

International Rock Gardener

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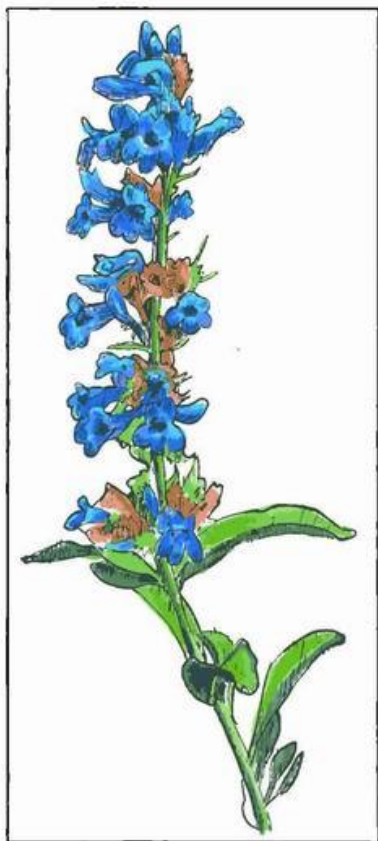


The [North American Rock Garden Society](#) 2016 Annual Meeting will be held from 22nd to 27th June 2016. Thirty years have passed since Alpines '86 was held in Boulder: today some thirty years later the Rockies are just as enticing for alpinists and rock garden plants as they were then. The then ten year old Rocky Mountain Chapter of NARGS has grown as well and is now celebrating forty years.

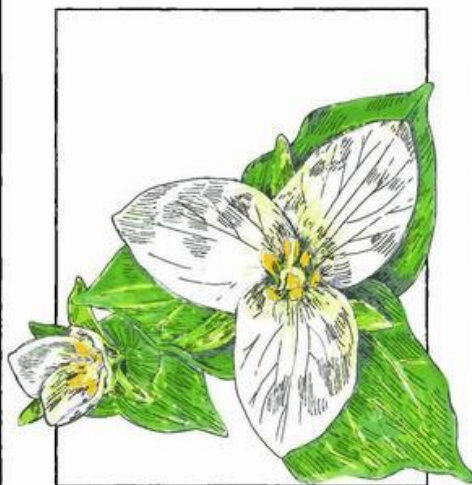
The AGM itself, opening in Denver, will continue in Steamboat Springs as part of a bigger event - with talks, visits, plant sales, hikes – everything one might hope for from such a gathering at high altitude in the mountains. The event's [programme](#) is wide-ranging – with the theme “A Higher State – Steppe to Alpine” ; rather appropriate in the light of the recent publication by Denver Botanic Garden and Timber Press of the magnificent book [“Steppes – The plants and ecology of the world’s semi-arid regions.”](#) We are sure that all attending will have a remarkable experience - if you have not already done so - [book soon!](#)

Cover picture: *Erythronium grandiflorum* in golden profusion in nature.

A HIGHER STATE



Steppe to Alpine

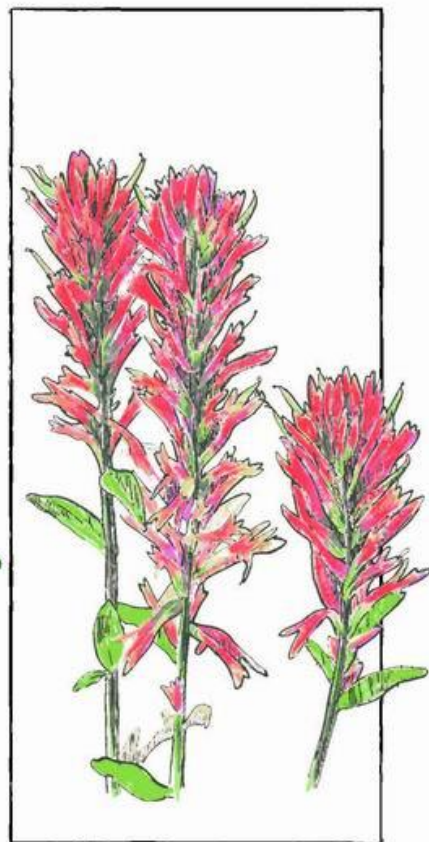


Steamboat Springs

June 22nd-27th 2016

NARGS

Rocky Mountain Chapter



Mike Kintgen of Denver Botanic Gardens and one of the authors of “Steppes – The plants and ecology of the world’s semi-arid regions” has written the following article to show just some of the treasures of the area that can be found around the event’s base of Steamboat Springs.

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Special Plants of Steamboat Springs and surrounding areas - Mike Kintgen

Routt County and neighboring Moffat and Jackson counties constitute the northwest corner of Colorado, and span several floristic boundaries. Moffat County the most northwest county in Colorado is largely influenced by elements from the Great Basin, Colorado Plateau and Rockies. Routt County with its higher elevations, more mountainous terrain and thus greater precipitation has elements of a disjunct Pacific Northwest/Northern Rockies flora, along with classic Southern Rocky Mountain elements. Jackson County combines all the above elements with the addition of some Great Plains factors. What makes Northwest Colorado so appealing is the ability to see dry steppe in the morning and a few hours later be standing next to *Rhododendron*, *Trillium*, *Lycopodium* and *Cypripedium*. One can also experience two seasons in one day. *Penstemon* and *Castilleja* will be blazing away in the lower valleys while *Trillium* and *Erythronium* are still in full glory in a cool subalpine forest, hence the use of *Penstemon*, *Castilleja* and *Trillium* for the floral emblems of the 2016 conference.



Penstemon cf. *alpinus*

The 2016 NARGS Annual conference will show many of these elements on the various hikes. Some of the most noteworthy plants and their associations are noted below. This article will focus largely on Routt County where most of the hikes take place with mention of a few areas outside Routt County

Routt County while moderately sized by Colorado Counties covers a rather long north/south chunk of Colorado. Habitats within the county range from Pinyon Juniper near State Bridge in the far southern part, to sagebrush steppe throughout at moderate elevations. Oak and service berry shrub lands give way to aspen forest in moister areas and at higher elevations blending into dense coniferous forest in the montane and subalpine and finally into alpine in the highest elevations of the Park Range. The Herbarium at the University of Colorado in Boulder lists 834 species for the county on

a computer generated list. There are several species missing from this list especially grasses and new country records bringing the current native and non-native flora for the county probably closer to 1000 species.

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Erocallis (Lewisia) triphylla

Pacific Northwest disjuncts:
The Steamboat area is perhaps best known regionally for many species of plants disjunct hundreds of miles from their normal ranges in Northwest US and Canada, in the Park Range.

Rhododendron albiflorum (*Azaleastrum albiflorum*), *Drymocallis glandulosa*, ***Erocallis (Lewisia) triphylla***, *Lewisia nevadensis*, *Mimulus lewisii*, ***Mimulus moschatus***, *Trillium ovatum* and *Viola purpurea* are just a few of the showier plants that William Weber mentions in the

Colorado flora, Interestingly he mentions that the Park Range is noteworthy for harboring perhaps up to 100 species not found elsewhere in Colorado. Many of these species are found in lush montane or subalpine forest. The Mount Zirkle wilderness area is perfect for finding most of these, and the hikes to Three Island, Gilpin, or Bear Lakes are three of my favorite trails to find these gems. The Big Creek lakes area on the Northeast side of the wilderness area is also particularly rich.



Mimulus moschatus

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Ipomopsis aggregata subsp. *weberi*

Regional endemics:

The area near Steamboat Springs is not nearly as rich in endemics as the steppe regions to the east, north or west or the high calcareous ranges of Central Colorado. There are however a few "regional Endemics". One of these is *Ipomopsis aggregata* subsp. *weberi* a white variant of the common pink to red scarlet gillia. It produces spectacular displays on Rabbit Ears Pass in late June- mid July depending on snowpack. It is also known from Northern Idaho and South central Wyoming where many of the species found in the Park Range spill over the state boundary via the Sierra Madre Range (in reality the northern extension of the Park Range).

Iliamna crandallii was reportedly collected near steamboat and is listed as being endemic: I have never set eyes on it despite several searches. Apparently it has not been seen since 1937. It is very similar to the more widespread [*Iliamna grandiflora*](#).



Left:
Corallorhiza



Orchids:

While not exceedingly rich in Orchids Routt County does offer a few eye-catching and intriguing orchids.

