

# International Rock Gardener

ISSN 2053-7557





## The Genus *Crocus* (Iridaceae) in Iran - three new species from the so-called "*Crocus biflorus*" aggregate.

Jānis Rukšāns, Dr. biol.

Received: 19<sup>th</sup> December, 2014 Published online: 30<sup>th</sup> January 2015

The International Rock Gardener - Online Journal – January 2015 ISSN 2053-7557

Abstract: Three new species of the genus *Crocus* from Iran are described.

Key words: *Crocus adamii*, *Crocus geghartii*, *Crocus gunae*, *Crocus reinhardii*, *Crocus iranicus*; Iran, Armenia, Georgia.

Correspondence to: [janis.bulb@hawk.lv](mailto:janis.bulb@hawk.lv) Cover photo: *Crocus gunae*, photo by Jānis Rukšāns

When, in 1975, Per Wendelbo & Brian Mathew published the circumscription of the genus *Crocus* in "Flora Iranica", they included in it nine species, of which one - *Crocus korolkowii* Regel ex Maw - grows in "Persia" but not in Iran. From the other eight species five bloom in autumn and three are spring bloomers. *C. sativus* L., the most widely grown, was not included because it is not a wild species but a cultivated triploid plant from ancient times.

Two of the autumn bloomers - *Crocus haussknechtii* (Boiss. & Reut. ex Maw) Boiss. from the *C. pallasii* Goldb. group and a crocus species named as *C. cancellatus* Herb. but more likely to be *C. damascenus* Herb. (its corm tunics have a long bristly neck) are distributed in W. Iran. All the samples from W. Iran and adjacent N. Iraq which were collected by me, Henrik Zetterlund (the Gothenburg Botanical Garden, Sweden) and Dr. Reinhard Fritsch (Leibnitz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben, Germany – hereafter referred to simply as Gatersleben), were identified by me as *C. damascenus* Herb.. As regards *C. haussknechtii*, a more thorough research is needed as the Iranian botanists have discovered three cytotypes with  $2n=12$ , 14 and 16 ([M. Sanei et al. 2006](#)), so it is most likely that several different species are hiding under this name.



Two examples of *Crocus damascenus* from Iran -

left: WHIR-191 collected by Jānis Rukšāns (WHIR = White, Iran, Rukšāns)

right: 2528 - collected by Reinhard Fritsch





## ---International Rock Gardener---



Map showing *Crocus* species with ring-like basal tunics in Iran (map from Google earth)

Another two autumn flowering species grow in Azerbaijan and Gilan provinces of N.W. Iran. ***Crocus caspius*** Fisch. & C.A.Mey is distributed in the Talish district of the Republic of Azerbaijan and in the adjacent area of Iran along the Caspian coast up to Gorgan. Phylogenetically it is close to the spring-blooming *C. michelsonii* B. Fedtsch. from the Kopet Dag and two other Central Asian crocuses - *C. alatavicus* Semenov & Regel and *C. korolkowii* (Petersen et al., 2008; Harpke et al., 2013). They share a common feature - their seedpods remain hidden in the soil at maturity.

The other - ***Crocus gilanicus*** Mathew - is phylogenetically the closest neighbour to the geographically distant and isolated ***C. autranii*** Albov from Abkhazia. Regardless of their differing chromosome numbers, both readily hybridise in cultivation and have fertile progeny.



*Crocus caspius* PF5035



*Crocus gilanicus*



*Crocus autranii*

The fifth autumn-blooming crocus, included in "Flora Iranica", is *Crocus speciosus* M. Bieb., now split into several different species (Rukšāns, 2010, 2012, 2013, 2014; Kerndorff et al., 2013A; Schneider, 2014).



## ---International Rock Gardener---

I found the Iranian *Crocus speciosus* sensu lato in two general regions - in two localities near the south-eastern coast of the Caspian Sea and in two localities on the south-western side of the Caspian Sea.

Both these general localities are separated by around 600km and represent different ecotypes. The crocus from the two western localities where it grows on open meadows I later described as a new species – ***Crocus archibaldiorum*** (Rukšāns, 2010, 2012, 2014). Populations from the S.E. coast were situated only in the shade of the trees or shrubs and they illustrate another, forest type of the *C. speciosus* group. Morphologically they are sufficiently different to be regarded as a distinct species. “*C. speciosus*” occurs in Talish, near the Iranian border (described as *C. polyanthus* Grossheim, nomen nudum), and may be found in Iran, too, and there are records about *C. speciosus* s.l. from Kaleybar (Tabriz).

Right: *Crocus archibaldiorum*

Three species of Spring-flowering Iranian crocus are represented in “Flora Iranica”. ***Crocus michelsonii*** is found on the Kopet Dag mountain ridge in Iran and in adjacent Turkmenistan. Two other species are from Series *Biflori* Mathew and have ring-like basal tunics.



*Crocus michelsonii*



*Crocus almehensis*

## ---International Rock Gardener---

Mathew's system, while no longer current, can still serve for identification purposes. The bright yellow ***Crocus almezensis*** Brickell & Mathew is distributed in the Gorgan area and, more to the west, are the bluish-white crocuses regarded by Wendelbo & Mathew (1975) as *C. biflorus* Miller, giving the name *C. adamii* J.Gay as a synonym. Later Iranian botanists described another yellow-flowered crocus under the name *C. danfordiae* Maw subsp. *kurdistanicus* Marooofi & Assadi.



Left: *Crocus kurdistanicus*

I got one bright yellow-flowered *danfordiae*-type crocus corm as a mixture of *Crocus biflorus* stock collected by Jim Archibald west of Lake Urmia (Orumiyeh) in Iran, but I have no idea whether it was collected originally in Iran or was an accidental admixture during cultivation. Unfortunately, the original description of subsp. *kurdistanicus* is very short and lacks many morphological details other than the flower colour, which enabled its separation from the type subspecies of *C. danfordiae*. Due to the very large distance between the localities of both crocuses, its status was later changed and now it is [Crocus kurdistanicus \(Rukšāns, 2014\)](#).

