

International Rock Gardener

ISSN 2053-7557



Number 166 The Scottish Rock Garden Club November 2023



First article this month is about the intriguing tulip from Kazakhstan – famed for its deeply furrowed foliage – *Tulipa regellii*. Frazer Henderson travelled in search of this unique tulip and was successful in seeing it in habitat.

Frazer is an active member of a number of horticultural societies and keeps the SRGC Forum up to date with events at the Sedum Society and the

Wakefield & North of England Tulip Society as well as posting - and giving talks - on the many

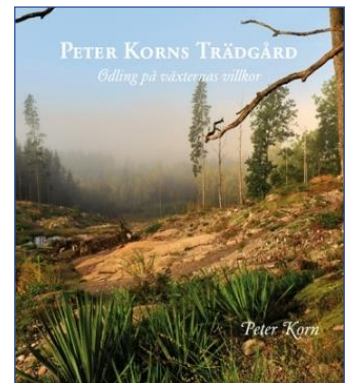


interesting places - such as the Yemen, that he has visited in his extensive travels to address his interest in island flora, mountain flora and wild tulips. Along with his professionally based [writings](#) Frazer can be found attending various alpine events as well as those of the many organisations of which he is a member.

This image of a watercolour of *Tulipa regellii* is by the English artist, alpine grower and allotment fan, Stephen Shelley.

Already recognised for his general horticultural nous, following visits to his [garden in Eskilby](#) and his trips to Scotland where his methods and talks drew great praise, Peter Korn, along with Julia Andersson, has made a fantastic garden of experiment and innovation at their [Klinta Garden](#), further south in Sweden. Anyone visiting there, expert or [student](#), is astonished by their skills and this has further advanced the acclaim garnered around the world by the book, “Peter Korn’s Garden – Giving plants what they want” – published in both Swedish and English versions.

Peter was awarded the 2020 Gröna Pennpris by Gröna Pennklubben, Awarding the prize the association wrote: “Peter Korn is widely known for his ability to transform poor land into thriving paradise. Based on his extensive knowledge of plants' natural habitats, he creates gardens and plantings that amaze and surprise. With persistence and aspiration, he literally digs in. Into gardening history as one of Sweden's foremost gardening personalities.”



Cover image: Perennial planting by Peter Korn.

---International Rock Gardener---

--- Travels in Kazakhstan ---

Tulipa regelii – a field excursion in Kazakhstan by Frazer Henderson

Having travelled to central Asia on many occasions, ostensibly to view the alpine and geophyte riches of the Tien Shan mountain ranges in spring and early summer, I decided in 2023 to fulfil a long-held desire to try and see *Tulipa regelii*, which with its ridged foliage is unique to the genus. As the species has a limited distribution being endemic to south-east Kazakhstan, on the fringes of the Tien Shan, and tends to flower earlier than others in the genus in the region, I arrived in Almaty in late March with plans to see the species at its *locus classicus* near Kurty some 95kms north-west of the city.



Kurty – steppe.

The hope of avoiding heavy traffic by setting off at 7 am proved to be misplaced. Almaty suffers from a suffocating smog in part due to the huge numbers of vehicles with internal combustion engines all of which, seemingly, were on the road that morning. My taxi-driver spent most of the time cursing and berating fellow drivers oblivious to the fact that his actions of constant mobile telephone use, unindicated lane changes, sudden braking and U-turns on dual carriageways were provoking the ire of other road users and contributing substantially to the level of snarled traffic. Anyway, after over 70 minutes of stop-start driving and near

---International Rock Gardener---

crashes we finally left the environs of Almaty and were able to make our way at a constant and serene pace along the lightly trafficked route to Kurty with clear skies and the Kazakhstan steppe stretching into the distance. After a further 30 minutes I asked the driver to stop – though he was perplexed as to why anyone would halt at such a featureless location - bade him farewell, hopped over a roadside fence and tramped my way westwards across the sheep-cropped landscape in the direction of where I hoped would be the Kurty river valley.



Kurty river coming into view.

It was a decidedly fresh morning little more than about 5C with a biting wind. As I made my way the heavily grazed ground seemed botanically unpromising comprising of little more than a sagebrush-grass complex of *Artemisia* spp, *Poa* spp and *Stipa capillata*. After about one and half kilometres I saw the river in the distance and as I got closer I noticed stony areas in the folds of the landscape.

Artemisia sp.