Cypripedium fasciculatum is probably the most beloved by local wild flower enthusiasts for its nodding greenish, brown maroon flowers. I have often seen it in rather dry Lodgepole pine forest with *Vaccinium*. One of the best sites is the Master Key Mine near the town of Columbine. *Calypso bulbosa* is always a crowd pleaser and can be found in damp spruce and fir forest. Lucky participants might just spy both of these special orchids in June on several of the hikes. Mixing in are ***Corallorhiza*** the coral root orchid, and various *Listera*, *Goodyera*, *Piperia*, *Limonorchis* and *Spiranthes* in various locations ranging from moist forest to wet sunny seeps and streamsides.

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Flowers that paint hillsides and meadows:

While not rare or even regionally specific Routt County can produce phenomenal displays of many wildflowers. From snow melt to late summer various wildflowers can paint the landscape in ribbons and pools of colors. Below are several descriptions of what might catch your eye from the car through the seasons.

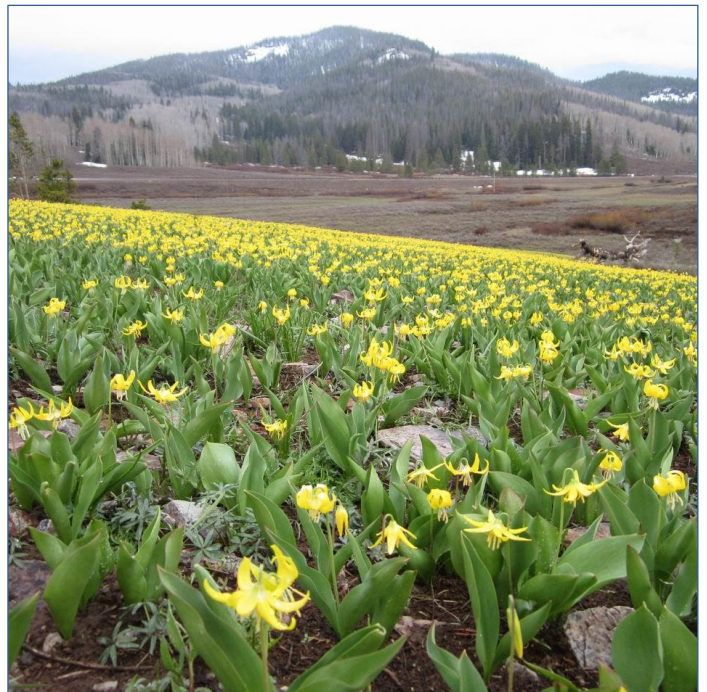


Ranunculus alismifolius* var. *montanus

Early spring brings waves of various buttercups and other early flowers, in north Routt County at elevation around 8,000 feet and above near Steamboat Lake and the town of Columbine it starts in May (earlier near Steamboat Springs) with *Ranunculus jovis* and *R. glaberrimus*.

Erythronium grandiflorum

At the same time ***Erythronium grandiflorum*** (fawn lilies) can paint entire hillsides yellow. Oddly enough some of these populations of fawn lilies seem to bloom heavily on alternating years. Blue *Mertensia brevistyla* and white *Noccaea fendleri*, and *Claytonia lanceolata* can add cobalt blue and snow white accents to all the yellow about the same time ***Ranunculus alismifolius* var *montanus*** chimes in from truly wet meadows with *Caltha leptosepala* and down around Steamboat Springs in the rich hay meadows *Ranunculus acrifolius* paints yellow patches in early June. Following spring up to the subalpine and alpine elevations *Ranunculus eschscholtzii* and *R. adoneus* can be found high in the Park Range or Flat Tops in late June and on into July.



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Above: *Delphinium nuttallianum*, below: *Phlox multiflora*



After the first flush of yellow, blue and white the party continues with *Phlox multiflora* and *Delphinium nuttallianum* on the dry sagebrush hills near Steamboat Lake with populations of the phlox read white to the camera but really are white, soft blue, lavender or pale pink to the human eye. If deep saturated purple is more ones color then *Delphinium nuttallianum* is the plant for the job, its displays range from scattered individuals in meadows and open aspen forest to saturated pools of purple blue near the Steamboat Springs airport in mid to late May. *Geum triflorum* various yellow *Senecio* along with white

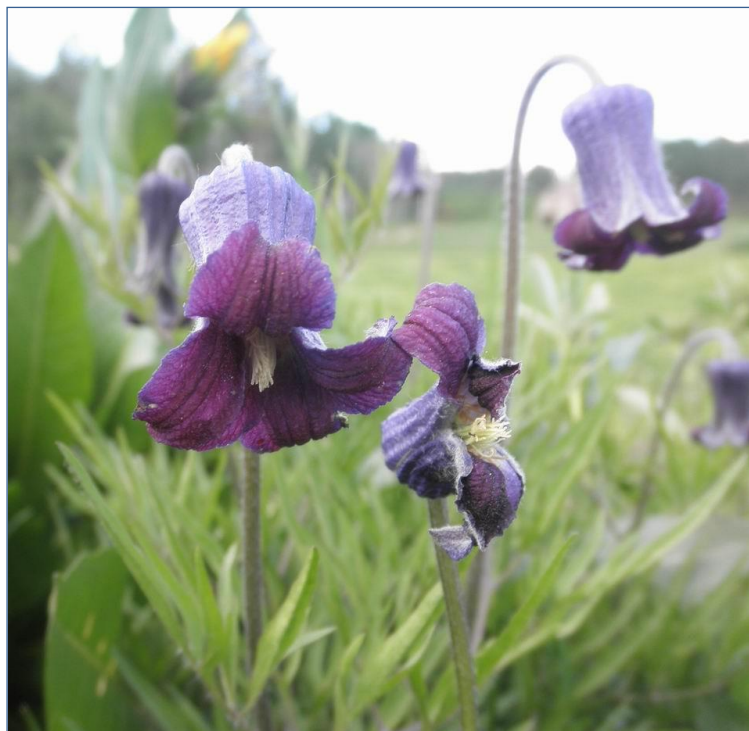
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Bistorita and *Valeriana* greet the summer solstice from moist montane meadows. About the time the Phlox is going over fields of yellow *Wyethia*, and blue *Lupinus argenteus* celebrate American's Independence Day on the sagebrush slopes. Fields of white *Ligusticum porteri*, blue *Delphinium glaucum*, and yellow *Helianthus quinquenervis* bloom beneath the aspen. As summer progresses fields of *Agastache urticifolia*, *Delphinium occidentale* and yellow *Heliomeris multiflora* continue the show. Late summer brings various colored asters (now in a variety of genera) blue *Gentiana parryi*, and sundry yellow asteracious plants including *Solidago*.

Two of Mike's favorites commonly seen alongside roads and trails in Routt County:

It's difficult to choose favorites among such a rich native flora. Of course every native plant holds some special place in my heart. Below are a few that have attracted my attention since a young age, none of these are regionally rare or endemic.

Right: ***Leptosiphon nuttallii* subspecies *nuttallii*** (Synonyms include *Linanthus nuttallii*, *Linanthastrum nuttallii*.) Widespread but only locally common, this plant forms domes of white phlox like flowers on gravelly slopes on Rabbit Ears Pass in early to mid-summer. It has proved to be a decent garden plant in my garden at 8,200 feet even self-sowing a bit



Left: ***Clematis hirssutisima***

A native of dry sagebrush slopes and steppe this clump forming non-vining clematis is slowly gaining a following in its native region thanks to the work at [Laporte Avenue Nursery](#). It has been a long lived beautiful addition to the garden with nodding maroon blue or maroon brown flowers and fluffy seed heads over beautiful ferny foliage.

A few areas outside of Routt County:

Grand County and Middle Park

South and east of Steamboat Springs stretch Grand County the source of the Colorado River (historically the Grand River) in Rocky Mountain National Park. Much of the county is Middle Park a large expanse of steppe stretching from the west side of the Front Range and north and west to the Gore and Never Summer and Rabbit Ear Ranges. What at first appears as a dry open valley of sagebrush and greasewood is in reality an area of amazing diversity. Specialized soils, that have not

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been glaciated or leached by heavy precipitation, harbor several rare endemics along with plants more widespread through the western steppes. Grand County holds at least two endangered species of plants and possibly a third that was just recently discovered. *Penstemon penlandii* is one of few federally endangered *Penstemon* along with *Astragalus osterhoutii*, both species commemorate regionally active botanists. C.W.T. Penland is of note as being an avid alpine botanist who discovered many of the rare alpine species on Hooiser Pass in Central Colorado and a specialist in *Penstemon*.



