

International Rock Gardener

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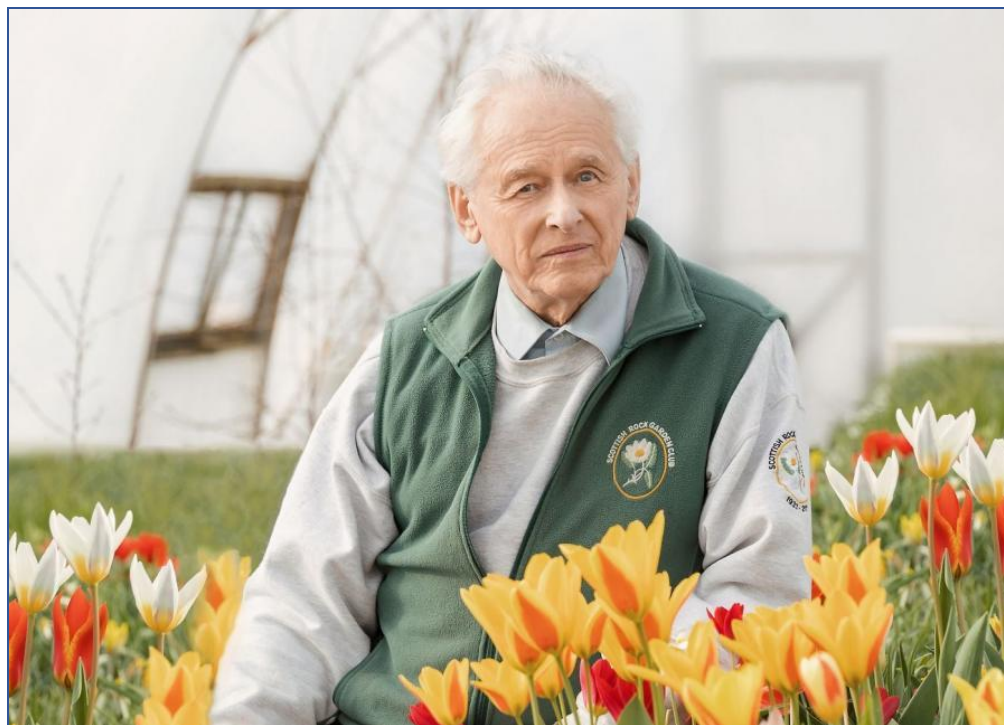


It is the pleasure of the IRG Team this month to pay tribute to the well-known Latvian botanist, Jānis Rukšāns following of his seventy-seventh birthday and the milestone of around sixty-five years involvement with collecting, breeding and growing bulbs. Jānis and his wife Guna, (another expert growing mostly on Hosta, Phlox and Peonia) have a farm 80 kilometres northeast of Riga, where Jānis has amassed what is probably the world's largest collection of ornamental bulbous plants.

Of the more than 5,000 examples grown, around a third are crocuses which are his particular passion. After personally discovering and describing over 50 species of crocus, Jānis is recognised as a world authority on the genus.

Jānis' interests lie in much more than bulbs, of course. He has been decorated by the Latvian State for his work in the country's struggle for independence, and an interest in politics continues. He has a fascination for folk history and music and is still much involved in choral singing.

As author of several books, including on tulips, two in English on crocuses, as well as "Buried Treasures," a memoir of his travels, scholars from far and wide have visited him in Latvia and to invite him to talk in various countries. His charming and easy manner as well as his expertise has made this tall gentle man a real favourite when presenting any lecture. In 2021 he was the first recipient of a new award from the Royal Horticultural Society, the Sir Daniel Hall Award - 'Awarded annually by the RHS Bulb Committee in recognition of significant personal achievement relating to bulbs and other plants within the committee's remit.'



Cover image: *Tulipa humilis* at the Karabel pass, Turkey - image by Jānis Rukšāns.

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--- A Lifetime of Learning ---

65 YEARS WITH BULBS by Jānis Rukšāns, Dr. biol. h.c.

janis.bulb@hawk.lv

In September this year I turned 77 years old. It's not a round number but if I remember that I introduced the first bulbs (*Corydalis* and *Gladiolus*) from the wild when I was 12 years old, it's quite a neat anniversary – 65 years since I seriously engaged in gardening, and particularly, in growing bulbs.

I guess I was born with a shovel in my hands! The English have this belief about the “green thumb” – that is, that people who can bend the upper phalanx of their thumbs back at a 90-degree angle are born gardeners. Latvians do not compare it to the ability to bend the tip of the thumb, but say that for some people, even a broomstick stuck in the ground will start to grow. I really can- or at least could until recently, bend the tips on my thumbs back at a right angle without difficulty, and many of my first childhood memories are related to the garden, even though I was born into a family of journalists living in the very centre of the Latvian capital, Riga. Somehow it has happened that I quite often manage to grow plants with which other gardeners have failed. I don't know if it's the ability of my thumbs to bend or some other mystical power. However, in spite of this, I too have had very bitter moments when instead of the expected flowers in spring, the soil in the garden is dark black with but a few weak sprouts. The vagaries of nature are often stronger than even the abilities of “green thumb” miracles.

Why did I become a gardener? I do not know. I could just as easily become a doctor, zoologist, geographer or other researcher in natural subjects. These are all professions that have always interested me, but fate turned me in the direction of the garden. After the war, our family was given a small garden in Riga. I remember how once I came home from the garden with my grandmother holding my hand, when, by our house, a chubby lady asked in Russian if my grandmother would sell her the bouquet of tulips she was carrying. I beseeched Grandmother not to sell them, but the flowers passed into Madame's hands for a ruble or two. I cried about it at home. As a child, of course, I did not understand how very important that ruble was to my grandmother. Maybe that's why I've never sold flowers from my garden, but only given them as gifts.

I had just learned to read, strongly encouraged by my grandmother, when I eagerly stumbled upon the rich home library. It had quite a lot of nature books, which interested me more than anything else. I also learned to read the “old print” (Gothic script), I no longer

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remember what edition it was, but the first article in that battered book was about the “fire-breathing” mountains, which I read again and again as my blood froze. After that, more than once I was awoken with a nightmare from these scenes of danger. Soon I was well known in the children’s and youth literature library of the city, where the librarians always left out some new book dedicated to nature for me. These books also made me learn Russian and Cyrillic.