According to "Flora Iranica", there is a population of "*Crocus biflorus*" collected in "*silvis Golestan*" - the Golestan forest, east-north-east from Gonbad-e Kavus. Specimen from there (Furse 5114) is pictured in Flora Iranica and has white stigmatic branches. This could be some so far undescribed species. During a visit to Golestan National Park I had a discussion with one of the forest guards who showed me pictures of a yellow crocus growing in a lighter spot deep in the forest. Due to the very poor English of my contact person it was impossible to conclude whether this was *C. almezensis* growing in atypical conditions at a much lower altitude, or a new crocus, and although we exchanged our e-mail addresses, all the attempts to continue our communication failed. Jenny Archibald gave me another crocus from this group by bequest from the late Jim Archibald. It was collected west of Urmia Lake and by the corm tunics looked somewhat close to the Georgian *C. adamii*.



Left: *C. reinhardii*, collection Fritsch 2516

Later I got a few other gatherings of Iranian crocuses. The example collected by Reinhard Fritsch under number 2516 turned out to be identical with my sample WHIR-120. Another which I got from the Gothenburg Botanical Garden without a specified locality other than "Iran" and originating from Giessen Botanical Garden turned out to be identical with my WHIR-164. A third crocus was collected by R. Fritsch (2525) close to the Azerbaijan border, and by comparing the morphological features it looked to be fairly close to the Georgian *Crocus adamii*. In April 2008 a small group of plant enthusiasts, under the guidance of Jill White, visited Iran. During the more than three week long trip, starting in Mashhad in the east and finishing in the westernmost part of Iran, in Kurdistan, near the border with Iraq, we stopped at sixty-two localities.



## ---International Rock Gardener---

Crocuses were observed at least at fourteen stops (only localities from which some corms were collected are counted because *Crocus michelsonii* was seen in many spots, but not registered in our travel notes). Due to the very early spring, crocuses in flower were seen only in two localities. In four checked localities they were provisionally identified as belonging to the large "*Crocus biflorus*" aggregate.



Left: Leaf section of *Crocus adamii*

According to "Flora Iranica", they belong to *Crocus adamii* but actually looked quite different. In order to make a correct identification, it was necessary to determine what was regarded as a typical *C. adamii* and what traits were to be considered as key features in separating the Iranian crocuses. The monograph of Brian Mathew (1982) is of no help to us here as *C. adamii* is reviewed therein very broadly including under this name a number of undoubtedly different species. Among the synonyms of *C. adamii*, Mathew is listed *C. tauricus* (Trautv.) Puring, which in fact is a different

species, morphologically resembling some species from W. Turkey but phylogenetically it is related to the very distant *C. abracteolus* Kerndorff & Pasche from south central Turkey and even belongs to a different series *Isauri* (Kerndorff et al. 2014).



Left: Leaf section of *C. geghartii*

The status of *Crocus geghartii* Sosn. (another synonym of *C. adamii*) is still unclear. *C. geghartii* leaves have 3-4 ribs in lateral channels, never observed in samples regarded as *C. adamii* from Georgia and from other localities in Armenia. The "*adamii*" from Turkey in Europe quite recently was described as a new species - *C. adamiioides* (Kerndorff et al., 2012). The status of crocuses earlier regarded as *C. adamii* and occurring in the former Yugoslavia and Bulgaria is still not

defined, but most likely they can be regarded as [\*C. adamiioides\*](#) or belonging to a new, as yet undescribed species.



*Crocus adamii* and *C. geghartii* in Georgia and Armenia (map from Google earth)



## ---International Rock Gardener---



*Crocus adamii* aff. from Nahiczevan, Armenia



*Crocus adamii* aff. from Getahovit, Armenia



*Crocus adamii* aff. from Vanadzor, Armenia



Above: *Crocus geghartii*



## ---International Rock Gardener---



Left: *Crocus almeheensis*

As was noted in an earlier publication (Rukšāns, 2014), in the case of species described long ago, quite often it is not easy to define just which gathering can be viewed as the type specimen and where the exact type locality lies. In a few such unclear situations some light was shone by recent researchers - Kerndorff et al. defined the epitype for *Crocus tauri* Maw (2013B) and *C. isauricus* Siehe ex Bowles (2014). Rukšāns (2014) tried to define the locus classicus for *C. chrysanthus* (Herb.)Herb.

The epitype of *C. adamii* is designed here. The results of Kerndorff et al. (2013B, 2014) showed that it most likely could be the type species for the new series *Adamii* distributed along the Anatolian diagonal and to the east and separable into two sub-clusters – “adamii-west” and “adamii-east” including the Iranian ***C. almeheensis***.



*Crocus adamii* aff. from Getahovit, Armenia



## ---International Rock Gardener---



*Crocus adamii* locations in Georgia (map from Google earth)

The type of *Crocus adamii* certainly belongs to the “adamii-east” cluster. George Maw, who regarded *C. adamii* as *C. biflorus* var. *adamii*, noted that it was an “eastern representative of this species from Georgia.”

I collected the Georgian *Crocus adamii* in 1978 near Kus Tba (Czerepashye/Turtle) Lake at the outskirts of Tbilisi. Unfortunately, the collected stock was later ravaged by rodents.

When I revisited the locality in 2007, 2010 and 2013, no *C. adamii* was to be seen there. The habitat was completely destroyed and I found only a few *C. speciosus* individuals at some distance from the lake, although in 1978 the leaves of this crocus covered the ground below pine-trees like grass. Now there were asphalted footpaths and a large sporting and recreation centre.

