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---International Rock Gardener---

May 2022

We hope that this month's IRG provides an interesting range of articles. Firstly, we have some terrific photos of Dionysia species in habitat in Iran. These plants are mainly grown in the alpine house in the UK. Luckily there are one or two nurseries selling these plants albeit not in large numbers, so it is not impossible to try one's hand at growing these often difficult plants. They can be seen growing well in some Botanic Gardens, such as Gothenburg or Tübingen where there are considerable collections. Second article is the description of *Crocus dolatyarii* – a new species from W Iran from Janis Rukšāns. Next up is a book review of Saunders' Field Guide to the Gladioli of South Africa by David Carver.
Unfortunately, the previous publication of *Tulipa brinkii* in IRG was precluded by IPNI.org as complying with official naming, so the article, with additions, is repeated here. Thanks to Sjaak de Groot and B.J.M. Zonneveld.

A little about our new contributors:

Sajad Alipour, gained a Ph.D. in Ornamental Plants and Landscape at the Ferdowsi University of Mashhad, Iran. He has been working on Iranian bulbous plants for more than 10 years (researching in different aspects such as climate change, seed biology, ecology, Phenological Growth Stages, propagation, adaptation, dormancy, etc.). The topic of his Ph.D. thesis is the adaptability assessment of several Iranian native bulbous plants. As a farmer (for more than 15 years), native ecotourist, researcher, and botanist, he has good experience and information about different crops and native plants. He spent seven months from August 2018 - April 2019 in Spain (UCLM University, department of ecology) for a research opportunity. His project was on the effect of fire on seed germination of more than 60 Spanish native plants. He has become well-known for his excellent photographs of Iranian plants in habitat, which he shares on social media.

David Carver is a young plant enthusiast who is garnering considerable success with his show plants at Alpine Garden Society shows. I daresay if he did not live so far south, in West Devon, he'd be having a similar success at SRGC shows! He has reviewed the long-awaited book from Rod and Rachel Saunders who were British botanists and horticulturalists who established Silverhill Seeds in Cape Town in the 1970s. They collected and studied rare specimens of South African plants such as Gladioli. They were stalked and murdered by terrorists in 2018 while on an expedition in the Ongoye Forest Nature in the north of KwaZulu-Natal.

Cover image: *Dionysia zetterlundii in* habitat - photo Sajad Alipour.

--- Dionysia in Iran ---

Finding *Dionysia splendens* - Dr Sajad Alipour

[This new *Dionysia* species was discovered by Sajad Alipour in 2020 and described in 2021 in the Edinburgh Journal of Botany 78, Article 397: 1–5 (2021)]

The discovery of *Dionysia splendens*

I was at the top of our mountain (altitude 3500m) in spring 2020 when I visited a new site. I went there to take some photos of the rock plants there when suddenly I spotted *Dionysia splendens*. At first, I thought that it must be *Dionysia bryoides*, so I didn't pay much attention to it, I just took some photos of that species. When I checked the Iranian Dionysia species, I doubted that was *Dionysia bryoides*, so I shared it on some social media where most experts said it could be new species. For the second time, I visited its site again and after that, I was sure that it was a new species. Unfortunately, these species grow on top of a big rock, and when I went there to take some material and record some information, I fell down, injuring my back rather badly.

I found it southwest of the village of Kaftar in the Fars province in Southwest Iran, in a place that is difficult to access, which explains why this remarkable plant had previously escaped notice. [The description may be read in the original paper, detailed above.]

Dionysia splendens is a cliff-dweller, often confined to vertical or even overhanging rocks.

Two plants of *Dionysia splendens.*

D. splendens has an altitudinal range. 3300–3400 m on west-facing limestone cliffs. Its flowering period is May.

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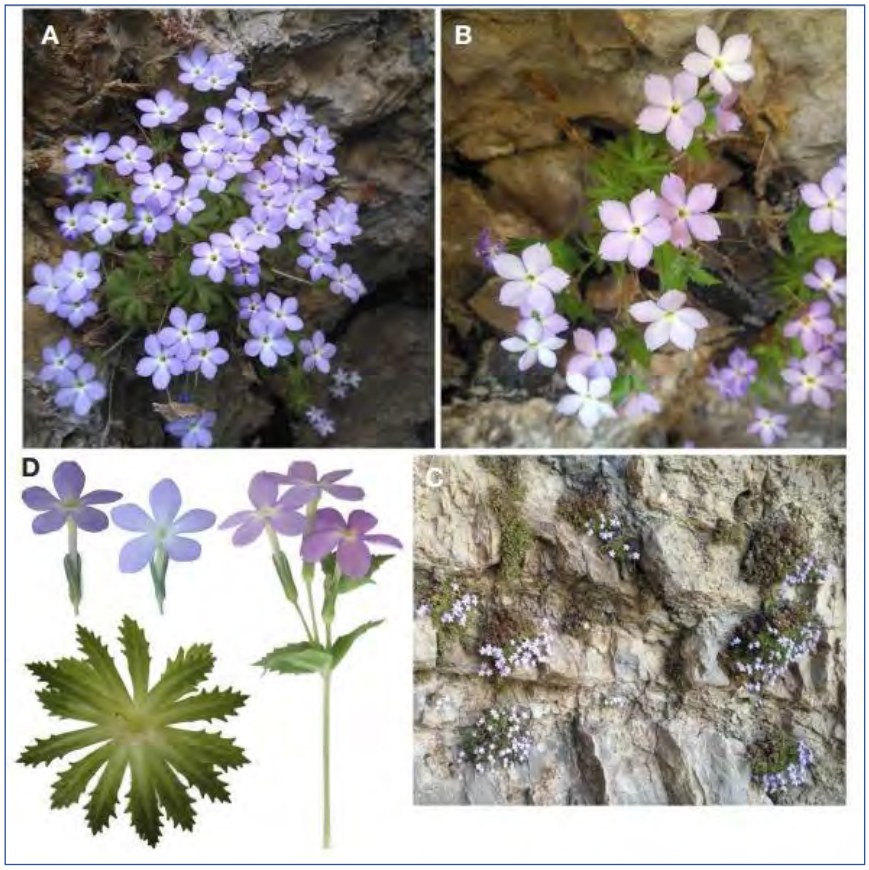

Figure from Ed. Journal of Botany 78, Article 397: 1–5: ***Dionysia splendens* Alipour, Mehregan & Lidén, sp. nov**. A–C, plant in habitat, type locality; D, close-up of flowers, inflorescence and leaf rosette (upper left, brevistylous corolla; upper middle, longistylous corolla).

Photographs: Sajad Alipour.

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Sajad Alipour scaling a cliff to see plants.