Penstemon penlandii



Both the *Astragalus* and *Penstemon* are found on selenium rich soils near Kremmling. Sharing nearby habitat with the *Penstemon* is a recently described species of [*Phacelia, P. gina-glenneae*](#). It is found on soil that resembles lunar surfaces. Gracing slopes of sedimentary derived soils are more common *Astragalus* species, *Eriogonum brevicaulis*, *Penstemon caespitosus*, *Penstemon cyathophorus* (a monitored species), *Aletes nuttallii*, *Delphinium geyeri*, *Phlox hoodii*, *Oxytropis sericea*, and several *Erigeron* and *Townsendia*. Early summer can be peak bloom time in Grand County. Both highways US 40 and state highway 9 pass through the heart of Middle Park from Denver to Steamboat and promise interesting roadside botany.

Phacelia gina-glenneae

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North Park:

Slightly higher than Middle Park and with similar but also different substrates, this area is interesting in that it is the southeastern limit in Colorado for several Great Basin/more northern Rockies species, notably *Lewisia rediviva*, *Penstemon radicosus* and *Eriogonum ovalifolium*. Several regional endemics and at least one federal endangered species call this impressive sagebrush valley home. *Eriogonum exilifolium*, *Aster coloradoensis* (*Machaeranthera* or *Xanthisma* in some floras) and *Phacelia formosula* (a federal endangered species) are part of the rich steppe flora. Sand dunes in the Northeast corner of the park are the home of an endemic *Corisperma* (Bugseed). Mixed in are wet alkaline meadows and fens hosting two native species of *Primula*, *Pedicularis scoplorum* and ***Petasites sagittatus***. Acidic fens/bogs at the Northwest corner of the park are home to *Drosera*, and *Eriophyllum*, while *Trillium*, *Cypripedium* and *Rhododendron* border the west end of the steppe in the forest on the slopes of the Park Range creating a truly dynamic flora.



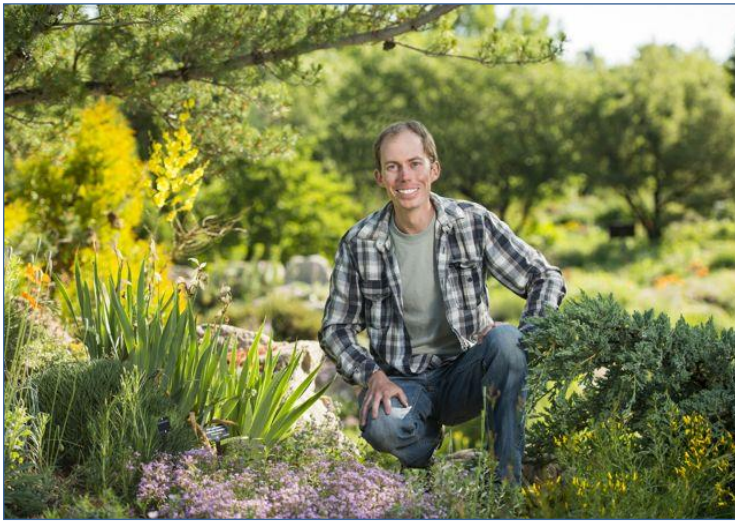
Petasites sagittatus

I hope you will find Northwest Colorado as botanically interesting and fruitful as I have. It has amazed and nurtured my curiosity in nature since various wildflowers caught my eye as a young child wandering the fields and trails with my parents. You will get a warm welcome in Steamboat Springs. M. K.

Ed.: In [International Rock Gardener 63, March 2015](#) we showed a brief photo report from Mike Kintgen of a trip in South America, undertaken with help from an SRGC Exploration Grant. Panayoti Kelaidis, also of Denver Botanic Gardens, shares memories from of another trip in the Colorado area five and a

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half years ago in his [Prairiebreak Blogspot](#). Panayoti Kelaidis is a world-famous ambassador not only for alpine and xeric plants but also for Denver Botanic Gardens – he has been honoured with many awards in the USA and beyond. Mike Kintgen, graduated from Colorado State University Magna cum laude and has explored for plants on four continents. He is proud to have Panayoti as his mentor and is collecting similar awards - for instance in 2013 he received the NARGS [Dr T. Paul Maslin Award](#).

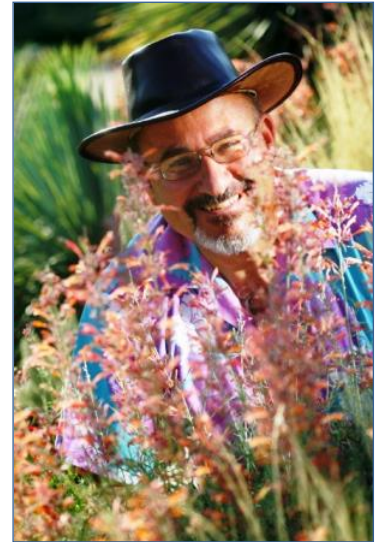


Discussing Mike Kintgen on that occasion, Panayoti said: “Mike began volunteering for me at [Denver Botanic Gardens](#) when he was 11, and 22 years later we’re still working together. He’s been on our staff nine years, and I believe he is the greatest horticulturist I know: his knowledge of plants is truly stupendous. He has traveled more than anyone I know of his age.”

Mike Kintgen
Panayoti Kelaidis

Proof, I hope, if any were needed that there are some top notch botanists in Colorado - in whose hands you may relax to enjoy the Steamboat Springs events!
M.Y.

All photos in this article by Mike Kintgen and Panayoti Kelaidis.



Astragalus osterhoutii in Grand County.

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SOME TAXONOMIC PROBLEMS IN THE GENUS *CROCUS* (IRIDACEAE)

Jānis Rukšāns

*There was Benjamin Robinson, the American botanist,
who when asked to identify a wild flower always replied,
'Press it, dry it, bring it back, and I'll name it for you.'*

Wilfrid Blunt, 'Of Flowers and a Village'.

Modern technologies and research work on a genetic level have radically changed our knowledge about the relationships between various species and their evolutionary development. Many taxa previously regarded as close relatives turned out to be very distant and vice versa. Great changes have affected many genera and crocuses are no exception. In 1886 George Maw in his fundamental monograph "The Genus *Crocus*" included 65 (67) crocus species. Almost 100 years later, Brian Mathew in his "The Crocus" described 80 species, widely applying the subspecies concept to characterize important differences; in this way the number of taxa discussed increased by 34 more items. This approach (subspecies status) now is called into question by most of the botanists working on crocus taxonomy, so we can assume that B. Mathew actually reviewed 114 different crocus species.

Particularly extensive research began with the introduction of DNA analysis into the process and the results were astounding. It proved that the existing systems, which seemed so logical and easy to comprehend, were far from reality. Crocuses which are morphologically very distant ended up as close neighbours on the phylogenetic tree and many new series (groups of taxonomically close species) were established. Significant in-depth studies have been undertaken in the ornamentally very highly valued group of species which B. Mathew joined in series *Biflori*. The German explorers Helmut Kerndorff and Erich Pasche, together with geneticist Dörte Harpke (Leibniz Institute of Plant Genetics and Crop Plant Research, Gatersleben, Germany) studied more than 100 populations of the former *C. biflorus* complex and their work resulted in the description of many new species, so now the total number of species in the genus exceeds 200, but H. Kerndorff, in a letter to the author, stated that in order to more or less finish the task at least an additional 100 years were still needed, and the number of crocus species eventually would amount to 300-400 taxa.

Identification of crocuses even at the time when Brian Mathew wrote his monograph was not always easy, and quite often the place of origin of the sample was essential for an accurate naming. Crocuses even within one taxon are quite variable and in extreme cases (such as albinos) their identification is close to impossible. Just recently Kerndorff, Pasche & Harpke (2015) published the results of a very detailed study on the morphological features, which need to be observed for a correct identification. Drawings and photographs for better understanding of the variability of the features accompanied the paper. And yet the problem of varying interpretations of different characters remains. Not long ago I sent a picture of the basal rings of one of the newly described species to two crocus experts, asking to characterise the teeth on their edges (a very important trait for a precise identification) and got two descriptions each dissimilar to the published one. The same is true when dealing with such features as the characteristics of colour, flower scent, hardness of the corm tunics – they all are features that are differently weighed by different explorers. The authors of the above-mentioned paper emphasise that for a correct identification it is necessary to observe 30 randomly selected individuals, in extraordinary cases no less than 20 plants, to get the median values for the inclusion in the keys. This question automatically arises – what if only one or two specimens are available? In many collections owned by botanical gardens or individuals many a taxon is represented by only a few specimens, and in herbariums quite often only one plant is designated as the type (a standard) for a species. Certainly such a requirement can only be met in a situation when the observer is in the exact spot and is lucky enough to be there just at blooming time, which would be really unique. I do not think that

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measurements expressed in tenths of a millimetre are of any practical use, and for me 3.4 leaves per plant seem rather strange (on condition that a goat had not visited the locality before then). In my opinion it is more practical to mention the border values and whole numbers, in this case that would be 3-4 leaves per plant.