In 2007 our team, guided by Dr. Kereselidze Dzhimsheer, former Director of the Tbilisi Botanical Garden ([The National Botanical Garden of Georgia](#)) explored several localities around Tbilisi, but no *Crocus adamii* was seen. In 2010 we had more luck. Then our guide was [Dr. Shamil Shetekauri](#) from the Botanical Institute, and we found *C. adamii* in two localities - near Igoeti some 40km N.W. from Tbilisi (CMGG-021), where it was growing in clearings and open spots among deciduous shrubs. Another locality was situated in Gareji steppe (CMGG-031) around 100km from Igoeti (S.E. from Tbilisi). There *C. adamii* was growing in very different conditions - on an open steppe in dense grass where spotting individuals without flowers was not easy. (CMGG = Colin Mason Georgia Group.)

Kerndorff et al. (2013B) also included into the *Crocus adamii* group several gatherings from Armenia (see map page 7). In spring 2014 I visited three localities of the *Crocus adamii* aff. in Armenia - near Tashir, Mt. Arteni and Vanadzor as well as the *locus classicus* of the crocus described as *C. geghartii* but generally regarded as a synonym of *C. adamii*.



## ---International Rock Gardener---

Earlier I got samples from Getahovit (from Zhirair Basmajyan, Armenia), from Bichenek pass on the border between Armenia and Nakhchivan (from Arnis Seisums, the National Botanical Garden of Latvia), and from the south easternmost corner of Armenia (Reinhard Fritsch 2504, Gatersleben). A quick glance confirmed that morphologically they all looked quite similar to the Georgian samples (though the ones from Bichenek and 2504 were more different), but for characterising the type here I used the gathering CMGG-021 from Igoeti in Georgia for it was collected in a habitat very similar to that near Kus Tba Lake ("from Georgia" by Maw,"near Tbilisi", as it is indicated by several Russian authors – Fedtschenko B., 1935; Grossheim A., 1940).



*C. adamii* CMGG-021 from Igoeti some 40km N.W. of Tbilisi - 2010



# ---International Rock Gardener---

**Description of species:** *Crocus adamii* J. Gay. Bull. Sci. Nat. Geol. 25: 319 (1831).

Syn. - *Crocus annulatus* var. *adamicus* Herb., Bot. Mag. 67: t. 3861 (1841); *Crocus biflorus* var. *adami* (J.Gay) Trautv., Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 17: 330 (1859), nom. superfl.; *Crocus biflorus* subsp. *adami* (J.Gay) K.Richt., Pl. Eur. 1: 250 (1890); *C. biflorus* subsp. *adamii* (Gay) B. Mathew - *pro parte*, The Crocus: 83-84 (1982); ?*Crocus geghartii* Sosn.?, Tr. Bot. Sada Akad. Nauk Arm. SSR 2: 8 (1949) - nomen nudum.

Holotypus: Not known. Authentic herbarium material at Kew is presumed by Mathew (1982) as the type specimen 'Habitat in Tauria et Iberia'. E. Gabrielian in "Flora Armenia" 10: 112 gives as "syntypes" "in Tauria et Iberia", LE!, K". No vouchers present in LE mention any definite location.

Because several different species are growing in the cited regions I selected for the epitype a voucher of Georgian plants corresponding best to Maw's (1886) plate 59b, Fig 2, e,f,g showing some specific features of *C. adamii* as accepted by most later botanists.

## 1. *Crocus adamii* sensu stricto

Epitypus: (hic design.) Ex culturae in horto Jānis Rukšāns leg. 20-02-2013 (Plants from Georgia, No.CMGG-021, collected 30-04-2010, near vil. Igoeti. alt.700m, 41.59.597 N, 44.25.330 E, in clearings between shrubs) is deposited in GB (Gothenburg).

**Habitat and distribution** - grassy slopes and on mountain steppe as well as among shrubs and on stabilised rubble at altitudes of 700m (Igoeti) - 2900m ("Flora Armenii").

**Flowering time** - February to May.

**Corm** - depressed globose, 15-20mm in diameter.

**Tunics** – outer coriaceous, inner membranous.

**Tunic neck** - bristly, comparatively long (up to 8mm) with few secondary splits.

**Basal rings** – present, edge almost smooth, with minor saw-like somewhat uneven in length teeth.

**Cataphylls** – silvery.

**Prophyll** – absent.

**Leaves** – 3-4 (-6 in cultivation in Armenian samples), greyish green, below flower at anthesis, 1.5 to 2mm wide, glabrous, white stripe 1/5 (-1/3) of width, with 1-2 ribs in lateral channels. In "Flora Armenii" the number of leaves is given 3-9 but I have never seen plants with that many leaves.

**Perianth tube** – white or white with darker stripes (more often in Armenian plants), sometimes uniformly dark (in Georgian samples).

**Bract and bracteole** – silvery, almost equal in size.

**Throat** – minutely hairy or nude, usually deep yellow, sometimes surrounded by a white, radiated, broader (Nakhchivan) or narrower (Armenia) white zone.

**Filaments** – (3-)4(-5)mm long, creamy to yellow.

**Anthers** - 2-3 times longer than filaments, yellow, arrow-like with abruptly pointed tips, basal lobes short.

**Connective** – creamy.

**Style** – yellow to orange, three-branched, usually ends below or, not so often, at tips of anthers, rarely exceeding those (in samples from Armenia).

**Outer segments** – (20-)28(-35)mm long and (7-)10(-13)mm wide, sometimes with slightly pointed tips. Outside lighter or darker lilac blue edged with diffused lighter margin, occasionally buff, with 3 - 5 darker stripes, sometimes confluent, especially at the base. Inside somewhat lighter blue, sometimes with whitish stripes up to the tips (especially in the darker forms).

**Inner segments** – only slightly shorter (<1mm) of the same width and slightly lighter in colour, without prominent stripes on the outside, but usually with a dark blotch at base, sometimes radiated at top. Inside of the same colour as the outer segments.