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--- Some more Iranian *Dionysia* species photographed recently by Dr Sajad Alipour ---

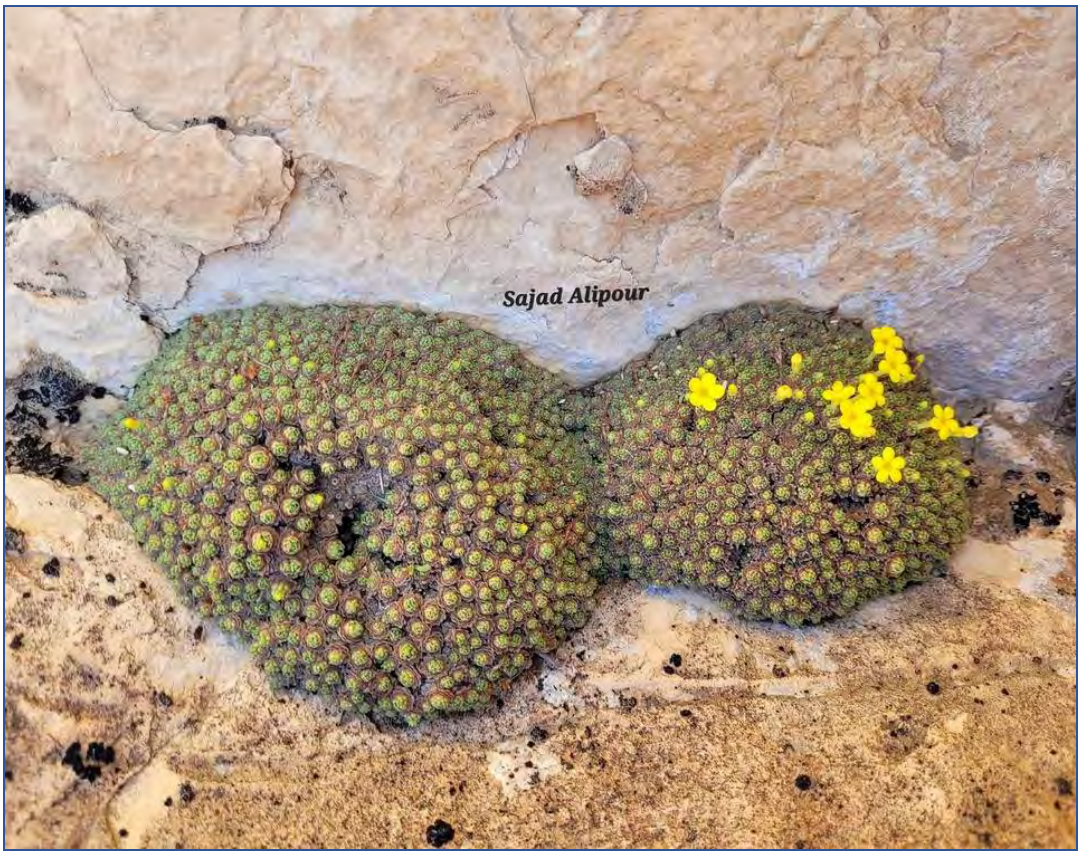
Dionysia michauxii, Shiraz, Fars province, Iran. 6 February 2022. Altitude: 1700 m.

Dionysia michauxii. Shiraz, Fars province, Iran

This species is endemic to Iran and is only found in a small population in Shiraz, Fars province. It is interesting to know that in Shiraz, this species just grows on a couple of rocks in its natural habitat. This is one of the earliest blooming of Iranian *Dionysia*.

[Seen also on 24 February 2022.]

Dionysia michauxii



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Dionysia michauxii

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Dionysia michauxii

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Dionysia michauxii

Dionysia michauxii, Shiraz, Fars province, Iran. 24 Feb 2022. Altitude: 1700 m. The first group bloomed about 20 days ago. Fortunately, its population is about 500 plants.

The leaves grow and become larger after the flowers fall.

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Dionysia michauxii 24 February

Dionysia michauxii

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Dionysia michauxii

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Dionysia michauxii

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Fortunately, in one week, I managed to photograph both subspecies of ***Dionysia sarvestanica.***

Dionysia sarvestanica **subsp.** ***spathulata***, Meymand, Fars province, Iran. 9 February 2022.

This species is an endemic of Fars province. My thanks to Marijn van den Brink for the note of its location.

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Dionysia sarvestanica subsp. *spathulata*

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Dionysia sarvestanica subsp. *spathulata*

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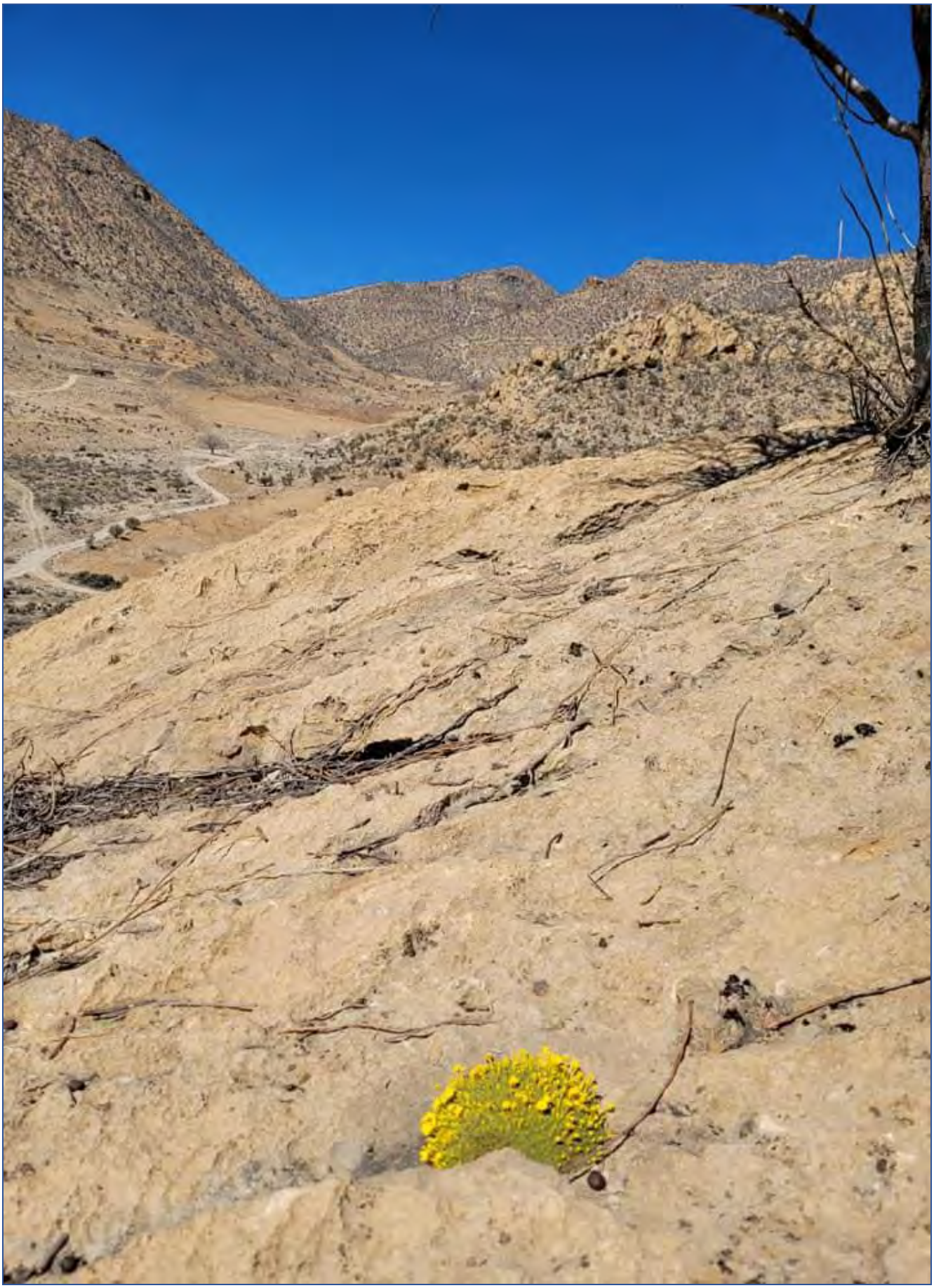

Dionysia sarvestanica subsp. *spathulata*

Dionysia sarvestanica* subsp *sarvestanica, Fars province, Iran. 12 February 2022.

