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Our presentation this month demonstrates clearly the “international” flavour to which we aspire. We begin with the description of an Argentinian natural hybrid viola from the English/Chilean duo, John Watson and Anita Flores Watson – which they have named for a mutual Dutch friend, Kees Jan van Zwienen. Next up is an article from the Latvian bulb-master, Janis Ruksans and Dimitri Zubov from the Ukraine on naming a new bulb from Iran. Dr Zubov is travelling to see more plants, even as we publish this issue – this time camping in Armenia! Frankie Wulleman, editor of the VRV journal, (Flemish Rock Garden Society) is our next author - with a piece on another charming South American plant – this time one which is already present in some gardens – and Frankie believes it is worth more of us trying to grow it. That is also the refrain of our last writer this month – the ebullient Austrian horticultural hero, Fritz Kummert – who enthuses about the “Blue broom” of Spain and Portugal.

Cover photo: *Oxalis muscoides* F.& W. 12569 Photo John M. Watson.

Tropaeolum azureum P.& W. 6055

Tropaeolum azureum P.& W. 6055 is from a 1988 Watson collection and featured recently in one of Ian Young’s weekly Bulb Log Diaries. Read the whole diary HERE. John Watson mentioned the trip, with Stephen Pern, on which seed of this plant was collected in the IRG of February 2019. This *Tropaeolum* is one of the continuing delights for Ian and Margaret Young of their plants grown from seed over the years that still flourishes for them in Aberdeen.

Those damned promiscuous rosulates. A second new wild hybrid for *Viola* L. section *Andinium* W. Becker, also an Argentinian endemic.

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(**Note:** We saw the plants in the chronological order presented below, but have often illustrated them with our best photo of the same one taken on a different visit.)

Getting there

All is owed to our good friend the Dutch plant and general natural history 'fanatic' Kees Jan van Zwienen [Figs.75, 94]. He it was who found the new viola featured here, and then generously informed us of it and its precise locality – Vallecitos, central Argentina. He'd photographed it late in the season, well past anthesis bar one last peeping, shy flower, but photos of the rosettes looked intriguing and puzzling [Figs., 18, 19], and demanded investigation. As we were to find out, the best time to catch it in full flower is at the very beginning of December.

But to begin at the beginning – we first need to get there, and fortunately it's not too far from our home in central Chile just across the other side of the high Andes. In fact a journey of 213 km by vehicle to be precise [Fig.78], following the River Aconcagua valley up from Los Andes, our nearby town, to the border with Argentina, where a mountain road tunnel of just over 3 km shortens the climb considerably. Thereafter the route takes the steady downward course of the Las Cuevas and Mendoza rivers, passing through the small transit town of Uspallata until it reaches Potrerillos, our operational base [Fig.1].

Fig.1: The 213 km route from our home at Calle Larga, Los Andes, over the Andes to Potrerillos, the 'jump off' point for Vallecitos, site of the new viola (green circle with violet dot).

The first part of the journey, in Chile up to as far as the customs and agricultural border control centre, concludes dramatically with the 29 close-set hairpin bends of the Los Libertadores Pass, climbing from Juncal (2200 m) by the

Aconcagua river at the base to the ski centre of Portillo (3000 m) near the mouth of tunnel through to Argentina. It rears up 800 m over a distance of a mere two and a half kilometres. As it bears the bulk of the commercial traffic from Argentina and surrounding countries to Chile and back, the chances of getting stuck behind a queue of crawling lorries, whether up or down, are high. As an added obstacle over the period of our three visits to Vallecitos in 2012 and 2013, major roadworks were taking place [Fig. 2]. This involved one way traffic and a possible further delay of 20 minutes or more.

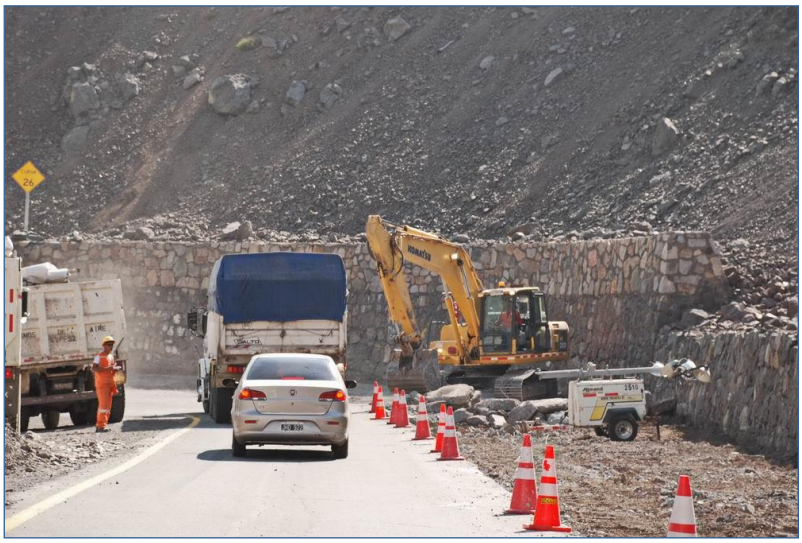

Fig.2: Roadworks on the Chilean side of the pass across the Andes frequently held us up for long periods throughout the time of our journeys to Vallecitos. (15 Jan 2013. JMW)

At least there could be the consolation of getting out to photograph Andean flora during prolonged stops. The choicest among these on the lower bends by the roadside is delightful dwarf *Alstroemeria parvula* [Figs.3, 4]. We were first shown it in 1995 by, of all people, a holidaying Swiss astronomer. He worked at one of the international observatories in northern Chile. Hard though it is to believe given its location, we were the first to learn of the existence there of this little beaut, which wasn't finally accurately identified until 2011. It turned out to be a 'long lost' species, not recorded until then since it was first published in 1864!

Fig.3: But the holdups could be a blessing in disguise when we got out and found flora such as this F.& W. 13135 *Alstroemeria parvula.* (20 Jan 2019. JMW)

Fig.4: Little F.& W. 12582 *Alstroemeria parvula* shows its potential as a candidate for alpine garden culture. (16 Jan 2013. JMW)

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Fig.5: The Puente del Inca (Inca Bridge), a spectacular piece of decorative civil engineering by Mother Nature just inside Argentina after crossing from Chile. (23 Dec 2012. Sarah Watson)

Although it seemed to take forever at times, one did eventually emerge with considerable relief from the trans-Andean tunnel and into Argentina, where things speeded up on the long, quite straight downhill run to Uspallata. The whole route through Argentina to Potrerillos is filled with dramatic geological scenery, including a close view of the Southern Hemisphere's highest mountain, Aconcagua. The most remarkably unique phenomenon, the Puente del Inca (Inca Bridge) [Fig.5], appears shortly after the tunnel. The force of the mountain river has cut a sizeable channel beneath a horizontal slab of harder rock, and an efflorescence of multi-hued streaked sulphur has since oozed out to paint the top of this natural bridge and the rocky river bank below. No less arresting are examples of colourfully contrasting layered strata on the almost bare, mountainous valley sides [Fig.6].

Fig.6: Looking good enough to eat. Chocolate sandwich rock strata on the way down in Argentina from the border with Chile to Uspallata. (20 Jan 2019. JMW)

Fig.7: Sunday afternoon by the Potrerillos reservoir. Most of the crowds of weekend trippers have left, but the moored vessels give testimony to their activities. (24 Jan 2019. JMW)

After a final high-sided, mountainous stretch along the course of the thickly muddy and turbulent River Mendoza, where the road passes via a number of short tunnels cut through projecting rock outcrops, the view opens up to reveal the 11 km long by 3 km wide Potrerillos reservoir at 1325m [Fig.7]. To create this the Mendoza River was dammed up between 1999 and 2003. It generates electricity, irrigates agriculture and supplies drinking water. In early 2018 the reservoir received lurid publicity when an Argentinian who murdered his Chilean wife to avoid financial loss was discovered to have weighted the body and thrown it into the water from the only bridge across. A major police-organized scuba diving operation eventually recovered the corpse, and the perpetrator is now deservedly rotting the remainder of his life away in gaol. Imagine your tap-water supply had originated from there when this became news, though ... ugh!

On a less ghoulish note, since the reservoir was established, Potrerillos (mean elevation 1450 m) at the opposite end to the dam, formerly a small rural community, has become a major holiday and weekend resort centre, as has the lake itself, with all manner of water sports. Such is its popularity with Mendoza residents that queues of vehicles kilometres long form for the Sunday afternoon return journey to the city. Even before that it was popular for hiking and trekking in the attractive countryside, as well as rafting on the Mendoza River. As a result a small supermarket now exists and tourist cabins have been built, which makes it the conveniently perfect base for us.

Fig.8: F.& W. 12564 *Lecanophora heterophylla* attracts by virtue of its perfect mallow flowers (when not nibbled by insects!). Just beyond Potrerillos. (12 Jan 2013. JMW)

The secret of the Silver Chain

The 11 km road from Potrerillos to Vallecitos (3000 m), the location of our viola, follows the valley of the Río Blanco. It reaches upwards to the west from where it empties into the reservoir at Potrerillos to near its source in the easterly outlying 77 km long Cordón del Plata Andean range (translation: Mountain Chain of Silver) [Fig.79] with its highest peak at 5968 m.

First to catch our attention by the roadside as we cleared the straggling upper outskirts of Potrerillos was perennial *Lecanophora heterophylla* [Fig.8], which possesses no fewer than eight synonyms, all bar one of them as the more familiar malvaceous genus *Cristaria*. From an aesthetic point of view the attention of so many botanists is justified. It has a dainty carriage with discreet, minimal, narrow, dissected foliage and relatively large, well-formed upright pink cups with a black centre. Its restrained height would make it a very welcome addition indeed to the middle section of the herbaceous border.

Fig.9: An attractive element of the lower Andean flora between Potrerillos and Vallecitos is F.& W. 12599 *Hoffmannseggia doellii* subsp. *argentina* of the Caesalpiniaceae. (2 Dec 2013. JMW)

Hoffmannseggia comprises 23 short to shortish herbs and subshrubs, all with reduced compound ferny foliage and large, flat-open bright yellow flowers with some red flecking and a bundle of stamens thrust out in front. Memorably, one bears the epithet *H. watsonii* too, though it's not named after John, we should add! They belong to the same group of the legumes as the sennas, and inhabit the Americas and Southern Africa. One of them springs as if by magic in summer from a bone-dry, bare roadside soil bank near our home, a never-failing delight if we look carefully as we drive past. The species here near the beginning of the climb to Vallecitos, *Hoffmannseggia doellii* subsp. *argentina* [Fig. 9], is only found in four northern and central Argentinian provinces, mostly in the Andes. By contrast, the bulky cactus *Trichocereus candidans* [Figs.10, 11] doesn't need any close-quarters seeking out whatever. It calls attention to itself from far and wide by the great white flaring, waterlily-like double flowers, among the largest we've seen anywhere ever in the wild while looking for plants.

Fig.10: Getting closer. On the way to Vallecitos - a stop for the spectacularly conspicuous roadside cactus, F.& W. 12597 *Trichocereus candidans*. (2 Dec 2013. JMW)

Fig.11: The great blossom of F.& W. 12597 *Trichocereus candidans*, without doubt the largest and showiest seen during visits to Vallecitos ... or indeed almost anywhere! (2 Dec 2013. JMW)

Getting a bit closer to the main climb up to our destination, we stopped to take photographs of a very attractive orange *Mutisia* species scrambling over wayside shrubs. It was clearly different from well-known *M. decurrens*, the only other species of that colour we were then familiar with. Well, we knew 'it' was different until we got home, examined our photos, and noticed that some plants of 'it' had narrow, entire foliage, while that of others, equally narrow, had deeply serrated margins. Guessed? That's right; we'd been tricked by dead ringers. 'It' was 'them', two different species masquerading as one! Once we realised that, we soon found other very minor differences between *M. subspinosa* [Fig.12] and *M. retrorsa* [Fig.13].

Fig.12: First and commonest of the two look-alike orange mutisias growing side-by-side on the way to Vallecitos, F.& W. 12551a *Mutisia subspinosa*. (12 Jan 2013. JMW)

Fig.13: The other orange 'spitting image', F.& W. *12551b Mutisia retrorsa*. Seeming to be the same species, they were given just one unqualified ref. number on the spot. (12 Jan 2013. JMW)

Half-a-dozen species of the smallish genus *Menodora* belonging in the Oleaceae are found in our part of South America, mainly in Argentina. We've already gone into a bit of detail about its only Chilean representative, *M. linoides*, in an earlier issue of this publication (Watson & Flores 2018a). We noted there how the winter jasmine-like yellow flowers of those known to us decorate compact shrublets and we promised an exciting one to come in a future issue. Well, here it is. *M. decemfida* [Figs.14, 15], as seen at the last level sector before the long, winding climb to Vallecitos, must surely be their *ne plus ultra*. Its free-flowering habit smothers the neat little bush in way that would make mountain plant lovers' hearts leap with joy while instantly visualising it somewhere in their garden.

Fig.14 - left: A bit further along the road at the foot of the Vallecitos climb, a surprising novelty lay in store for us, F.& W. 12598 *Menodora decemfida* (Oleaceae). (2 Dec 2013. JMW)

Fig.15 - right: Delightful, jasmine-like F.& W. 12598 *Menodora decemfida* reaches to 2700 m, one of two truly temperate alpine species in the genus. (2 Dec 2013. JMW)

Despite the delays of these various irresistible floral distractions, we eventually reach the end of our climb at Vallecitos, and can look back and down at the apparently endless twists and turns of the route stretching back almost as far as the eye can see [Fig.16]. It underlines in no uncertain way that we've just risen up from 1400 m to 3000 m in something around 15 kilometres. Now let's pause at the small cluster of buildings where we park the jeep and assess the walk ahead, because that's where we must look for our 'wanted' viola. We're not sorry to see it's a wide, level track on a gentle, even gradient with a (presently inactive) ski lift leading up along the base of the slope to the left and a matching shallow rocky rise to our right, which Kees Jan told us, the viola inhabits. Everywhere is liberally peppered with tufts of very short grass and dotted about with dwarf Andean herbs [Fig.17].

Fig.16: Vallecitos, its access from Potrerillos, the start of the ski lift, and an Andean plant excursion group climbing up through the viola's habitat. (16 Jan 2012. Kees Jan van Zwienen)

Fig.17: Of conveniently easy access. The new viola's type habitat at Vallecitos on the right-hand slope, the ski lift the other side. (23 Dec 2012. Sarah Watson)

Fig.18: One of Kees Jan van Zwienen's original Internet photos of the Vallecitos viola, showing the solitary and only flower he encountered. (16 Jan 2012. Kees Jan van Zwienen)

Fig.19: The 'other', out-of-flower rosettes in the Vallecitos population, assumed by Kees Jan and ourselves as likely to be *Viola atropurpurea*. (16 Jan 2012. Kees Jan van Zwienen)

We had those photos Kees Jan had taken of it without flowers as an indication of what the viola plants looked like at that stage, and how variable they were. One was green, wide and flat to the ground [Fig.18], reminding us of our own *Viola beckeriana* [Fig.86] (Watson & Flores 2013), while the other, cryptic, narrower and columnar [Fig.19], couldn't be differentiated at sight from well-known *V. atropurpurea* [Fig.88]. That two different species were growing together at Vallecitos seemed very feasible then. But if so, might there be hybrids, as happened further south in Patagonia between *V. cotyledon* and *V. pachysoma* to produce our *V.* ×*blaxlandiae* (Watson & Flores 2012), the first known cross of section *Andinium*? The viola at Vallecitos turned out to be as easy to find as falling off a log – given you knew exactly what to look for. Just a short walk up the slope and there they were, even right down beside the track, tucked about here and there very inconspicuously beside or even under rocks and between the grasses [Fig.20, 21]. However, we were late that first time, and so lucky to find the one or two still in bloom tucked away from the sun in the immediate lee of rocks, or even below their overhangs. This at least enabled us to photograph and press them. Nonetheless they were only green ones [Figs.22, 83, 87]. All the 'aff. atropurpureas' were well past flowering. This meant but one thing. We had to return, come what may. Although we could now see that similar though they were to *V. beckeriana*, critical differences such as bearded, not glabrous corollas separated the green plants beyond doubt as a distinct taxon, whether species or hybrid.