**Capsule** – up to 15mm long, cylindrical.

**Seeds** – up to 2mm in diameter +/- globose, reddish brown.

2n = 10 (Pogosjan, 1981 - cited in "Flora Armenii").



## ---International Rock Gardener---

*Crocus adamii* is very easy in cultivation. For me it grows equally well both in the garden and in pots under cover. During the hottest spells in summer I take the pots with the corms of *C. adamii* out of the greenhouse as they don't need very hot and dry summer rest, but they haven't suffered when left in the greenhouse during the summer.

All the samples gathered in Iran looked sufficiently different from *Crocus adamii* and other gatherings from E. Turkey, available for comparing, thus they could be regarded as a new previously undescribed species. The main features allowing easy identification in field conditions without laboratory equipment and DNA checking are the morphology of the leaves (the number of ribs in the lateral channels) and the shape of the edge of the basal rings.



*Crocus adamii* corms and corm tunics



© Zhirair Basmajyan

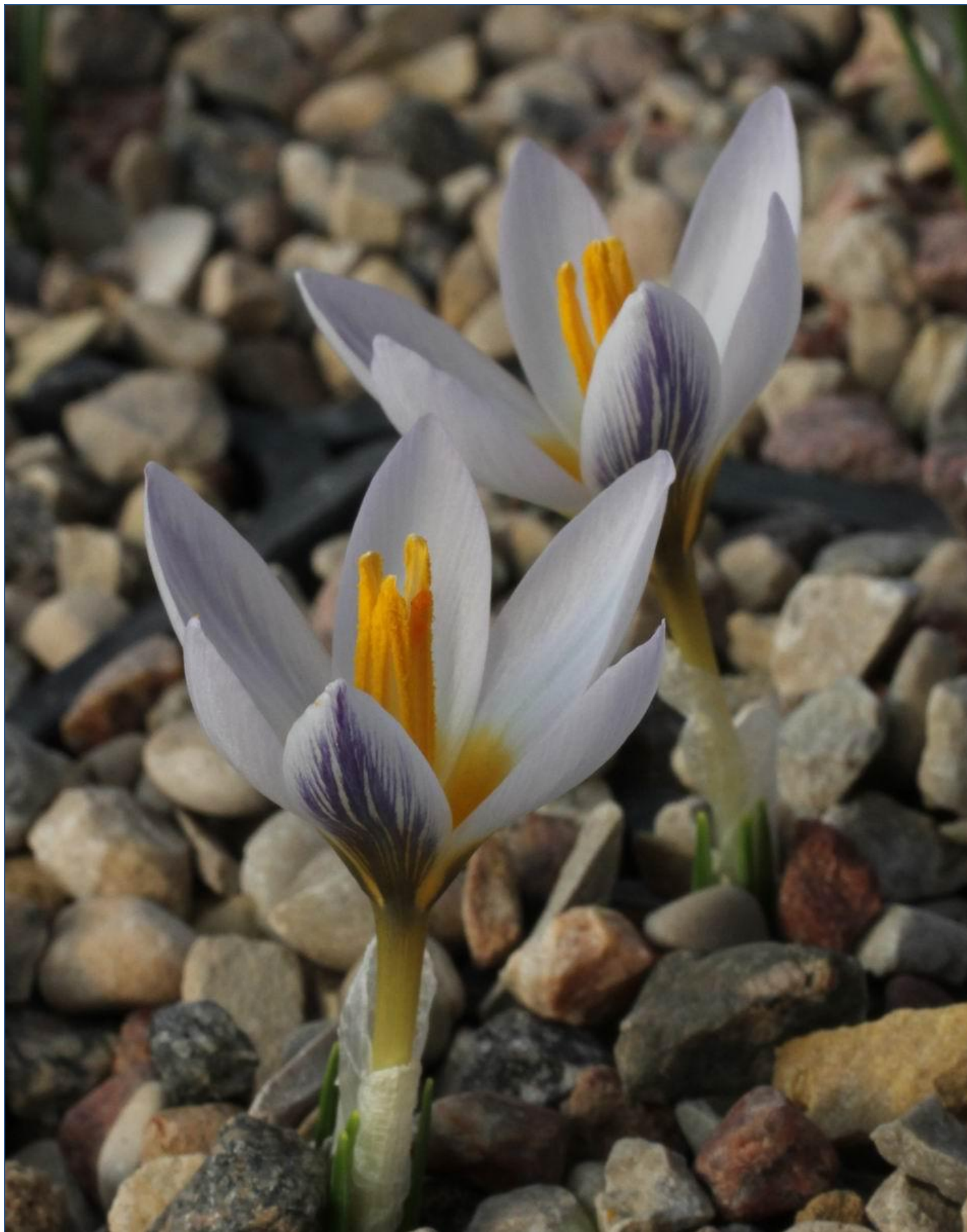


© Zhirair Basmajyan

Left and far left:

*Crocus adamii* aff.  
photos:  
Zhirair  
Basmajyan





*Crocus gunae* Rukšāns species nova



## 2. *Crocus gunae* Rukšāns species nova

Type: Ex culturae in horto Jānis Rukšāns. (Plants from Iran, Mazandaran, between Astaneh and Fulad Mahalleh open slope not far from pass. 36.01.001 N; 53.37.750 E. Collected 23-04-2008. WHIR-100)  
Holotype: GB (Gothenburg).

**Habitat and distribution** - Known only from the type locality, where it was blooming at altitude of 2350m at the bottom of a narrow gully near melting snow, practically in water, together with *Colchicum kurdicum*, but opening its flowers slightly later.

**Flowering time** – April.

**Corm** - depressed globose, 15-18mm in diameter.

**Tunics** – coriaceous with a few splits from base to top.

**Tunic neck** - up to 7mm long formed by narrow, long tunic splits.

**Basal rings** – well developed, with very uneven edge and irregularly spaced few triangular longer teeth

**Cataphylls** – silvery, turning buff with age.

**Prophyll** – absent.

**Leaves** –dark, slightly greyish green with 3 ridges in lateral channels, white stripe 1/4 of leaf width, in the wild reaching flower base at anthesis, but in cultivation only just emerging.