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Dionysia sarvestanica subsp. *sarvestanica*

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Dionysia sarvestanica subsp. *sarvestanica*

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Dionysia sarvestanica subsp. *sarvestanica*

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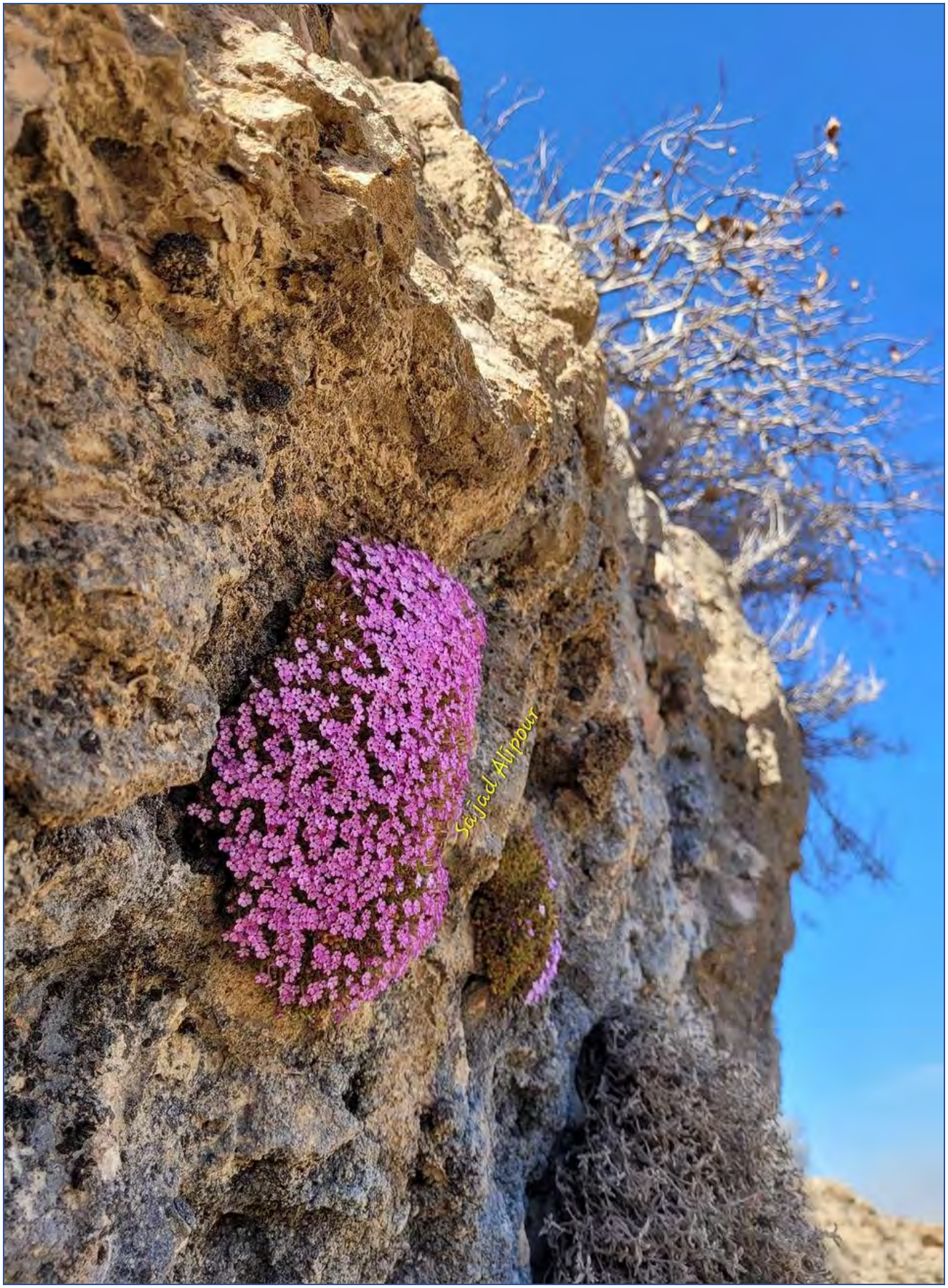
Dionysia bryoides Boiss. Shiraz City, Iran. 22 February 2022 Altitude: 2040m.



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Dionysia bryoides

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Dionysia bryoides

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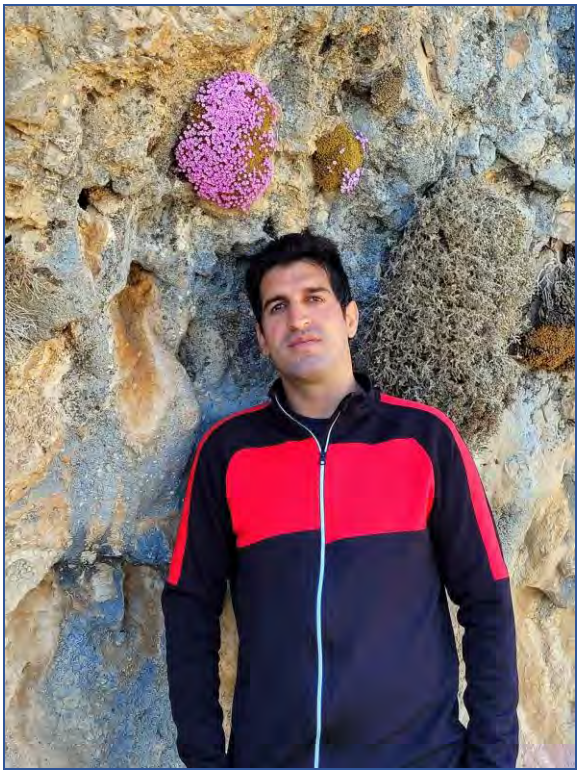
Dionysia bryoides



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Dionysia bryoides

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Dionysia bryoides

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Dionysia bryoides

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Dionysia diapensiifolia 22 Feb 2022 Endemic to Iran. Shiraz City, IRAN Altitude: 2040m.

Dionysia diapensiifolia

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Dionysia diapensiifolia

Dionysia viva, Arsanjan City, Fars province, Iran. 9 March 2022. Altitude: 1700 m. Unfortunately, due to last year's drought, most of the *Dionysia viva* plants in this mountain were completely destroyed, and only six plants survived.

Dionysia viva

Dionysia viva

D. splendens is somewhat reminiscent of *Dionysia viva* Lidén & Zetterl. in growth habit and the structure of its inflorescence, but *Dionysia viva* has large irregularly dentate leaves, a much smaller yellow corolla, and numerous small angular seeds.

Dionysia viva

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Dionysia viva in habitat – with Sajad Alipour

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Dionysia viva

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***Dionysia janthina* Bornm.** Fars province, Iran 27 March 2022. Altitude: 2530 m

This is the first report of this species in Fars province. Unfortunately, it was only found on a small rock and it's really endangered due to mining activities a few kilometres away.

Dionysia janthina

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Dionysia janthina

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Dionysia janthina

Dionysia janthina

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Dionysia esfandiarii - Endemic to Iran. Bavanat, Fars province, Iran 30 April 2022

Altitude: 3010 m

Dionysia esfandiarii

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Dionysia esfandiarii

Dionysia esfandiarii

Large cushion of *Dionysia esfandiarii* – with Sajad's hand for scale.