Fig. 20: As we ourselves first saw the new hybrid. Two plants of the viola (F.& W. 12548) ringed, the large green resembling one parent, the small darker one the other. (23 Dec 2012. JMW)

Although much remained to be answered, we returned more than satisfied. We'd at least added another newbie to our list for publication. We stopped the jeep just below Vallecitos to select the best specimens of two delightful dwarf Andeans we couldn't leave without adding as photographs. They were among several choice roadsiders we'd steeled ourselves to drive past on the way up, fearful of losing precious time through further delays. Included among them was a solitary plant of spectacular

but familiar *Caiophora coronata* [Fig.68], which we missed, but shall meet again later on in this tale. The two we did nail, *Oxalis muscoides* [Figs.23-25] and *Astragalus bellus* [Fig.26] were both unmistakable by genus, if among the most perfectly refined of the hundreds of species in each.

Fig.21: Three unusually close-together plants of F.& W. 12548, the Vallecitos viola, playing hide-and-seek. (23 Dec 2012. JMW)

22) One of the few flowering individuals of the Vallecitos F.& W. 12548 viola seen during our first visit. Note similarity to the green one photographed by Kees Jan. (23 Dec 2013. JMW)

Fig.23: F.& W. 12569 *Oxalis muscoides* in a roadside bank habitat just below Vallecitos. (2 Jan 2013. JMW)

Fig.24: Highly covetable for alpine gardeners - F.& W. 12569 *Oxalis muscoides* - posing proudly for its portrait just below Vallecitos. (2 Jan 2013. JMW)

Fig.25: A closer shot of *Oxalis muscoides* (F.& W. 12603) with its leaflets opened flat. (14 Jan 2013. JMW)

For that first visit we had the immeasurable pleasure of the company of daughters Sarah and Nicola, together with Nicola's partner Ben. They were over on one of their all too infrequent visits from England and jumped at the opportunity to see their dad displaying his plant hunting chops in the field. It was something they'd never experienced before, let alone when terminating in an encounter with a plant not previously known to science. Given their presence, the easy-going terrain and interesting plants so close at hand were particularly welcome. Sarah runs a small wild food foraging business, Nicola hand-crafts leather, particularly side-saddles (and has meanwhile become a mum), and Ben is a science teacher. Having as young girls also helped John at plant sale events during the period of his ill-fated and defunct Four Seasons Nursery, the world of mountain flora wasn't unfamiliar for them either. Nothing could have been more agreeable than barbecuing outside together at the tourist cabins of Potrerillos where we stayed overnight, or their excitement at sharing our discoveries and appreciating the imposing scenery underway. As a finale on our way out we picnicked in the pleasant rural surrounds of Potrerillos on local Mendoza wine and empanadas, the South American near-equivalent of Cornish pasties [Fig.27]. Sarah and Nicola will feature more prominently in a later account describing the discovery of another species when they were once again with us.

Fig.26: Just below Vallecitos. Up among the best dwarf species of its genus - F.& W. 12602 *Astragalus bellus*. Molto bellissimo indeed! (2 Dec 2013. JMW)

Fig.27: Daughters Sarah, Nicola & partner Ben, over from the U.K., came along to see 'the old boy at work'. A Potrerillos picnic of wine and empanadas (pasties). (23 Dec 2013. Sarah Watson)

Fig.28: Here we go (or don't go!) again! The obstacle race - the same endless stop-start Chilean roadworks on the Los Libertadores Pass to Argentina. (15 Jan 2013. JMW)

Fig.29: The steep, tortuous, road up from the Aconcagua River valley to the pass across into Argentina contains several snow and rock avalanche tunnels. (24 Jan 2019. JMW)

Fig.30: One of the avalanche tunnels on the last road climb of the Los Libertadores Pass in Chile up to the tunnel through the Andes at Portillo. (24 Jan 2019. JMW)

Fig.31: Unfavourable weather conditions at the very start of our second visit caused us to remain down in Potrerillos and postpone driving up to Vallecitos. (12 Jan 2013. JMW)

Here we go again ... just

After 'the kids' had left, the two of us returned on our own after just under a month to investigate another 'mystery' plant, and perhaps look a little further afield for other locations of the violas, if any. Climatic conditions were far from auspicious over on the Argentinian side. Even before we got that far though we had to negotiate those eternal Chilean roadworks on the Libertadores Pass with its

claustrophobic avalanche tunnels [Figs. 28-30]. Our arrival at Potrerillos was met by ominous looking weather over the mountains [Fig.31]. This worsened for the rest of the day and overnight, such that we were obliged to hang around the reservoir meantime, making the most of appreciating its considerable wildlife [Fig.32].

Fig.32: Wildlife compensation. A Coscoroba swan on the reservoir at Potrerillos, where we were obliged to remain for a bit after our arrival, due to bad weather. (6 Jan 2019. JMW)

The following day, if not quite so bad, looked to be scarcely better up above, but rather than waste another day we decided to chance our luck. Although there was no rain and we noticed a few violas in flower, conditions were far from ideal, not least as our major interest was photography. It remained threatening, so we didn't venture far or stay long, but at least ticked off meanwhile a few more of the Andean 'goodies' on offer at Vallecitos. *Leucheria* is a medium-sized Andino-Patagonian composite genus confined almost entirely to temperate South America and the Falklands. It varies in form and height from rather lanky herbs to compact and silvery cushions embellished by sizeable short-stemmed or occasionally stemless heads in clear colours. *L. salina* [Fig.33] is somewhat intermediate between these extremes, but couldn't be shown to better advantage than growing out of a vertical rock face crevice, as here. There's never any hesitation in adding to its extensive photo file yet another portrait of common *Azorella monantha* [Fig.34], a doyen among hard cushion-forming plants. But the figurative big fish of the day for us, if literally a dwarf plant, was undoubtedly *Calceolaria brunellifolia* [Figs.35, 36], an endearing species we'd never encountered previously.

Fig.33: We ventured up to cloudy Vallecitos, but only stayed a short while, managing to find and photograph F.& W. 12566 *Leucheria salina* in the gloom. (12 Jan 2013. JMW)

Fig.34: Another of the few we stopped to photograph in poor light during that short visit - F.& W. 12565 *Azorella monantha*, a common Andean. (12 Jan 2013. JMW)

Morning of the following day looked encouragingly kinder, with blue skies and little cottonwool clouds over the Andean peaks [Fig.37]. Our hopes were raised, but it proved to be a false dawn. Intending to try the next access into the Andes shortly to the south in case our viola might be there too, we discovered the road had been blocked, and we and others were turned back by local officials [Fig.38].

Fig.35: At least we scored a welcome personal 'first' in the discouraging conditions, F.& W. 12567 *Calceolaria brunellifolia*, a species we believe the Archibalds collected. (12 Jan 2013. JMW)

Fig.36: F.& W. 12567 *Calceolaria brunellifolia*. We can find no record of this attractive little podgy-flowered species in cultivation, an absence begging rectification. (12 Jan 2013. JMW)

Fig.37: A brighter dawn at last. Looking west towards the Andes of Mendoza with our locality in the gap to the right between the 'cotton wool' clouds. (13 Jan 2013. JMW)

Fig.38: The storms caused slides and floods which blocked many roads. It was an indication of what lay ahead in two days' time. (13 Jan 2013. JMW)

Fig.39: But the weather hadn't finished with us yet. More of the same was in store. (13 Jan 2013. JMW)

Fig.40: Fortunately the cloudbursts passed quickly, the sun broke through, and as it calmed down and the threat of more receded we were able to return to Vallecitos. (13 Jan 2013. JMW)

Who's afraid of a little shower?

Nor had the low pressure front done with messing our plans up yet. More squalls followed next day [Fig.39], but fortunately the sun broke through this time [Fig.40]. Nevertheless, it remained very unsettled, but out of sheer frustration and desperation not to waste more time still of the little remaining to us, we gave Vallecitos yet another go. Luckily the road leading up to it is in more stable surroundings, so hadn't been blocked like the other.

Fig.41: Anita strutting her stuff around the viola habitat at Vallecitos on our return once the downpours ended. (14 Jan 2013. JMW)

As light was not fully to our finicky satisfaction for photographing the violas, tucked away as many were in shadowy nooks, we hoped it might improve, so decided meanwhile to explore further along the picturesque adjacent San Andrecitos (Little St Andrew) stream valley. This involved short-cutting over the 'viola ridge' from Vallecitos [Fig.41] to save a long walk down and round to the San Andrecitos entrance, which we'd already covered for some distance when with daughters.

The valley certainly justified our effort, being full of natural interest, floral and other. Of the former,the familiar evening primrose, *Oenothera odorata* [Fig.42] provided our first portrait of it in the wild. We caught frequent glimpses of the little Andean hillstar hummingbird, *Oreotrochilus estella*, with its glistening metallic-green, blue-black-bordered 'bib', but it proved too uncooperatively restless to allow a decent photo.

Fig.42: F.& W. 12577 *Oenothera odorata* in the wild near its elevational limit here at Vallecitos. (14 Jan 2013. JMW)

Fig.43: Emerging from shelter to bask on *Nassauvia axillaris* in the post-storm sunshine - the Andean butterfly Wagenknecht's white, *Hypsochila wagenknechti*. (14 Jan 2013. JMW)

Fig.44: There are some 15 species of the all-South American genus Cinclodes (say 'sink loads' if you will), waterside birds like the N Hemisphere dipper. Here *Cinclodes oustaleti.* (14 Jan 2013. JMW)

Even the best we took are a sad disappointment. Better luck with other animates was on hand though. Although we were in a temporary sunny break, the heavily-veined Andean white butterfly *Hypsochila wagenknechtii* [Fig.43] was still probably a bit dopey from its long, inactive shelter from the weather, as it remained at rest with wings folded up and unmoved, no matter how close the camera lens. All the way along the valley in the luxuriant vegetation by the streamside, we noticed one or two busy brownish grey birds, *Cinclodes oustaleti* [Fig.44], about the size of a sparrow and renowned for fearlessness of human presence. Apart from one black species all *Cinclodes* are characterised by the conspicuous white 'eyebrow' stripe across the face, but are mostly not so easy to identify below that level. They're invariably birds of the shoreline or wetlands, where their arthropod prey is plentiful, and are most frequently seen directly by the Pacicif or up in the Andes, as here.

But to continue with what we were there for, Andean plants. *Ranunculus peduncularis* [Fig.45] surprised us, as it's usually a quite tall, vigorous mountain plant, growing up to half a metre or so, but here it was around its lowest noted stature of some 10 cm (Hoffmann *et al*. 1998), or even less. Since the rich, saturated ground conditions couldn't have been more favourable, either it's a natural dwarf form, or heavy pre-floration grazing may have reduced its potential. As such, with its gleaming marsh marigold-sized, multi-petalled cups, it had everything to appeal to the world of alpine gardening. Dwarf and neat as it is, *Erigeron leptopetalus* [Fig.46] by contrast would sell itself as a nursery plant to no more than a few dedicated specialists, so is best appreciated in its natural setting.

Fig.45: F.& W. 12606, an uncharacteristically short *Ranunculus peduncularis* in soggy turf at the Quebrada San Andrecitos. It's perhaps been affected by heavy grazing. (2 Jan 2013. JMW)

Fig.46: Dwarf F.& W. 12549 *Erigeron leptopetalus*, one of the Andeans seen during our progress along the San Andrecitos stream valley adjacent to Vallecitos. (14 Jan 2013. JMW)

Fig.47: The widespread South American *Saxifraga magellanica* (F.&W.12607) at home rooting down into damp crevices on the rocks at Quebrada San Andrecitos near Vallecitos. (2 Jan 2013. JMW)

The valleysides closed in briefly to form a cliff-sided defile where the rich green stream surrounds were replaced by a floor of largely bare fallen scree rubble. But ledges of the rockwork proved to be the perfect habitat for *Saxifraga magellanica* [Fig.47]. This may be the only representative of the 'mossies' in South America, but it certainly makes its presence felt there, ranging along the Andes periodically from Ecuador to Tierra del Fuego (SIB 2019). At the top of the large integrated boulder of the cliff on the northern side, what was undoubtedly the bust of a man wearing a hat stood out in profile [Figs.48, 49]. Might it be 'Little St Andrew' watching over the valley that bears his name? Needless to add, above all in this context, that apostle is appropriately the patron saint of Bonnie Scotland as well as several other countries.

Fig.48 - right: Richard Dawkins notes that laws of nature would be defied if objects didn't occasionally resemble familiar things, religious or other. Anita passes a rock 'statue'. (14 Jan 2013. JMW)

Fig.49 – far right: The imperious rock figure guarding the San Andrecito valley adjacent to Vallecitos. Perhaps it's San Andrés (Saint Andrew) or…? (14 Jan 2013. JMW)

Fig.50: John was struck by the rock's fanciful likeness to World War 2 figure Benito Mussolini, a familiar figure when John was a young boy.

In the scree directly below this monument grew something of a completely converse nature – of delicate geometric beauty and immediate appeal to anyone drawn to the world of mountain flora. *Caiophora pulchella* (= pretty, so aptly named) [Fig.51, 52] could easily be, and sometimes is, mistaken for a *Loasa*, its compatriot genus in the homonymous Loasaceae family. No shame there. It took us a while to get it right when back at home, since we'd never run into it before. The reason for the confusion is the shape and small size of the flower. Loasas have open five-pointed yellow or white (as here) stars, where the green tips of a smaller calyx star show between the petals. Caiophoras, by contrast, are, other than this one, bulky plants known for their large, entire, incurved bowl-shaped flowers, which we nickname 'stinging lampshades' [Fig.68]. Some species to the north are in fact more open, but with the petals still united at the base. None of the others thread about over the ground as does *C. pulchella* either. As a further distinction it possesses very few potentially urticaceous hairs, as can be seen ('potentially' because we didn't test them!).

Fig.51: Dainty and delightful F.& W. 12571 *Caiophora pulchella* of the Loasaceae threading its way about among scree at the base of the 'Mussolini Rock'. (14 Jan 2013. JMW)

Fig.52: F.& W. 12546 *Caiophora pulchella* would be a welcome addition to rock gardening, not least as, unlike the majority of its family, it perhaps doesn't sting. (23 Dec 2012. Sarah Watson)

The stony floor continued for a bit further once past the short rock gateway until we reached a picturesque feature where the stream ran down slanting rocks, spread, and spilled over ledges as several short waterfalls [Figs.53, 54]. It could have been fitted into any fair-sized natural garden as a prime attraction. A dryish east-facing, lichen-patterned rock face to one side of this attraction held the penultimate interest of this Vallecitos visit. A solitary, venerable specimen of *Calceolaria pinifolia* [Fig.55] appeared as a remarkable long, thick, twisted woody trunk hanging down from the most minimal of cracks. The dense tufts of green, pine-like foliage that gave it its name and erect stems bearing typical flowers for the genus formed an almost globular body at the end, like a balloon on a string. John was gobsmacked by its unexpected appearance (for him) in this part of the world, and even more so by the habitat. Although it's recorded

from the northern desert Andes of Chile and Argentina down to here, its southern limit (Hoffmann *et al*. 1998), John had only seen it once before, in 1971 during his first visit with Martyn Cheese and Ken Beckett. That was at its other, northern extreme, which could hardly have been more different: fully exposed to the strong ultraviolet sunlight at nearly 4000m in the arid high semi-desert Andes of Atacama.