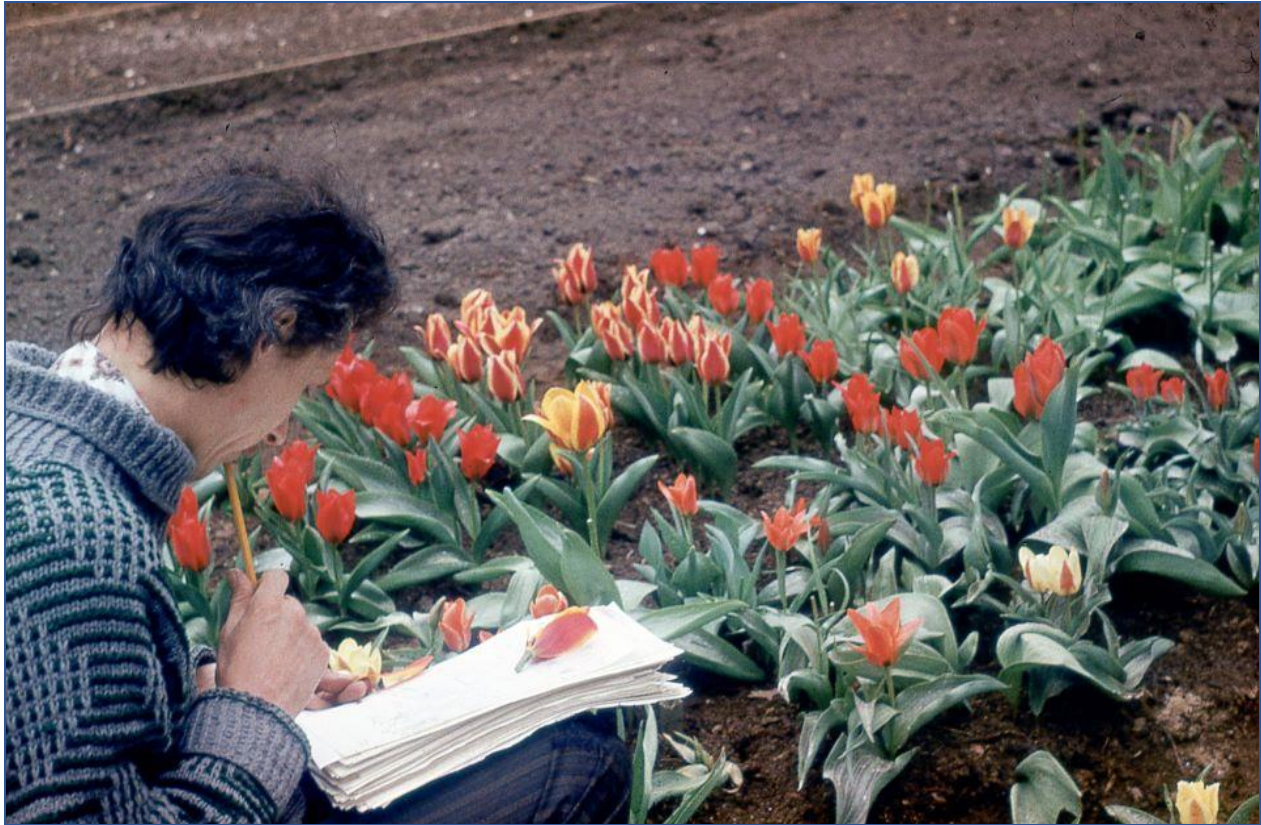
Therefore, it wasn’t much of a surprise that I was drawn, to the Botanical Garden of the University in Riga, the various shows organised by the Latvian Horticulture and Beekeeping society, which ultimately led me to the groups of young naturalists and then to the Bulduri Horticulture College. I was still studying in the fourth year of basic school when our family was given a small plot of land in the country. A year later, I was already spending summers there in a temporary hut built there. That’s where my first “expeditions” began, on the meadows of the river’s Gauja floodplain in search of *Gladiolus imbricatus*, in the shade of hazels below the now cut down forests with *Corydalis*, *Anemone*, *Hepatica*, *Gagea* etc. – wild plants growing in the undergrowth. Even then I started looking for interesting, unusual colour forms to transfer them and try to reproduce them. My first rock garden consisted of around 200 Latvian wild plants.



Gladiolus imbricatus – one of the first bulbous plants introduced in my garden when I was 12.

Looking back, I see how my interests have changed. The first serious research began during my studies in university, when I chose, as the subject of my diploma thesis research, the possibility of crossing wild tulip species using *Tulipa vvedenskeyi* in hybridization. As a result, many dozens of interesting hybrids were created, which differed pleasingly from the assortment of widely cultivated Dutch tulips. I still grow dozens of them, in small quantities.

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Working with descriptions of wild tulip hybrids in my garden (1971).

The next crop I gave more attention to was daffodils. In total, I collected about 700 varieties in the collection and created several hundred new hybrids, trying to combine the high quality of flowers from the breeders of English-speaking countries with the growing capacity of Dutch varieties. At the same time, I grew and crossed *Corydalis*, created about 60 varieties, at that time more than half of all the varieties known in the world. However, even though my interests have changed over time, my love for crocuses has always remained the same.

Among my daffodils, around the Millenium.



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My *Corydalis* seedling beds at the Millenium.

I am a collector by nature. I have collected stamps, matchbox labels, coins and beer bottle labels, so it should come as no surprise that I have also approached gardening with a collector's passion. But one can't cover everything. More than once, one has had to make difficult decisions, giving up a part of the collection in order to devote more attention to the rest. So, over the years, I gave up my collection of tulip varieties, leaving only wild species and interspecies hybrids created by myself. After that, I gave up the varieties of small bulbous plants created in Holland, again leaving only the wild species and their forms, as well as some varieties created by myself. And then came one of the most difficult decisions - I sold my entire collection of daffodils, this time also all my hybrids, a total of 1400 samples, to a large association of three Dutch companies. And yet, I still have about 6,000 samples left in my own collection, I still cross crocuses a little, go on expeditions in search of new plants, buy and exchange seeds from bulbous plants that grow wild in places where I have little hope of reaching.

77 years brings the time to start thinking about what will remain after you, when, in the words of the Persian poet Omar Khayyam, "perhaps tomorrow, the moon will already be looking for you in vain". The years keep coming, but my strength is running low and the collection has to be gradually reduced. A few years ago, I could transplant more than 10 thousand pots in a season, now I am thinking about which ones to transplant, and which ones can be left for another year in the same soil. Visitors often ask - who will continue my

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work when I can no longer do it myself? This is the problem of many breeders - children see what hard work this is, which requires complete dedication, and choose easier ways.