**Bract and bracteole** – thin, silvery white, bracteole much smaller than the bract.

**Perianth tube** – white, light greenish or yellowish.

**Throat** – bright yellow, slightly lighter toward the narrow diffused edge.

**Filaments** – up to 6mm long, deep yellow.

**Anthers** - 10-11mm long, yellow with subacute tip.

**Connective** – light yellow to yellow.

**Style** – yellow, yellow orange to orange red, divided into three branches around the middle of anthers, fringed at tip, ending below or at tip of anthers, may overtop them later.

**Flower segments** – widely lanceolate to subovate (in cultivation) with subacute to acute tips, inside very light lilac shaded throughout.

**Outer segments** – up to 30mm long and 11mm wide, outside very light bluish violet shaded ground colour with lighter or darker purple to greyish purple stripes, sometimes partly confluent, ending at tips of sepals or slightly lower, sometimes a light zone between stripes with light yellow suffusion, at base slightly translucent yellow throat colour.

**Inner segments** – slightly smaller - 29mm long and 10mm wide, outside light bluish violet with dark greyish green basal blotch, on sides and at top edged yellowish from translucent throat colour.

**Capsule** – oblong, up to 16-18mm long.

**Seeds** – 2-3mm in diameter, pinkish buff, almost globose, but with large, prominent caruncle.

2n = ?

**Etymology** - Named for my wife Guna Rukšāne who always supports my researches and looks after my collection during my absence while on mountain trips.

*Crocus gunae* can be distinguished from other species reviewed here by the number of ribs in leaf lateral channels and by the shape of the edge of the basal rings. Excluding the crocus from Golestan forest mentioned in “Flora Iranica” and *C. almeheensis*, *C. gunae* is the most Eastern growing crocus species from *C. biflorus* aggregate, well distanced from all other species of this group. It was blooming through water at the bottom of a small gully on open mountain slopes where it grew together with *Colchicum kurdicum*, *Ranunculus* sp., *Corydalis* sp. (from Section *Leonticoides*), *Geranium macrostylum* etc. It grew in very sticky clay and the corms were situated very deep in the soil (around 15cm), therefore it was not easy to collect even a few. At first it seemed to be a very pale crocus and such were all the individuals seen in the wild, but in cultivation the colours became much brighter – the stigma changed from pale to dark yellow, and the throat colour darkened, too. Right away it was clear that it was a new species from the “*C. biflorus*” group. Although we spent several hours searching the vicinity and higher up the slope, no other populations were found there.



## ---International Rock Gardener---

It was the second week of the Iranian trip and until this date I had not succeeded in getting in touch with home. Here, when I was climbing higher up the slope, my cell phone suddenly buzzed. It was my wife and she was the first who congratulated me with this discovery, so I decided to name the new crocus in her honour as *C. gunae*, in such a way expressing my thanks for her careful watching over my collections during this long trip.



Corm tunics – *Crocus gunae* (size of all graph paper in images is 5mm square)



Leaf section *Crocus gunae*



Seeds of *Crocus gunae*

The presence of clear yellow colour on the reverse of the sepals in *Crocus gunae* which is even more clearly expressed in *C. iranicus* can be regarded as some link between the golden-yellow *C. almezensis* and the blue-whitish *C. adamii*, although DNA researches are needed to confirm this.

In cultivation *Crocus gunae* first bloomed two years later and proved to be a good grower and set seed after being hand pollinated, but it is not completely hardy and suffered in a much too changeable winter when a warm spell in January was followed by a hard frost in February, despite the fact that it was growing in a greenhouse. In summer it needs dry and most likely hot conditions regardless of the high altitude where it grows in nature.



## ---International Rock Gardener---



*Crocus gunae* pictured in habitat. Photo above: J.R. and below: Bob Charman





## ---International Rock Gardener---



Left: *C. gunae* in the wild – photo: Bob Charman



Right: *C. gunae* corm



Basal ring and corm tunic of *Crocus reinhardii*







## ---International Rock Gardener---

### 3. *Crocus reinhardii* Rukšāns **species nova**.

Type: Ex culturae in horto Jānis Rukšāns. (Plants from Iran, Kuh-e Sendan Dag between Zanjan and Rasht, 36.42.394 N; 48.45.491 E. Collected 26-04-2008 WHIR-121) Holotype: GAT (33764).

**Habitat and distribution** - Known from three localities situated within a distance of 18km. The type specimen was gathered near a very wet valley some way below the pass, where it was growing in mountain turf on slightly higher, drier spots at the altitudes of 1600 - 2400m.

**Flowering time** – April.

**Corm** - slightly depressed globose, up to 20mm in diameter (in cultivation).

**Tunics** – coriaceous but not hard, even somewhat papery, shortly split at the base in around 5mm wide segments.



**Tunic neck** - 7-10mm long, formed by broadly based triangular tunic splits, at the top with short secondary splits.

**Basal rings** – with distinct, evenly spaced, 3-5mm long, sharp, narrow teeth.

**Cataphylls** – greenish white.

**Prophyll** – absent.

Left: *Crocus reinhardii*, leaf section

**Leaves** – (5-)7(-9), 2.5 - 3mm wide, dark green, with two ribs in lateral channels, the white stripe very variable: from ~ 1/5 up to almost half of leaf width.

**Bract and bracteole** – somewhat translucent, silvery, very prominent, bracteole

usually longer than the bract.

**Perianth tube** – white at the base, with distinct violet stripes, or less often violet throughout.

**Throat** – dark orange yellow, at margin yellow, edge radiated, usually with longer median stripe.

**Filaments** – 4-6mm long, yellow to orange yellow.

**Anthers** - 8-10mm long, deep yellow, with subacute tips.

**Connective** – indistinct.

**Style** – orange, split into three branches with more or less expanded tips, ending around tips of anthers, sometimes slightly below or rarely overtopping.