Fig.53 - left: Anita crossing at the head of the scenic San Andrecito waterfall just short of our point of return back to Vallecitos. (14 Jan 2013. JMW)

Fig.54 - right: What price Chelsea Flower Show rock gardens! The Quebrada San Andrecitos waterfall seen here cascading from top to bottom. (14 Jan 2013. JMW)

Fig.55: F.& W. 12572 *Calceolaria pinifolia* lodged in a rock face near the waterfall. Fascinatingly, only seen by John once before – in 1971, in the high Atacama Andes. (14 Jan 2013. JMW)

Best of all though, Anita discovered a second site for the viola on the green slopes a bit further and higher, above the upper stream course [Fig.56], which really brightened up the gloomy day, our last before we had to return for unavoidable reasons. The colony here consisted of the cryptic-coloured columnar form only [Figs.19, 57, 80, 89]. It's situated no more than 500 m in a straight line to the northeast of what will be the type population at Vallecitos: but importantly, they are partitioned by a sharp ridge 50 m high, and with no further violas in between.

Fig.56: Just above the waterfall, our limit up the valley. But climbing one side Anita (distant, centre) located a valuable second colony of the viola, if out of flower. (14 Jan 2013. JMW)

Fig.57: It needed one more brief visit the following season to find and photograph the new viola's cryptic form in flower at last (F.& W. 12600). (2 Dec 2013. JMW)

Fig.58: A male *Rhinella arenarum*, the Argentinian common toad, at the edge of the Potrerillos reservoir. (15 Jan 2013. JMW)

Fig.59- above right: Anita holding a female *Rhinella* friend during our final visit to Potrerillos and its reservoir. (15 Jan 2013. JMW)

Fig.60: Froggy would a-wooing go. (15 Jan 2013. JMW)

Getting back

It goes without saying that the day of our return was bright and sunny from dawn to dusk, with no more than an occasional puff of cloud over the mountains: Sod's law in action. To make the best of it we breakfasted al fresco beside the shallow end of the reservoir just below Potrerillos. We weren't sorry to have taken our cameras along. As we sat there quietly an accompanying chorus from the waterside vegetation announced the presence of loads of toads a-courting. Their overwhelming reproductive urge made them completely oblivious to anything else, and we had no trouble getting some decent shots. The first to fall to the camera was the all-brown or dull-greenish male of this typically warty species, *Rhinella arenarum* [Fig.58], a common species throughout most of Argentina, although it doesn't occur over in Chile with us. The female is larger, paler, and patterned with grey on the back. One didn't seem to object in the slightest to the indignity of Anita picking her up without difficulty from the shallow, clear water [Fig.59]. Finally, John even caught a pair *in flagrante* [Fig.60]!

Amphibians in South America always remind John of the hilarious moment when one of our Chilean colleagues told him in English that he'd just finished an illustrated book of newts for publication. Now this seemed an excellent new contribution to the natural history of the country, but extremely puzzling – as there are no wild newts in the Southern Hemisphere! John assumed therefore that he must have access to a public aquarium in Santiago, and asked whether he'd photographed them in that kind of environment. Our friend found that strange indeed, laughed, said of course not, it was all done in a studio as is usual, and showed us the proof of his book. It was full of artistically posing naked young women – nudes, of course!

Sad to relate, when we passed the reservoir a year or so later it was almost completely dry - a desert of crazy-cracked mud with no more than a turgid pool or two remaining in the deeper hollows. Obviously all the thriving wildlife except any that could escape on wing had been wiped out. It seems the incoming Mendoza River had silted it up badly, as anyone with a bit of foresight might have foreseen: an ecological disaster waiting to happen. The empty depression has now been cleaned and filled again, but although it looks an ethereal blue from a distance [Fig.7], no evident wildlife had returned to the margins when we passed by recently and looked around. Sad.

As we got close to the bridge across the Mendoza River below Uspallata we encountered an ominous portent of things to come. An earth mover was putting the finishing touches to clearing a slide down the mountainside caused by the downpours, which had temporarily blocked the road [Fig.61]. We thanked our lucky stars and the industrious workmen that we hadn't been held up. With some relief, and hoping that worse didn't lie ahead, we stopped for lunch beside a small natural pond [Fig.62] below and to one side of the bridge and not far from the river. Looking around as we ate, it was soon apparent it held yet more biodiversity than had the margins of the vast reservoir of Potrerillos earlier.

Dragonflies? It seemed nothing ought to be much easier to identify than these most conspicuous of insects. That was until we tried! To our surprise we discovered they're legion throughout the world. It's not too difficult to figuratively pin one down to its family (Libellulidae here) but the further you go than that the more complicated it becomes. For the most part you may need to literally pin your (dead) specimen down and examine the intricate veining on the wings. Thanks, but no thanks. There seems little doubt though that the darter patrolling the pond was an *Erythrodiplax* sp. [Fig.63], a neotropical genus known collectively as dragonlets, and that it was most likely a male. The lesson is clear – 'pastelero a tus pasteles' (stick to your cake-making, pastry cook), as they say here in Chile. And since our particular brand of cake-making is botany, *Blackstonia perfoliata* [Fig.64] of the Gentianaceae, growing in waterside vegetation, was perfectly familiar to John as a wildflower from downland forays during his salad days at the RHS Gardens, Wisley. Nevertheless, its presence here was almost beyond belief, considering its natural range covers the Mediterranean Basin and parts of

Europe. Being a refined species of specialised habitats and not even a recognised garden plant might well qualify it as a prime candidate among plants for the title of 'most unlikely trans-continental escape and establishment in the wild'. Its presence in Argentina is most likely explained though by the fact that it is said to possess herbal medicinal qualities.

Fig.61: As we moved up the valley from Uspallata to the pass we found that the recent bad weather had caused slides across the road. But luckily we got through. (15 Jan 2013. JMW)

Fig.62 - below left: We stopped for a meal break at this natural pond near the bridge crossing the Mendoza River below Uspallata and were rewarded by its surprising biodiversity. (15 Jan 2013. JMW)

Fig.63: A species of *Orthetrum*, a neotropical darter dragonfly genus, at home by the little Uspallata pond. (15 Jan 2013. JMW)

Fig.64 - right: *Blackstonia perfoliata.* This pretty Gentianaceae species was growing in the periphery of the pond. It's a surprising adventive in South America. (15 Jan 2013. JMW)

As we'd feared it might, the road situation deteriorated yet further on the long climb up to the pass after Uspallata, where steep declines of loose rock rubble, gravel and soil run down to right beside the road. At the largest and most destructive avalanche, the road workers' machinery had managed

to carve a way through the massive blockage, but they were finishing off a temporary clearway diversion which still only allowed one-way traffic ... but at least that [Fig.65]! Various torrents in the sector [Fig.66] indicated the erosive capacity of water on this unstable geology, and such was the force of the loosened, descending boulders here that they had smashed through the road, flinging it down to one side like an open door [Fig.67].

Fig.65: There were several large and small rock and mud avalanches beyond Uspallata as well, though when we got there the blockages had been cleared or diversions created. (15 Jan 2013. JMW)

Fig.66: A torrent running down from the Andes near the border with Chile, showing by its colour the effect of erosion. These increase with destructive force during storms. (24 Jan 2019)

Fig.67: There could hardly be a greater demonstration of the ferocious power of the storms than this: the road broken and swept to one side by a rock avalanche. (15 Jan 2013. JMW)

Fig.68: The decorative 'stinging lampshade' flowers of F.& W. 13138 *Caiophora coronata* by the road just short of the high Andean crossing through to Chile. (24 Jan 2019. JMW)

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Once seen (1972 for John) never forgotten finds its full expression in the remarkable white Andean 'stinging lampshade', *Caiophora coronata* [Fig.68], since encountered on several occasions, even while being pollinated by a hillstar hummingbird above Santiago. Its presence by the roadside indicated we'd almost reached the pass to Chile, but we didn't dare to stop that time in case more blockage problems lay ahead. Our cameras did it full justice there on a later occasion instead.

Fig.69: The entrance on the Argentinian side of the tunnel through the Andes to Chile. Constructed for the trans Andean railway, it was converted later for road transport. (24 Jan 2019. JMW)

Fig.70 - below: *Alstroemeria spathulata* (here F.& W. 13139), plentiful beside the Los Libertadores Pass, was surprisingly absent from our digital collection until recently. (24 Jan 2019. JMW)

With no small relief we eventually reached the entrance of the tunnel through the Andes to Chile [Fig.69] without further delays. We knew the weather on the Chilean side had been fine, which allowed us to become much more relaxed. Even so, the prospect of the dreaded roadworks ahead on the Los Libertadores Pass and their endless waiting queues loomed. We therefore steeled ourselves to keep the cameras under wraps and ignore the tempting clumps of pink *Alstroemeria spathulata* [Fig.70] on the long, slanting screes and roadside banks beside the higher bends. As the work has been finished since, we've been able to make up that loss handsomely on a recent journey though.

Fig.71: The usual Los Libertadores Pass roadworks on our way back down. This time we had the luck to pass through all bar one of the one-way sections without being stopped. (15 Jan 2013. JMW)

Sure enough, we arrived at the expected disruptions [Fig.71]. But this time fortune favoured us, and except for the last blockage but one, we seemed to keep on arriving at the very tail end of the queue passing through on our side just as the controller was about to turn his green 'go' signal to the red 'stop'! Even that one more prolonged hold-up near the bottom of the pass was no real hardship as it allowed us to get out and photograph one of the finest individuals of common *Schizanthus hookeri* [Fig.72] we've ever seen. It was posing there in proud isolation, just waiting to have its portrait taken. The species is one of only three perennials in the genus, all Andeans, all attractive, although even they aren't long-lived.

Fig.72: Often though we've photographed the species, the only enforced stop afforded a welcome opportunity to portray this outstanding F.& W. 12581 *Schizanthus hookeri*. (15 Jan 2013. JMW)

The very last one-way system marked the beginning of our final more gentle downhill 40-odd kilometre run home, and we again sailed through that one smoothly, looking with pity at the long stationary queue in the other direction which was waiting to face the climb and delays which thankfully now lay behind us [Fig.73]. Nevertheless, it was with considerable ease of mind that we reached the eastern outskirts of Los Andes above the Aconcagua River [Fig.74], with no more than an easy 'bike ride' left to home and a nice, long rest.

Fig.73 - left: Feeling superior and smug. (15 Jan 2013. JMW)

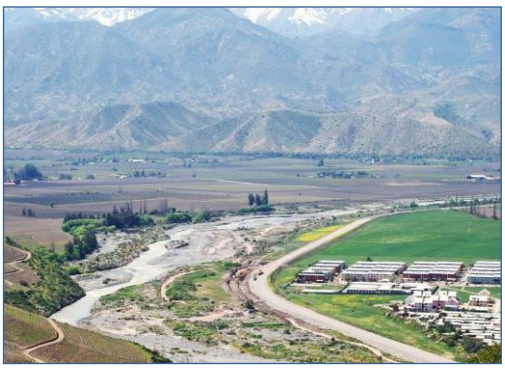

Fig.74 - right: On the home stretch in Chile. (24 Sep 2008. JMW)

Fig.75: Discoverer of the new viola, Kees Jan van Zwienen, beside *Echinocactus polycephalus* in the Alabama Hills, California. (13 Aug 2018. Photo by his wife, Annerie Verploeg van Zwienen)

Tying up a loose end

Although we'd managed that season to obtain herbarium specimens and photos of the one with green rosettes, we failed to find any of the other variable manifestations of the violas in flower. Until we did, the resolution of their identity or identities remained technically unresolved. We therefore made one final hasty return visit to Vallecitos on the 2nd of December the following year in stable, bright weather while on our way further south to another project. Consequently we succeeded in both filling that gap handsomely and proving that all the violas there did in fact belong to a very variable hybrid swarm [Figs. 57, 80-84, 87, 89].

Viola* and its section *Andinium

Viola is cosmopolitan and of mainly temperate and high tropical mountain distribution. With an estimated 610-655 known and accepted species it is the largest genus of its family, Violaceae, and is comprised of 16 sections, most endemic to the Northern Hemisphere (Wahlert *et al*. 2014, Watson & Flores 2018b). *Viola* has been found by investigators to have evolved ca. 35 Ma years ago in what is now the southern end of temperate South America (Clausen 1929, Ballard *et al*. 1999, Marcussen *et al*. 2012, Marcussen *et al*. 2015). This early branching from the rest of the genus has led to the conclusion that it contains species of the most direct ancestral origins in three of its sections, two of which are endemic to the subcontinent and the third is mainly distributed there.

The largest of those 16 sections when its unpublished but accepted species are taken into account, is the section (sect.) *Andinium* (Watson & Flores 2018b), one of the two endemic to South America. Its 102 published taxa as listed in IPNI (2019), together with another (Watson *et al*. 2019), the present nothospecies and a further 36 of the section waiting to be described or collected, are known coloquially as the Andean rosulate violas, and are distributed between the equator and southern Patagonia. Their full complement, almost 140 species as currently recognised by ourselves, includes those 36 known either as specimens – or in a few instances as reliable photographs – but which are as yet unpublished (Watson & Flores ined.).

Apart from inclusion in two regional floras sect. *Andinium* was ignored botanically for decades following the death in 1928 of its historical authority, Wilhelm Becker of Berlin-Dahlem, with specialised study of this formal infrageneric grouping as a whole not being resumed until the mid-1990s. When these factors are taken in conjunction with the inaccessible habitats of many of its taxa, the majority as solitary or very few known populations, the fact that it is still poorly understood compared with the other sections is hardly surprising. Furthermore, as many as 40 species are currently unknown in the wild, which serves to compound the problems, as also do the destruction of Becker's large and important collection at Berlin-Dahlem during WW2 (Hiepko 1987, Haagemann & Zepernick 1993) and the difficulty of distinguishing between some taxa. Nevertheless, Marcussen *et al*. (2015) have been able to calculate that the section split from the rest of *Viola* as early as 29 Ma. This revelation, together with the section's specialised adaptation to developing Andean uplift and more recent mediterranean geoclimatic conditions, explains why so many of its taxa are so uniquely unlike the rest of *Viola* (Watson & Flores 2012a, 2013a, 2013b).

The novelty presented and described below belongs in sect. *Andinium*, and like the only other generally known nothospecies there (Watson & Flores 2012b) is considered to be a hybrid between two taxa of the infrasectional sempervivoid alliance.

Taxonomy

Viola* ×*zwienenii J.M. Watson & A.R. Flores, nothosp. nov. [Figs.18-22, 57, 80-84, 87, 89]
= *Viola atropurpurea* Leyb. × *V. beckeriana* J.M. Watson & A.R. Flores.

Type: ARGENTINA. Mendoza Province, Cuyo de Luján Department, Vallecitos, 32º58'26"S 69º21'32"W, 3000 m, 23 Dec 2012, leg. A.R. Flores & J.M. Watson, F.& W. 12548! (holotype CONC; isotype herb. Flores & Watson).

Diagnosis: Forms of the new natural hybrid bear resemblance to the two confidently postulated parents, *Viola atropurpurea* Leyb. and *Viola beckeriana* J.M. Watson & A.R. Flores, but all individuals differ from both to a greater or lesser degree by more than one critical morphological character. Corollas of *V. atropurpurea* are notably small and strongly coloured as opposed to the consistently large, white flowers of *V.* ×*zwienenii*. *V. beckeriana* possesses glabrous corollas, whereas those of *V.* ×*zwienenii* are invariably bearded. Other properties exclusive to one or other of the parents occur at random among the hybrid swarm to create a polymorphic range of unique combinations. These include columnar, tightly imbricate, cryptic rosettes; flowers around the outer rosette circumference (*V. atropurpurea*): and plane, green, somewhat lax rosettes; flowers within the rosette circumference (*V. beckeriana*).