In my garden, I have amassed the world's largest collection of crocuses, with currently about 1700 samples. In total, during my expeditions, I have discovered and described 85 new and internationally recognized bulbous plant species. Also, the total assemblage of bulbous plants, which currently has more than 4,500 specimens, is among the largest in the world. Where will this material stay? The Botanical Garden of the University of Latvia showed interest in taking over the collection. Years go by, but the matter has not moved beyond the selection of a place and the selection of a possible greenhouse type. The Teterev Foundation seems to be ready to finance this project. I am willing to donate my collection to the botanical garden. However, nothing has progressed for several years.

But I didn't start writing to complain. I wanted to tell you about some observations, especially in recent years. In general, I have already described the cultivation of bulbous plants in many books, but every year brings something new. Only when it seems that you already know everything, do you start to understand that you still know nothing. You seem to do everything right, but the results are lacking. Now for about some conclusions of the last years.

Soil acidity (pH):

The vast majority of bulbs are quite tolerant of soil reaction, namely acidity or alkalinity. There is a general opinion that the optimal reaction for growing bulbous plants is close to neutral, but slightly on the acidic side, around pH 6.5-6.7. And indeed, most bulbous plants feel very good in such soil, grow well, bloom and ripen new bulbs year after year.

I encountered soil reaction (pH) problems for the first time while growing tulips. At that time, the restored free Latvian state paid the first independent farmers for land reclamation, liming of soils, road construction, electricity installation and other measures that were necessary to start farming. I was among the first ones in my district, and I also used these services and my fields were limed with Estonian flint ash. Three years later, in the field where daffodils had previously grown very well, I planted my, at that time, very large collection of tulip cultivars. A year later, when harvesting, I was shocked at the tiny bulbs, hardly any large ones that would bloom normally the following spring. I was looking for a reason, and then I remembered the publication of V. Nollendorf, a leading researcher of plant nutrition in Latvia at that time, about the effect of soil acidity on the yield of tulip bulbs. In acidic soils, tulips do not form large bulbs, but divide only into many small ones. I checked the acidity of the soil, and it turned out to be around pH 5-5.5. But the soil was treated four years before with chalk. Acidity is

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neutralized by calcium (lime), but calcium, like nitrogen, is the easiest to leach from the soil. It had also happened in my fields. And the pH again became acid.

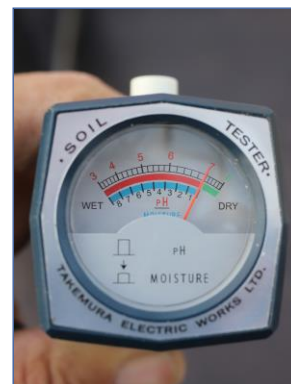


Professional soil pH and moisture tester used by me.

Now I grow all the bulbs in pots. Although I prepare the substrate artificially and check its acidity before using it, for the sake of safety, for tulip pots, before applying a layer of mulch (I use stone chips for mulch), I sprinkle an additional dose of chalk, which washes into the soil when watering the pots, thus ensuring that the substrate does not become acidic.

Daffodil cultivars are very tolerant of soil acidity and will grow well in almost any moist soil. However, this cannot be applied to wild forms of daffodils. Although my daffodil cultivars had already gone to Holland and I no longer grow them, when in 2019 my friend from Northern Ireland, the famous daffodil breeder Brian Duncan, invited me to take part in a small expedition to Portugal and Spain, I immediately agreed, because crocuses grow there too and there is still much ambiguity in the taxonomy.

During this expedition along the way I also collected some wild forms of daffodils and was surprised that several of them did not grow well in my collection and the bulbs became smaller and smaller. Likewise, the collected crocuses withered. On the next trip, I already had a soil acidity meter with me, and I was surprised to find that in many places both daffodils and crocuses grew in very acidic soil. Similarly, some species of crocuses that had grown well in my garden, planted in pots, produced tiny corms and were just on the verge of extinction. Now I always take



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a professional pH tester with me on expeditions. It turned out that all those species that did not want to grow with me in pot culture grew wild in acidic or even strongly acidic soil. There was a similar soil in my former garden, too, where those species grew very well in open ground.

I always tried to create the substrate so that the pH was between 6.5 and 6.8; that is, only slightly acidic or even close to neutral. On the other hand, when I checked the garden soil, its pH was always around or even below 6. Now I started preparing a special soil mixture for these poorly growing species of crocuses and daffodils, using a ready-made store-bought rhododendron and conifer peat compost as a substrate, mixing it with coarse sand in a 1:1 ratio up to 1:1.5. Immediately, the harvest blossomed, where before I collected small, non-flowering bulbs or corms, now normal-sized underground organs grew. Of course, preparing a special mixture is not easy and I once forgot that a specific species needs an acidic substrate. I planted it in a standard mixture. I didn't want to sift and dig them out again, so I carefully removed the covering topsoil and replaced it with clean, acid peat moss in a layer about 5 cm thick. The results were simply outstanding. Now I no longer prepare a special mixture, but I plant all these plants, forming a kind of layer cake. I filled the pot with a standard substrate [1 part of peat moss, 1.5-2 parts of coarse sand + dolomite chalk + chalk + complex slow-dissolving granular fertilizer (I used a recipe intended for growing potatoes)], pressed it so that at least 7-8 cm of free space remained at the top (I use 20 cm deep, so-called rose pots), then I place bulbs/tubers/corms, cover them with a very thin layer of standard substrate, then about 5 cm of acidic, clean moss bog peat comes on top, and on very top again a thin layer of standard substrate. About 1.5 - 2 cm of free space remains, where you can pour chipped stone mulch.



Narcissus bulbocodium bulbs placed in 15x15x20 cm large pot, then filled on top with acid peat moss, after pressing down space will remain for top dressing with stone chips.

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I used to put a thin layer of pure coarse sand on top of the compacted substrate before planting the bulbs, then I stacked the bulbs and topped them with pure coarse sand again, basically copying my growing style when all my plants were planted in the open garden. It was easier to harvest them in the garden. Now that I have less strength left, I found that when growing in pots, you can do without it. Why don't I pour peat over the bulbs right away? During harvest, the plants have not been watered for quite some time and the peat forms a kind of hard cover in which the bulb tips get caught and this makes gathering difficult. The thin layer of soil protects against it. The soil piled on top of the peat, when watering, in turn protects the fines of the peat from floating between the pebble mulch.

Now I grow this way practically all wild daffodil species and many alpine crocuses that



grow wild in the alpine turf meadows - species of the *Crocus veluchensis* group, *CC. vallicola*, *scharojanii*, *pelistericus*, *scardicus*, *jostii*, etc. In the past, I never grew *C. kosaninii* bulbs of good, satisfactory size, now I am very satisfied with their size; I also observed the same with Spanish and Portuguese crocus species. I think that I have thus discovered the secret of the growth of some of these species, which led collectors to add them to the list of "difficult species to grow".