---International Rock Gardener---

These were more promising locations for plants as I had read that *T. regelii* favoured south-facing slopes of loose slate/shale scree. I spotted to the north some white flowers in the distance on a rocky incline. My stride quickened and thoughts raced ahead of how I had achieved my goal of seeing this rare and unusual species so quickly. However, as I approached, I realised the plants, waving strongly to me in the stiff breeze, were standing too tall to be *T. regelii* and as I got nearer, I realised they were *T. biflora*.



Tulipa biflora - two flowers on stem

Despite its name I saw only one specimen with two flowers amongst the many hundreds growing within the scree and rocky outcrops. As Everett states, in her monograph [1], the species is highly variable, differs in size throughout its range (Central Asia, Caucasus, northern Arabia) and several of the regional variants could be considered as being separate species indeed some botanists use *T. buhseana* or *T. talijevii* to describe the species in this geographical area around the Kurty river as well as eastwards to Lake Kapshagai.



However, Zonnefeld in his analysis of the DNA of the genus [2] confirmed that *TT. buhseana and talijevii* were insufficiently distinct and should be considered as being *T. biflora*. The species is attractive: a bright white flower with an egg-yolk centre and the outer tepals suffused with a soft-red blush fading to a yellowish light green near the base.

Whilst there were several flowering specimens

there was an abundance of non-flowering plants suggesting a colony in the many hundreds within the disordered stony ground.



---International Rock Gardener---

I searched the scree for some vestiges of a ridged foliage to indicate the presence of *T. regellii* but found none and so decided to proceed northwards, inspecting every rocky outcrop as I advanced over the next kilometre. As I made my way a little closer to the shoreline I startled a Green Sandpiper (*Tringa ochropus*) which in turn, through its call, caused agitation amongst a commotion of coots (*Fulica atra*) – what an appropriate collective noun for the species -, a small flock of mallards (*Anas platyrhynchos*) and a pair of Ruddy Shelduck (*Tadorna ferruginea*) which immediately took to the wing.

As I progressed, I made my way carefully through extensive numbers of the spiny though non-flowering *Acanthophyllum pungens* and found a single specimen of the Scorpiris (juno) *Iris kuschakewiczii* (right). Its most notable features were the white margin to its green leaves and the dark violet smudge



surrounding the white crest on the lilac-blue falls. I also saw a couple of different gagea species, in largish numbers, which I've assumed were *GG. bulbifera* and *tenera*, though, since species within the genus are fiendishly difficult to identify in the field with certainty, I could, of course, be widely mistaken.



Gagea bulbifera, also with an uncharacteristically downward facing inflorescence.

---International Rock Gardener---

Finally, I spotted a leaf with ridges on scree and though there were no flowering plants I realised that I had found my target species. I also noted that seedlings of *T. regelii* seemed to be surprisingly abundant. Spotting a single spent flower I concluded, reasonably enough, that my visit was too late. The adjoining photograph shows the location of my first introduction to *T. regelia* with the spent bloom highlighted in red. I decided after spending some time noting the leaf shape and its ridges as well as taking numerous photographs of record that I would still continue my trek northwards just in case a late flowering specimen existed in another



rocky outcrop – the eternal optimism of a plant-hunter again to the fore!

Ten minutes later my luck held as I came across a scree bed with flowing specimens. I was delighted and immediately set about photographing the plants noting that the weather could change at any time. Images were taken of individual blooms, individual leaves, the habitat as well as close-ups of stamens and style. An

inordinate number of leaves were inspected and measured as I sought to record the moment as a darkening sky loomed to the east.



It was here by the Kurty river that the species was first collected by the Russian botanist and geographer Andrei Krasnov (1862-1914) in 1886 and formally described by him in 1888 [3]. The specific epithet

commemorates the German-born Eduard (von) Regel (1815-1892) the then Director of the

---International Rock Gardener---

Imperial Botanic Garden, St Petersburg, Russia and who himself had been at the forefront of tulipa taxonomy, indeed he described 25 species including, notably, *TT. greigii* and *kaufmanniana*.



Scree habitat showing density of *Tulipa regelii*.

The species has a fascinating taxonomic history which is well covered by Mathew & Wilford [4] but suffice to say that though it was previously considered to be within its own subgenus it now resides within *Eriostemones* (section *Biflores*) along with the likes of *T. biflora* and *T. bifloraformis* [5]. The species is in the Red Book of Kazakhstan and is listed as Endangered by IUCN [6].