When I worked on the identification of gatherings in my collection, I encountered another problem. Different authors describe species features in quite a chaotic way and their succession differs for each author; thus the comparing of taxa becomes fairly difficult. In order to facilitate my work I started to elaborate something like a “matrix” in which to enter all the available information about the features from already described taxa, with the addition of my own data. Then having two descriptions beside one another it is very easy to compare them and find just in which aspects and how they differ and can be distinguished. It all starts with the corm and goes upwards in accordance with the arrangement of the parts in a crocus plant – tunics, cataphylls, and proper leaves, followed by the bract and bracteole, then comes the flower tube, and the concluding elements are the throat with the attached stamens (filaments plus anthers) and the style in their middle, surrounded by the perianth segments. The capsule and seeds are observed later, so they are characterised as the last ones, but that is common for all authors. You can see below an example where *Crocus mazziaricus* is pigeonholed. Of course, each author can use his/her own system but I find this one the handiest. Most important is to follow the same approach in all publications, at least by the same author.

Other great problems in crocus taxonomy are the ambiguous characteristics or even the absence of data about the original locality of the type specimen. This is the issue with many “older” species when only the overall region is mentioned; now we know that in these same regions other species occur that are similar but at the same time sufficiently distinct. Old herbariums in most cases lack notes on flower colour; or the sheets are in a very poor condition. This can lead to a lot of confusion and even contradictory conclusions by different authors, as was the case with *Crocus isauricus*. There were no herbarium sheets indicating the exact locality and B. Mathew (1982) applied this name to “*biflorus*” crocuses distributed in a very wide area from the Lycian Taurus W. of Antalya to the mountains N. of Silifke. In 2014, Erol, Can & Küçüker most likely designated *C. concinnus* or *C. mawii* as the **lectotype** of *C. isauricus* Siehe ex Bowles. (“The area between the Alacabel pass and Ibradi-Gembos Yayla, which is located westwards of the (...) Sertavul pass” – Erol et al, 2014.) Some features (basal rings, the number and development of leaves) which are discernible on the attached picture of the original Siehe’s herbarium sheet (G00309890) quite well match those of the plant from Akseki region regarded by me as *C. concinnus* Kerndorff & Pasche (or *C. mawii* of same authors; the differences between both species are very subtle).

Unfortunately it is completely impossible to judge the flower colour of the plants in this herbarium sheet as the “decayed colours, the present ‘tobacco-like’ condition of the pressed specimens, do not allow identification” – quoted according to Kerndorff et al. (2014) who, later in the same year, appointed a plant from the Sertavul pass located to the east of Akseki as the **epitype** for *C. isauricus*. Regardless of the poor quality of the published herbarium, there is one feature that allows me to embrace the judgment of Kerndorff et al., namely, the dimensions of the perianth segments. In *C. concinnus*: “The segment proportion of outer segments is 3.4 signalling comparatively strap-like segments”. But in the plant from Sertavul: “The segment proportion of outer segments very low (2.2) which signals a very bowl-shaped flower”. Flowers on the published herbarium sheet are distinctly bowl-shaped (segment proportion ~ 2.1-2.5), so they in a greater extent match the specimens from Sertavul. I would not describe *C. concinnus* flower segments as “strap-like” though its flowers certainly are not bowl-shaped either.

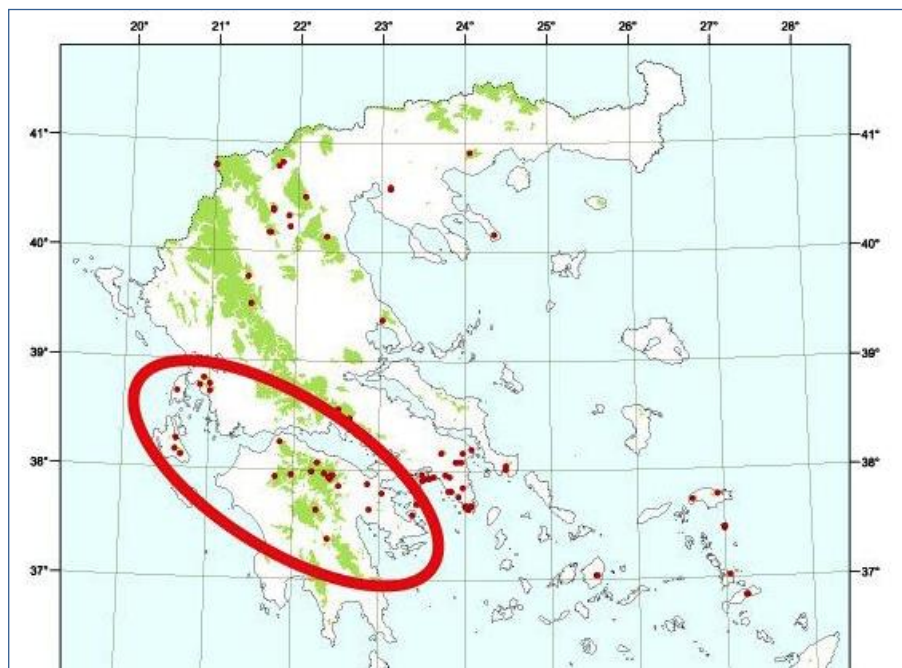
Not that long ago the designation *Crocus tauri* was applied to most gatherings related to *C. biflorus* originating east of the so-called Anatolian Diagonal where many of the species constituting the latter’s aggregate actually occur. Only recently H. Kerndorff and E. Pasche (2013), having compared a number

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of herbaria and descriptions of this species, assigned this epithet to the gatherings from near the town of Darende, appointing them as the epitype of *C. tauri*. I encountered similar difficulties while trying to resolve where exactly the plants came from that represent the true *C. chrysanthus*, and also while picking the epitype for *C. adamii*, as well as while trying to determine where the typical, true *C. speciosus* grows for within this species (*sensu lato*) areal also occur different albeit on the outside very similar species.

Unfortunately, many new species described by Kerndorff & Pasche lack precise data about the localities where they grow not only in the published papers (that could be logical for the reasons of nature protection) but also on the type herbarium sheets available only to scientists. That does not allow other researchers to verify the published data; occasionally the type locality is specified so generally that it covers an entire mountain ridge. For example, about *C. albocoronatus*, the authors wrote: "Central Taurus Mountains... until now known only from one locality" (Kerndorff, 1993). The length of the Central Taurus mountain system exceeds 200km and from there many new crocus species have been described. Even a very approximate indication of its distribution area is truly impossible. Sometimes it is very important to know the origin of a plant for a correct identification. The morphological differences between *C. neapolitanus* ($2n=8$, W. Italy) and *C. neglectus* ($2n=16$, E. Italy) are so subtle (Harpke et al., 2015) that without the knowledge of the origin it is practically impossible to distinguish them (on condition that you have no mini laboratory in your pocket to check the DNA *in situ*, which, I'm afraid, is still to be constructed).

At present the former "*Crocus biflorus*" group is the most researched and from there the greatest number of new species has arisen. This research is still on-going and I suppose that several new species are waiting to be described from the Balkans, where more thorough investigations have just begun. There could be at least two species hiding under the name of *C. biflorus* in the Apennines, and there are several new ones in Balkans, too. Very interesting results were produced in a study on *C. reticulatus* – several new species named and for several other taxa their status was changed. This study also proved that under the common name of *C. ancyrensis* hid more than one taxon (Harpke et al., 2014). Certainly large areas for exploration remain with the complexes formed by *C. speciosus* s.l., *C. pallasii* s.l., *C. cancellatus* s.l., *C. chrysanthus* s.l., and others. Here I would like to repeat a quote from the Scottish Rock Garden Club Crocus Forum (reproduced in former issue of Int. Rock Gardener): 'I wonder if when we purchase plants in the future they will come with a certificate of authenticity with DNA analysis attached. It will be the only way it will be possible to identify them as given the marginal differences (it) will not be possible by seeing them in flower!' I do hope that such a day will never come!



As an illustration of the complexity of this undertaking I give here an insight into *Crocus mazziaricus* s.l., which, according to the present day knowledge, is distributed from Lefkada Island off the western coast of Greece (from where it was described) to Denizli Province in the western Turkey.

[N.B. 's.l.' is 'sensu lato' – in the broad sense.]