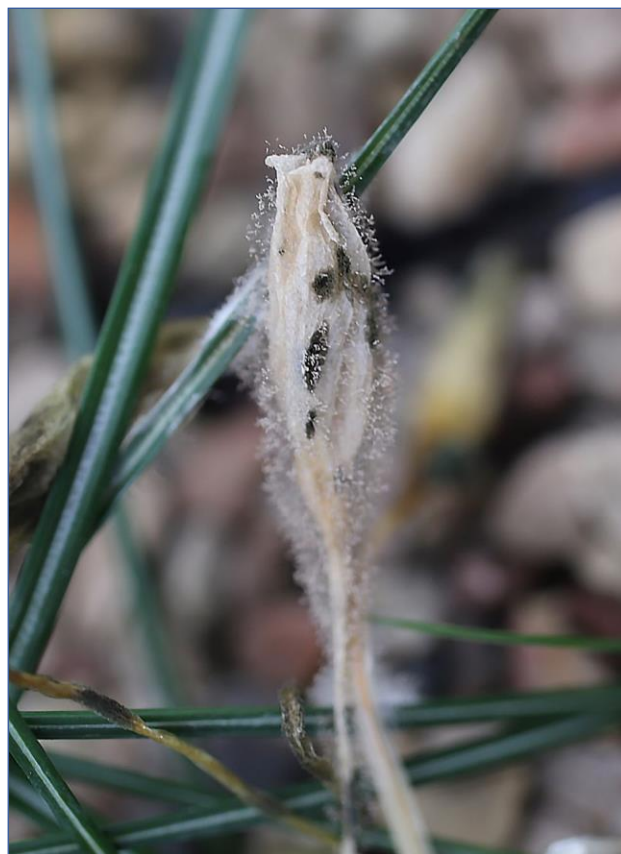
Spring blooming crocus bed
in full bloom, 13/03/2017.

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Diseases:

If someone tells you that these plants do not get sick here, don't believe it. All plants, like all living creatures, have their own diseases, pests that damage or destroy them, those agents also have their own natural limitations that prevent them from completely destroying a species, etc. It is a natural food chain.

It was no secret to anyone that crocuses that bloom in autumn must have all the flowers that have bloomed removed, otherwise they start to rot, and the rot goes down the tube of the flower to the bulb, infects and finally destroys it. Similarly, all cyclamen growers carefully pick all blooming and fallen flowers, because they start to rot, infecting the leaves and rotting them first and then the underground tubers. Colchicums are also very sensitive. Spring blooming crocuses usually do not have this problem. The weather is often sunny, the flowers dry naturally and are not affected by any rot, so there are usually no worries in spring. The spring of 2023 was unlike any other. Crocuses bloomed profusely in March, even though the weather was cool, cloudy and wet. There was almost no sun. I noticed too late that the crocus flowers that have bloomed, lying on the ground, are covered with white wool - mould caused by *Penicillium* or *Microdochium nivale* (formerly *Fusarium nivale*). Even some leaves were already infected. Then I started to pick off these flowers, but it was already too late.



White “wool” covering dead crocus flowers, leaves and shoots.

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In the summer, while collecting corms, I noticed that there were some infected corms in almost every pot - covered with large black sclerotia. The most abundantly flowering species had suffered the most. During flowering, spraying with one of the fungicides that work against snow mould and are used on sports field lawns in early spring would probably have helped. However, I try to keep the use of chemicals to a minimum in my nursery. Spraying during flowering can harm pollinating insects, also leaving spots on the flowers, so nothing better than the very laborious picking of the dead flowers has been invented. We are learning all through life. From now on, I will also apply the same regime to the spring crocuses as to the autumn blooming species.



White mould covering dead crocus flowers, leaves and shoots in the very wet and dark spring of 2023.

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On the left, 3 still living corms of Crocus infected with fungal disease which could live, on the right, 4 completely dead corms which already formed black sclerotia.

However, you can't do without chemicals altogether. Several years ago, the well-known crocus researcher Eric Pasche wrote to me from Germany that his collection of crocuses was rapidly dying because it was destroyed by the bulb scale mite (*Rhyzoglyphus*), against which he had tried all available means, including total disinfection of the greenhouse, changing the pots etc., but nothing helped. I had also observed the death of some underground organs of bulbous plants in my collection, but no matter how much I examined the damaged or dead bulbs with a strong (40x) magnifying glass, I only once found 1 mite on a crocus. In my collection it seemed that *Scilla* and *Muscari* suffered more, they rarely died, but the bulbs looked bad. I observed mites on their bulbs a couple of times. Also, for some of the colchicums, the corms looked strange - partially without the outer covering scale, with dark dots, as if these are the places where the pest is sucking on the corm.

Since I have undergone a special course, I also have access to professional plant protection products, but I do not want to work with treated bulbs or corms, because I never use rubber gloves. Without gloves I feel the plant – is it healthy or there are some problems

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with it? Therefore, I modify the treatment: when the bulbs (or corms) are placed in the pot, I spray over them with an acaricide (anti-mite) solution and then immediately cover them with soil. In this way, I prevent any damage to the surrounding environment - there are no pesticide residues that need to be disposed of (in the Netherlands, after treatment of the bulbs, they simply spray the used chemical solution on the field where the bulbs will be planted later), and I also have no direct contact with the poison. Of course, I use a protective face mask while spraying. By the beginning of the growing season, the poison has already broken down, and by digging up the bulbs in the next season, no one can be harmed. I have been using this technique for three years now and it seems that I have practically prevented the plants from dying as a result of the action of pests.



Spraying already placed crocus corms with acaricide solution.



A couple of years ago, Estonian plant protection specialists visited my nursery, and after examining the suspicious plants, they immediately announced that the culprit was not a mite, but gladiolus thrips. Gardeners have learned how to fight it easily - after harvesting the corms, they are put in gauze bags, which in turn are put in a large polyethylene bag, where a

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powerful insecticide is blown in. Amateurs most often use a spray called Cobra. For small quantities and small bulbs, tea bags can also be used instead of gauze bags. Keep for one day and then take out for storage until planting. I haven't tried it myself, because, as I mentioned before, I work without gloves and so contact with poison cannot be avoided.



Wounds on crocus corms made by some pest – thrips or mites.

However, I cannot do entirely without insecticides either. In recent years, a new, previously unseen pest has appeared on plants of the *Iris* genus (juno, reticulata irises, also irises of the *oncocyclus* group) - a black, jumping leaf-sucking flea-beetle. A similar pest that was difficult to fight against damages cabbage plants. We do not grow cabbage, but in our garden it attacked Siberian irises and few juno irises grown in open garden. It appeared in the greenhouse for the first time this year. Then I had to use the same systemic acaricide/insecticide with which I sprayed the bulbs in the pots. One spray was enough to kill this pest in the greenhouse. In the field, irises need at least a couple of sprayings. Later, in the summer, it no longer appears, but it is harmful only in early spring.