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Dionysia esfandiarii

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Dionysia caespitosa* subsp. *bolivarii Semirum, Isfahan province, Iran Altitude: 3100m, 23rd April 2022

Dionysia caespitosa subsp. *bolivarii*

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Dionysia caespitosa subsp. *bolivarii*

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Dionysia caespitosa subsp. *bolivarii*

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Dionysia caespitosa subsp. *bolivarii*

Dionysia revoluta Fars province, Iran Altitude: 3000m 24th April 2022

Dionysia revoluta

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Dionysia revoluta

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Dionysia revoluta

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Dionysia jamzadiae Lidén, M.Irvine, Alvén & Mehregan Bavanat, Fars province, Iran

Altitude: 3010m 1st May 2022

Dionysia jamzadiae

Dionysia jamzadiae

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Dionysia jamzadiae

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Dionysia jamzadiae

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Dionysia zetterlundii Chaharmahal and Bakhtiari Province, Iran Altitude: 3100m 4th May

Dionysia zetterlundii

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Dionysia zetterlundii

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Dionysia zetterlundii

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Dionysia zetterlundii

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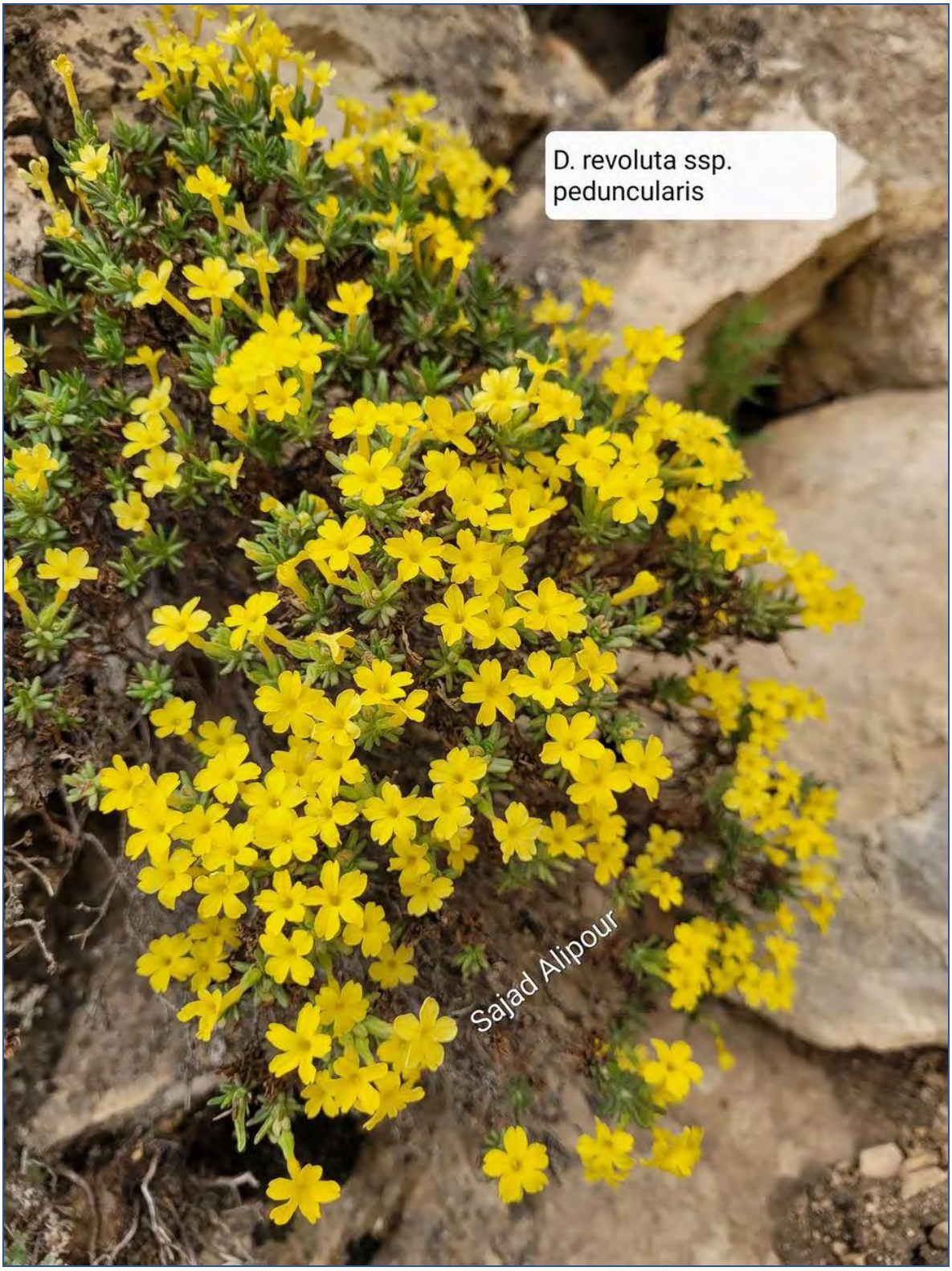
There are more than thirty-five species of *Dionysia* in Iran, and since the beginning of 2022 Sajad has managed to visit and photograph sixteen of them. The first species was *Dionysia michauxi in* February and the last one was *Dionysia splendens* in May.

To accomplish this mission, he travelled more than 9,000 kilometres. The final few of the sixteen species he saw follow below…..



Dionysia revoluta subsp. *peduncularis*

Dionysia mozaffarania

Dionysia zagrica

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Dionysia iranshahrii

Dionysia splendens, the final species photographed by Sajad Alipour in 2022.

Many thanks to Sajad Alipour for the use of these photographs.

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--- Species Description ---

Crocus dolatyarii – a new species from W Iran

Janis Rukšāns, Dr biol. h.c. (Latvia)

janis.bulb@hawk.lv

All pictures and map from author if not otherwise stated.

Summary: A new crocus species growing wild in West Azerbaijan Province, Iran, is described and illustrated. Photographs and distribution maps are provided.

Key words: *Crocus*, Flora Iranica, geophyte, Iran, new species.

Introduction

In 2010 one of the most eminent rare plant seed collectors and distributors from the UK, Jim Archibald, died. He was a great friend of mine, and many rarities in my bulb collection came into existence simply from the seed distributed by him. He never cashed any money from me and all my cheques were returned together with valuable seed packets, even though the procuring and selling of seeds was his business. According to his wish, all the crocuses grown in his collection were sent to me by his widow Jenny. Among them there was a paper bag labelled "*Crocus* sp., *biflorus* group, W of Lake Urmia, Iran" without any other information on the origin. The crocuses from their first blooming indeed looked noticeably conspicuous and certainly represented a new species, very different from all the other crocuses growing in my quite representative collection. During every trip to Iran, when our team was in the region "W of Lake Urmia", I looked for crocuses which would be similar to this gift from Jim.

Flower details of crocus species received by author from Jim Archibald, as collected W of Lake Urmia.

Crocus species received by author from Jim Archibald, as collected W of Lake Urmia, blooming in the author's collection.

In 2019 I got a mail and some pictures of a very special crocus from Dr Alireza Salami of the University of Teheran, Iran. The pictures were taken at high altitudes on the border between Iran and Iraq, W of Oshnavieh by a mountain climber and depicted a crocus with yellow flowers that were flushed and striped purple on the outside. In this part of the crocus range hitherto there had not been any references of crocuses with yellow flowers, so it certainly represented a new species. In Iran at present are known only two *Crocus* species with yellow flowers. One of them – *Crocus almehensis* –which, in the wild, grows to the east of the Caspian Sea at the western end of the Kopet-Dagh on mountain meadows at high altitudes and has large bright yellow flowers [8] (there is personal information from a guard of the National Park in Almeh who had seen another yellow-blooming crocus in forest clearings at much lower altitudes, but this has not been confirmed).