Red dots mark localities where *C. mazziaricus* s.l. was observed in Greece (by A. Strid), red circle marks the area where typical *C. mazziaricus* grows.

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Crocus mazziaricus [Herb.](#) Edwards's Bot. Reg. 31(Misc.): 3. 1845. Type: Greece, Lefkada (Lefkas), A.D. Mazziari (K). Ic.: G. Maw. Monogr. Crocuses: pl. 31; B. Mathew. The Crocus: t. 39c.

Synonyms – *Crocus spruneri* Boiss. & Heldr. (1846); *Crocus schimperi* [J.Gay](#) ex [Baker](#) (1877).

Habitat and distribution – grows from sea level up to 1500m altitude in open woods or scrub on rocky hillsides based on limestone formations, often in terra rossa. According to B. Mathew (1982), distributed in the southern part of the former Yugoslavia, mainland Greece, the Peloponnese, the Ionian Islands, Euboea, Naxos, and in Denizli, Muğla and Aydın provinces in south-western Turkey, but it is most likely that several still unrecognised species occur in this area.



Corms and flowers of typical *Crocus mazziaricus* from Lefkada Island

A: Lefkada (*locus classicus*) and the Peloponnese, Greece (regarded by the author of this paper as the typical and true *C. mazziaricus* sensu Herbert).

Flowering time – September-November.

Corm – 15-25mm in diameter, in cultivation larger.

Tunics – in typical specimens coarsely fibrous, fibres distinctly reticulate.

Tunic neck – like a bunch of strong fibres, reaching up to 25mm in length.

Basal rings – absent.

Cataphylls – 3-4, white.

Prophyll – absent.

Leaves – 4-5, greyish green, glabrous, up to 3mm wide, with 3 ridges in widely open lateral channels, the white stripe around 1/3 of the leaf width, usually emerge only after anthesis and remain very short until spring, or appear only in spring.

Bract and bracteole – unequal, the tip of the bracteole exerted and visible without dissection.

Perianth tube – white to greenish, striped purple to brownish throughout or only below the perianth.

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Throat – nude, from greenish white to light yellow, but always in a somewhat pale to lemon yellow shade, never orange.

Filaments – 3-6(-7)mm long, glabrous, whitish to pale yellow.

Anthers – up to 22mm long, bright yellow.

Connective – of the same colour as the anthers.

Style – from lemon yellow to lighter or darker orange, divided into many branches at the tips of the anthers and usually overtops them. The degree of branching and the length of branches vary widely even within one population.

Flowers – fragrant, very variable in colour – those from the *locus classicus* and the Peloponnese are mostly white or pale lilac, in mainland Greece, on the islands and in Turkey – predominantly lighter or darker lilac, although in mainland Greece among lilac individuals appear whitish-coloured ones as well.



Flower segments – (25-)30-50mm long and 10-17mm wide, obovate or oblanceolate, obtuse to acute.

Outer segments – outside plain coloured or with darker stripes of varying width, inside slightly striped, stripes or veins more prominent in the lower part and sometimes enter the throat.

Inner segments – outside base with a yellowish blotch shining through from the throat, lined with short greyish stripes continuing from the tube.

Capsule – ellipsoid, up to 25mm long and up to 8mm wide, usually purplish tinged, carried just above ground at maturity.

Seeds – ellipsoid, up to 4mm long, dark brown to reddish brown, with a prominent, paler caruncle and raphe.

2n = 16 (according to Brighton, 1977 – as *C. cancellatus* in the area where *C. mazziaricus* s.l. is distributed).

Etymology – named after Alessandro Domenico Mazziari (died 1857), who collected the species on Lefkada.

Herbarium sheet of *Crocus mazziaricus* from *locus classicus*.

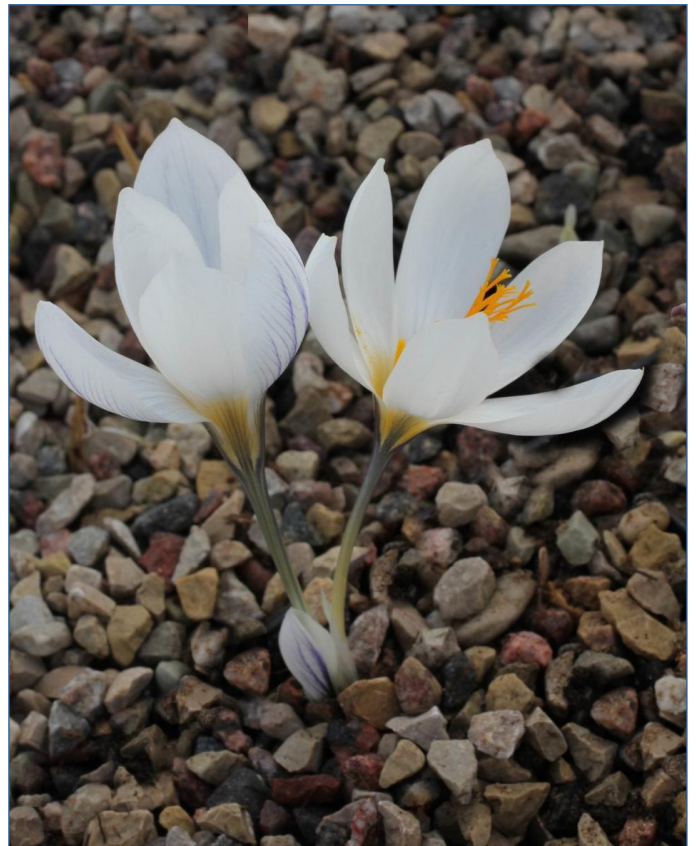
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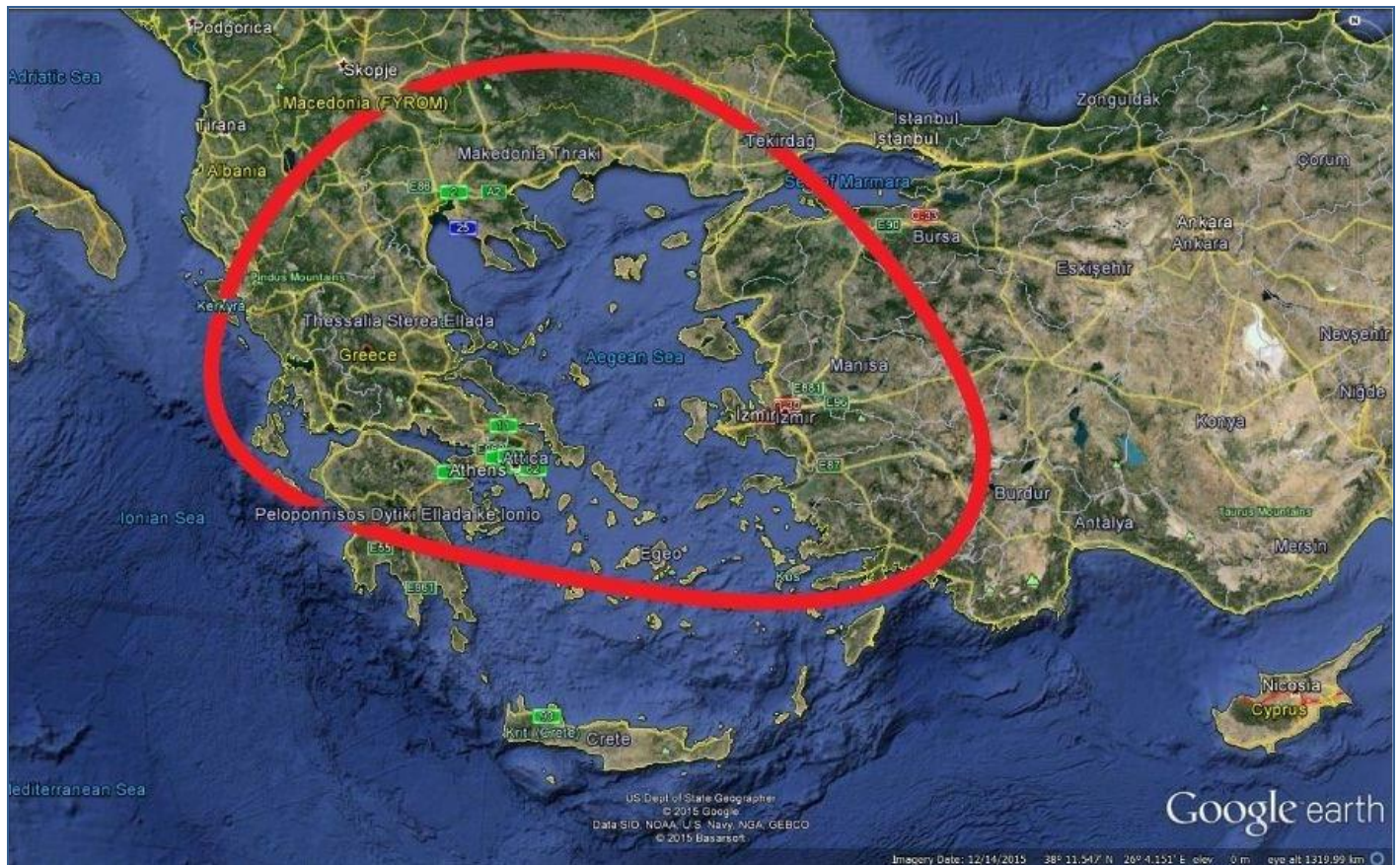
Left: *C. mazziaricus* on Akarnanias Mtn. near Moni Romvou (near Lefkada Island), right: *Crocus mazziaricus* Pelopones Stemnitsa.