---International Rock Gardener---

The most striking feature of *T. regelii* and which is unique within the genus is, of course, its single, arcuate or arched leaf with longitudinal ridges which wave left and right, except for the ridge closest to the leaf margin, in the transverse plane. In the many specimens inspected I noted the ridges often, but not always, possessed a weak claret colouration with a much deeper and richer blood-red hue on the leaf margin and apex. Everett states the ‘crests are tinged purple’ and that the leaves have a “metallic pinkish sheen” which, of course, may be the case in different light or with plants at other locations. Colouration, of course, can be fickle and subject to a huge range of variables but what is clear is that many of the plants certainly had a colouration due to the presence of anthocyanin in the cell-sap within the red-purple spectrum. The reasoning for the ridges on the leaves is not really understood. It could be to aid moisture collection or retention and yet the plant grows, certainly at Kurty, in close proximity to, and under the same climate as, *T. biflora* which possesses leaves that in contrast are smooth, long and narrow. Clearly more investigation is necessary as to the purpose of the unusual leaf shape. I also noted that the single leaf clasped the stem in the manner which is described formally as being amplexicaul.



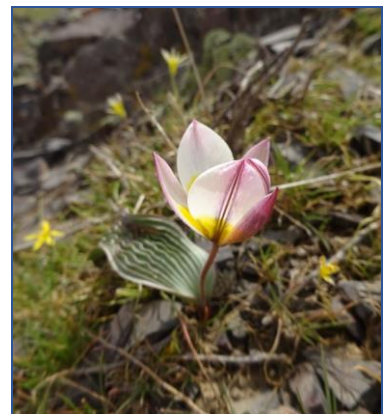
The flower stem, or at least that above ground, was between two and six cms in length from those inspected with most of these being closest to the lower end of the range. The stem colour varied within a continuum of cinnabar to burgundy. The flower, in colour, was similar in many respects to those of the *T. biflora* complex being predominantly white with an egg-yolk yellow centre on the inside of both the inner and outer tepals.

---International Rock Gardener---

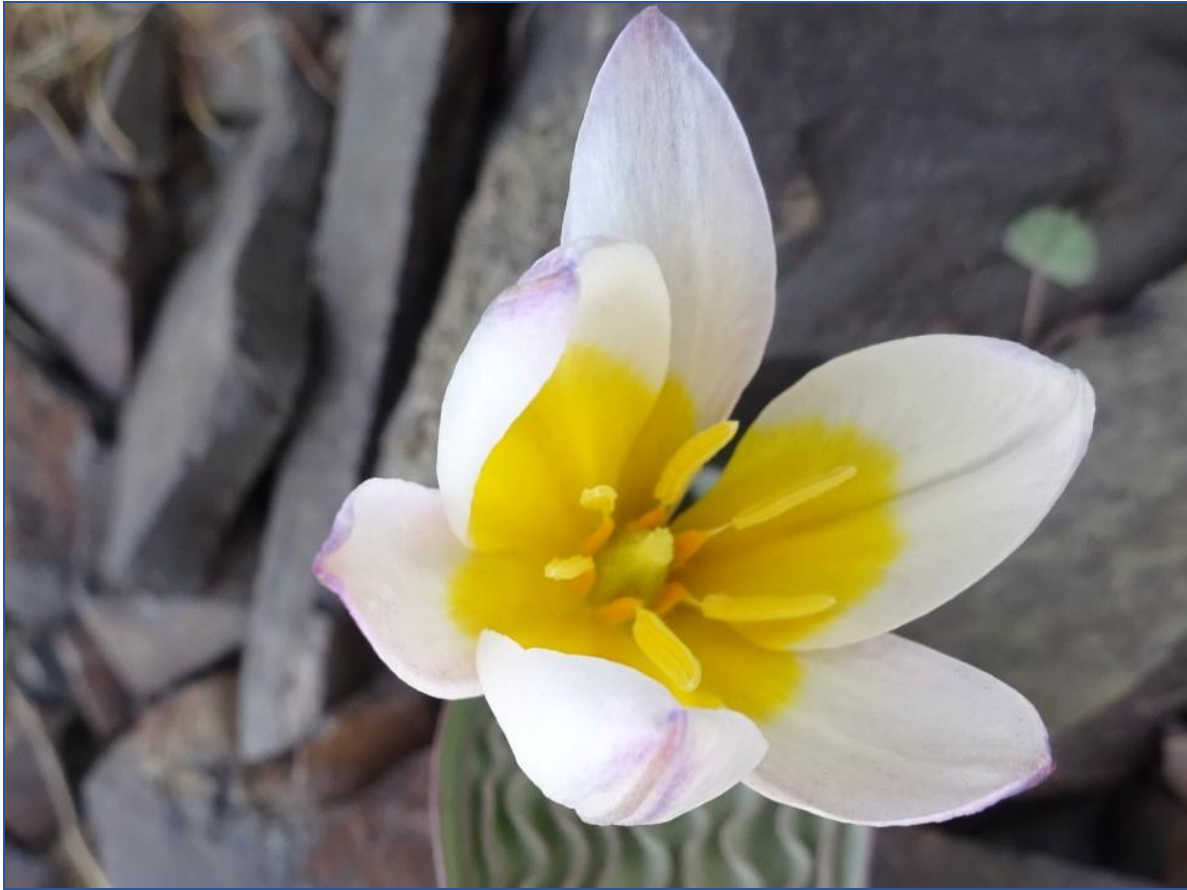
The exterior of the inner tepals was usually white though a few possessed rather attractive carmine striations. The exterior of outer tepals was by contrast stained with a reddish blush. The filaments were yellow and could clearly be seen to be pubescent with wispy hairs. The anthers were also yellow as was the style. Though a solitary flower is usual I did find – and it really did take some searching - a single specimen with two flowers, though sadly both were spent. Botschantzeva [7] states that the tulip possesses a ‘faint pleasant scent’, however, I can attest that whatever there might have been had been consumed by the breeze on the day of my visit.