Description: *Life form* perennial, acaulous, rosulate, glabrous, evergreen hemicryptophyte. *Rootstock* axial, ca. 5-15 cm or more long x ca. 2-6 mm dia. at junction with caudex, subligneous, at times shortly branched below, with multiple filiform feeder roots. *Caudex* to ca. 1-3 cm (exceptionally 7 cm), at times absent, simple or branched, with leaf scars or enveloped by vestiges of dead vegetation. *Plant* clumps or mounds of up to 6 rosettes, rarely as many as 12, rosette occasionally solitary. *Mature rosette* ca. 2-4.5 cm dia. × 1-5 cm high, loosely to densely imbricate, more or less plane to columnar, depressed towards centre of face, slightly glaucous, dull green, or warm grey, when at times dull maroon tinged on rosette face towards apex of leaves. *Leaves* spathulate, ca. 12-18 mm when mature, arranged in more or less evident spirals, estipulate; *pseudopetioles* ca. 5-15 x 1-1.5 mm, plane, more or less thick and fleshy; *lamina* ca. 6-6.5 x 6-7.2 mm, entire, broadly ovate, obovate, rhomboid, transverally oval to suborbicular, usually as wide or wider than long, cuneate to pseudopetiole, leathery-succulent, apex apiculate or not; margin to ca 1 mm wide, more or less evident, extending along complete border and at times also pseudopetiole in apiculate leaves, from along complete lamina border or at apex only in rounded, non-apiculate foliage, thin-cartilaginous, pale-translucent, sometimes pinkish tinged and with dull-red marginal line around interior in apiculate-leaved forms; minutely capitate-ciliate to upper margin in rounded, non-apiculate foliage, and from base to midway or less in apiculate leaves, at times extending intermittently partially down pseudopetiole; cilia ca. 0.5 mm, proceeding from leaf border within upper edge of, and resting on, margin. *Anthesis* continuous. *Flowers* ca. 12-14 mm high × 9-17 mm wide, axial, solitary, forming ring within or around upper circumference of rosette. *Peduncles* ca. 8-10 mm somewhat shorter than leaves; *bracteoles* 3-4 mm, inserted 1 mm from base of peduncle, amplexicaul, linear-lanceolate, channelled, suberect and proximate to peduncle, subhyaline, apex rounded. *Calyx* 4-4.8 x 10-12 mm, somewhat tumid at base, glabrous, lustrous, green when foliage green, otherwise pale to deep dull red; *sepals* entire, acute; margin narrow, hyaline; *superior sepal* 3 x 1.6 mm, triangular; lateral sepals 4 x 1.8 mm, lanceolate; inferior sepals 4.5 x 1.8 mm, lanceolate. *Corolla* white, at times very faintly tinged pale violet on apex of petals, always faintly to very strongly veined blackish violet on inferior petal, usually with brief vein or dash of same colour on lateral petals, rarely lateral petals also veined at lower margin and with faint line or dash on superior petals; inferior petal with pronounced yellow throat marking extending forwards; reverse of all petals white, lightly part-veined or partially streaked deep violet; *superior petals* 5-6 x 2-2.5 mm, broadly linear-oblanceolate, apex rounded; *lateral petals* 7-7.5 x 3-3.5 mm, obovate, sparsely to densely white-bearded, usually with more or less clavate, rarely with filiform indumentum; *inferior petal* 8-10 x 6-6.5 mm, broadly obcordate, apical sinus and rounded lobes more or less pronounced, with two parallel ca. 3 mm longitudinal lines of dense, short,

white, fine (pollen trap) hairs at junction of inferior petal and spur; *spur* ca. 1.2-1.5 mm long × 1.2-1.5 mm dia., stoutly cylindrical, slightly flattened horizontally, apex rounded. *Androecium* and *gynoecium* exserted, readily visible; *anthers* ca. 1.5-2 mm, minutely cilate along margins, apex with single short, fine, porrect hair; lower pair with 1.2-1.4 mm narrowly cylindrical, somewhat downcurved nectar spurs; connectives 1-1.5 mm, brownish orange. *Ovary* 2 mm; *style* 1.8-2 mm, strongly geniculate, clavate; *stigma* a small, porrect tapering central beak between style crest arms; *style crest* one single, stout, strongly recurved, long, lateral, somewhat paddle-shaped lobe-arm either side of style head, sometimes outcurved at extremities, the whole anchor-shaped. *Fruit* 5 x 3 mm, orbicular, tri-valved capsule; *seeds* not seen.
Note 1: floral and other details which could only be examined by means of high magnification are based on the limited number of such samples it was possible to examine. Although they indicate a range of variation as noted, this taxon is a hybrid, so it is possible further variations may exist throughout the populations as a whole.
Note 2: pollen-trap hairs are not known for either *V. atropurpurea* or *V. beckeriana*.

Field note: The population is dispersed across a stable, moderate to gentle south-facing slope (away from direct sun) with a base of stony soil and a dense superficial random scattering of small to medium-sized rocks. The vegetation consists of a fairly open cover of dwarf Andean steppe species in limited variety, many of them vigorous, together with a few well-established adventives, notably *Cerastium arvense* and *Taraxacum officinale*. Various small, wiry Poaceae predominate the native flora, which as well as the new *Viola* also includes *Azorella spinosa*, *Berberis empetrifolia*, *Calandrinia caespitosa*, *Calceolaria brunellifolia*, *Oxalis muscoides*, *Saxifraga magellanica*, *Senecio* sp. and *Valeriana macrorhiza*.

Other material examined and further recorded locations: ARGENTINA. Mendoza Province, Cuyo de Luján Department, Vallecitos, Valle San Andrecitos, 32º58'16"S 69º21'19"W, 3050 m, 14 Jan 2013, leg. A.R. Flores, F.& W. 12575! (paratype herb Flores & Watson). Ibid. F.& W. 12576! (paratype herb Flores & Watson). Ibid. F.& W. 12578A! (paratype herb Flores & Watson). Ibid. F.& W. 12578B! (paratype herb Flores & Watson). Ibid. F.& W. 12579! (paratype herb Flores & Watson). ARGENTINA. Mendoza Province, Cuyo de Luján Department, Vallecitos, 32º58'26"S 69º21'32"W, 3000 m, 2 Dec 2013, leg. A.R. Flores & J.M. Watson, F.& W. 12600! (paratype CONC, herb. Flores & Watson).

Distribution: As presently known *V.* ×*zwienenii* is a rare endemic of Argentinia and that country's central Mendoza Province, with two closely adjacent locations 500 m apart and separated from one another by a 50 m high ridge. [Figs.76-79, 85, 93]

Overall environment and habitats: The location is situated on the east-facing exposure of a major eastern outlier of the main Andean chain at about 1700 m lower down than its average maximum elevation. The local physical geology consists of major valleys draining down to the east from the heights and separated by ridges. The overall proximate vegetation type is Andean steppe on rock-strewn terrain, with some patches of low shrubs such as *Berberis empetrifolia*, *Baccharis* and *Senecio* spp. The main cover is grasses, dwarf and wiry in drier exposed situations and more verdant along watered valley floors and lower sides. Density of cover is variable, with habitats ranging through bare accumulations of fine scree rubble; rock faces and ledges; dense, vigorous streamside herbage; and, for the main, a more dispersed low to dwarf mountain steppe flora, as including the novelty here.

Phenology: Anthesis begins in November with the colony at peak flowering right at the start of December, and continues through towards the end of the latter month. Seed dispersal may be assumed to follow approximately a month later.

Etymology: We have great pleasure in naming this new natural hybrid as *V.* ×*zwienenii* after its discoverer, the Dutch amateur naturalist and indefatigable globetrotter Kees Jan van Zwienen [Figs.75, 94]. He came to our notice as a result of photographs of the Andean and Patagonian floras posted up on his website (van Zwienen 2019). This has 14 folders of different subjects including animals, arthropods and birds seen on his travels. A main one contains his botanical trips to Europe (21), W Asia (13), N Africa (1), North America (13), and of course the main focus of his and our attention, South America (37). We soon got to correspond with him personally, and he has provided much valuable information as well as photographs to help illustrate several of our articles. He and his ecotour group once stayed at our home in Los Andes, Chile: a memorable meeting. Without doubt our friendship and interaction will continue.

Fig.76: The provinces of Argentina, showing Mendoza, where *Viola* ×*zwienenii* is endemic, with its position marked and arrowed red.

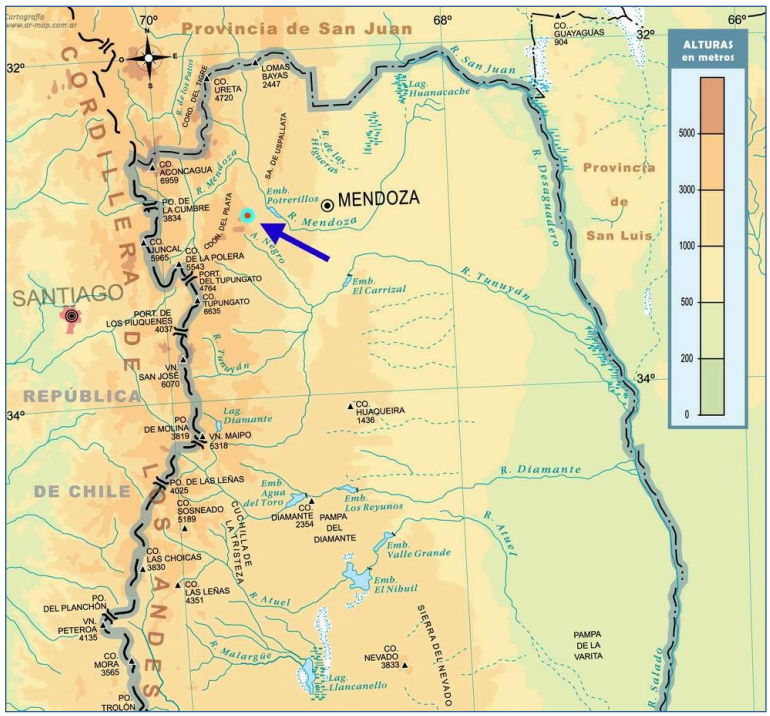

Fig.77: Physical map of nothern Mendoza Province with the location of *Viola* ×*zwienenii* (arrowed, red-centred blue circle) on the eastern outlying Andean Cordón del Plata.

Fig.78: The route (blue dotted) from our home to the precise location of both the type and nearby second sites of *Viola* ×*zwienenii* (red centred green circle. (Courtesy of Google Earth)

Fig.79: Bird's eye view of the Río Blanco valley leading to the *Viola* ×*zwienenii* type location. The Andean Cordón del Plata beyond. Luján de Cuyo Dept., Mendoza Prov. (Photo - Giuillote)

Fig.80: F.& W. 12600 *Viola* ×*zwienenii*, a form resembling *V. atropurpurea* in its columnar rosette, cryptic coloration and ring of flowers around the rosette circumference. (2 Dec 2013. JMW)

Fig.81:F.& W. 12600 *Viola* ×*zwienenii*, an intermediate form with green foliage but somewhat elevated, narrow rosettes and the flowers ringed around the circumference. (3 Dec 2013. JMW)

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Fig.82: F.& W. 12600 *Viola* ×*zwienenii*. Another intermediate form at Vallecitos, in particular displaying the mounding tendency associated with V. beckeriana. (3 Dec 2013. ARF)

Proposed conservation status:
As yet no more than two closely adjacent populations of *V.* ×*zwienenii* have been found. Fortunately one is reasonably numerous by the standards of the section, and the other, although nearby, is not significantly close to human activity. Although the larger population is in fact situated at the basal hub of a ski and hiking area, and subject to a degree of foot passage over its habitat by visitors, as observed it does not seem to be under any threat from this. Nevertheless, being in the vicinity of constant anthropic activity, and bearing in mind its overall extreme rarity as confined to one single limited area of no more than 500 m extent, it should certainly at least be considered as vulnerable (VU), if not endangered (EN).

Notes

What constitutes a wild hybrid? [All the following information may be found in the International Code of Nomenclature, Chapter H, Names of Hybrids, Articles H1-H12 (Turland *et al*. 2018).]

One or both of two readily visible physical aspects should alert an investigator to the possibility of a natural hybrid. The first is presence within any population of considerable morphological variation which distinctly exceeds that of known related taxa. The other is clearly definable possession of a mixture of distinct characters of two or more potential non-hybrids as already known. The suspected hybrid population as a whole should not fall within the reasonably expected range of polymorphism of any such. An assumed parent or parents may or may not be recorded as present with or near the hybrid. If so, this is clearly an advantage, but it is not a sine qua non. The protocol for formal recognition of a hybrid as legitimate requires that it must have at least one known or postulated published progenitor.

Given this obligation is fulfilled; there are two possibilities to express the hybrid's identity formally. The simplest, provided at least two parents are known or suspected, is a hybrid formula. That is to say placing a multiplication sign × (or if not available a lower case letter x) between the names of the parent taxa. These should be presented in alphabetical order together with the names of their authors. No more is needed.

The alternative is what is called a *nothotaxon. In that case an epithet of the author's or authors' creation is provided, as for any non-hybrid plant, but with the addition of the same multiplication sign

or x. The standard multiplication sign should be placed against the initial letter of the hybrid epithet as throughout this text, but if an x is used instead, it must be separated by a space to indicate that it is not part of the name. In the case of a nothospecies or lower rank, exactly the same procedure must be adopted as for non-hybrid plant publication; that is with a full diagnosis and description, etc. The names of the known or postulated parents are also to be provided, expressed as a hybrid formula.

*From Classical Greek *nothos*: bastard, base-born, mongrel (Stearn 1966).

Which to choose? Recommendation H.10B advises authors to consider whether a name is needed, as formulae are more immediately informative (of the proposed parents). The formula is also a whole lot simpler and quicker. It should be borne in mind though that nothotaxa are listed in IPNI (2019) and other important sources, whereas formulae are not. That means formulae are much more likely to be overlooked, even in serious works; a considerable disadvantage. As a broad rule of thumb it seems sensible to apply 'notho' taxonomic names where the hybrid in question has a significant population or widespread distribution rather than existing as one or a handful of individuals together with its parents. However, even in the latter event some factor such as proof of reproductive compatibility of the parents, above all if taxa where it would not otherwise be expected, or current evolution of the plant alliance concerned, may be considered sufficiently important to indicate the nothotaxon option as a means of drawing attention.

Fig.83: F.& W. 12548 *Viola* ×*zwienenii*. Close-up of a depressed, green-leaved extreme form. Vallecitos, Cuyo de Luján Department, Argentina. (23 Dec 2012. JMW)

Precedents: Hybridity is not uncommon in the genus *Viola*. Just over 200 nothospecies are listed by IPNI (2019), while 223 of 2532 distinct *Viola* epithets published for the genus at species level in The Plant List (2013) are hybrids. Although several of the latter are classified as synonyms, and the great majority as unresolved, it is nevertheless clear that crosses in the wild are a common phenomenon.

Remarkably, considering the status of sect. *Andinium* as the largest such alliance of the genus, only one nothospecies, *Viola* ×*blaxlandiae* J.M. Watson & A.R. Flores (2012b), has so far been recognised for it and described. Even that is only listed by IPNI, as it was published shortly after the most recent Plant List version had been compiled. Unlike the present novelty, it occurs over a wide local

area, frequently together with both parents, *Viola cotyledon* Ging. and *Viola pachysoma* M. Sheader, J.M. Watson & A.R. Flores. It is even more polymorphic than *V.* ×*zwienenii*, but always with a mixture of characters derived from both parents.