**Flower segments** – subovate with rounded to subacute tips, inside lighter or darker bright bluish violet, somewhat lighter to the base, but can be quite light, too (observed in the pictures taken by John Ingham 3km from the *locus classicus*).



**Outer segments** – 25-30mm long and 6-9mm wide, outside bright violet blue with a dark even blackish purple basal blotch with feathered edge or with three long dark purple stripes from the base to the top, sometimes the back yellow tinted, with only a narrow bluish edge. Sometimes flowers light blue but still with a very dark purple basal blotch, with some longer or shorter stripes.

**Inner segments** – 23-29mm long and 7-9mm wide, of the same colour as the outer segments and with a dark basal blotch, somewhat smaller than on the outer segments, in striped forms the translucent throat colour gives the impression of a yellowish zone surrounding the basal blotch, rarely with a short median stripe up to half of petal length.

Left: Capsules and seeds of *Crocus reinhardii*

**Capsule** – up to 20mm long, greyish buff coloured.

**Seeds** – light purplish violet, 3mm long and 2.4mm wide, with prominent caruncle (1mm long).

2n = ?



## ---International Rock Gardener---

**Etymology** - Named after Dr. Reinhard Fritsch (Gatersleben), who has made a great contribution in the exploration of the Iranian Flora (genus *Allium*) and has never forgotten about my interest in crocuses during his research expeditions. He has always helped me to correct my Latin diagnoses of new taxa and his comments have helped to improve my publications.



*Crocus reinhardii*



## ---International Rock Gardener---



This very beautiful and bright crocus is easy to tell from other Iranian species and *Crocus adamii* by the basal rings which have evenly spaced, long, needle-like teeth. I collected it along a roadside where we had stopped to take pictures of *Fritillaria olivieri* which was growing in a very wet spot in long grass but, nearby, only a few metres higher, where the grass was less dense, in slightly drier conditions, I spotted crocus leaves. At another stop at some 3km distance, a member of our team, John Ingham, separated from our group and walked higher up the slope to the melting snow. There crocuses were still in flower. Later I compared his pictures with the plants collected by me and they looked to be of the same type, only lighter in the overall colour. All the individuals pictured by him were quite similar and generally could be regarded as belonging to the same species. Another gathering (2516) was made by Reinhard Fritsch ~ 15km from the *locus classicus*, but at a lower altitude and they were identical with the type gathering.

Left: *Crocus reinhardii* photo: J.R.

Below: *Puschkinia scilloides* and *Crocus reinhardii* photo: John Ingham



In cultivation *Crocus reinhardii* has turned out to be a good grower, although I have grown it only in pots. It increases well and also sets seed. It seems to be quite hardy and did not suffer in the winter when *C. gunae* (WHIR-100) barely survived. In summers I keep the pots in the greenhouse.

Page 21





*Crocus iranicus* Rukšāns species nova (WHIR163)

#### 4. *Crocus iranicus* Rukšāns species nova

Type: Ex culturae in horto Jānis Rukšāns. (Plants from Iran, right before Saqqez city border. 36.17.783 N; 46.15.102 E. Collected 30-04-2008. WHIR-163. Holotype: GB (Gothenburg). Paratype: GB (Gothenburg) (specimen received from Giessen as *C. biflorus* from Iran).

**Habitat and distribution** - Iran, Kurdistan. Known only from the type locality where it grows at the altitude of 1600m, in sandy clay, on sides of a deep gully in sparse grass, together with *Sternbergia* sp., and *Fritillaria* sp.

**Flowering time** - March - April (observed only in cultivation).

**Corm** - globose, 10-12mm in diameter.

**Tunics** – very hard, leathery, even woody, usually without splits, but with an obvious parallel enervation.

**Tunic neck** - 10-12mm long, formed by narrow, spindly, at tips slightly curved tunic splits.

**Basal rings** – well developed with irregularly saw-shape edge and occasional, irregularly spaced longer needle-like teeth.

**Cataphylls** – silvery, distinctly greenish white at the upper part.

**Prophyll** – absent.

**Leaves** – (4-)5-6, bright dark green, with 5(-6) ribs in lateral channels, the white stripe around 1/3 of leaf width.

**Bract and bracteole** – subequal, silvery white, thin.

**Perianth tube** – white, in the upper part becomes greyish or bluish.

**Throat** – small, lighter or darker yellow.

**Filaments** – 8-12mm long, yellow to dark yellow.

**Anthers** - 13-19mm long, distinctly arrow-shaped with subacute to acute tips and 2-3mm long basal lobes.

**Connective** – white.

**Style** – yellow, splitting into three bright red branches, fringed at tips, sometimes even shortly subdivided in many small secondary branches, ending below the tips of anthers, rarely equalling them.

**Flower segments** – ovate to sub lanceolate, tip subacute, sometimes even rounded and notched, inside almost white, with slightly translucent outer blue striping.

**Outer segments** – 35-37mm long and 12-14mm wide, densely striped light bluish or lilac (sometimes stripes confluent) on white ground, rarely light golden yellow shaded among the stripes and at the edge.