Tulipa regelii - inner and outer tepal colouration.



---International Rock Gardener---



Tulipa regelia : close up of filaments, stamens and style.



Tulipa regelia - two flower stems.

---International Rock Gardener---

Tulipa regelii :
density of
plants in 20x20
cm square.

I counted in
excess of two
hundred
individual
plants on that
single rocky
outcrop alone
and though
most were



non-flowering I concluded, noting the many outcrops and having inspected three of them and confirmed the presence of the species, that along the river there was in fact a substantial community. Let us hope that remains the case. The IUCN estimates the total population for the species to be between 3000 to 5000 mature specimens across just ten geographical locations within Kazakhstan hence its endangered status.

The morning had passed quickly and I sat in the lee of a larger rock outcrop and ate my supermarket-sourced picnic of meat, cheese, bread, chocolate and more chocolate and watched Ruddy Shelducks constantly alighting and leaving on their watery runway and wondered why like me they just couldn't sit still and relax in the moment.



---International Rock Gardener---



Rosularia glabra

I noted that the surrounding outcrop held small numbers of the succulent *Rosularia glabra* which seemed to be a good

indication of the climatic conditions of the location: dry. The lichen community – crustose forms very much to the fore - appeared to be prolific and certainly enhanced, especially those containing the bright yellow of pulvinic acid, the visual appeal of what might otherwise have been a dulled gun-metalled screeface.



Variously coloured lichens on the rocks.

---International Rock Gardener---



Lichens containing the bright yellow of pulvinic acid.

As I made my way off the slope into a gully I noticed a small rock moving and realised that I had come across an Horsfield Tortoise (*Testudo horsfieldii*) stumbling its way through the rocky landscape much in the manner of my own exploration of the area. I took a short video

---International Rock Gardener---

of record with my camera inadvertently dislodging a largish stone which set off an explosion of Chukar partridges (*Alectoris chukar*), their discordant alarm calls sounding loud in the silent landscape and providing an excuse – if one were ever needed – for the Ruddy Shelducks to practise, again, their take-off routine.



Horsfield's tortoise.



On leaving the gully I plodded across the close-cropped pasture with my eyes fixed on the ground in the hope of seeing other interesting plant species. Suddenly small, attractive, blue flowers of the Hill Violet (*Viola collina*) appeared beneath my feet. Within the Viola genus, in addition to the normal, characteristic open flower forms

---International Rock Gardener---

(Chasmogamous flowers), species may have on the same plant small, closed flowers that self-pollinate within a bud (Cleistogamous flowers). This is likely to be a strategy to ensure the continual survival of the species when, for whatever reason, there may be a misalignment between flowering and the availability of pollinators. Though I didn't find any closed flower buds on those plants I checked that was, perhaps, because it was still early in the season and cleistogamous flowers tend to be produced after chasmogamous flowers.



At the bottom of another gentle decline I found specimens of the attractively flowered *Valeriana chionophila* (left), a species which I had not seen before but which is found in the lower lying regions surrounding the Tien Shan to its north and west. The epithet *chionophila* translates as snow-lover.

The rest of the field trip passed without incidence as I made my way back across the depleted pasture towards the road noting that a few *Euphorbia rapulum* and *Vicia subvillosa* remained immune to the attentions of sheep.