Crocus mazziaricus near Tripoli, Peloponnese.

Although *Crocus mazziaricus* is a well-known and widely distributed species, its taxonomic status, or rather, just to which populations its specific epithet should be applied, is still debatable. At present it is regarded as occupying a vast territory and as an extremely variable species. After having collected quite representative material throughout its range, beginning in the *locus classicus* on Lefkada, moving through the Peloponnese into mainland Greece and continuing northwards through Thiva and Larissa as far as the Athos peninsula, then shifting southwards to Samos and Ikaria and turning eastwards into W. Turkey, I noticed a very interesting tendency – the dominant colour in the observed populations gradually transformed from almost invariably white to quite deep lilac, with almost no whites in Turkey (although some whitish ones there were seen). Similarly the corm tunics changed: on Lefkada and the Peloponnese they were distinctly more finely fibrous than those to the east, and the length of the tunic neck varied greatly, from very short up to 5cm long.



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The area where crocus regarded as *C. mazziaricus* s.l. is distributed, according to the Atlas of the Aegean Flora and Flora of the Turkey.

Certainly in such a large region several species must be hiding under the common name “*C. mazziaricus*” because the routine is like this – when a sample of an autumn-blooming crocus with reticulated tunics is collected in that area then according to Mathew and Flora of Turkey it is automatically labelled as *C. mazziaricus*. The description here is based on my own observations of the plants collected during several trips to the Peloponnese and in 2014 to Lefkada. One exemption from the general viewpoint is the very special *C. dilekyarensis* from a small isolated population on the west coast of Turkey (Rukšāns, 2015). Further research, with the inclusion of DNA analysis, is still needed in the rest of the area. Attached here are some pictures from several observed populations in this region (starting in Thiva in Attica, moving northwards through Thessaly to Macedonia, and turning south to Samos and S.W. Turkey) that will allow you to form your own ideas of the variation in this group.



Habitat of
“*C. mazziaricus*”
s.l. from near
Thiva



Crocus mazziaricus aff.
Road from Thiva to Athens just after
Paleohori, near Thea.
In shrubs and small clearings.
Alt. 442 m. 38.08.00,7N; 23.25.04,5E

Herbarium sheet of "*C. mazziaricus*" s.l. from near Thiva.

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“*C. mazziaricus*” s.l. from near Thiva - corms.

B: Surroundings of Thiva, Attica, Greece.

This population was accidentally spotted in 2011 when, together with my wife Guna, I was hurrying to the airport, so there was time only for a brief look and the recording of the geographical coordinates. It grew in sparse grass in clearings between dwarf spiny shrubs and had just started to bloom. I returned to the locality together with my Czech friends in autumn 2014 when the crocuses in the first spot had almost finished flowering, but we found another beautiful locality near the village of Thera, where it was blooming abundantly between dense shrubs and in small clearings; pale lilac individuals dominated there, although whitish ones were not rare; we even saw one in a distinctly pinkish shade. In the lateral channels of the leaves in this population were (3-)4-5 ribs, corms for the most part had longer necks, though this feature varied greatly, tunics were more coarsely fibrous than those on the Peloponnese.



“*Crocus mazziaricus*” s.l. from near Thiva – flowers.



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Above and below : “*C. mazziaricus*” s.l. from near Larissa; photo George Papapolymerou.



C: Near Larissa, Thessaly, Greece.

I have not seen this population. Its pictures were sent to me by George Papapolymerou, a great Greek crocus aficionado. The population (judging by the pictures) is very uniform, lilac, and looks very distinct, certainly worthy of an in-depth research. According to George the leaves in 10 to 15 per cent of the observed plants had already emerged during anthesis.

D: The Athos peninsula, Chalkidiki, Greece.

Crocuses from the *mazziaricus* group were seen growing there only in deep limestone rock splits along the footpaths to the top of Mt. Athos at the southern end of the peninsula. Only very few corms had to be dug up to realize that it was not the searched-for *C. athous* so we had little interest in collecting more of them. At home they bloomed with bright lilac-blue flowers. Corm tunics were very coarsely fibrous-reticulated, with a comparatively short fibrous and bristly neck. On the attached picture the remnants of the old tunic give the impression of a very elongated corm, but in reality it

is subglobose with a flattened bottom and is around 10-12mm in diameter.



Corm of "*C. mazziaricus*" s.l. from Mt. Athos.

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“*C. mazziaricus*” s.l. from Mt. Athos – flower

E: Samos Island, Greece

On Samos too only very few corms were collected. All the plants were invariably blue-flowered and their throats were in the deepest yellow seen in the specimens of this group in Greece. The corm tunics were very coarsely reticulated.

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Corms of “*C. mazziaricus*” s.l. from Samos Island.

**Flowers of
“*C. mazziaricus*”
s.l. from Samos
Island.**



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Left "*C. mazziaricus*" s.l. from Gölçük, Muğla Province, and right, from Honaz Dağı, Denizli Province, S. W. Turkey.



Corms of "*C. mazziaricus*" s.l. from Honaz Dağı, Denizli Province, S.W. Turkey.

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F: S.W. Turkey

I grow many gatherings of the so-called *Crocus mazziaricus* from Turkey, but most of them have been collected in spring, without flowers, so it is impossible to judge the variability of this crocus there. On the other hand, they at least can be regarded as very randomly collected – no preferences to a particular flower type are of any significance when collecting corms in leaves. And all Turkish plants invariably are more or less blue. Even the most light-hued forms will show some bluishness on the flower segments. The only exception was one very small gathering from a road by Tuzla Beli, which turned out to be very distinct – pure white with very finely reticulated tunics, even somewhat resembling some forms of *C. pallasii* s.l. – if not for the many-branched stigma I would have been quite hesitant about the name for this acquisition.



“*C. mazziaricus*” s.l. from vil. Çamköy in Denizli Province – corm.

G: SW Turkey, Çamköy, Denizli Province.