Fig.84: F.& W. 12600 *Viola* ×*zwienenii*. Close up of a typical columnar, cryptic-leaved form. Vallecitos, Cuyo de Luján Department, Argentina. (23 Dec 2012. ARF)

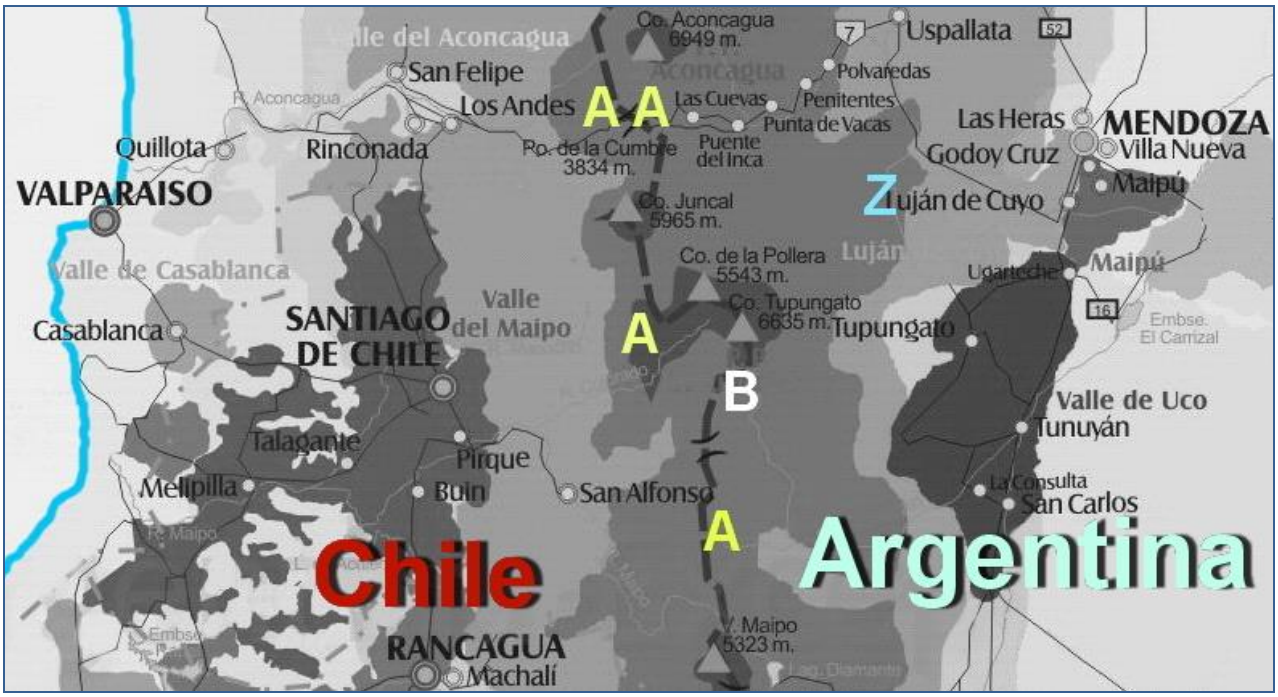

Fig.85: Z = *V.* ×*zwienenii*. A = *V. atropurpurea*. B = *V. beckeriana.*

In fact, recorded natural *Viola* hybrids are almost exclusive to the Northern Hemisphere. This is an indication that the violets and pansies are prone to cross on a regular basis: also that representatives of the genus above the Tropic of Cancer have been studied much more intensively. Important factors which differ markedly between sect. *Andinium* and most Northern Hemisphere equivalents are the number of taxa relative to their distribution areas, type of terrain occupied, relative overall abundance, and population sizes. As opposed to many boreal violas, the 140 of sect. *Andinium* are spread as a narrow, longitudinal band along the Andean chain and Pacific coast from near the tip of South America to the equator, an unprecedented distance of 7500 km. Most occupy the continuingly active Andes range, which creates unstable habitats due to uplift, volcanism and consequent notable geoclimatic changes. These cause extinctions, fragmentation and isolation of populations as well as triggering the frequent evolutionary changes needed to adapt to these transforming environmental conditions. As a further effect, the majority of taxa as known consist of no more than one or a very few small to minimal and often fragmented colonies, these frequently significantly apart from any others in the section. With the exception of 18 to 20 relatively widespread species, populations of the high mountains tend to be separated from one another by stretches of lowland terrain or abruptly variable levels of elevation with consequent significant changes in vegetation zones. Furthermore, when two or more different taxa do occur together they are usually not closely enough related to be reproductively compatible. By contrast, many boreal violets in particular inhabit large stretches of stable and level or gently undulating terrain where various taxa may share common habitats, with their close kinship allowing for potential interbreeding.

Investigation of sect. *Andinium* has been advancing steadily over the period of the new millenium, however, and following publication of *V.* ×*blaxlandiae* another two nothospecies have been recognised for the section by the present authors in addition to the novelty presented here. Probable hybrid origin of several stable species, which are nevertheless clearly intermediate morphologically between others sharing the same geographical area, is under consideration. A number of populations differ significantly – yet only very slightly – from accepted taxa, so cannot be defined at present and may also be of interspecific origin. Significantly, all but one of these occur within the section's most concentrated centres of distribution: northern Patagonia and NW Argentina. These sectors are where further evidence of active hybridisation is most likely to be found. Future DNA analysis will surely shed valuable light on the situation too.

Parent species: The virtually certain progenitor of the two designated for *Viola* ×*zwienenii* is *V. beckeriana* (Watson & Flores 2013b) [Fig.86]. As may be seen in the two tables below, it has contributed to some forms of the hybrid its unique rosette structure and colour as well as the disposition of the flowers within the circumference of the rosette [Figs.18, 20-22, 82, 83, 87]. All aspects of its corolla – shape, size, colour and markings – occur in every known flowering individual of *V.* ×*zwienenii*. Moreover, the only known locality of *V. beckeriana* is relatively nearby, at ca. 45 km to the southeast (Watson & Flores 2013c).

Certain features of quite widespread *V. atropurpurea* [Fig.88] as also found in *V.* ×*zwienenii*, such as the columnar rosette formation, cryptic coloration and flowers ringed around the upper-outer circumference of some forms [Figs.19, 57, 81, 85, 89], and the constant bearded corolla and similar style crest of all forms, are shared with other related species of sect. *Andinium*. Furthermore, its uniquely small and coloured corolla is not expressed in the hybrid, although the equally distinctive clavate petal indumentum is in fact possessed by many *V.* ×*zwienenii* individuals, if not usually as the dense covering which characterises *V. atropurpurea*. These factors make the latter's postulation as a parent slightly more speculative, albeit only slightly so. However, as with *V. beckeriana*, the nearest population of *V. atropurpurea* is not far distant either at 50 km or less to the west of the new hybrid (K.J. van Zwienen, pers. comm.), as well as being the only other known relevant species of the sempervivoid alliance registered within 250 km of Vallecitos (Watson & Flores ined.).

Fig.86: F.& W. 12365 *Viola beckeriana* (type), a considered parent of *V.* ×*zwienenii*. Similarity to some of the latter photographed by Kees Jan and ourselves is evident. (17 Dec 2010. JMW)

Fig.87: F.& W. 12548 *Viola* ×*zwienenii,* the depressed, green form resembling *V. beckeriana*, as first seen in bloom - showing the flowers within the rosette circumference. (23 Dec 2012. JMW)

The most enigmatic feature of *V*. ×*zwienenii* is the origin of the lack of an apiculum on the leaf-tips in some individuals. This manifestation is known for no other taxon of the sempervivoid alliance of sect. *Andinium*. Whether inherited from an undiscovered species or even an extinct parent, or whether it has arisen spontaneously as a result of gene pairing between parent species would have to be the resolved by in-depth molecular investigation.

Although recorded for various other of these sempervivoid violas species, pollen trap hairs are not present in either *V. atropurpurea* or *V. beckeriana*, so their derivation is also beyond current speculation.

TABLE 1. Uniformity and dimorphism of organs of the new nothospecies.

V. ×*ZWIENENII* CHARACTER STATE CONSISTENCY	HOMOGENEOUS	VARYING
Texture of plant (**glabrous** or ~~with indumentum~~)	X	
Rosette form and height (**plane** or **columnar**)		X
Rosette diameter (**broad** or **narrow**)		X
Rosette coloration (**green** or **cryptic**)		X
Lamina width (**broad** or ~~narrow~~)	X	
Lamina (**with margin** or ~~without margin~~)	X	
Lamina margin (**papillose-cilate** or ~~not papillose~~)	X	
Flowers (**within rosette** or **on circumference**)		X
Corolla size and shape (**constant** or ~~variable~~)	X	
Flower colour (**white** or ~~other~~)	X	
Corolla venation (**dense** or **light**)		X
Lateral petals (**bearded** or ~~glabrous~~)	X	
Inferior petal (**with fine indumentum** or ~~glabrous~~)	X	
Style crest (**stout, recurved lateral lobes** or ~~other~~)	X	

TABLE 2. Inherited parental features of *Viola* ×*zwienenii*.

PARENTAL CHARACTERS	V. ATROPURPUREA	V. BECKERIANA
Rosette form & height if **plane**		X
Rosette form & height if **columnar**	X	
Rosette diameter if **notably broad**		X
Rosette diameter if **relatively narrow**	X	
Rosette coloration if **green**		X
Rosette coloration if **cryptic**	X	
Lamina **broad**	X	
Lamina **papillose-ciliate**		X
Flowers if **around rosette circumference**	X	
Flowers if **within rosette circumference**		X
Corolla **white**		X
Corolla venation **present**		X
Lateral petal **bearded**	X	
Style crest as **stout, recurved lateral lobes**	X	

Footnote

While enjoying a drink in his small café as we were about to leave at the end of our very last day, we got talking to the owner or adminstrator at the Vallecitos centre where we'd parked the jeep [Fig. 16]. We told him what we were doing there and showed him some specimens of the new viola we'd just collected for pressing. He indicated a winding maintenance track leading up to the south and related that when at the top a good deal higher up, he'd seen many more such violas. We were sorely tempted to stay longer and see whether we might be able to drive up there ourselves, but the maximum time we could spend on the project had run out, so we couldn't. Whether these will prove to be a further population of *V.* ×*zwienenii*, or *V. beckeriana*, or the other parent, or even a different species altogether remains for others to find out. Since there would be some tough footslogging involved, I fear it's way beyond our physical capacities now.

Fig.88: Actual *Viola atropurpurea* (F.& W. 12593) at Portillo, Chile, showing similarity between its rosettes and many out of flower at Vallecitos during our first visit. (1 Dec 2013. JMW)

Fig.89: F.& W. 12600 *Viola* ×*zwienenii*, another columnar, cryptic form. The dark, dense veining on the lower petals suggests the influence of midnight-blue *V. atropurpurea.* (2 Dec 2103. JMW)

Fig.90: *Viola* aff. ×*zwienenii* discovered in the Andes NW of Uspallata. Columnar habit, cryptic-coloration and bearded petals as present in V. atropurpurea. (14 Nov 2014. Mário Duchoň)

Stop Press!

When this article was all but finished and on the point of being submitted, an e-mail arrived from Vit Grulich, a Czech academic botanist from Masaryk University, Brno. He had read our recent IRG article describing the new *Viola abbreviata* (Watson & Flores 2019) and had been intrigued by the similarity of its appearance to one encountered by a student of his, Mário Duchoň, during a November 2014 ecotour in Argentina. Vit sent the photo as an attachment [Figs.90, 92] and asked for our opinion. He himself was unsure that his student's plant was the same as ours, and he was dead right! We were immediately struck by its resemblance to the new hybrid described herein. The only obvious but very slight difference is the greater number and density of capitate indumentum on the petals of Mário's plant than any we saw – cf. Figs.89 and 90. Vit had written that the location was in the Uspallata district, and as ours was also in that vicinity and of easy access, we supposed it was quite feasible Mário had seen and photographed his plant there as well. To settle that we asked Vit for more precise details.

Just imagine our surprise when we learned of the location and its actual coordinates, 32º32'39"S 69º31'17"W, shortly to the NW of Uspallata [Fig.91], whereas the type and its adjacent site are due south of that little town and much further from it [Figs.77, 78]! In fact Mário's and ours are a significant 50 km apart [Fig.93]. Putting known details on the map, the actual point of his is the eastern extremity of a west to east transversal ridge of the Cordillera de Tigre, at an elevation of 3500 m. In a wider context, other than this new discovery only *V. atropurpurea* of the sect. *Andinium* sempervivoid alliance is known this far north, with its maximum range there 170 km nearer the equator than Mário's site [Fig.93].

Fig.91: Map of the Mendoza, Potrerillos, Uspallata sector showing the location of the *Viola* aff. ×*zwienenii* discovery as green, red-centred circle arrowed green.

Unfortunately, Mário isn't able to recall the size of the population or whether there was any variation in the rosettes or flowers. Vit assumes this to indicate that most likely there wasn't, or Mário would have taken more photos. Obviously there is no specimen either, considering the visit was a tour without official permission to collect. Given these circumstances it isn't possible to know for certain that the Uspallata population is indeed *V.* ×*zwienenii*, however likely that seems. If it is not, then two other possibilities remain; either that it's a different but closely related hybrid, sharing *V. atropurpurea* as one parent with *V.* ×*zwienenii*, but the other as a different species; or if the population is large enough, stable, and effectively homogeneous, it could even be considered as a distinct species or nothospecies. We hope that local Argentinian collectors and botanists may be able to resolve this situation in due course.

Fig.92: A close up of the Uspallata *Viola* aff. ×*zwienenii* showing the dense capitate petal indumentum as also possessed by *V. atropurpurea.* (14 Nov 2014. Mário Duchoň)

Fig.93: U = the latest Uspallata discovery. Z = *V.* ×*zwienenii*. B = *V. beckeriana*. A = V. atropurpurea, with A1 the most northerly and A2 the most easterly sempervivoid alliance locations.

Acknowledgements

To Kees Jan of course: his absolutely crucial primary role is noted in our opening paragraph above, and in the Etymology section. What more could we have asked from anyone? We hope he may be amused that 'his' viola will be the last of around two thousand or so different names and combinations at species level and below listed in alphabetical order for the genus by IPNI.

Thanks to Vit Grulich and Mário Duchoň we have been able to include the intriguing discovery by the latter of a population which is either conspecific with, or closely related to *V.* ×*zwienenii*, but well to the north. They have kindly agreed to our including their data and illustration here.

As ever, Wikipedia and Google have provided us with invaluable information and links, Google Images in particular allows a visual check of plants when their names are known or suspected. Another important aspect is the maps it provides, and of course Google Earth is supreme in that respect. It's impossible to thank all those who post up to our benefit on these provider sites of course,

but there are very many as individuals, groups and institutions. Apropos: we even owe *V.* ×*zwienenii* to this facility, since we got to know Kees Jan through his website.

At the time of our first visit, daughters Sarah and Nicola had flown over from their homes on the English South Coast on one of their periodic visits to us in Chile. Nicola's life-partner Ben joined them. That greatly enhanced our pleasure. Several of Sarah's photos have also provided a valuable supplement to our own.

We'd also like to put in a special word for the reliability of our aged Suzuki jeep and the competent mechanics who have maintained it over time. What a valuable asset it has proved during our last 14 years of plant exploration.

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Fig.94: By a happy coincidence Kees Jan, here seen competing in Belgium, shares with Margaret Young and John a passion for road-race cycling as well as plants. (Photo - anon)

Fessia olangensis (Asparagaceae): a new species of squill from Golestan Province, NE Iran

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Summary. *Fessia olangensis* (Asparagaceae), a new squill species endemic to Golestan province (eastern section of Alborz mountain range, NE Iran), is described and illustrated. Morphological differences between the new species and the closely related sympatric *F. gorganica* are discussed. Photographs (habitat and morphology), a distribution map and a preliminary conservation assessment are provided.

Key words: new taxa, conservation, geophyte, squills, Caspian Hyrcanian mixed forests, *Scilloideae*, Iranian flora.

Introduction

The genus *Fessia* Speta was separated from the aggregate genus *Scilla* L. [4] by the Austrian botanist Franz Speta (1941-2015) in 1998 [9]. For the moment the genus possesses 12 (13) species, such as: *F. bisotunensis* (Speta) Speta, *F. furseorum* (Meikle) Speta, *F. gorganica* (Speta) Speta, *F. greilhuberi* (Speta) Speta, *F. hohenackeri* (Fisch. & C.A.Mey.) Speta, *F. khorassanica* (Meikle) Speta, *F. parwanica* (Speta) Speta, *F. purpurea* (Griff.) Speta, *F. puschkinioides* (Regel) Speta, *F. raewskiana* (Regel) Speta, *F. vvedenskyi* (Pazij) Speta, and one doubtful taxon – *F. assadii* Malekloo, Hamdi & Jouharchi, which might be cfr *F. khorassanica* in reality [5]. At the same time the Russian botanist Helena Mordak [6] considers all these taxa within the section *Fessia* (Speta) Mordak, stat. nov. of the genus *Scilla*.