---International Rock Gardener---

I had planned to hitch back to Almaty as there was no public transport on the route and, fortunately, picked up a ride within 20 minutes. Alas, the vehicle broke down ten minutes into the journey and I had then a further 30-minute wait before the next ride which proved to be a great experience as it was provided by a retired couple of school-teachers (of Physics and Russian) who now pursued, enthusiastically, an interest collecting culinary herbs and photographing the native flora. They had spent the morning engaged in their hobby and had bundles of fresh and dried foliage filling most of the back seat. An entertaining and informative discussion ensued of our shared pursuit conducted via my limited Russian, their scant knowledge of English and Google translate on their mobile telephone. We conducted some limited window-botanising spotting largish stands of the buttercup-yellow *T.*

kolpakowskiana growing on the verges and central reservations of dual carriageways – too dangerous alas, in view of the standard of driving in the country, to permit closer inspection.



However, it was noted by me as a third tulip species for the day. The couple dropped me off in the outer suburbs of Almaty and by means of local buses and the efficient underground metro I made my way back to the city centre.

On returning to my modest hotel and writing up my notes that evening I reflected that it had been a successful day in the field; I'd seen my target species, and had even caught it in flower, at its *locus classicus* and the weather had thankfully remained kind. What a curious and wonderful thing it is to go in search of plants in unknown countryside, I thought, as I began planning the following day's excursion.

F.H.

---International Rock Gardener---

References:

1. Everett D. (2013). The Genus Tulipa: Tulips of the World (Botanical Magazine Monograph) Kew
2. Zonneveld B. J. M. (2009). The systematic value of genome size for all species of Tulipa L. (*Liliaceae*) Pl. Syst. Evol 281: 217-245
3. Krasnov, A.N. (1888) Scripta Botanica Horti Universitatis Imperialis, St. Petersburg
4. Mathew B. & Wilford R. (2001). *Tulipa Regelii*, Curtis's Botanical Magazine Vol 18. No. 1, pp. 6-11
5. Christenhusz, M.J.M., Govaerts R., David J.C., Hall T., Borland K., Roberts P. S., Tuomisto A., Buerki S., Chase W. & Fry M. F.. (2013). Tiptoe through the tulips – cultural history, molecular phylogenetics and classification of *Tulipa* (*Liliaceae*) Botanical Journal of the Linnean Society, Volume 172, Issue 3, pp 280–328, <https://doi.org/10.1111/boj.12061>
6. Wilson, B., Sultangaziev, O.E., Ivashenko, A. & Epiktetov, V. (2022). *Tulipa regelii*. The IUCN Red List of Threatened Species 2022: e.T184531957A184539363. <https://dx.doi.org/10.2305/IUCN.UK.2022-2.RLTS.T184531957A184539363.en>
7. Botschantzeva Z.P. (1982). Tulips: taxonomy, morphology, cytology, phytogeography and physiology. Translated and edited by HQ Varekamp. Rotterdam: A. A. Balkema



River Kurty made into reservoir.

---International Rock Gardener---

--- Habitat Manipulation ---

Growing in sand: Peter Korn, Sweden.

If you have a garden with good moisture-retaining soil and access to compost, there is really no reason to build sand beds except if you want to grow rock garden plants that require special conditions. However, if you have a dry garden with sandy soil or a thin layer of soil, sand beds are an excellent alternative.

Over 25 years ago I made my first sand beds to be able to grow rarities from the Himalayan peaks, plants originating from the ravines of New Zealand or cacti from the American desert. At that time, the well-drained sand beds were a prerequisite for the rarities to survive in our wet climate.



Successful sand bed.

Why sand?

I continued to experiment with all kinds of plants from drier environments but also grew other plants, vegetables and trees. Almost everything grew very well but more slowly, overwintered better and withstood dry periods without problems. In general, they were much healthier, more long-lived and bloomed better than they ever had in the more traditional flower beds. Some types of plants that require readily available nutrients to develop well however, work better in richer soil. Salad leaves just got hard and bitter and the herbs slowly faded away.

---International Rock Gardener---

They would certainly have developed better in ordinary soil or if the sand bed had been covered with fresh grass clippings or regularly fertiliser watered regularly.

Suitable sand for cultivation

Over the years I have been growing in sand, I have tested many different types of sand from many different suppliers both in Sweden and abroad. The quality varies greatly and even the degrees of fragment particles from the same gravel pit can vary between orders.

During quarrying, a layer of clay or coarser particles is sometimes encountered which can significantly change the composition even though it is travelling through the same sieve. Therefore, it may be worth going to the gravel pit and feeling the sand before ordering too much. The simplest test to see if the sand is good is to take moist sand in your hand and squeeze it together. If the lump falls apart when you open your hand, it's probably good sand and if the lump doesn't fall apart, there is probably too much fine material and the drainage will not be good enough. If the sand gets dirty, it may contain too much clay.