Crocus almehensis in habitat. Photo John Ingham.

Crocus kurdistanicus 18IRS-020

In 2002 Iranian researchers Maroofi & Assadi published one more species with bright yellow flowers from Kurdistan as *C. danfordiae* subsp. *kurdistanicus* [4]. In 2014 I elevated its status to that of a species – *C. kurdistanicus* (Maroofi & Assadi) Rukšāns [6,7]. Until its rediscovery by our team in 2018 there was only a brief description of this species that lacked essential information about its morphological features. After its finding not very far from the *locus classicus* it was

possible to make a full and detailed description of *C. kurdistanicus* which will be published in coming “The First Supplement of The World of Crocuses” (in preparation). I was positive that a new *Crocus* species was portrayed in the pictures sent to me by Dr Alireza Salami, on account of its flower colour – very conspicuous and nothing like any other crocus growing in this region.

New yellow blooming crocus species from W Iran. Photos courtesy of Dr Alireza Salami.

New yellow blooming crocus species from W Iran. Photo courtesy of Dr Alireza Salami.

That of course spurred me to undertake further research in this region. The first attempt was made in 2018 and although we found several very interesting crocus species in both West Azerbaijan and Kurdistan Province, not one resembled the plants I mentioned above. My next trip to Iran was cancelled due to the Covid restrictions and only in 2022 was it possible to make a research trip to Iran by courtesy of Dr Alireza Dolatyari, botanist at the Iranian Biological Resource Center, who invited me to take part in his crocus research expedition to N and NW Iran. Of course, one of our targets was just this yellow crocus; the data about its distribution area were kindly presented to me by Dr Alireza Salami.

Unfortunately, our ascent to its locality some 6 km before the supposed location was hindered by around a 3-metre-thick blanket of snow that had blocked all the roads. Local border guards which we met on our way near the highest point and to whom we showed the pictures of this crocus, confirmed that indeed such a crocus was growing there, but at that moment the place was under deep snow which would melt only around mid-May. However, just a kilometre before along the road and at the place where our team was stopped by snow, another very beautiful crocus bloomed. On returning home, I compared my herbariums of Iranian crocuses prepared during this

trip with those of Iranian crocuses grown by me before and found that the crocus discovered nearby the road to the “new yellow” was identical to the beautiful blue crocus received from Jim Archibald as collected “W of Lake Urmia”. Thus one of several “enigmas” was solved. I decided to name this new crocus after Dr Alireza Dolatyari, who invited me to take part in this expedition.

Crocus dolatyarii blooming in its habitat

***Crocus dolatyarii* Rukšāns**

Type: Iran, West Azerbaijan: W Oshnaviyeh, Sheikh Rivas region, 36°56’N, 44°57’E, alt. 2250 m. Holotype IBRC! (Her. No. 3528); Isotype RIG! (22IRS-076, leg. A. Dolatyari & J. Rukšāns, 11-04-2022).

Habitat and distribution – on open slopes and between low phrygana shrubs together with *Iris bakeriana*, *Colchicum* cf. *szovitsii*, *Iris ewbankiana, Puschkinia sp. nova*, *Ornithogalum* sp., *Bellevalia* sp. observed at altitudes of 2200-2250 m near melting snow and lower. At present confirmed only from the surroundings of the type locality, but might be distributed wider.

Flowering time – April.

Corm – depressed globose, 5-9 mm in diameter.

Tunics – papery but strong, split at the base into 2-3 mm wide segments.

Tunic neck – somewhat bristly, 5-7 mm long, formed by widely based triangular splits of the main tunic, with occasional deeper splits.

Basal plate – up to 10 mm in diameter, strong.

Basal rings – almost absent or poorly developed, weak, up to 2 mm wide with a rough edge or with tiny densely set teeth.

Prophyll – absent.

Cataphylls – white, mostly 3, rarely 4.

Leaves – 3-4(5), smooth, greyish green with a silvery bloom, up to 3mm wide, the white stripe very narrow, less than 1/5 of lamina width, lateral channels with (3)4 ribs, one rib often less developed, edges bending downward and slightly inward; appear during blooming and reach the flower base at blooming time.

Perianth tube – white with blue stripes, rarely the stripes below the flower segments become confluent.

Bract and bracteole – transparent, colourless, the bracteole slightly longer than the bract, ending mostly well, rarely shortly, below the base of the flower.

Throat – glabrous, large, white, gradually becoming light lilac blue from the third of segments length, not edged. In J. Archibald's sample sometimes slightly flushed pale yellow.

Filaments – glabrous, white, 7-**9**-11 mm long.

Anthers – yellow, 10-**14**-18 mm long, with very long – mostly 2 mm, in one case observed even 3 mm, long basal lobes.

Connective – white.

Style – in the throat white, higher up turning yellow to light orange, divided at the top into 3 short (2)3(4) mm long, orange to reddish orange stigmatic branches, stigma distinctly papillose, mostly positioned below the tips of the anthers, only in 2 cases out of 32 observed flowers it ended at the anther tips and twice overtopped them.

Flower segments – ovate to obovate, sometimes elliptic, mostly light blue, with darker greenish blue "tongue" on the outside base, rarely darker blue, observed two pure white individuals. In total, 32 individuals were observed and measured. As it is sometimes observed, in some crocuses with white or light blue flowers the colour in herbarium changes to blue, and although the dominating colour in the wild population was very light blue, in herbariums all flowers after drying were bright blue.

Outer segments – 24-**32**-43 mm long and 8-**11**-14 mm wide, the outside lighter or darker light blue with a greenish blue basal blotch surrounded by a darker blue and mostly with a white or whitish rim, sometimes with a darker midrib, occasionally it widens at the very tip into a small darker blotch; the inside light blue changing into a large diffused white throat.

Inner segments – 24-**28**-35 mm long and 7-**11**-14 mm wide, by colour practically the same as the outer segments.

Capsule and **seeds** – unknown.

2n = ?

Etymology – named after Dr Alireza Dolatyari from the Iranian Biological Resource Center, Iran, founder and curator of IBRC herbarium (IBRC), researcher of Iranian flora who has much contributed to the research of the genus *Crocus, Allium* and other bulbous genera growing in Iran.

Crocus dolatyarii blooming together with *Iris bakeriana.*

Landscape at *locus classicus* of *Crocus dolatyarii*. Photo Alireza Dolatyarii.

Discussion

According to the published pictures, a quite similar crocus (HKEP-1631) was found by H. Kerndorff et al. [2] between Orumiyeh and Silvana at an altitude of 1470 m (as the previous experience has shown, those data can be rather incorrect) and labelled as *Crocus* cf. *roopiae*, even though the two species share only the whitish colour of the throat. *C. roopiae* was published from Kars Province in Turkey (earlier belonging to Russia) by G. Woronow in 1924 and was included among the synonyms of *C. biflorus* subsp. *taurii* by B. Mathew [5], which is certainly not correct. There are only a few descriptions of *C. roopiae* available which lack several essential details, but even these data indicate sufficiently significant differences between the two species – according to the Flora of the USSR [3] *C. roopiae* has a bearded throat whereas in *C. dolatyari* the throat is glabrous, corm tunics are firmly coriaceous (vs. strong but papery in *C. dolatyarii*), 2-3 basal rings (vs. almost absent or poorly developed, weak in *C. dolatyarii*); according to the Flora Caucasica [1], the flower base in *C. roopiae* looks “inflate”, in *C. dolatyarii* it is slender. Consequently, all this confirms that the crocus found by our team represents a new species that is described and published here as *C. dolatyarii*.