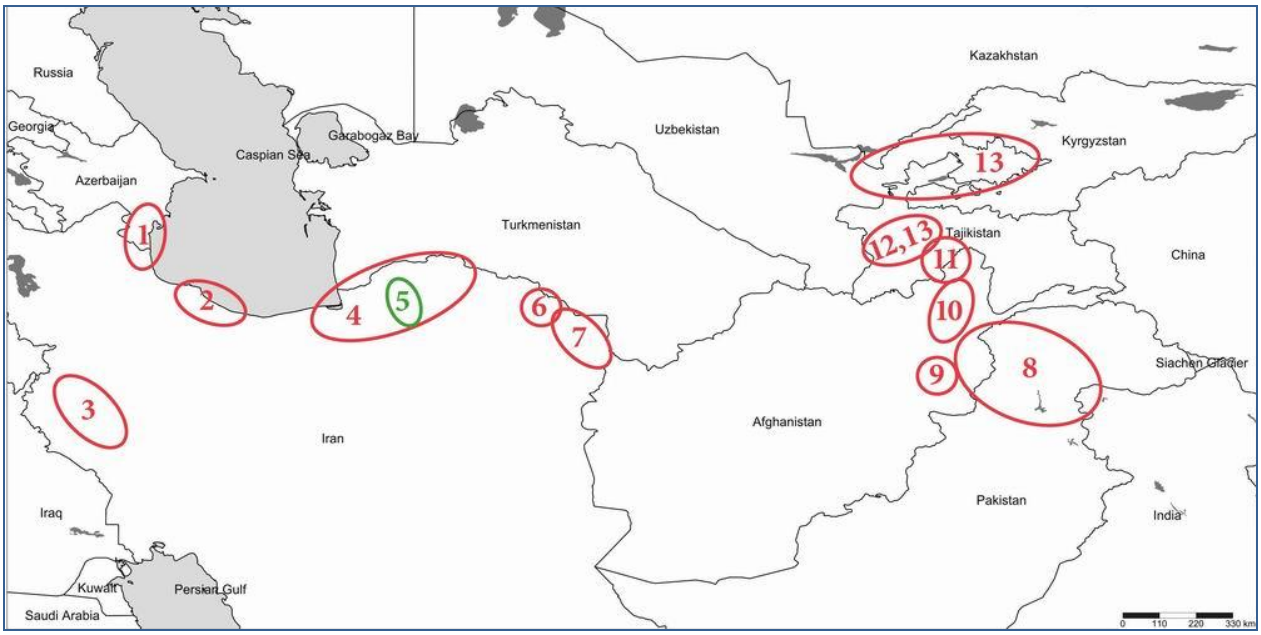
Speta divided the genus *Scilla* sensu lato into many new genera and restored the generic status of some former genera (which were previously included in *Scilla* s.l.) which he regarded as distinct. All the species related to *Scilla bifolia* L. remained in *Scilla* sensu stricto. Species of the former genus *Chionodoxa* Boiss. were also incorporated within *Scilla*. Earlier included within the *Liliaceae* Juss. family, this genus is now placed in the *Asparagaceae* Juss., subfamily *Scilloideae* Burnett[1].

Not all botanists accepted such extensive splitting. Several of the genera published by Speta in 1998 are now returned to *Scilla* (e.g., genus *Othocallis* sensu Speta with well-known species – *S. siberica* How.). In the International Plant Names Index (IPNI) the genus *Fessia* is regarded as different from *Scilla* and the World Checklist of Selected Plant Families (Kew Gardens, UK) supports the same viewpoint. Here we follow this division.

Franz Speta characterised [9] the genus *Fessia* as having comparatively small bulbs covered with silvery, whitish, brown or black to purple-violet tunics. Inner scales are white, living around 3 years. It produces thin, white and unbranched adventitial roots that live only one season.

[1 ***Scilloideae*** (named after the genus *Scilla*, "a squill") is a subfamily of bulbous plants within the family *Asparagaceae*. *Scilloideae* is sometimes treated as a separate family ***Hyacinthaceae*** Batsch ex Borkh., named after the genus *Hyacinthus* Tourn. ex L.. *Scilloideae* or *Hyacinthaceae* comprises many popular garden plants such as *H. orientalis* L. (hyacinths), *Hyacinthoides non-scripta (L.)* Chouard ex Rothm (bluebells), *Muscari* Mill. ssp. (grape hyacinths), *Scilla* ssp. and *Puschkinia* Adams ssp. (squills, or scillas), etc.]

In most species 2-9 leaves are formed in early spring, excluding two species with leaf development in autumn. Scapes 1 – 4, semi-terete to slightly round-shaped, angular, bearing 2-20 flowers, erect to semi-erect and lying prone to the ground after blooming until the fruit ripens. Bracts are irregularly shaped and always spurred. Flower segments are free, blue-violet to white; filaments are narrow, formed at a short distance above the base and bear ice blue to dark blue anthers. Ovary is globular to ovate with 2-6 ovules per locule, style clearly detached, and round black-brown seeds without elaiosomes and a smooth testa. The distribution area of the genus *Fessia* (Map 1) stretches from Talish mountains in Azerbaijan along the northern border of Iran and within Zagros mountain range (6 species + 1 described here) to north-eastern Afghanistan (4 species), NW Pakistan slightly entering NW India (1 species) and the former Soviet Central Asian republics – Tajikistan, Uzbekistan, Kazakhstan and Kyrgyzstan (3 species). In total at present there are 12 (13) species recognised.



Map1: Distribution areas (approximate) of all known species from the genus *Fessia*: 1 - *F. hohenackeri*; 2 - *F. greilhuberi*; 3 - *F. bisotunensis*; 4 - *F. gorganica*; 5 - *F. olangensis* (shown green); 6 - *F. assadii*; 7 - *F. khorassanica*; 8 - *F. purpurea*; 9 - *F. parwanica*; 10 - *F. furseorum*; 11 - *F. raewskiana*; 12 - *F. vvedenskyi*; 13 - *F. puschkinioides*.

Figs.01 and 02: *Fessia greilhuberi* – cultivated plants.



Fig.03 – left: *Fessia purpurea* from Pakistan in Gothenburg BG, Sweden.
Figs.04 and 05 – right: *Fessia khorassanica* WHIR-033.

Fig.06: *Fessia khorassanica* habitat.

Fig.07: Janis Rukšāns picturing *Fessia khorassanica* in its habitat, NE Iran (photo - John Ingham)



Figs.08, 09, 10: *Fessia vvedenskyi* from Hodji-obi-Garm, Varzob gorge, Tajikistan – cultivated plants.

Fig.11 - left: *Fessia puschkinioides* in Yassi, Kyrgyzstan.
Fig.12 - below: *Fessia puschkinioides* from Sina, SE Uzbekistan – cultivated plant.

In 2008 our small team visited Olang gorge and pass. We had records from other travellers that "*Scilla gorganica*" and some other geophytes had been observed there. Our area of exploration belongs to the ecoregion of Caspian Hyrcanian mixed forests in the eastern section of the Alborz mountain range. At middle elevations (700 - 1500 m) in this cloudy zone, Oriental Beech (*Fagus orientalis* Lipsky) is the dominant tree species in pure and mixed stands with other hardwoods such as Chestnut-leaved Oak (*Quercus castaneifolia* C.A. Mey), Caucasian Oak (*Q. macranthera* Fisch. & C.A. Mey. ex Hohen.), European Hornbeam (*Carpinus betulus* L.), Oriental Hornbeam (*C. orientalis* Mill.) and Sweet Chestnut (*Castanea sativa* Mill.). Upper mountain and subalpine zones (> 1500 m) are characterized by distribution of *Quercus macranthera*, *Carpinus orientalis*, and the presence of shrublands and steppes. Alpine meadows occur at the highest elevations.

A few kilometres before the mountain pass near Razi and Jouzchāl villages, on a steep forested slope (*Quercus macranthera, Carpinus betulus* and *C. orientalis,* woodland) and a flat meadow among shrubs at altitudes between 1900-2000 m we found several interesting bulbous plants. Among them were *Galanthus transcaucasicus* Fomin*, Iris hyrcana* Woronow ex Grossh.*,* (syn. *Iris reticulata* M.Bieb.sensu lato) *Colchicum szovitsii* Fisch. & C.A.Mey., *Corydalis cava* subsp. *marschalliana* (Willd.) Hayek, *Ornithogalum bungei* Boiss., an autumn-blooming crocus from the *Crocus speciosus* M. Bieb. group (later published by Rukšāns as *C. zubovii*) and *Fessia* sp., regarded *in situ* as *F. gorganica*. The latter species was very little known in cultivation and among botanists. Franz Speta [8] lists several occasions when it was misidentified with *S. greilhuberi* Speta and *S. hohenackeri* Fisch. & C.A.Mey. (now both belong to the genus *Fessia*). At that time, we knew it from one sample seen at Kew Gardens and from the slowly developing seedlings from this sample. All the collected squills were grown in the collection under the name given at the collecting time as *S. gorganica* Speta.

In 2016 both authors revisited the Olang gorge and pass. This time we found *Fessia* sp. growing along our entire route starting from 1400 m altitude up to the pass at 2200 m. There were supposedly two different *Fessia* ssp. – one with narrow shorter leaves in woodlands and woodland clearings with *Quercus macranthera*, the other bigger squill with distinctly wider leaves and solely in deeper shade of *Fagus orientalis* forests. A few days earlier over Gonbad-e Qabus we found true typical *Fessia gorganica* (16IRS-093) at 1200 m altitude. After that it became clear that some plants observed in the Olang gorge undeniably differed from true *F. gorganica* by the scape (number of flowers) and the bulb tunic colour (plants were seen long after blooming with almost ripe seed pods). That spurred us to do further research and compare the plants from both localities by growing them side by side in identical conditions. It seems that in the Olang gorge there were spots where both species grow in close vicinity (sympatric distribution), but preferred different ecological conditions (as mentioned above). Comparison of filaments and style as well as bulb tunics confirmed this conclusion. The population observed just near melting snow only a few metres below Olang pass was still in bloom during our 2016 visit (end of April). In general, the plants there were observed with 4 flowers on scape but a few scapes with up to 5 flowers were seen as well.

Our observations evidence that the easiest way to separate both species is by checking the colour of the bulb tunics. There are only two *Fessia* species with a purple tunic outer – *F. khorassanica* (occurs in the east of Iran) and *F. gorganica*. Tunics of all the other species (including *F. olangensis*, newly described here) are greyish to silvery or brownish. *Fessia gorganica* is more floriferous having as many as 16 flowers per scape, whereas in *F. olangensis* there are usually only 3-4 flowers per scape, only rarely can scapes be observed with 5 flowers. Filaments are very different in both species. In *F. gorganica* they are flattened at the base, somewhat transparent and tightly enclose (clasp) the ovary, near the tip of the ovary the colour changes to blue or lilac, sometimes the filaments there become somewhat narrower, though not always. Shortly above the apex of the ovary they widen, spread outwards and become pure white and parallely edged or gradually taper to almost filiform right below the anthers. In *F. olangensis* the filaments are white throughout, the base only slightly narrowed, not flattened, they start spreading from the base not encircling the ovary, higher up parallely edged and tapering in the upper third or shortly below the anthers. The style in all the observed samples of *F. gorganica* was white or whitish, only sometimes was the stigma bluish, while in *F. olangensis* – it is light lilac throughout, becoming slightly darker at the apex. This set of features allows us to regard these two fessias as morphologically distinct and easily recognisable species. Seedlings of *F. olangensis* derived from cultivated plants grown without isolation between other species of *Scilla* s.l. from our collections (more than 100 samples represented) showed no traits of possible hybridization events with some of them.

To facilitate the distinction of these *Fessia* species, here we give the descriptions of both sympatric ones – the new *F. olangensis* and *F. gorganica*, as well as a key that reviews all the species of the

genus *Fessia* known at present, including the ambiguously described *F. assadii* recently found in the Kopet Dag mountain range slightly to the west from the vicinity of cfr *F. khorassanica* (holotype K! – *Scilla khorassanica* Meikle, specimen K000464861, coll. no. 58, coll. Gibbons, R.B.; Gibbons, L., 21/04/1971, Iran, Islamic Republic of).

Materials and Methods

Field studies for *Fessia olangensis* were undertaken in Iran in 2008 and 2016 (Rukšāns and Zubov, pers. observ.), and seed grown living material in cultivation was examined by us between 2008 and 2019. Herbarium specimens of other *Fessia* species were examined at the herbaria of K and GB [abbreviations after 2]. Measurements, colours, and other details given in the descriptions are based on living material, spirit and herbarium specimens and data derived from field notes. Morphological and anatomical examinations were made using stereo microscope Stemi 2000-C and inverted microscope AxioObserver A1 equipped with digital camera AxioCamERc 5s and ZEN 2012 software (Carl Zeiss, Germany). Morphological terminology follows [1]. Distribution maps were plotted using specimens and recorded coordinates, verified using Google Earth Pro (©2017 Google). The distribution maps were produced using SimpleMappr [7]. The preliminary conservation status of *F. olangensis* was assessed using IUCN's Red List Categories and Criteria [3]. *Method for estimating AOO.* Area of occupancy (AOO) was calculated directly at the reference scale of 4 km^2 (2 × 2 km) grid cells by counting the number of occupied cells in a uniform grid that covers the entire range of a considered taxon, and then tallying the total area of all occupied cells: AOO = no. occupied cells × area of an individual cell [3]. For *F. olangensis* AOO = 2 × 4 = 8 km^2.

Fig.13: *Fessia olangensis* at Olang Pass (together with *Anemone caucasica* in background).

Fig.14 a: *Fessia olangensis* blooming near melting snow.

Fig.14 b: Melting snow patch below the Olang pass.

Fig.15: *Fessia olangensis* at Olang Pass.

Figs.16 and 17: *Fessia olangensis* - cultivated plants

Taxonomic Treatment

Fessia olangensis Zubov & Rukšāns **sp. nov.**

Type: Iran, Golestan Province, gorge along the road to Olang pass, 36°50’ N, 55°15’ E, c. 1920 m; 26 Apr 2016, leg. *Rukšāns & Zubov* (16IRS-142). Holotype: GB!, cultivated plants ex culturae in horto Jānis Rukšāns, 23 March 2019.

Bulb: more or less globose, up to 20 mm in diam., tunics light silvery to brown.

Leaves: 5-6, dark green with a lighter midrib, slightly channelled, up to 17 cm long, at the base 9 mm wide, at the widest part 12 mm wide, more or less parallely edged, abruptly narrowing in a pointed end, smooth, appear shortly before flowering, cucullate at apex.

Scapes: up to 4-5, weak, glabrous, upright at anthesis, lying when fruiting, light green with anthocyanin hue one side, up to 22 cm long, somewhat flattened in the basal part, with ± two quite indistinct ribs, bearing 2-4, rarely up to 5 flowers a scape.

Fig.18a - right: *Fessia olangensis* - cross-section of a scape.

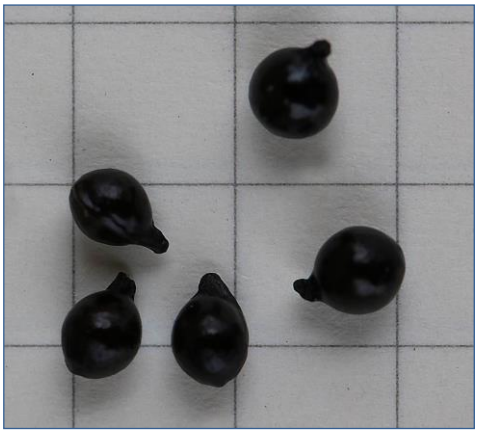


Fig.18b - left: Fresh seeds of *Fessia olangensis* (5 mm grid).

Pedicels: glabrous, weak, curved, at the base ± adpressed to the scape, then bending sideways and a little downwards; lower pedicels 8-12(-15) mm (n=30) long, upper ones – 3-5 mm long.