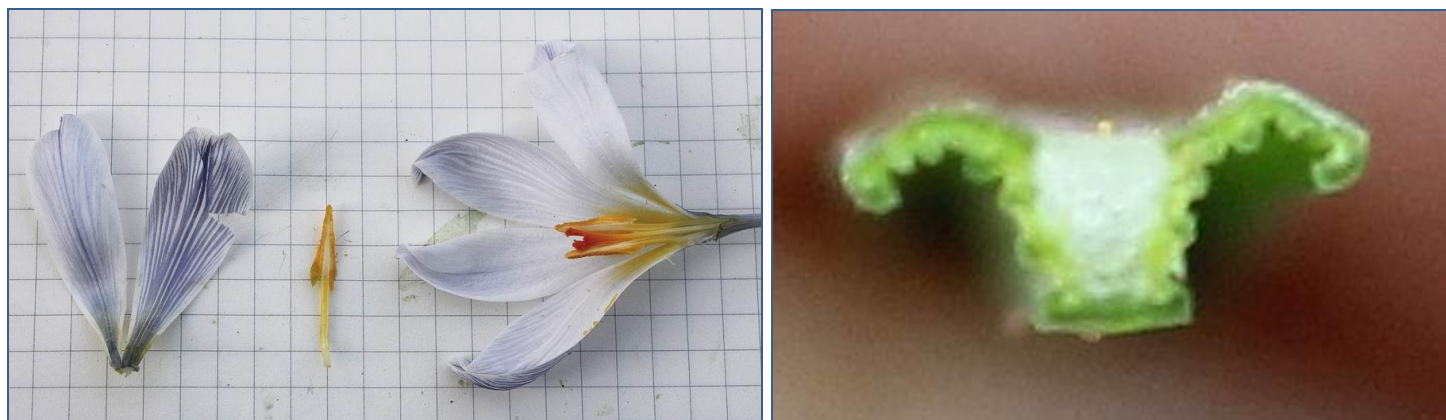
**Inner segments** – 33-35mm long and 11-13mm wide, lighter than the outer segments and usually only flushed light bluish or lilac, with occasionally notable indications of a striping.

**Capsule** – up to 20mm long, light buff.

**Seeds** – 2mm in diameter, brownish with prominent caruncle.

2n = ?

**Etymology** – named for the locality where it was found – Iran (Kurdistan).



*Crocus iranicus*, dissected flower and leaf section



## ---International Rock Gardener---

*Crocus iranicus* is easy to recognize among others by its leaf morphology. There are not many species with 5-6 ribs in each of the lateral channels and none of them occur in Iran. Geographically the nearest with such a feature is *C. schneideri* Kerndorff & Pasche from Tahtali Dağ in Cappadocia, Turkey, others grow in W. Turkey. All the geographically neighbouring crocus species have only 2-3 ribs, up to 4 in *C. geghartii*. Another feature separating it from neighbour species is its very hard corm tunics, something similar to that of some Greek crocus species.

*Crocus iranicus* was found just near Saqqez city border where we made a technical stop. Taking advantage of this opportunity, we went into the mountains and very soon were walking along the steep banks of a small stream and collecting seeds of a *Fritillaria* sp. Suddenly I spotted crocus leaves. After a long search I managed to collect some five corms, which turned out to belong to one of the best crocuses collected during the WHIR trip. When they first bloomed with me, there were no doubts that it was a new species. This was confirmed by the leaf morphology and corm tunics.



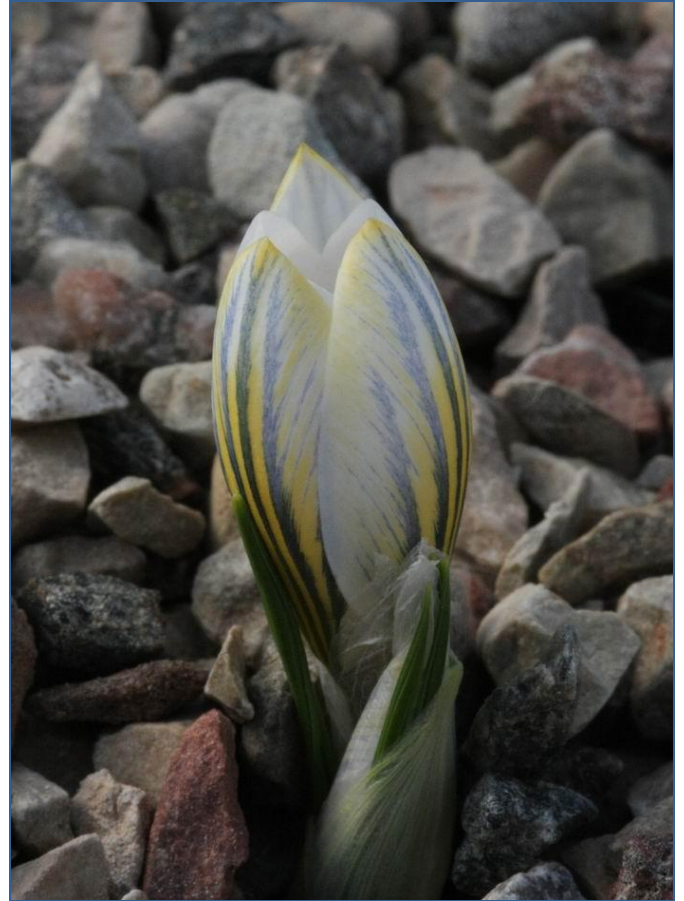
*Crocus iranicus* - basal rings and corm tunics