Similarly wounded corms of *Colchicum triphyllum*.



Crocus seedpods damaged by some pest.

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Diseases caused by fungi can also cause problems. I simply destroy the diseased plants. It is best, of course, to destroy the diseased and infected plants. As my horticulture teachers taught me when I was young, it is better to destroy 10 healthy plants than to leave one sick. This was said in relation to viral diseases for which there is no medicine, only the destruction of diseased plants. But it can also be applied to many other ailments. And yet... sometimes the sample is very small, a great rarity, and the hand simply does not rise to destroy the plant, if there are still any signs of life in it. And here a paradox appears. Sometimes, instead of destroying, I have planted crocus corms which strictly speaking should be destroyed, in a separate pot. I attach an additional label to them - "bad" or even "very bad" corms. And to your surprise - the next year they turn out to be the best grown, and in the pot next to it, where the beautiful, good bulbs of the same species were planted, the yield was much worse. Of course, often not all the "bad" ones have grown up, some have died, with an inability to explain why. I once planted 7 bulbs of a very rare species of crocus with the additional label "dead" because they really looked completely dead, and the following spring I was surprised to find that three of the "dead" ones had come back to life forming 3 small but healthy replacement corms.



The last way for the virus infected lilies...

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Be careful with pesticides:

I will not talk about individual protection here. We all know that poisonous chemicals to combat pests and diseases should be used with caution, following the instructions attached to each pesticide and using personal protective equipment - rubber gloves, face masks, special clothing, etc. I want to tell you about the mistakes I have made when using plant protection products.

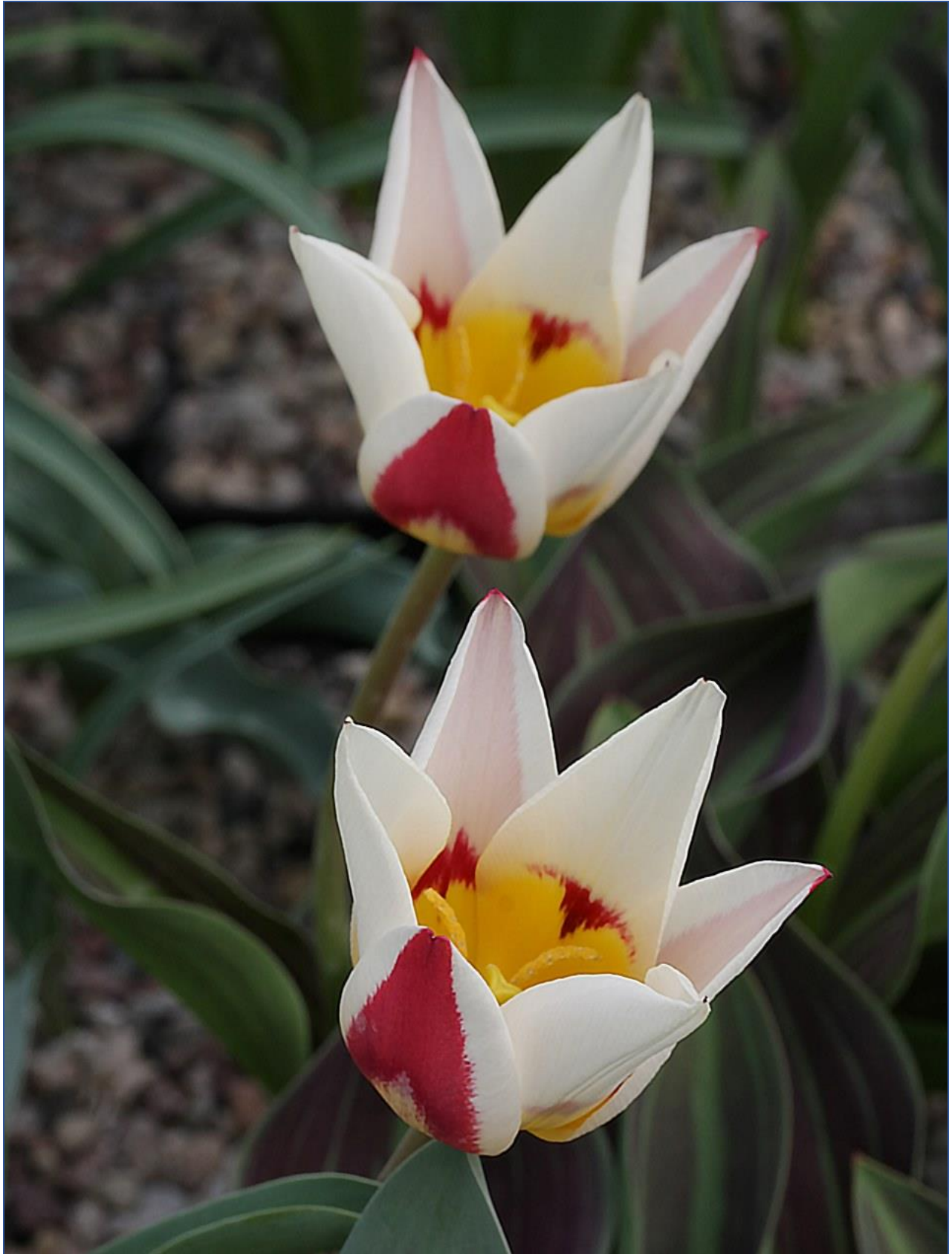
My fritillaries started to die. Literally in a couple of years, I lost the entire large collection of *Fritillaria imperialis* cultivars. I blamed *Fusarium*, a particularly dangerous strain of it that I had brought in with bulbs bought from China, where I had purchased a wild form of *F. pallidiflora*, which was the first to die. I tried to use the same technique that I used when fighting pests, that is, I sprayed the bulbs in pots with a fungicide solution. The results were catastrophic - the following year the fritillaries looked very depressed, their height had decreased several times, many did not even emerge. True, the harvest was excellent in terms of quality - the bulbs, although much smaller than could be, were all beautiful looking and healthy. Fungicides can often turn out to be phytotoxic when overdosed - harming not only the fungus, but also the plant itself. When dipped in the solution, they only come into contact with the chemical for a certain amount of time, but when the bulbs are sprayed at planting, the exposure appears to have been too long, or perhaps the concentration of the pesticide solution then was too high.



Crocus repotting.