Crocus dolatyarii Holotype IBRC! (Her. No. 3528). Photo Alireza Dolatyarii.

Crocus dolatyarii isotype herbarium.

Crocus dolatyarii - Archibald's crocus, sample herbarium.

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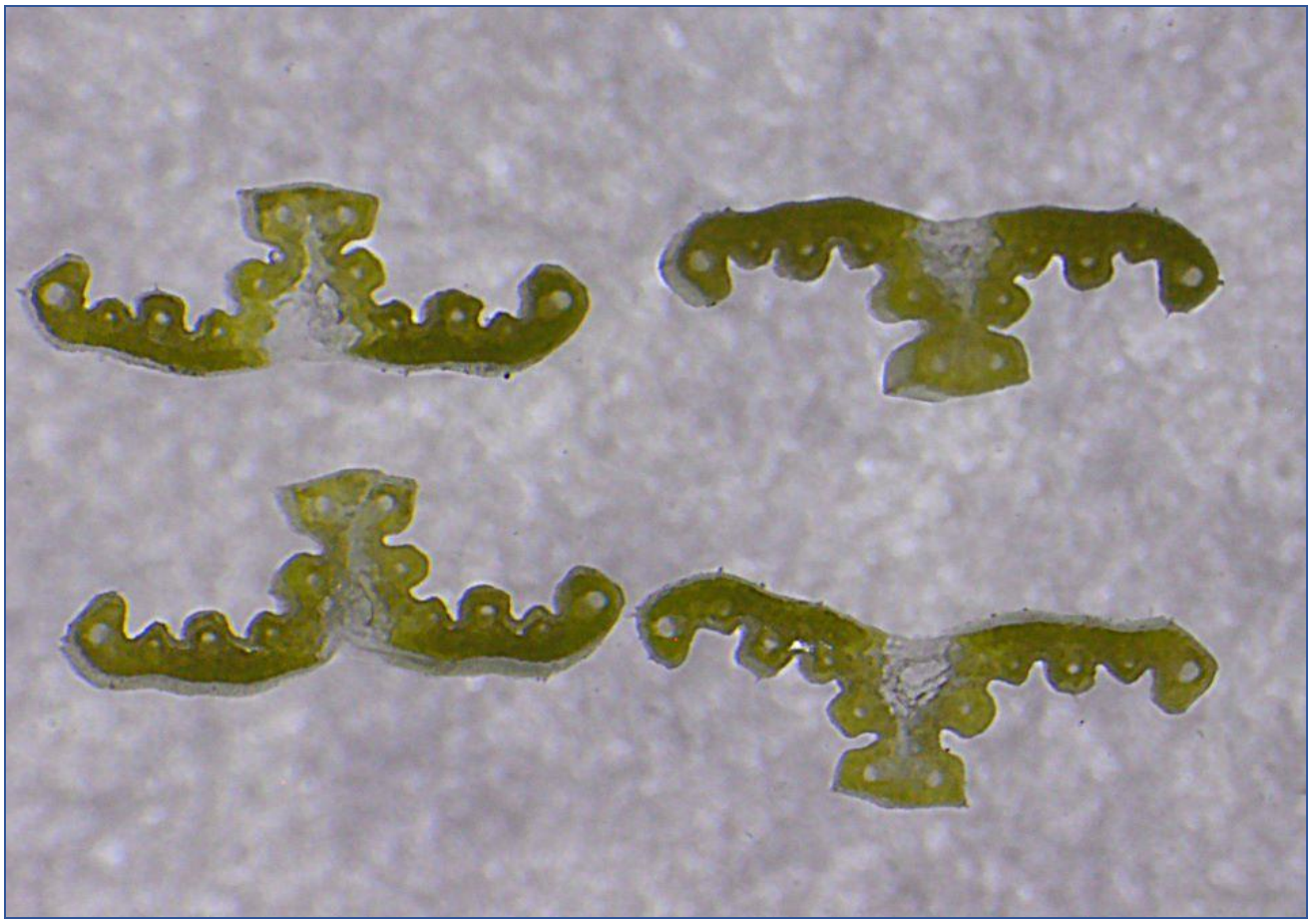

Crocus dolatyarii – leaf morphology. Photo Alireza Dolatyarii.

Crocus dolatyarii - corm tunics.

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Crocus dolatyarii distribution map: red mark – *locus classicus*; yellow mark approximate locality of HKEP-1631 sample.

Below: *Crocus dolatyarii*. Photo Alireza Dolatyarii.

Crocus dolatyarii. Photo Alireza Dolatyarii.

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Albino of *Crocus dolatyarii*. Photo Alireza Dolatyarii.

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Crocus dolatyarii.

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Crocus dolatyarii.

Crocus dolatyarii.

Acknowledgments

First, I express my thanks to Dr Alireza Dolatyari who invited me to take part in this marvellous expedition, giving me such great improvement in my knowledge about the bulbous flora of Iran, to

our team partner Vaclav Jošt (Czech Republic) for his help in search of new plants and preparing of herbariums. And I'm especially thankful to my family for the hard work at my garden during my absence, because of the field studies *in situ*. As usual – thanks to my language corrector Mārtiņš Erminass who made my paper more adequate to English grammar rules.

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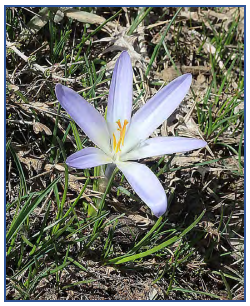
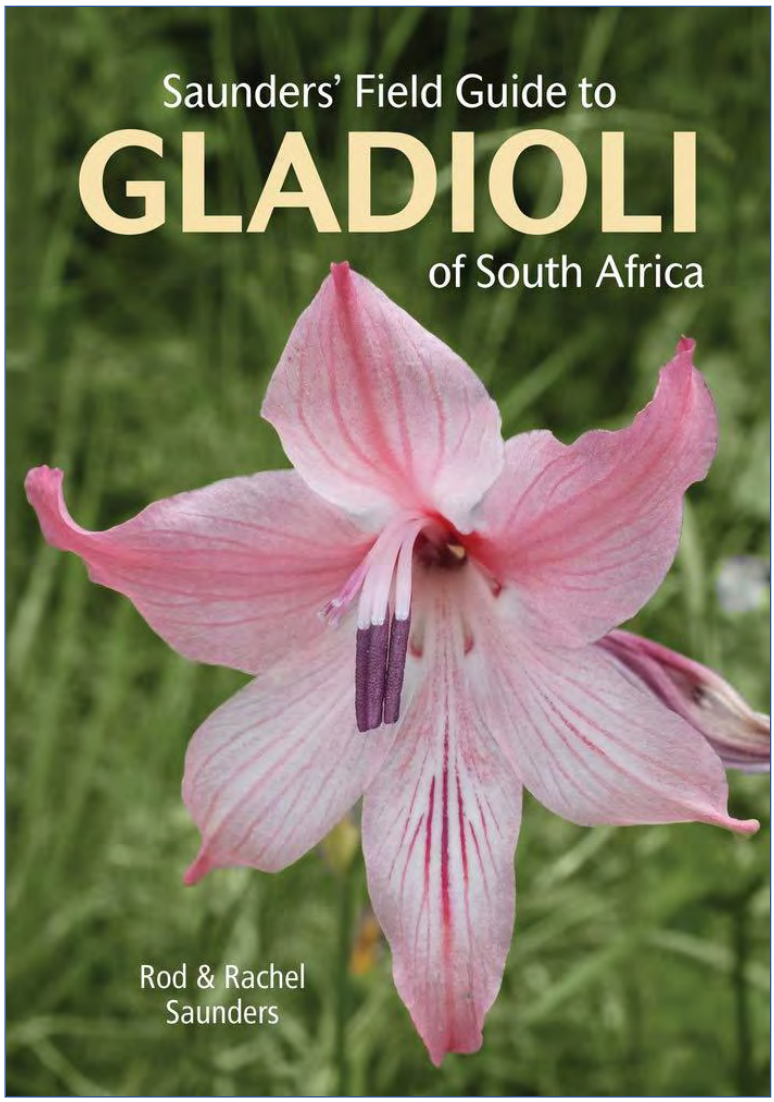