## ---International Rock Gardener---



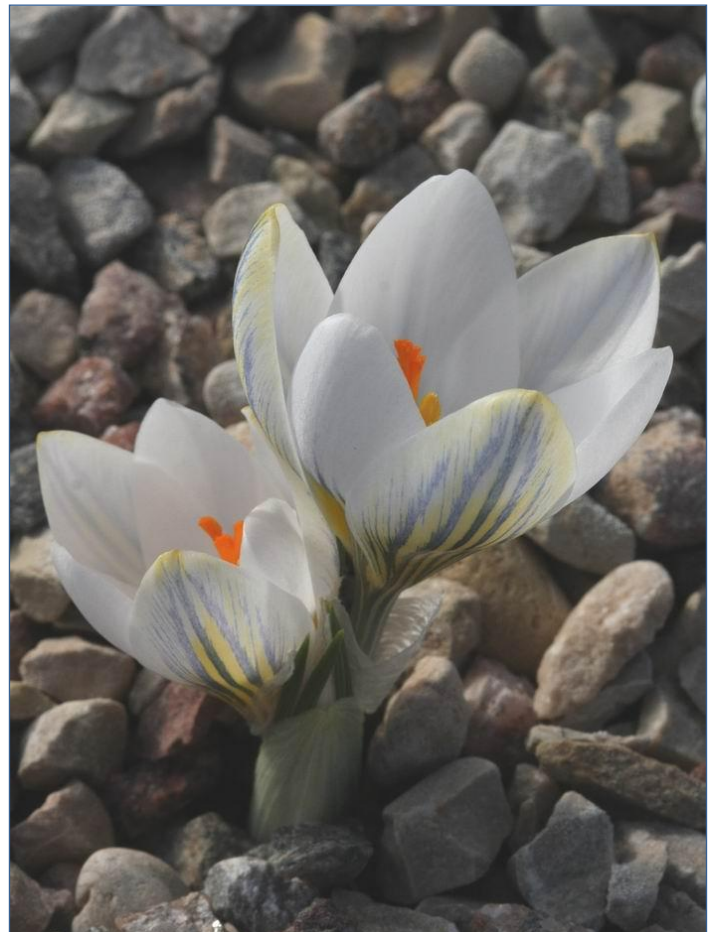
*Crocus iranicus* ex Giessen Botanic Garden



*Crocus iranicus*, opening bud

A crocus very similar in flower (later the identity was confirmed by morphological features, too) had for years been grown in the Gothenburg Botanical Garden (Sweden). This crocus was received from Giessen Botanical Garden (Germany) as collected in Iranian Kurdistan.

This is an especially beautiful crocus. Unfortunately, not all of the collected individuals have survived, hence here only three plants were used for the description of the variation, but it is very possible that the variability in the wild is much greater. It sets seeds well and I have several pots with seedlings which have not bloomed yet, but the progeny may be quite variable because the parents have different colours. I grow it in pots and so far have not tried it outside. In summer, the pots are kept in the greenhouse, where they stay dry and warm, similar to the conditions in the Iranian province of Kurdistan.



*Crocus iranicus*





*Crocus iranicus*

## Acknowledgments

I'm very grateful to Jill White (UK) who invited me to take part in the Iranian trip which resulted in the discovery of those beautiful crocuses, Zhirair Basmajyan (Armenia) who arranged my research trips for Armenian crocuses, Henrik Zetterlund (Gothenburg Botanical Garden, Sweden) for the living material and for the opportunity to work with GBG collections and also to Reinhard Fritsch (Gatersleben, Germany) for his comments and help with accessing material and preparing this article and Mārtiņš Erminas for correcting my ugly English. I'm especially thankful to my family for the help and patience during my trips and preparation of my publications.

J.R.

## References

- Fedtschenko B.** in Komarov, V. L., ed. 1935. *Crocus* L. Flora SSSR. Vol. 4: 499-511. Leningrad: Editio Academiae Scientiarum URSS. (In Russian).
- Gabrielian E.** 2001. *Crocus* L. Flora Armenii, vol. 10: 112-115. A.R.G. Gantner Verlag KG, Rugell/Liechtenstein. (In Russian).
- Grossheim, A. A.** 1940. Genus 228. *Crocus*. Flora Caucasica. Vol. 2: 200-206, 2nd ed. Baku, Azerbaijan: AzFAN. (In Russian).
- Harpke D., Meng S., Rutten T., Kerndorff H., Blattner F.** 2013. Phylogeny of *Crocus* (Iridaceae) based on one chloroplast and two nuclear loci: Ancient hybridization and chromosome number evolution. Mol. Phylogenet. Evol. 66: 617-627.
- Kerndorff H., Pasche E., Harpke D., Blattner F.** 2012. Seven New Species of *Crocus* (Liliiflorae, Iridaceae) from Turkey. Stapfia 97: 3-16.

**Kerndorff H., Pasche E., Blattner F., Harpke D.** 2013A. A new species of *Crocus* (Liliiflorae, Iridaceae) from Turkey. Stapfia 99: 141-144.

**Kerndorff H., Pasche E., Blattner F., Harpke D.** 2013B. *Crocus biflorus* Miller (Liliiflorae, Iridaceae) in Anatolia - Part IV. Stapfia 99: 159-186.

**Kerndorff H., Pasche E., Harpke D.** 2014. *Crocus isauricus* Siehe ex Bowles (Liliiflorae, Iridaceae) and its relatives. Stapfia 101: 3-18.

[Stapfia papers are available from [here](#)]

**Mathew B.** 1982. The *Crocus*. A Revision of the Genus *Crocus* (Iridaceae): 83-84. London: B.T. Batsford Ltd.

**Maw, G.** 1886. 59. *Crocus biflorus*. A Monograph of the Genus *Crocus*: 288-294. London: Dulau & Co.

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

**Rukšāns J.** 2010. *Crocuses: A complete guide to the genus*. Portland. London: Timber Press.

**Rukšāns J.** 2012. A revision of *Crocus speciosus* in Turkey and Iran. The Alpine Gardener, 80 (2): 206-211.

**Rukšāns J.** 2013. Seven New Crocuses from the Balkans and Turkey. [The Alpine Gardener 81:188-193, with supplement. AGS.](#)

**Rukšāns J.** 2014. *Crocus danfordiae* Maw and *C. chrysanthus* (Herbert) Herbert (Iridaceae) and some of their allies in Turkey and Iran. [International Rock Gardener. Online Journal, 52: 2-23.](#)

**Sanei M., Rahimyan H., Agayev Y., Soheilvand S.** 2006. [Conference report. Internet publication.](#)

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

**Wendelbo P. and Mathew B.** 1975. *Crocus*. Flora Iranica, no. 112: 2-11. ed. K. H. Rechinger. Graz, Austria: Akademische Druck und Verlagsanstalt.