One of the very first new plant species I discovered was a small tulip from the Karatau mountain range in Kazakhstan, which I named the *Tulipa berkariense* after the gorge where I found it. It produces stolons up to 40 cm long, which instead of going down deepening the position of bulb, as most wild tulip species do, this tulip has stolons growing sideways and the young bulbs develop away from the mother plant. I collected several samples and started to propagate some of them as

named cultivars, because usually instead of one bulb it produced 2 replacement bulbs.



Tulipa berkariense 'Little Ilze'

I named one clone with variegated leaves 'Little Ilze' after my youngest daughter, the other with plain leaves - 'Morning Star'.



Tulipa berkariense 'Morning Star'



Unfortunately, the side-growing stolons do not care about the purity of the stock, and when planted next to each other, both cultivars mixed.

Tulipa berkariense stolons

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Planting in pots, as I do now, eliminates this problem. The walls of the pot do not allow the new bulb to "break into" foreign territory, but I still did not have "clean" specimens - almost every pot had a wrong specimen in it. I decided to use the chemical weeding practiced in Holland, with the help of which wrong varieties and virus-infected specimens are destroyed in large fields.

I prepared a solution of Roundup and carefully applied a small stroke with a brush to the leaves of the wrong colour. I was really shocked during the harvest - not only the processed "wrong" plants had died, but all the ones planted in the same pot. Apparently, the roots and stolons of the potted tulips were so tightly intertwined that the herbicide diffused through them from plant to plant and killed them all. It is good that a couple of pots were free of wrong individuals, so they were not treated and I managed to save both varieties.



Crocuses are repotted, top-dressing with stone chips begins, followed by watering.

"Secrets" of *reticulata* irises

There is hardly a year when someone or even several people do not ask the same question - how do you manage to grow *reticulata* irises, what are the secrets of growing them? And I can always give only one answer - I would be very happy if I knew it myself. I just don't know, I'm never sure of the result - whether something will grow next year, or

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whether the bulbs will rot and die. It is a plant whose cultivation results I am never sure of. Reticulatas have a very dangerous disease called "ink disease", because black spots appear on the scales of the bulb, and the bulb itself becomes black when it dies.

It is caused by the pathogen *Drechslera iridis* (*Bipolaris iridis*). The first symptoms appear on leaves by the appearance of reddish-brown elongated spots with chlorotic margins and grey centres. Older leaves develop grey centres. Dark spore masses may be visible on lesions. Usually, older leaves are infected. Irregular, ink-black stains appear on bulb covering sheets. Affected bulbs rot to leave an outer 'shell' containing a mass of black fungal spores. Fleshy scales may exhibit small yellow dots or irregular sunken black craters with distinct raised margins. New spores that form in spots can spread through the air to healthy foliage. Wet weather is suspected to favour disease development. It persists on affected bulbs and crop debris, and as spores in contaminated soil. For chemical control begin applications before disease appears and repeat every 10 to 14 days while conditions are favourable for disease development. Mancozeb-based products can be used, but each country has own regulations for allowed chemicals.



Reticulata iris bulbs infected with ink disease.

However, I somehow manage to maintain a core collection, even though many die every year. What are my basic principles of growing reticulatas?

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1/ Reticulata irises must be transplanted every year! I think that basically my problems started with the moment when I planted the bulbs sent from the Dutch nursery in the collection, which were left to grow for another year without replanting. When planted in an open field (rock garden) they bloom beautifully and profusely in the first year, often even better in the second year, but in the third only rare flowers and plants appear. In Holland, they are grown using huge doses of chemicals, treating the bulbs before planting and several times during vegetation. It is not available to amateurs - the relevant chemicals are only allowed for professional growers, not home gardeners. In the garden plants return to the same place not earlier than after 3 years (3-years rotation cycle).

2/ When transplanting, you should look very carefully at all the bulbs - any with dark spots on the dry scales must be destroyed, they cannot be cured. Also, all those with even one yellow dot on their juicy scales must be destroyed.

3/ Although I try not to use chemicals, reticulata irises are an exception and immediately after harvesting, I treat them with one of the available fungicides.

4/ I diligently hand-pollinate during the flowering period to obtain seeds from each wild stock. I grow the seedlings in another greenhouse to isolate them from the mother plants as much as possible. Seedlings manage to avoid infection for longer, especially if they are grown in isolation from the parent collection.

5/ Avoid nitrogen fertilization in spring. Maybe a small dose could be given with the first watering to promote leaf development, but I don't do that either. It is enough if, when preparing the substrate for planting, slow-dissolving granular complex fertilizer with a reduced nitrogen content is added to it. Well-nourished, beautiful looking large bulbs during digging time, usually rot before autumn planting. I remember how happy I was for the big, beautiful *Iris winkleri* bulbs when I first dug them up in my collection, and the tears in autumn, when only the tiny bulbs up to 1 cm in diameter were alive - the rest were all rotten. Especially sensitive are Central Asian species, which Dr. Rodionenko separated into a different genus – *Alatavia*.

6/ Watering should be stopped early. One of the first English gardening books I read in my early youth said that every drop of water after flowering is harmful to reticulata irises. At

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that time, I didn't have a greenhouse and for the part of the bed where the reticulatas grew, after flowering I put a special film roof to protect them from the rain. Now, growing in pots in the greenhouse, I water for the last time about 10 days after flowering.



7/ After covering the bulbs in the pots with soil, before adding the top-dressing with stone chips, similarly to the tulips, chalk is sprinkled on the iris pots so that the substrate is not acidic under any circumstances.

Top-dressing with chalk.



Following these rules, the collection has somehow managed to be preserved, although some species (*I. pamphylica*) and few very valuable wild specimens have been lost.

Reticulata irises in bloom.

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Cultivation and taxonomy:

In recent years, there is almost no one publication, where H. Kerndorff is one of the authors, that does not question the data obtained from cultivated plants as imprecise and incompletely characterizing the species. No matter how much I respect H. Kerndorff as a very knowledgeable and smart crocus researcher who, together with other researchers, participated in the discovery and description of more than 60 new crocus species, I cannot agree with this thesis of his. When applied to bulbous plants, it is not always possible to obtain a complete description of the plant in field conditions. During flowering, there are no seed capsules and seeds, the foliage is not always sufficiently developed, etc. Visiting remote and hard-to-reach regions several times to obtain additional data is far from easy and often even impossible. The population may be grazed, the vagaries of the climate may destroy plant remains. Often, new species are discovered when the plants are without flowers, only in the green or even dry leafy state, and only by growing the collected specimen under controlled conditions do we find that the collected plant is a new species.