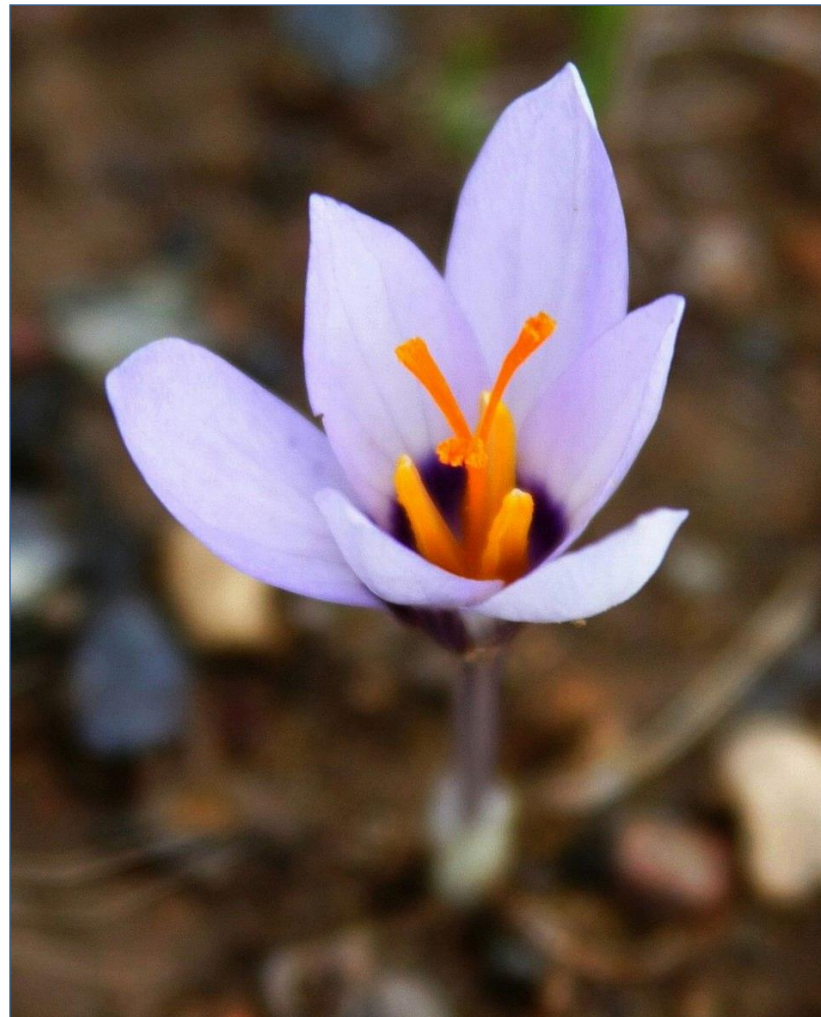
Our team found a very special population during one of the rare autumn trips to Turkey near the village of Çamköy in Denizli Province – there crocuses grew in a small spot in grazed grass between low trees in the middle of ploughed fields. The population was extremely variable from very light to medium lilac flowers with almost invariably deep bluish purple throats, the branching of the style varied enormously, from almost trifid or with branches that were only slightly subdivided at the top to almost typically many-branched. One plant was so much like *Crocus mathewii* that only the coarsely reticulated corm tunics suggested it as belonging to the *C. cancellatus* family and prevented an announcement of a “new locality” for *C. mathewii*. On the attached pictures you can see this plant and its corm. This surely is a new, not-yet described species, waiting for the right time.



“*C. mazziaricus*” s.l. from village of Çamköy in Denizli Province – flower variation.

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“*C. mazziaricus*” s.l. from near the village of Çamköy in Denizli Province which is superficially similar to *C. mathewi*.



Acknowledgments

I'm especially thankful to all my friends who joined me in my trips (too many to be list all) and especially to Arne Strid for sharing of maps and information gathered by him about acquisitions and herbariums of Greek crocuses. To Stylianos Charalampidis and George Papapolymerou (Greece) who helped me to reach remote corners and sent me so many pictures about wild habitats of Greek crocuses. And as allways to Mārīņš Erminas for his patience in correcting my English. I'm especially thankful to my family and my wife Guna for their help and support during my trips and preparation of my publications. It is not easy to live with me - so often leaving home for sometimes quite crazy travels and passing so many hours and days at computer.

Jānis Rukšāns

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***Campanula coriacea* - a Turkish alpine worth growing outside by Grahame Ware**

Like many an alpine gardener, I become intrigued by plant descriptions in the dark light of winter. As Vitamin D deficiency kicks in and I slip into an endorphin-starved metabolic state exacerbated by doing too little too often, my condition does not improve staring at TV sports with a stein of beer in my hand. Making an order for exotic alpine seed always provides a lift and a sure fix. It goes without saying though that it doesn't always work out - the imagination and the truth are often at a variance. One moment that did work out though happened when I ordered from Mojmir Pavelka's 2011/11 Euroseeds.

The entry read as follows:

"163 *Campanula coriacea*, 2400m, Artos Dag, Turkey. Leafy stems 10-15cm, pubescent dentate lvs., pale blue flws.in dense raceme. Limestone rock crevices. 2010". There are the photos of the material collected on [Pavelka's website](#).



Campanula coriacea just beginning to bud up with pink 'nibs' - photo G. Ware

History

Ah yes, "imagination and truth". The truth is that there is not a lot of horticultural info regarding this species. I will list further below what I have been able to find out. But first let me tell what I have found out from my own experience.

My plant has stayed very much in character both in form and flower colour. But take note- Pavelka had this species on offer in his 2007/08 catalogue as well, from a collection he made in 2006 also in the Artos Dag. Pavelka mentions in his 07/08 catalogue that the flower colour varies "from pale to dark blue flowers." My plant from the 2010 collection is most definitely not in the dark blue range.

And note again that three years later, another Pavelka accession from the same or very similar population, shown [here](#), is a similarly pale hue.

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I received the seed in in January of 2012 and after stratification inside the fridge for 6 weeks, it germinated outside after 3 weeks. The germination rate was not high; around 40% and I lost some to [woodbugs](#) that around here are an enemy of tender seedlings in pots.

It was slow to grow in the pot but I doubled up the pots and overwintered it outside in a coldframe. The next Spring it bounced and it didn't look too bad. It was about 2"-3" across when I decided to plant it out into a permanent garden position in September 2013. I believe that it doesn't really like it to be too cold despite the suggestion from quite a few pundits that it will take Zone 5 at least. When I looked at the fact that it hails from the Anatolian diagonal and grows at an altitude of 2500m or less, I concluded that it would not take temps that were too cold or wet. Artos Dag is but 3500m ASL so it hardly a big peak by any standard.

The Mediterranean climate of Yellow Pt. on the dry, east coast of Vancouver Island with proper placement would be perfect thought I. Hot, dry summers are a must for this species where in its native habitat where mean temps for July and August reach into the mid-30C zone. Drainage also has to be top notch. Those just happen to be our highs here in Yellow Pt. during Summer as well. Although, some collectors of this species mention finding it in shady sites (as they do with *C. choruhensis*), I grow mine in full sun, in a bed of manufactured sand (sifted and sized granitic chips that stone masons use for patio foundations and paths, etc.) with a small top-dressing of broken down clam and oyster shells. It sits high in a well-sloped bed nestled in a little raised pocket adding another level of drainage. Outside, it grew grudgingly but at least developed some biomass with the woody stems and base increasing ever so slightly. However, one to two years ago, it was unassuming in its early stages, a pretty non-descript smudge of green.



When many strongly woody stems started to grow out last Spring (2015) with lovely, toothed leaves, I was delighted. 'Maybe this is the year it flowers?' I thought. When it had sent out about 25 stems each (about 30 cms/12inches. long), I thought I'd be in for a good surprise. The thing that really tickled me at

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this point of development was the crisp, coriaceous leaves that are bristly (hispid) on the edges only (note the pic above and the bristles on the edges of the new leaves). I just could not stop touching the leaves and softly squeezing (caressing?) them with dumbfounded delight. Few plants that I've grown and known have a feel that is this amazing.

As people that follow my articles and garden know, I am a big believer of growing in the open garden. I'll admit to this preference and have Jack Elliott to thank for this position/belief. If you can establish a plant in the open garden it will flourish and do much better in every conceivable way. Having said that, there are certain genera that take very well to alpine house and crevice-boulder construction. But as I have pointed out on more than one occasion, you don't necessarily need boulders or crevices to achieve a substrate that makes a plant happy and floriferous. My "All Washed Up" bed is a testament to that. Briefly, this zone is a narrow elevated bed that uses driftwood from the beach to make the edges and borders with almost pure manufactured sand with a tiny amount of good old, Canadian peat moss. The alkaline subsoil is hard with highly compacted, fractured sandstone. This is also a good substrate for *Campanula choruhensis* that I wrote about extensively in [IRG 56-August 2014](#). It gets a lot of sun and heat and not a lot of water during the summer. The fact that both *C. coriacea* and *C. choruhensis* are perennializing in this bed attests to achieving good growing conditions.



In the "All Washed Up bed"

The bed is also "painted" with beach pebbles and moonsnail shells. Black shale from a local road cut is another visual and repeated element in the All Washed Up bed. It is a really lovely "installation" of plants and *C. coriacea* fits right in.

C. coriacea developed beautifully this past summer and despite the precocious Spring and above average temps, it did not flower until July. The flowers come in waves. By the end of the summer, this plant produced 100's and 100's of flowers in the middle of Summer during a ferocious heat wave (33C-35C for weeks on end) here. Heroic I'd say.

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The flowers are about 1.5 cm- 2 cm across and an icy (not milky) blue - a good colour that harmonizes nicely with the light green leaves.



Flowering through a heat wave

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Others' Anecdotal Experiences with *C. coriacea*.....

This is one of the real strengths of *C. coriacea*- the fact that it is a true mid-Summer flowering plant. To underline this fact, I discovered that Panayotis Kelaidis had a pic of it in full flower in August in Denver, Colorado in his [Prairiebreak Blogspot](#).