It is usually not enough to mix in more coarse material to increase the the drainage capacity as the fine particles will fill the spaces between the larger grains of sand. On a new site, I usually test all the gravel pits in the area to find the best sand.



Tulipa orphanidea in a southfacing sandbed.

---International Rock Gardener---

The most common particle sizes that are readily available is 0-8 mm and contains a mixture of everything from fine particles to 8 mm gravel. Depending on where you order it, it may be called either drainage gravel, pipe trench gravel, wall sand, hard sand or natural gravel and all types can be good if the visual profile looks promising. It is usually possible to get a readout showing the distribution of the different fractions before ordering. If it can be tipped off a whole lorry, this will prove the cheapest way to buy. Sometimes you can have the sand delivered in a big bag, but this is much more expensive. An alternative is to collect it yourself with a trailer, but sand is heavy and you can't carry much.



Astragalus exscapus

No need to water

It is important to include all the different particle sizes so that the sand keeps its moisture in the summer, but there should not be too much of the fine material and minimal clay. Rather too coarse than too fine. It must also be natural gravel, not crushed material that compacts and becomes very hard over time.

If the sand has a good composition, it will retain moisture in the summer while being well-drained during wet periods; not too dry and not too wet, just right at all times.

The reason the sand holds the moisture is that the capillary force is broken by the good drainage. If there is too much fine material in the bed, capillary action brings the moisture to the surface where the water evaporates. This is the same with soil that is not covered with

---International Rock Gardener---

plants or, for example, mulch. The moisture-retaining surface absorbs more moisture from deeper layers, which can dry out the bed deeply during the summer.

It is therefore good that the top 10 cm of the sand bed dries up quickly and thus reduces evaporation. A sand bed needs to be at least 20 cm deep to retain moisture during the summer. The top 10 cm dries up quickly while the bottom 10 cm retains moisture. Because the surface is dry, roots are attracted to the moist layer. When it rains, the water quickly drains down to the lower layer where the roots are.

Mycorrhiza

In sand there are very few available nutrients and minerals and the plants compensate for the poor conditions with larger root systems. This also makes them more resistant to drought. To meet their nutritional needs, many plants live in symbiosis with fungi where the mycorrhiza helps the plant to absorb water and nutrients. In return, the fungus receives organic compounds from the plant that it extracts through photosynthesis from the sun. It can take time to get the cooperation going and it can easily be broken if the plants are fertilised as they prefer to take the readily available nutrients and not give anything away. The fungi do not thrive in wet beds but want the even moisture found in the lower part of the sand bed.

This is an important aspect when building a sand bed. You cannot dig a pit and fill it with sand. Every time it rains heavily, the bed will flood, the fungi will disappear and there is a risk that much of the plant's sucker roots will rot away if it is wet for too long.

A sand bed should always be raised and always have a certain slope to avoid standing water. If you want a border around the bed, it should not be so dense that it risks becoming a dam.



Androsace sp.

---International Rock Gardener---

Choice of plants

The choice of plants for sand beds is the same as for a regular flower bed, but the number of varieties that work well is significantly increased. Many of the plants that are usually considered difficult to grow and sensitive to moisture in ordinary flower beds can be reliable perennials in sand beds. The microclimate improves and the well-drained sand lowers the plant zone by a few centimetres. If the bed is also placed in a warm and sheltered location, this can make a difference of several zones. Plants from steppe areas are particularly suitable for sand beds and it is quite easy to check online where different plants originate. The Caucasus, Central Asia and the north-west of the USA have a slightly drier climate than ours, so plants from there usually work well here* as long as they are well-drained. In these areas there are also many good species for really dry gardens and if you look at higher altitudes in the mountains you will find many excellent species for northern Sweden*. Many of the best varieties are only available in really well-organised specialist nurseries and cannot be found in the big chains. Growing them from seed tends to be the easiest and cheapest way, and you get lots of seedlings to set out.

(Ed.: *Peter writes about Sweden, but the same also applies in much of the UK)



Dracocephalum sp.

