143.

International Code of Nomenclature for algae, fungi, and plants. 2025. Retrieved from https://www.iapt-taxon.org/nomen/main.php [Accessed 18 Feb. 2025].

Kerndorff, H., Pasche, E., and Harpke, D. 2015. The Genus Crocus (Liliiflorae, Iridaceae): Lifecycle, Morphology, Phenotypic Characteristics, and Taxonomical Relevant Parameters. Stapfia, 103: 27 – 65.

Kerndorff, H., Pasche, E., and Harpke, D. 2016. The Genus *Crocus* (Liliiflorae, Iridaceae): a descriptive seed morphology. Part one: macroscopic traits and phylogenetic relevance. Stapfia, 105: 3 – 41.

Kerndorff , H., and Harpke, D. 2021. Reticulate corm tunic characters in the genus *Crocus* (Liliiflorae, Iridaceae) and their taxonomical value. Stapfia,112: 61 – 88.

Kerndorff , H., and Harpke, D. 2022. *Crocus cobbii* Kerndorff, Pasche & Harpke species nova (Liliiflorae, Iridaceae) and its relatives. Stapfia, 113:5 – 32.

Mathew, B.F., ed. 1982. The Crocus. A revision of the genus Crocus (Iridaceae). London: B.T. Batsford Ltd, 127 pp. + 96 plates. ISBN 0-7134-3390-6.

Mathew, B. 1983. The Greek species of Crocus (Iridaceae), a taxonomic survey.Ann. Musei Goulandris, 6: 63 – 86.

Petersen, G., Seberg, O., Thorsøe, S., Jørgensen, T., and Mathew, B. 2008. A phylogeny of the genus Crocus (Iridaceae) based on sequence data from five plastid regions. Taxon, 57: 487 – 499.

Rukšāns, J. 2013. Seven new crocuses from the Balkans and Turkey. Alpine Gardener, 81: 188 – 193 & Supplement.

Rukšāns, J. 2014. *Crocus danfordiae* Maw and *C. chrysanthus* (Herbert) Herbert (*Iridaceae*) and some of their allies in Turkey and Iran. Int. Rock Gard., 52: 2-31.

Rukšāns, J. 2017. The World of Crocuses. Latvian Academy of Sciences. 568 p.

Schneider, I. 2014. *Crocus brachyfilus* (*Iridaceae*), a new species from southern Turkey. Willdenowia, 44: 45 – 50.

Sigovini, M., Keppel, E., and Tagliapietra, D. 2016. Open Nomenclature in the biodiversity era. Methods in Ecology and Evolution, 7 (10): 1217 – 1225.

Stoyanov, K., and Raycheva, Ts. 2024. Iridaceae family in Bulgaria. Atlas with determination keys. Plovdiv: Agricultural University Academic Press. [in Bulgarian].

Tabasi, M., Mehrabian, A., and Sayadi, S. 2021. Distribution patterns and conservation status of *Crocus* species in Iran, one of the diversity centres of *Crocus* in the Middle East. Folia Oecologica, 48:2: 156 – 168.

Takhtajan, A.L., ed. 2006. Konspekt Flora Kavkaza 2: 104. Editio Universitatis Petropolitanae. [in Russian].

Wendelbo, P., and Mathew, B. 1975. Iridaceae. Flora Iranica, No. 112. Ed. K. H. Rechinger. Austria. Graz: Akademische Druck- u. Verlagsanstalt.