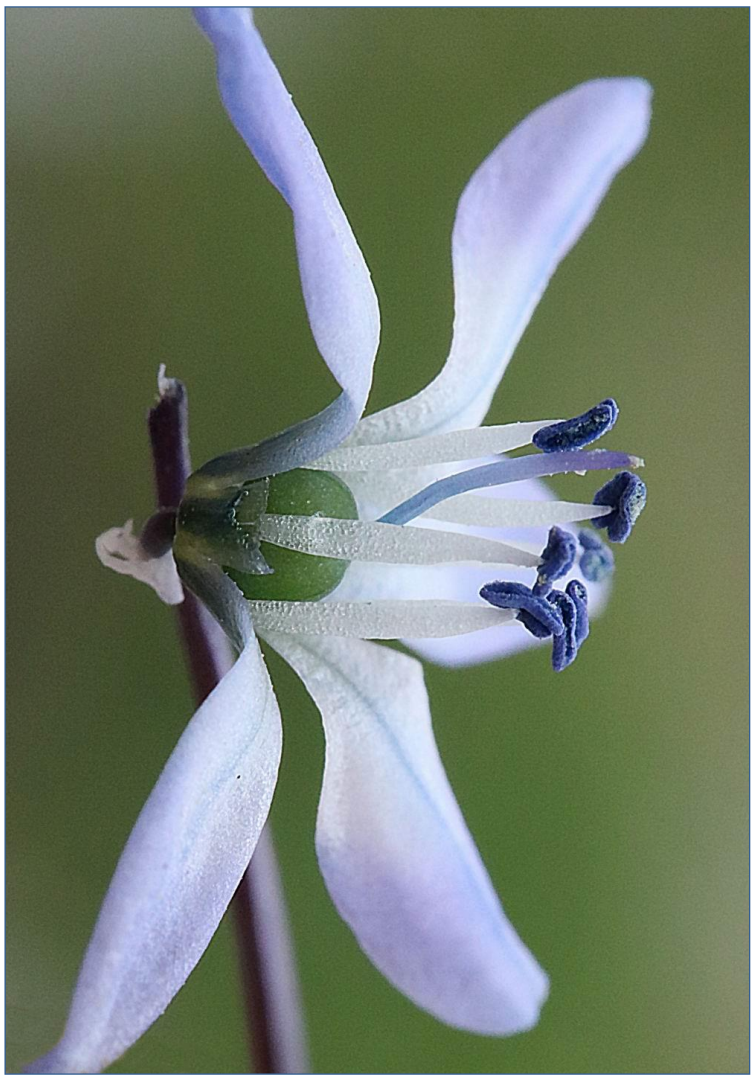
Bracts: white, split, 1-2 mm long, irregular and pointed, the upper ones often divided into two branches.

Figs.19 and 20: *Fessia olangensis* bracts.

Perianth segments: 6 in two whorls, up to 14 mm long and 4 mm wide, the outside light blue with a dark green triangle at the base which becomes green higher up and further transforms into a green-blue midvein; the inside light blue becoming white at the base with a distinct greenish midrib; segments remain attached to ovary when faded.

Stamens: 6, in two whorls; **filaments** – 1 mm wide and 5-6 mm long, white throughout, at the base slightly narrowed but not flattened, higher up parallely edged and narrowing in the upper third or shortly below the anthers; **anthers** – versatile, introrse, up to 3 mm long, dark blue, **pollen -** blue.

Gynoecium (ovary and receptacle): syncarpous, tricarpellate; ovary superior, globose, indistinctly triangular in cross section, light green, 2 × 2 mm in diam.; placentation axile, ovules up to 6 per locule; pistil filiform, style 6 – 10 mm long, bluish; stigma capitate.



Figs.21 and 22: *Fessia olangensis* flower details - filaments and style.

Fruit (capsule): at maturity indistinctly triangular in cross section, globose, at maturity up to 1.1 × 1.3 cm, light green with a weak anthocyanin hue; **seeds** ± orbicular to ovoid, 3 × 2,5 mm, seed coat shiny brownish black to black. Rapha weekly expressed, ending at micropile area by the prominent, up to 1-2 mm long, black caruncle.

Etymology: named after Olang gorge and pass in Golestan Province of NE Iran where it was discovered.

Recognition: possibly related to *F. gorganica* but differs by greyish to brown bulb tunic colour; bluish-lilac with contrast green to bluish midvein perianth segments; pure white anther filaments, upright, unexpanded at base; bluish-lilac pistil [*vs* blackish-violet bulb tunic colour; bluish-lilac without or with slightly darker midvein perianth segments; white refracted (bluish-lilac at the refraction point) above ovary expanded anther filaments, which embrace the ovary at base; white pistil – in *F. gorganica*].

Distribution: West Asia: Iran, eastern section of the Alborz mountain range; possibly a narrow local endemic of Golestan and maybe Semnan Provinces. Map 2.

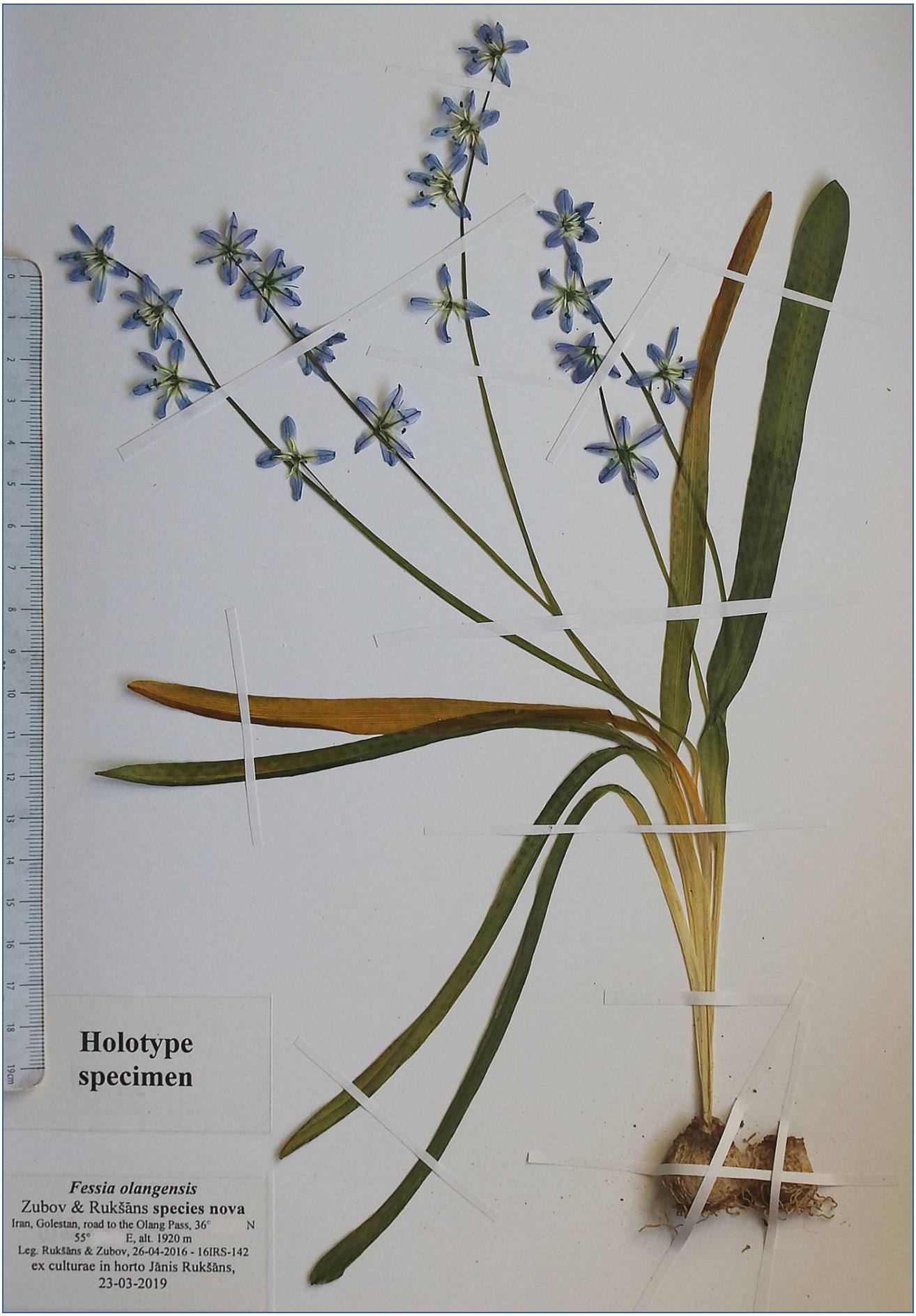
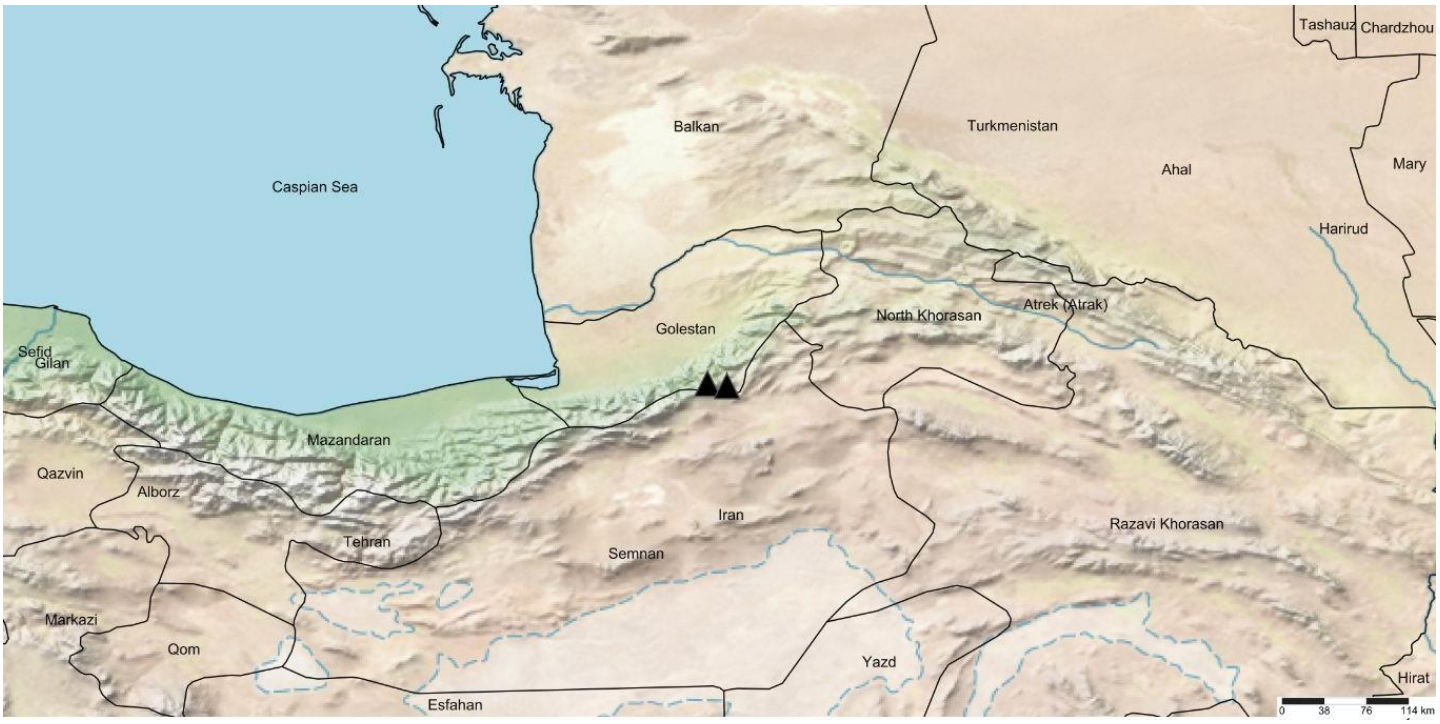


Fig.23: *Fessia olangensis* holotype herbarium, GB, Sweden.



Map 2: Distribution of *Fessia olangensis* based on collection localities.

Specimens examined: **IRAN.** Golestan Province, gorge along the road to Olang pass, c. 1920 m; fl., 26 Apr 2016, *Rukšāns & Zubov*; *ibid.*, cult. (specimens grown from seeds in J. Rukšāns' garden, Latvia), fl., 23 March 2019, Rukšāns (holotype GB!). The exact localities of *Fessia olangensis* have not been documented here for fear of unlawful plant collecting.

Habitat: broadleaf deciduous forests and woodlands (*Quercus macranthera, Carpinus betulus*, and *C. orientalis*), among shrubs, in clearings, growing together with *Galathus transcaucasicus, Ornithogalum bungei, Crocus zubovii, Fessia gorganica, Colchicum szovitsii*, *Corydalis cava* subsp. *marschalliana, Iris reticulata* s.l., *Anemone caucasica* Willd. ex Rupr., *Ficaria fascicularis* K.Koch, etc. at altitudes from 1900 - 2240 m. Known only from the type locality and its vicinities.

Fig.24: *Fessia olangensis* habitat - deciduous forests facing to Caspian Sea.

Fig.25: *Fessia olangensis* habitat - lighter spots in deciduous forests.

Conservation status: *Fessia olangensis* is endemic to north eastern Iran, and is restricted to the Golestan Province, and possibly can be found in Semnan Province. Its area of occupancy (AOO) is provisionally estimated to be less than 10 km^2, and there are two known severely fragmented subpopulations. The habitat could decline rapidly due to deforestation; there is also the threat of small-scale collection of bulbs by illegal collectors, and this could cause a slow, long-term decline. This species is also deemed to be climate change sensitive. Due to the limited AOO, severely fragmented subpopulations and the range of threats, this species is assessed as Critically Endangered (CR) under IUCN Red List Categories and Criteria [3]. CR B2ab(ii,iii): B2 – Geographic coverage in the form of AOO estimated to be less than 10 km^2 threshold (AOO for *F. olangensis* estimated to be 8 km^2) and – a. Severely fragmented or known to exist at only a single location (*F. olangensis* is known from only two severely fragmented subpopulations (based on two geolocated data points) at a single location); and – b. Continued decline observed (Map 2).

Phenology: flowering: March - April, at lower altitudes possibly already in February; fruiting: April – May.