Design

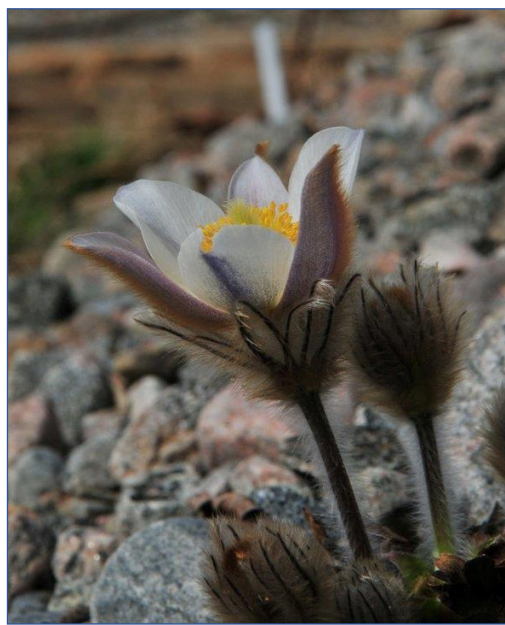
How you plant is a matter of taste. It can be large areas with a single plant, large groups or mixed plantings. I prefer to have many different varieties that alternate throughout the

---International Rock Gardener---

growing season. By not using ground cover but only plants that don't take up much space, you can easily fit 30 different varieties in one square metre. First a lot of bulbs in spring, followed by low perennials in spring. Every month there are more perennials, all a little higher than last month's, to hide the ones that have finished flowering. This continues until late autumn when the ornamental grasses begin to dominate and they decorate the entire winter until the bulbs have started again. A similar method can also be derived to suit "rock garden beds".



Grasses in sand.



*Pulsatilla
iintegrifolia*, far left
and *P. vernalis*,
left - in Peter
Korn's "old"
garden near
Gothenburg.

---International Rock Gardener---

*Pulsatilla
zimmermannii.*

Planting

When planting in sand beds, in my experience it is always best to use bare-root perennials. This means that they are planted



without the soil from the pot, which usually consists almost entirely of peat though the numbers of nurseries using peat-free compost are increasing. It doesn't matter how well the bed has been laid out if you still plant with the peat clump. The wet peat makes it easy for the plants to rot in winter and in summer the peat clump becomes very dry. It is easier for weeds to take hold when the surface is kept moist around the peat, and the mycorrhizae that cooperate with the roots are disadvantaged by the peat. When I have bought plants in pots, I always wash the peat away very carefully and at the same time take care to divide the plant into as many parts as possible. Sometimes there are only a few pieces but sometimes quite a few small plants.

This bed was planted in the spring 2021. Only 0-8 mm sand, bare rooted plants and no fertiliser or irrigation.



---International Rock Gardener---

Fertilisation

If it's a brand-new bed, I usually sprinkle some organic pelleted fertiliser such as Chrysan (an all-purpose fertilizer, organically based with urea and potassium salt) or similar fertiliser before planting to give the plants a faster start. It should not be an organic fertiliser that adds humus to the soil in the bed. I use about half of the recommended amount for leafy perennials and a maximum of one third for steppe plants. When I supplement existing beds, I usually don't fertilise at all because the symbiosis with the mycorrhiza has already started. When planting, it is important to get the roots as deep as possible so that they reach down to the moisture-retaining layer. Most plants can be planted a few centimetres deeper than they were in the pot because the surface layer of the sand bed dries up so quickly. If you dig up plants from a bed of topsoil, it's not as important to wash away all the soil, but I do it anyway to avoid getting a lot of weed seeds. When I plant, I do not firm the sand, just press a little with my fingers so that there are not too many air pockets around the roots. If the surface is too compacted, it is more difficult for the water to penetrate when watering through the bed.



Nemophila maculata

---International Rock Gardener---



Nemophila maculata, close up.

Watering

After planting, it is important to water the bed thoroughly so that it sinks and any air pockets around the roots are filled with sand. Usually one watering is enough, but if there is a very hot period after planting, a second watering can be useful. Watering is only necessary until the roots have really

found their way down to the moist layer. If it is a bed with a well thought out plant selection, the bed will never need to be watered again for the sake of the plants. In a dry summer, some plants may wilt to protect themselves from dehydration and



can look rather dull. If you want to water, do it on cool days; many drought-resistant

---International Rock Gardener---

perennials hate it when it's hot and wet. For me, it's important to have a core of perennials, ornamental grasses and shrubs that can withstand all the extremes and even benefit from no rain for a few months.



Maintenance

In order for these beds to remain as sand beds with all their benefits, it is important to keep them clean and remove all organic material during the spring and winter. If leaves and stems are left behind, they will quickly decompose into soil that will form a thin layer on the sand. Should this happen, the capillary force is no longer broken, and the bed dries out more in the summer. In addition, the surface retains moisture longer, making it easier for weeds to take hold.

Linum catharticum.

If you have not had time to do a thorough spring clean or if a layer of soil has formed after several years, it is usually quite easy to scrape off the top few centimetres and replace it with new sand.