Crocus zetterlundii

Even when cultivating the collected samples, it often takes years until we find the special features that distinguish this sample from the already known, already described and named species. So, for example, I had collected *Crocus zetterlundii* at three localities - two samples

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(LST-103 and LST-108, collected based on leaves only) together with H. Zetterlund in 2005 and one sample (JATU-008, collected during flowering) in 2007. According to the flora of Turkey, these specimens were referred to as *C. pulchricolor*, and are also considered as such by Turkish botanists S. Yuzbaşıoğlu and A. Güner, despite the great distance between the localities of the two species. From the first bloom in my collection, I put a red label on them, thus noting that they need special attention. Every spring I mark them as "different from *C. pulchricolor*", but it was only in 2015 that I discovered an unmistakable feature that distinguishes the two species and that is constant from year to year - it is the colour of the cataphylls. I noticed this because the two species were harvested one after the other, without any time gap between them.



Crocus pulchricolor



Crocus pulchricolor

The 2023 season provided further confirmation that the two species are distinct. The unfavorable spring contributed to the development of snow mould, which caused the death of many crocus bulbs. All samples of *C. pulchricolor* (there are 6 samples in the collection) were severely affected by this

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disease, almost half of the corms died, but the healthy ones produced beautiful, large replacement corms. On the other hand, only 3-4 specimens of *C. zetterlundii* growing next to it were lost, while the rest produced two, but small, replacement corms instead of one. This single feature could not serve to distinguish the species, but it would give an additional argument for the conclusion that they are two different species.

Crocus reinhardii

Another pair of two similar species also behaved similarly. From Iran, I described two relatively similar species of crocus growing in the neighborhood - *Crocus reinhardii* and *C. inghamii*, which differ in the type of colouration of the flowers and the bracts. Both flowers are basically blue, only *C. reinhardii* has a dark striped back to the petals, but *C. inghamii* has a dark blue “tongue” on the



middle, without any stripes. The populations of both may even partially overlap. Among the thousands of *C. inghamii* flowers I have found one specimen with a striped flower. I could not verify whether it was a deviation in the colouration type of the flowers of this species, or whether it was an individual of *C. reinhardii* in this population. The two species can also be easily distinguished by the corm tunics - *C. reinhardii*'s corms are hard, leathery, but *C.*

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inghamii's are thin, papery. This can be observed very well in cultural conditions when transplanting plants. When transplanting both species one after the other, you can immediately tell which one of them it is when you hold the corm in your fingers. In the field, with the distance of time and space, it is difficult to determine it so accurately. And again, the 2023 season gave an additional argument for distinguishing the two species. All samples of *C. reinhardii* behaved similarly to *C. pulchricolor* - many died, the living formed large, beautiful corms, whereas *C. inghamii*, just like *C. zetterlundii*, had practically no losses, but formed two smaller replacement corms instead of one.



Crocus inghamii

Such details can only be observed when the species are grown in culture conditions next to each other. Unfortunately, it is not always possible to obtain such data. Some authors, including H. Kerndorff & al., give very imprecise data on species localities, which I have often indicated already in my earlier publications. In 2016, I described *Crocus sakaltutanensis* from Erzincan province, which is very different from the other species of this type grown in my collection. A. Güner believes that it is identical with *Crocus sivasensis*, which was already described earlier by H. Kerndorff and E. Pasche, indicating its locus classicus SE from Sivas in Cappadocia. All the samples cited by A. Güner come from the province of Erzincan, a long way from Sivas. Since *C. sivasensis* was not found by our team despite repeated searches in the given region, we can use only images given in [the publication of H. Kerndorff & al. \(2013\)](#).

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If two flowers out of six in fig. 4 (as HKEP-9927) resemble *C. sakaltutanensis*, then the other four flowers and flowers in fig. 6 q-t do not even remotely resemble *C. sakaltutanensis*.



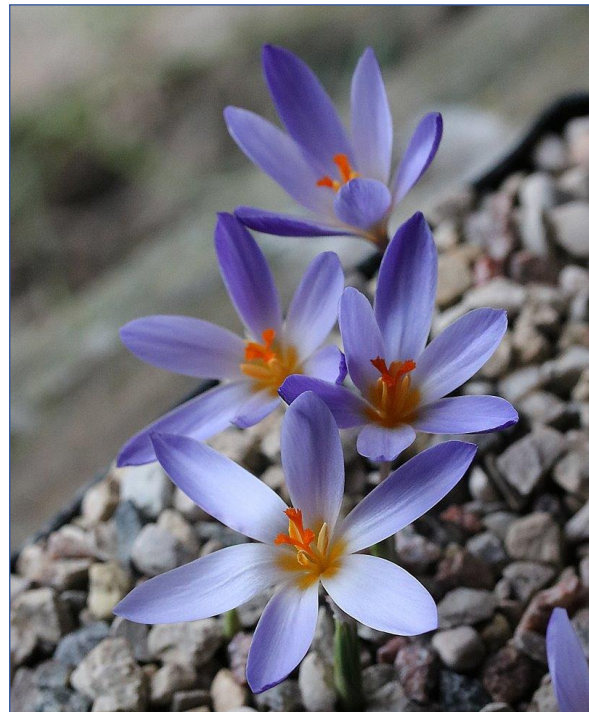
Screenshot of *C.*

sivasensis Fig. 6 q-t,
courtesy of ZOBODAT
(2023/08/20)

URL of data record –

https://www.zobodat.at/pdf/STAPFIA_0099_0159-0186.pdf

The two species do indeed appear similar when comparing their descriptions, but this cannot be inferred from the published images.



Crocus sakaltutanensis

By growing them side by side, under the same conditions, it would be possible to perfectly compare them and confirm or deny the identity of them both. This only confirms how

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important it is to give more or less precise data on species localities, thus allowing other researchers to compare plants and draw the right conclusions.

I have always been convinced that under the name "*Crocus mazzii*" there are actually at least two, if not more, species. It is during the transplanting of cultivated plants, when you dig up samples of one after another, that allows you to feel with your fingers that another species has actually started. So, this autumn I found out that my assumption that another crocus grows on the island of Samos (Greece) was confirmed as correct when digging up the bulbs, because this specimen has a very distinctly coarser venation of the reticulated corm tunics than those that grow in the classic locality of this species on the island of Lefkas (Lefkada) and the neighboring areas in the Peloponnese. Extremely long and strong corm tunic's neck of so named *C. pallasii* from Israel, gave additional points to regard them as another species.



Above left: *Crocus* cf. *mazzii* (KJGR-074) from Samos Island, Greece.



Above centre: Typical *Crocus mazzii* from Lefkada Island (14GRA-051), *locus classicus* of this species.