C. coriacea – photo Panayoti Kelaidis.

'ZZ' (Zdeněk Zvolánek) believes that *C. coriacea* is “difficult” – see IRG 46-October 2013: [“Gardens in the mountains: Karabet Pass.”](#)

There is a nice close-up in Skalnicky of the [flowers](#): detail shown below.



Some people have had good success with this species in an alpine house. [Jim Archibald](#) in his catalogue suggested that *C. coriacea* is “of great promise for the alpine house”.

Verbatim from the Archibald archives-

253.800 : *CAMPANULA CORIACEA* Turkey, Van, W of Yukari Narlica. 2200m. Shady, conglomerate cliffs. (A most distinct species, restricted to the Van area of S.E. Turkey & of great promise for the alpine-house. Rosettes of thick-textured leaves with wide lilac-blue bells.)

The AGS garden at Pershore has it growing in [an alpine house](#), pictured by Anne-Marie Culliney. To me it doesn't look in character and the colour of the leaves and flowers not what you would find in the wild or outside.

Right: ***Campanula coriacea*** grown/photographed by Rudi Weiss.

Rudi Weiss also took Archibald's advice to heart. He states in the SRGC forum, June 11th 2009, that *C. coriacea* thrives in his alpine house. His pictures attest to that.

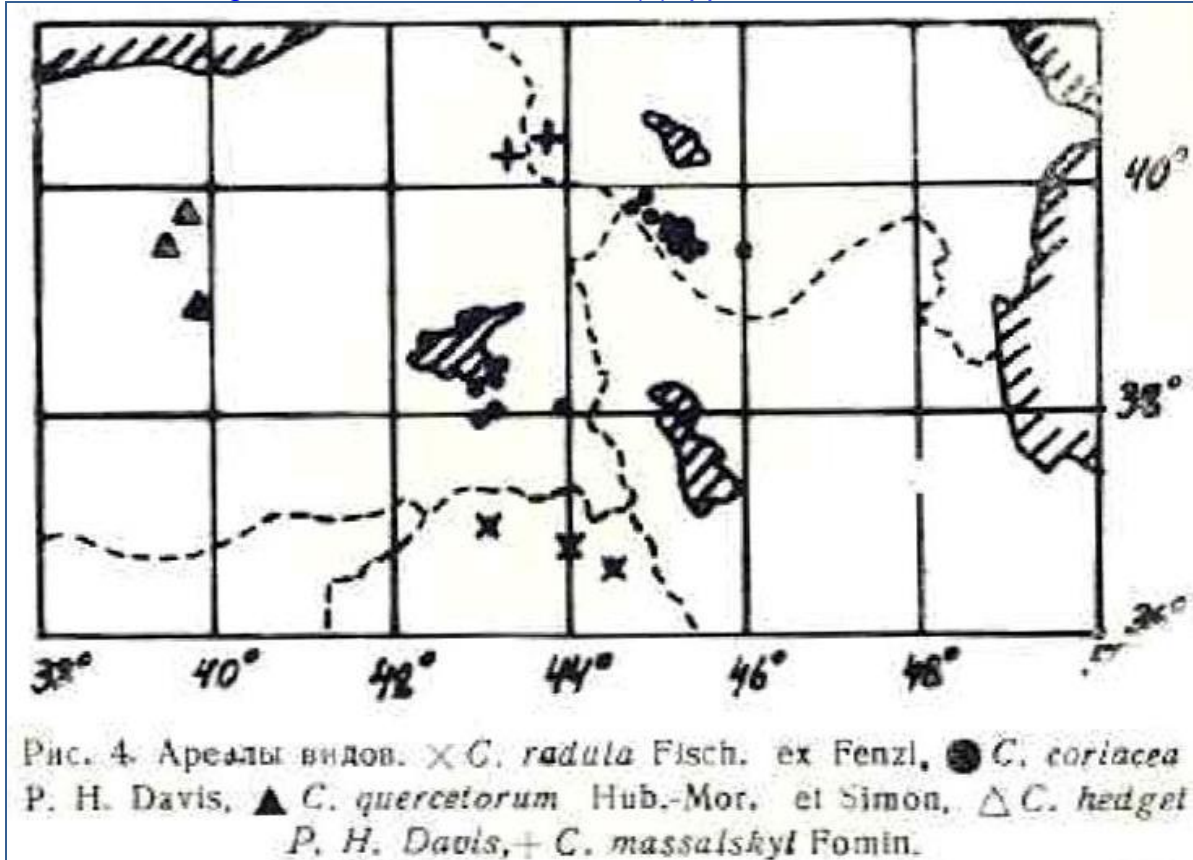


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However, in an alpine house, you can expect *C. coriacea* to be greener and less coriaceous (resembling leather) simply because it doesn't have to be (coriaceous that is). Remember, in order to survive the searing heat of its native habitat being coriaceous is vitally important to slow evaporative stress. Note that Weiss' plants were grown from seed collected in 1989 by himself [near Lake Van](#) and not from Archibald's collections.

Botanical History

Оганесян, М. Э. (Oganesyanyan) (1990) "Once again about the types of *Campanula coriacea* and *Campanula radula*" [Biological Journal of Armenia, 43 \(3\). pp. 195-202. ISSN 0366-5119.](#)



Distribution map of *Cc. radula*, *coriacea*, *hedgei* and others from the Armenian Journal of Biology.

Becek and Karabacek in the Turkish Journal of Botany 27 (2003) pp 509-511 report that "*Campanula coriacea* P.H.Davis (Syn: *C. radula* Fisch. var. *minor* Boiss.) is known to be an endemic taxon distributed on calcareous rocks in Adilcevaz (Bitlis) and Van castle (old Van city) in East Anatolia (Damboldt, 1978). The type specimen of this taxon was collected in 1954 by Davis and Polunin on limestone rocks (1900m) in Adilcevaz. Davis reported that the specimen collected by McNeill and Kotschy in 1859 from Van castle (the type specimen of *C. radula* var. *minor* no: Kotschy 472) had the same properties as his specimen (*C. coriacea* specimen of Davis)."

The '[Van Herbarium](#)' website quotes, in relation to *C. coriacea* :

"*C. coriacea* Davis in Notes R.B.G. Edinb. 24:29, t. 4 (1962). Syn: *C. radula* Fischer var. *minor* Boiss., Fl. Or. 3:909 (1875).

Endemic. Ir.-Tur. element. The species is closely allied to *C. hedgei* (Upper Euphrates) and to *C. radula* Fischer from N. Iraq and possibly from Daralaghez (Soviet Armenia). In the latter area there probably exists another still undescribed species, intermediate in floral characters between *C. hedgei* and *C. radula* (as suggested on the basis of limited and insufficient material). Fedorov (in Fl. U RSS 24:248-249, 1957) has stressed the variability of this isolated population in Daralaghez in relation to habitat. According to him the typical *C. radula* grows in shady and moister places whereas the plants near to *C. coriacea* grow in dry, open places. We are not convinced that

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the differences, especially in floral characters, are due only to ecological conditions. The whole group shows relationships with the variable, chasmophytic perennial *C. postii* from S. & E. Anatolia, N. Iraq and W. Syria (Latakia). The observed differences in habit, indumentum and floral characters between the different populations within and between the species are presumably due to long isolation and allopatric differentiation.”



Summary

What a display and what a plant! It is an altogether wonderful plant of high summer with terrific staying power. I have it growing with some seed grown *Penstemon* sp. and a compact, seed grown *Paeonia mascula*. I have cut it back in the hope of getting some good seed and to encourage this plant to give me another season of magnificence. The new shoots have set up nicely in the woody crown just waiting for next year.

I would certainly encourage people to try it outside so that it has the real habit and form it has in its natural state. To the best of my knowledge Pavelka and [Stanek](#) still have wild-collected seed on offer.

G. W.

Endnotes:

[Nordic Journal of Botany 25: 5357, 2007 - "A new Campanula \(Campanulaceae\) from east Anatolia, Turkey."](#)

Abstract : *Campanula demirsoyi* A. Kandemir (Campanulaceae) is described and illustrated from a localised area of Erzincan province. It is closely allied to *C. hedgei* Davis and *C. coriacea* Davis. Diagnostic morphological characters are discussed and compared with those of related taxa.

Ali Kandemir in this article wrote :

“The range of the Munzur mountains is one of the centres for endemic plants in Turkey and is located on the Anatolian diagonal (Ekim et al. 2000). The concept of the diagonal was first proposed by P. H. Davis (Davis 1971). Thirty-three percent of the species growing in Turkey are found along the diagonal (Ekim and Guner 1986). 17 *Campanula* taxa grow in the Munzur mountains, eight of which are endemic and five endemic species grow in this area only”.