Saunders' Field Guide to Gladioli of South Africa – Review by David Carver.

A book, guide and legacy to two extraordinary plant hunters and researchers.



At first glance of the front and back of the book, it reads and looks to be a well set out extensive guide on this fascinating genus.

Turning the first page you are met with an eye-catching photo collage of the huge variety of the flowers. Each photo shows off the many different species and variations you find with in the genus. The photographs are well laid out and next to each flower you see a page number, there it will take you to the appropriate page to read upon that species.

The preface gives a good image of the life and work the couple had envisaged completing. We get taken through the history of the genus and how the well-known garden hybrids were introduced into the horticultural industry.

Then we are lead through the different sections into which gladiolus are split. I found this the most interesting part to read, as I have very little background knowledge on the genus and especially the specific taxonomy which helps key out the species and which groups they fall into.

After covering the introduction and background of the genus we go into the different species. To start we read about how the pages are set out, when we go over each plant. As we cover each section you cannot help but notice how much work has gone into each species with detailed descriptions and many clear photos covering the flowers and natural colour variations. They cover everything from an image of the seed, to the background and history of the plant name, notes on the ecology & description of the specie. You notice key terms are

highlighted, this provides to be useful as there's a terminology index towards the back of the book, this has detailed explanations and even some photos to help you understand.

I believe this book has been thought out to appeal to everyone. From the total novice to an expert in the field looking to take a guide on a planned trip to explore the magnificent South African flora kingdom.

This 383-page book is of an impressive quality and is of a size which will be easy to take with you on travels or to just hold and read at home. I do not feel as if there was anything they missed out on when it came to covering this impressive genus. I could tell that the people who were behind making this book a reality were following the passion and love which both Rod and Rachel had when they began and almost finished their journey.

I would recommend this guide to anyone who has a love for this fantastic plant. It offers an informative read on the research in which Rod and Rachel had set out and had near enough finished, on data basing all the species found in South Africa.

I found the guide to be interesting and not too overpowering. I was wowed by the huge collection of images used throughout the book, in fact over 1,300 of them which is emphasised on the back of the book. A book I am really pleased to have in my collection and look to possibly take with me one day in the future to South Africa.

Seen here in the foothills of the Drakensberg, Rod and Rachel were inveterate hikers.

Saunders' Field Guide to Gladioli of South Africa (Struik Nature Field Guides)
by Rod Saunders and Rachel Saunders.
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---International Rock Gardener---

--- Species Description ---

Tulipa brinkii J.J. de Groot & B.J.M. Zonneveld species nova: a new tulip from the Kuh e Aladag in Iran's North Khorasan province.

J.J. de Groot jacjdegroot@casema.nl Beeklaan 9, 2191AA De Zilk, The Netherlands.

B.J.M Zonneveld ben.zonneveld@naturalis.nl Naturalis Biodiversity Center, Darwinweg 2, 2333C Leiden, The Netherlands. (PO box 9517, 2300RA Leiden).

1: *T. brinkii* spec. nov.

Abstract:

T. brinkii spec. nova is a tulip from the Kuh-e-Aladag in NE Iran. It is described here as a new species, based on its locality and different genome size and the article is provided with photos of cultivated plants. The differences with related species are discussed.

Keywords:

T. brinkii spec. nov., Iranian tulips, genome size, Kopet-Dagh area.

Introduction:

The genus Tulipa Linnaeus (1753:305) (Liliaceae) includes 87 species (Zonneveld 2009), 78 species (Christenhusz et all 2013), or 83 species (WCSP 2016 Kew). Today there are more than 150 species including the genus Amana. Several of them are included as a synonym of other species though the DNA value shows that it is a good species, others are newly described and a number are still waiting to be described.

T. brinkii is one of the several red flowering Iranian tulips with inner tepals that are smaller than the outer tepals, and these tulips mainly grow in the Zagros mountains of W. Iran. However, this newly described species grows in the Kuh-e-Aladag which is a mountain range in NE Iran, roughly between Sankhast in the SW and Bojnurd in the NE. It forms the eastern extension of the Alborz Mountains and include the SE corner of the Golestan National Park and the Salook National Park. These mountains consist largely of granite overlayed with chalkstone.

This newly described species is very variable, especial in the size of the plants, the colour of the pollen and the colour of the stems. In some forms there is an anthocyanin colouring on parts of the leaves in the springtime. The hairiness of the bulb tunic is also variable from plant to plant and from year to year. Together with 6) *T. micheliana* 46.3 pg, 3*) hoogiana* 47.7 pg, 2*) botschantsevae,* 4) *persica* Sweet 48.3 pg, (is *T. hoogiana* hort*)* and the species known in cultivation as 5) *T. eichleri* 48.6 pg, (which is not the *T. eichleri* Regel from the Caucasus), it forms an ancient, variable group of tulips, all with a relatively low amount of DNA and growing in the area around the Kopet-Dagh mountains. Successors of this group of tulips migrated from this area in the distant past to Central Asia as well to Turkey and the Middle East.

Desert with *Papaver pavoninum* and the Kuh e Aladag in the distance. Photo K.J. van Zwienen.

2: *T. botschantsevae*

3: *T. hoogiana*

4: *T. persica* (*T. hoogiana* of hort.)

5: *T. eichleri* (hort.)