---International Rock Gardener---

Sand beds are not maintenance free; they also need to be weeded as often as a regular flower bed but there are usually only a fraction of weed plants. It is also very easy to pull up the roots from the well-drained sand. Most weeds are quite easy to get rid of in a sand bed.



Bulbs planted in crushed concrete and some sand. It looks like they like it.

Alternative substrates

Since sand is a finite resource and it is becoming more difficult to get hold of sand, we at Klinta Trädgård have, in the last 5 years, started to test other substrates. Both in our own garden but especially in public plantings. In some places you can get recycled sand from e.g. playgrounds and then most of the finest fractions are usually washed away, which makes the sand excellent for sand plantings. Various crushed materials can also work, but there must not be too much of any fine fraction, as this will make the bed very compact. Recycled crushed concrete can be excellent for lime-loving plants. Crushed concrete can become very hard over time and almost impossible to weed. To avoid the crushed materials becoming too hard, I usually mix them with 10-20% sand. The round grains of sand settle between the angular particles and prevent them from getting stuck together. In completely artificial urban environments, I sometimes use 10-15% biochar to favour mycorrhizae and microorganisms. On roofs, lightweight materials such as recycled Leca (lightweight expanded clay aggregate) pumice or lava gravel work very well. Again, I mix the substrate with sand and biochar. Sand

---International Rock Gardener---

to give a better structure to the substrate and biochar to prevent the nutrients from leaching out too quickly as they are bound in the carbon.



South facing sandbeds with different particle sizes.

Biological diversity

One aspect that I didn't think much about at first was how much the sand beds favoured different kinds of insects. They come as a bonus and add another interesting dimension to creating a garden. Unfortunately, the alternative substrates don't seem to be as suitable for insects but it is possible to find new ways of working that do favour diversity. John Little in England has developed many inspiring solutions using recycled materials, using these in his own garden and [business](#).

The optimal sand for cultivation is not always the best for insects to dig nests in, so it is best to add islands with different particle fractions. Everything from the finest sand you can find to really rocky beds. The most important thing for most insects is that the insect beds are in warm, sunny locations and do not become overgrown with large perennials. If you combine the sand beds with horizontal and vertical logs, fauna depots, stone walls and functioning insect hotels, you have created an oasis for biodiversity. Many insects depend on specific native plants, so it is good to mix the exotic garden plants with northern European species.

---International Rock Gardener---

Planting for the future

Probably not many people in Sweden thought that 2018 was a top summer for cultivation, but for me it was finally a "real" summer with 5 months almost without precipitation and many nice days above 30 degrees. Such summers will probably not be so unusual in the future and new solutions that work in an increasingly extreme climate are needed. Sand beds are one option worth trying.

5 important points:

Use well-drained natural sand.

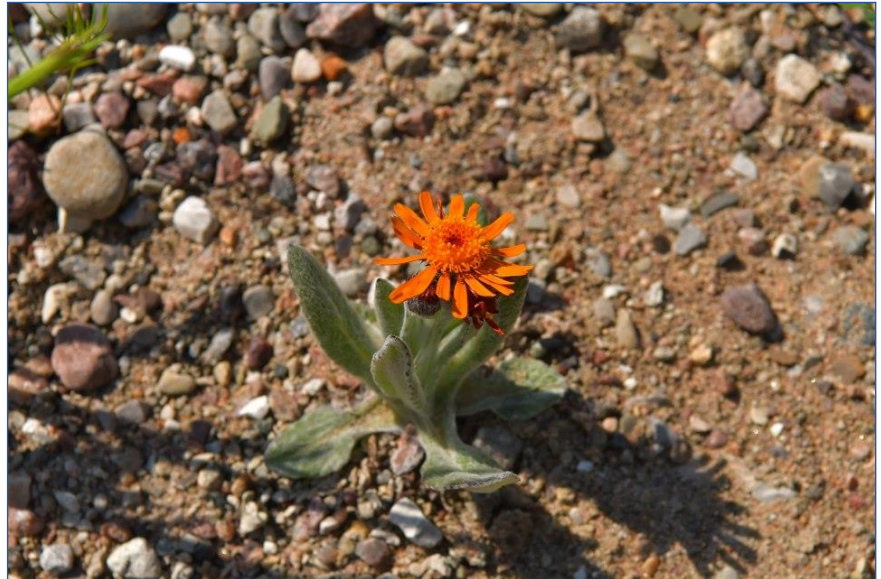
Always use raised sand beds.

Plant bare-root plants.

Water properly when planting.

Clean the sand bed thoroughly during spring and winter.

Tephroseris capitata.



Anthyllis montana Rubra.