Above right: *Crocus mazzii* (PELOG-008), from near Alepohori, Peloponnese.

Left: Corm tunics of typical *Crocus pallasii* from *locus classicus* in Crimea, Ukraine.

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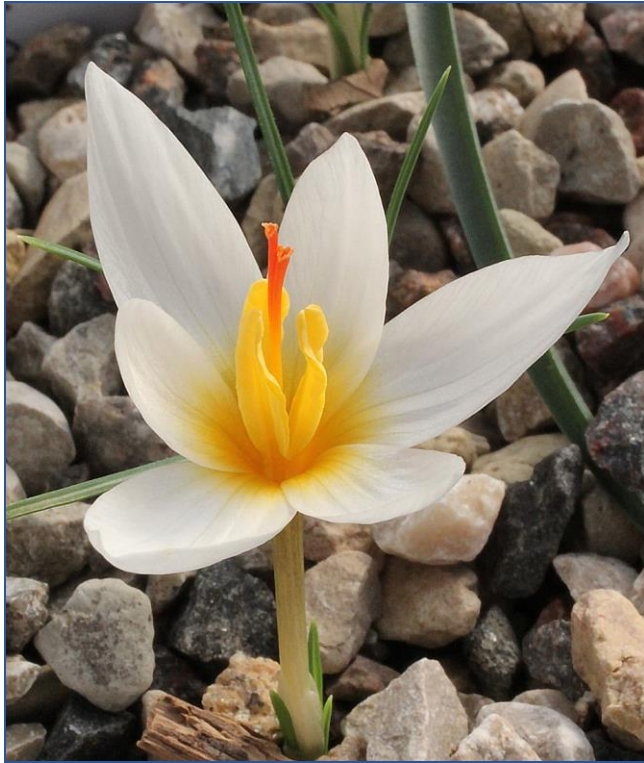
Above left: Typical *Crocus pallasii* from Kaya-bash yaila in Crimea, Ukraine (collected 2012, just before Russian invasion).

Above right: Flower of *Crocus* cf. *pallasii* from Israel (ILOP-009).

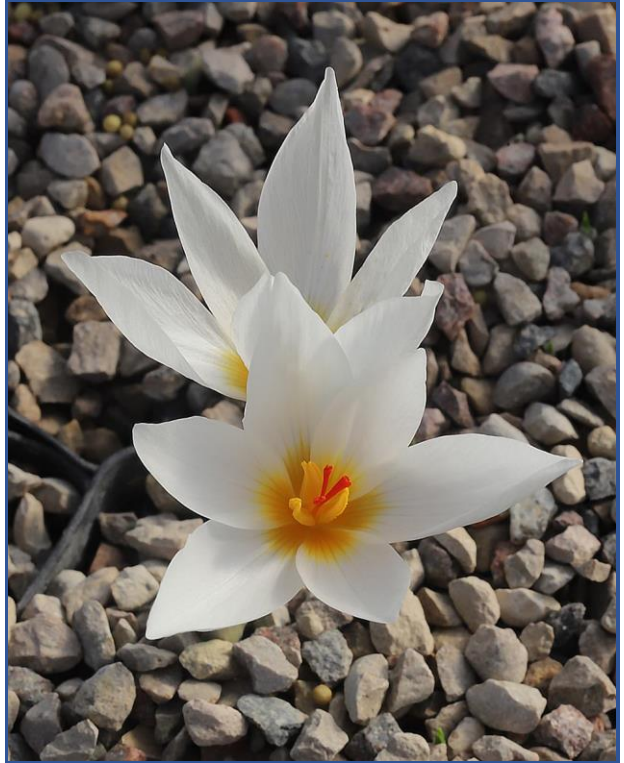


Corm tunics of *Crocus* cf. *pallasii* ILOP-009 from Israel.

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Left: *Crocus hadriaticus* from North Ionia, Greece (14GRA-049).



Right: *Crocus hadriaticus* from South Ionia, Greece (18GRA-096).



Left: Shoots of *Crocus hadriaticus* from North Ionia, 6th September, 2023.



Right: Shoots of *Crocus hadriaticus* from South Ionia, 6th September, 2023.

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In the fall of 2018, while visiting the province of Ionia in Northern Greece, we observed in a few places, a crocus that strongly resembled *Crocus hadriaticus*, but the common appearance, plant height, raised deep doubts whether the species was correctly identified, although according to the Greek flora materials and the complex of general features, it should have grown here just this species. Small specimens were collected, but when the plants collected were transplanted a year later, one specimen from Ionia was accidentally mixed up with a specimen of this species (*sensu lato*) collected the same year from Mount Parnassus, which B. Mathew has distinguished as subsp. *parnassicus*. During the following two to three years when the mixed stocks flowered, specimens with a white flower throat (subsp. *parnassicus*) and those with a yellowish throat (collected from Ionia) were carefully marked. In such way it was possible to separate the two samples again. In the fall of 2023, the crocus transplant was greatly delayed, and several of the fall-blooming species had already developed shoots up to 10cm and even more, long. Then I got additional confirmation that the samples were separated successfully. The shoots of the Ionian crocuses were only up to 3 cm long, the crocuses from Mount Parnassus invariably had 10 cm and even longer shoots. Specimens from Mount Parnon with light lilac flowers, which B. Mathew has distinguished as subsp. *parnonicus*, had not even started to form shoots yet. Typical *C. hadriaticus* from the Peloponnese and neighboring mainland Greece (specimen from the vicinity of Varnakovo) had shoots just beginning to form and were only slightly shorter in length than those from Ionia. So, for regarding of Ionian plants as distinct taxa is necessary to found some more prominent morphological features.



Crocus hadriaticus
subsp. *parnassicus*
(18GRA-099) from
Mount Parnassus in
Greece.

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Left: *Crocus hadriaticus* subsp. *parnassicus* (18GRA-099)

Right: Shoots of *Crocus hadriaticus* subsp. *parnassicus* from Mount Parnassus, 6th September, 2023.



Crocus hadriaticus subsp. *parnonicus* from Mount Parnon, near Agios Fokas, SE Peloponnese.

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Typical *Crocus hadriaticus* (PELOG-003) from near Alepohori, Peloponnese.

Such observations can only be obtained from cultivated plants grown side by side under identical conditions of soil, cultivation, humidity and temperature, but would never be possible from observing them in the wild, in the open air. Of course, this is not enough to distinguish a new taxon, but these features give additional points that confirm or deny your opinion about observed plant's status.



Typical *Crocus hadriaticus* (PELOG-009) from near Vlahokerasia, Peloponnese.

Every year brings something new and the longer you live, the more you realize that you still don't really know anything about plants and their cultivation...