6: *T. micheliana*

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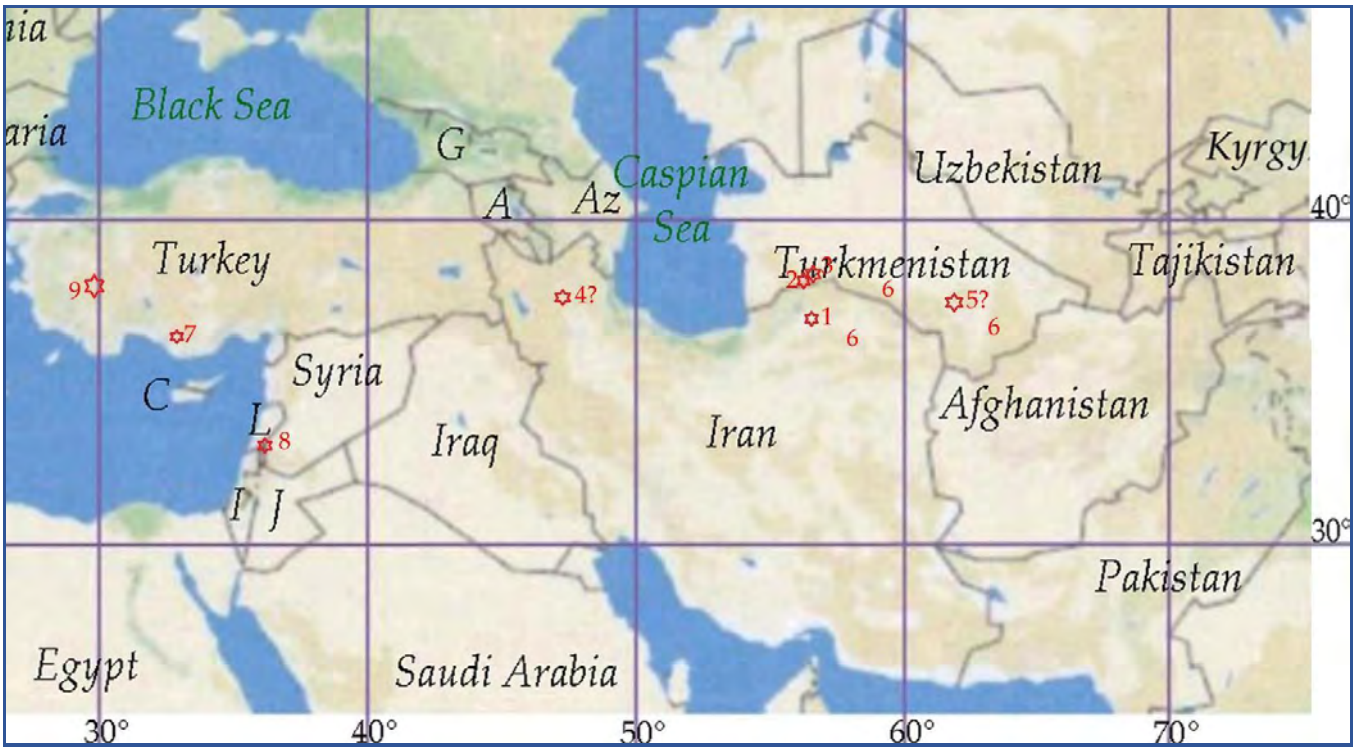
Material and methods:

Offspring are grown from wild collected seeds, which are growing in the collection of J.J. de Groot as nr. 09-25. This new tulip was found by M. v. d. Brink in 2009 in the spring. It was growing together with *Fritillaria gibbosa*, on the lower, south facing mountain slopes about 10 km NE of Sankhast, where the mountains meet the desert. It was already in seed there at that time. Some seeds were collected and taken to the Netherlands. They were sown in the autumn of 2009, and needed nine years till flowering.

Flowcytometry was done by B.J.M. Zonneveld from Naturalis Biodiversity Centre. with propidium iodide and *Agave americana* 'Aureomarginata' with 15.9 pg, as standard (Zonneveld 2021).



Distribution map of the tulips mentioned herein.

# 1: *T. brinkii* sp.nov.	# 2: *T. botschantsevae*	# 3: *T. hoogiana*
# 4: *T. persica*	# 5: *T. eichleri*	# 6: *T. micheliana*
# 7: *T. harmoniana*	# 8: *T. agenensis*	# 9: *T. undulatifolia*

***Tulipa brinkii* J.J. de Groot & B.J.M. Zonneveld species nova: a new tulip from the Kuh e Aladag in Iran's North Khorasan province.**

Type:

The type form (holotype) is a cultivated plant grown from wild collected seeds nr. vdB 09-25, from the collection of J.J. de Groot. An herbarium specimen is deposed in the Leiden herbarium (L) Naturalis Biodiversety Centre with the nr. L.4420634.

Description:

The bulbs are up to 45 mm in diameter with a leathery brown tunic which is covered inside with hairs on the top and bottom. The hairless, green stem is 140 mm long, including the flower stem of 100 mm. The 4 (7) leaves are spear-shaped, green and keeled. The strongly waving margins are light reddish-brown with only some hairs near the tip of the leaves. The basal leaf is 192 x 75 mm, the second is 194 x 51 mm, the third is 187 x 41 mm and the fourth leaf is 145 x 29 mm. All the leaves are close together on the stem. The flower has outer tepals that are much bigger than the inner tepals. The spear-shaped outer tepals are 75 x 42 mm and dull pinkish red on the outside and straw coloured to the tip. They have outwards curved margins and a pale-yellow basal spot over 15%. The inside is bright red with a dark basal spot over 15% which is bordered with a yellow rim. The similarly coloured, oval inner tepals are 60 x 39 mm. The stamens are 25 mm long including filaments of 10 mm. The anthers are dark purple and the pollen is ochre-yellow. The triangular filaments are purple-black. The straight ovary is 24 mm long and pale green with some pale red stripes. The stigma with slightly protruding lobes is bright rose-red.

In the young stage, it is a stoloniferous species with very small young bulbs at the end of hairlike stolons. That is very similar to the young stages of the Middle Eastern *T. agenensis.*

Etymology:

T. brinkii is named after Marijn van den Brink who collected the seeds of this species. He visited the countries where the tulips grow in the wild several times. There is a nice photo gallery online at https://photos.v-d-brink.eu.

Discussion:

#1 *T. brinkii* 47.8 pg, is morphologically similar to the somewhat larger #7 *T. harmonia* 49.0 pg, from the western Taurus mountains in Turkey, a species described in 1892 by Sprenger (Cat. (1893)5. – Gartenflora 42-1893) but lumped into #9 *T. undulatifolia* 57.1 pg, by Baker. However, the growing distance from one species to the other is more than 2200 km in a straight line.

The similarity of this new species from north east Iran with the tulips growing in western Iran, the Middle East and Turkey is a strong argument to describe this species, as its morphological characters indicate a direct link to these western species.

Table:

	T. harmonia	*T. brinkii*	*T. agenensis*
Covering on the inside of the bulb tunic	short hairs, mostly on the nose and bottom	long hairs, mostly on the nose and bottom	a layer of woolly hairs
Length of the stem	up to 30 cm	up to 17 cm	up to 20 cm
Covering of the leaves	sparsely short hairs on the margins	few short hairs, only near the leaf tip	short hairs on the whole margins
Filaments	triangular, 12 x 3,5 mm	triangular, 10 x 4 mm	triangular, 13 x 3 mm
pollen	yellow or light greyish-purple	ochre or light greyish-brown	variable, from yellow to black
Ovary	straight	straight	bottle shaped
DNA value	49.0 pg	47.8 pg	56.2 pg

Plant parts of *Tulipa brinkii.*

1 *Tulipa brinkii*

7 *Tulipa harmonia*

#8: *T. agenensis* in the Judean hills.

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Flowcytometry is a valuable way to discriminate species when the visible marks give no decisive answer. In the case of *T. brinkii,* it pointed out that that the average DNA mass/weight in the cell nucleus of this species with 47.8 picograms, is 1.2 pg, lower than the DNA mass of *T. harmonia* from Turkey which has 49.0 pg.

Zonneveld (2021) selected perennial plants to provide convenient standards for the determination of genome size with flowcytometry.

#9: *T. undulatifolia*

Photos are by J.J. de Groot unless otherwise stated.

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Marijn van den Brink in the Kuh e Aladag. Photo K.J. van Zwienen.

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