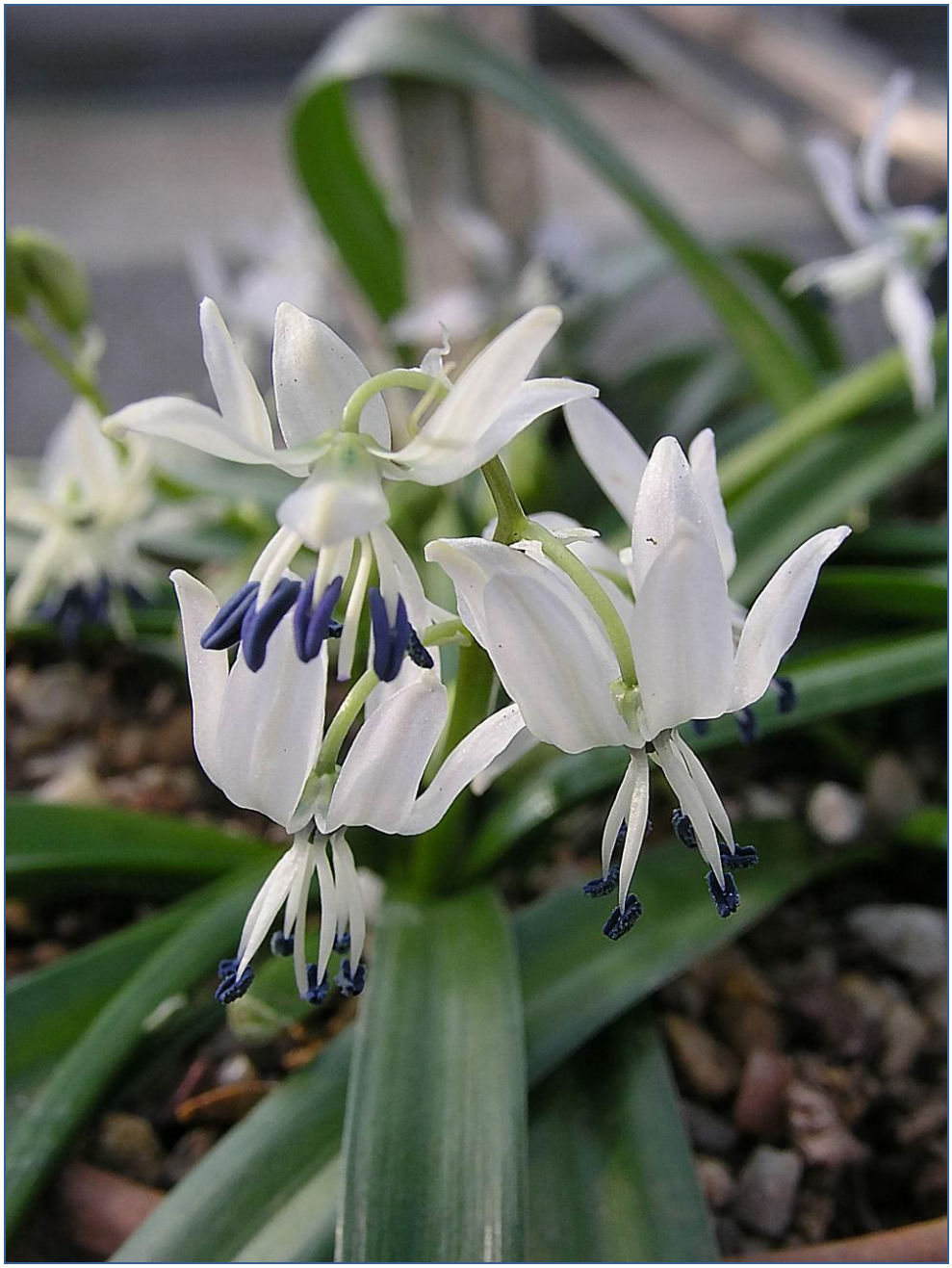


Fig.26: *Fessia gorganica* in Royal Botanic Gardens, Kew, UK.

Fig.27: *Fessia gorganica* in Brian Mathew's collection.

Figs.28 and 29 – below: *Fessia gorganica* (16IRS-093) from near Gonbad-e Qabus, NE Iran.

Fig.30: *Fessia gorganica* (16IRS-137), from Olang gorge.

Fessia gorganica (Speta) Speta, Phyton (Horn) 38: 101 (1998)[2]

Type: Iran: Gole-loveh bei Minou-dasht, circa 700 m, F. Ressl, 22. IV. 1974 (Sp). Tafel XXV.

Synonyms: *Scilla gorganensis* Meikle, Kew Bull. 30/3, 533-536 (1975). Type: Mazandaran, 87 km E. of Gonbad-e Qabus, in *Carpinus-Quercus* forest beside a creek, 1250 m, 25. 3. 1965, M. L. Grant 17212 (W); *Scilla gorganica* Speta, Linzer Biol. Beitr. 7/2, 253 (30. 5. 1975).

Habitat: In deep shade under deciduous forests, known from several gatherings in Golestan Province at altitudes 400-1500m (-1900 m - our observations, DZ, JR).

Bulbs: pear-shaped, 18-40 mm long, 15-30 mm wide, inside white; tunic deep purple. Roots white, annual and unbranched.

Leaves: dark green, 3-8, appear shortly before flowering, broadly linear, pointed, shallowly grooved, smooth, up to 25 cm long, 0.7-2 cm wide.

Scapes: 1-4, semi-globose in cross-section, 18-27 cm long, thick, with 2-6(-16) flowers on each scape.

Pedicels: spreading to slightly nodding, 8-16 mm long.

Bracts: spurred, irregular, white to violet, 2-6 mm long, 2-3 mm wide.

Perianth segments: 6, in two whorls, reflexed, closing during rain and at night, (12-)15-17 mm long, 2-3 mm wide, the outside "Wedgewood Blue", the midvein and at the base "Light Cadet Blue", tips greenish; the inside "Wedgewood Blue" with a threadlike blue midrib; remain attached to ovary when faded.

Stamens: filaments – thread-like with a narrowing in the lower third, tapering, 8-10 mm long, in the lower third very thin and transparent, flattened, violet in lower part, tightly enclosing the ovary, shortly above the tip of the ovary widening and becoming pure white, parallely edged or gradually narrowing to almost filiform just below the anthers; anthers – "Prussian Blue"; pollens – blue.

Ovary: bluish green, spherical (with basal edges), light green, with two spherical ovules per locule.

Style: thin, white to whitish, 7-9 mm long, stigma white or slightly bluish toned.

Capsule: nearly subglobose, ca. 7 mm in diameter.

Seeds: subglobose, fresh 1.2-2.2 mm in diameter, black, without elaiosome; testa smooth, germination epigeal.

[[2]The description of *F. gorganica* is prepared using the original description by F. Speta [8], only slightly modified according to our observations on cultivated plants.]

Key to the identification of the genus *Fessia* species

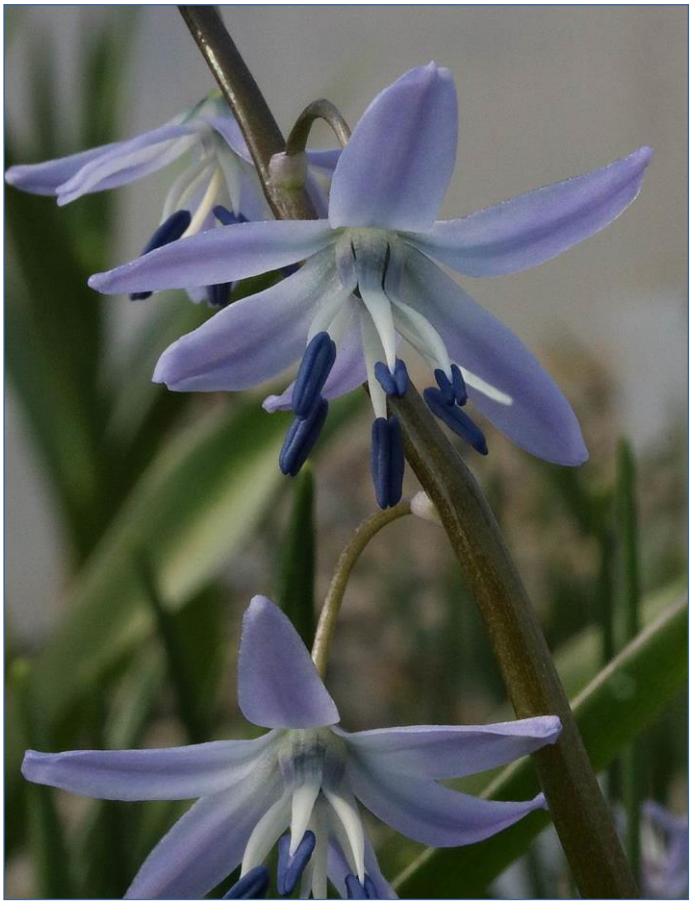
[by 8, 9; modified by Rukšāns and Zubov]

1 Leaves appearing in autumn
- 2 Scape with 4-10 light purple flowers, style 9-12 mm long, filaments 10 mm long, flower segments 15-20 mm long ……..……..... *F. greilhuberi*
- 2 Scape with 10-20 (-25) flowers, style 6-7 (-10) mm long, filaments 7-8 mm long, flower segments 12-15 mm long …….... *F. purpurea* (syn. *S. griffithii* Hochr.)

1 Leaves appear in spring
- 3 Flower segments white with a dirty blue midrib, (8-)10-13 mm long, style 6-8 mm long, pedicels 1.5-3 mm long ……..... *F. puschkinioides*
- 3 Flower segments lilac purple, bluish, less often white (then pedicels at least 3 mm long, usually distinctly longer)
  - 4 Bulb tunic outside purple
    - 5 Flower stem one, erect, with 2-10 flowers on 3-6 (-10) mm long pedicels, flower segments 8-12 mm long, style 5-8 mm long, filaments 6-8 mm long, flowers distinctly blue ……. …… *F. khorassanica*
    - 5 Flower stems more than one, recumbent, pedicels 8-16 mm long, flower segments (12-)15-17 mm long, style 7-9(-10) mm long, filaments 8-10 mm long, flowers bluish, less often white …… *F. gorganica*
  - 4 Bulb tunic outside silvery grey or light brown, leaves up to 3 mm wide
    - 6 Flower segments 9-10 mm long, bulb tunics light brown …… *F. parwanica*
    - 6 Flower segments 14-21 mm long, bulb tunics silvery grey..... *F. raewskiana*
  - 4 Bulb tunic outside whitish, greyish or light brown, but not purple, leaves distinctly wider
    - 7 Scapes with nodding tips, pedicels (5)7-17(-25) mm long, bent downwards……..……..... *F. vvedenskyi*
    - 7 Scapes erect or recumbent without nodding tips
      - 8 Flowers distinctly purple ……...…..…….. *F. furseorum*
      - 8 Flowers light to pale blue or bluish, rarely white

- 9 Leaves 6-9(-12), flowers remain half- open *F. bisotunensis*
- 9 Leaves 2-6, flowers open star-like
  - 10 Scapes erect …… *F. assadii*
  - 10 Scapes recumbent
    - 11 Flowers 2-4(5), pedicels up to 8-12(-15) mm long, flower segments spreading *F. olangensis*
    - 11 Flowers 2-7, pedicels 10-25 mm long, flower segments +/- recurved *F. hohenackeri*

Fig.31: *Fessia gorganica* bract (16IRS-141), Olang gorge.



Figs.32 and 33: *Fessia gorganica* (Olang gorge) flowers, showing shape and colour of filaments.

Figs 34 and 35: *Fessia gorganica* flower details - shape and colour of filaments and style.

Acknowledgments

First of all we want to express our greatest thanks to all our travel partners to the Iran mountains – they are too many to be listed here, but everyone is remembered, especially we are thankful to our guides and car drivers who solved all problems along our trips. We are also grateful to our friends and correspondents for their shared opinions and experience: Henrik Zetterlund (Gothenburg Botanical Garden, Sweden), Arnis Seisums (National Botanic Garden, Latvia), Tony Hall (Kew, UK), John Ingham (UK) and others for the help in our researches and expressed opinions, shared literature and herbarium scans. In addition, we are especially thankful to our families in particular for their hard work at the garden during our absence while in the mountains.

Fig.36: The authors: Zubov & Ruksans with *Crocus puringii* in Baidar valley, Crimea, Ukraine.

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---Plant Portrait---

Calandrinia umbellata by Frankie Wulleman

A lot of our alpine plants in the rockgarden bloom in springtime. So, it's not always easy to have a colourful rockgarden in summertime. You have to search for some plants which can flower in that period. *Calandrinia umbellata* is such a plant.

This plant is not well known by most people and I can't understand why that should be. It belongs to the family of the Portulacaceae. You can find this plant in South America, especially in Chile, Peru and Argentina. It grows in dry and warm habitats, such as deserts and rocky places. That's why it must really be a good rockgarden plant for the Czech gardens with their dry and warm summers. *Calandrinia umbellata* is a small plant for any garden or trough, making a size of 10 cm high and 15 cm wide. The linear leaves are 5 cm long and they are slightly hairy. The flowers are dish-shaped and they are 12 mm wide. The colour of the flowers is really special: they are very bright, deep pink. A flashy thing to see! You almost need sunglasses to look at the flowers. The plant blooms in July, August and September.
You must give this plant a sunny place in a warm rockgarden. It does not like the shade. It will only bloom when it's warm enough and the flowers will open up when there is a lot of sunshine. In cloud weather, the flowers remain closed.
In wintertime, some plants can be lost, because they hate winter-wet. But that's not all bad because in springtime, seedlings will appear quickly in April or May. They grow very fast, and in the same

season, they will bloom. This is another good point for this plant: you will have a plant in flower every year. This *Calandrinia* cannot be divided so you can increase this plant only by seed. F.W.

---Plant Portrait---

The Blue Broom or Hedgehog Plant – Fritz Kummert

Erinacea anthyllis – the blue broom

When did I see my first Blue Broom, *Erinacea anthyllis* in flower? I don't remember. No doubt it must have been in the Alpengarten in the Belvedere in Vienna. I had read about it in 'Parey's Blumengärtnerei'.

My parents did not insist that I hand over some of my meagre pay as an apprentice towards Horticulture but my father did demand that I order 'Pareys Flower Gardening'. A new edition came out at that time; the pages were uncut when it arrived, but carefully, I opened them, wanting to read it to have something for my money.

A large world of plants opened before me, though not as exciting for me at the beginning with the fern plants as it later became with the flowering plants.

At the same time, the family camera, an Exakta Ihagee, was handed over to me. My mother had played the lottery just before the war and won enough to buy the camera and also basic darkroom equipment. Therefore, I also have a colour slide from 1943, as a baby, and a few pictures, showing snowy landscapes (my father was very sparing with explanations) from his work at the Alpine Fortress Ostmark on the Saualpe. There were many family pictures in black and white, but unfortunately they did not make it to later times.
Later, little was photographed, as it was too expensive. And at fourteen, I was allowed to take the camera over and it served me well. I even went so far as to buy a second body (with intact shutter!) which served as a spare parts store. I still remember taking it on a mountain hike with my fiancé at

the beginning of the seventies, just before my wedding in high winter. It was around -25 ° C and it was the only one of three cameras taking pictures. The others had not worked despite warming the batteries on our bodies. The Exakta had no batteries; everything went very slowly, since the lubricant had solidified! But it took pictures.

Erinacea anthyllis ‘Granada’ at Würzburg

Hedgehog plants in our own lists and in older textbooks

Thankfully many pictures, in black and white and in colour of these plants, were added to lists, otherwise we would have found nothing! I made for the first time in 1988 a black and white shot in the Viennese Alpine Garden in the Belvedere, in 1989 for the first time colour slides in nature, in the Sierra di Cazorla, and in 1992 colour slides of the full developed Mountain Heath in the Botanical Garden in Würzburg.

The textbooks available judged *Erinacea* very differently. My oldest ornamental book, the third edition of Bosse's 'Vollständiges Handbuch der Blumengärtnerei' (Complete Handbook of Flower Gardening) from 1860, suggests that the plants should be overwintered under glass in an unheated alpine house or cold frame and the pots set outdoors in the summer. 'Parey's Blumengärtnerei', 2nd edition, is also a bit cautious in terms of hardiness, speaking of protection against moisture in summer and winter.

Books on perennials did not mention every dwarf shrub; however Wehrhahn's was an exception. A separate section for dwarf woody shrubs is found only in 'perennials' by Wilhelm Mütze from a series that Wehrhahn would have known, from 1936. Mütze does not however, mention *Erinacea*. The woodland books usually mention the species, but do not seem to know its advantages! Usually they are positive about the hardiness of the blue-broom, provided that it was planted in stony soil in full sun.

The old textbooks also reminded me that the actual number of varieties listed was obviously larger in the past. Sometimes I imagine the nightmare as a teacher teaching young people plants without visual aids. For many years I worked as a lecturer at the University of Natural Resources and Applied Sciences and was able to fall back on the Türkenschanz Park, built in 1895, in which there are extensive plant collections. I asked for permission to visit the park with my students and received it! In the usual range of modern parks, I would probably not consider this possibility in 2080.

Erinacea anthyllis, Sierra Nevada, showing the spines.

The low-growing shrubs can reach up to 60 cm high and up to 3 m wide. They are very branched from the base, the angled, almost striped blue-green shoots stand upright, ending in a sharp point. The young shoots are covered in silvery, silky-hairs which they lose as they age. The lower leaves are opposite, the upper alternate, they are quite short-lived, 7-13 x 2-3 mm in size and ovate-lanceolate to spathulate, later the growth and feeding of the plants continues in the spikey shoots. The flowers are in pairs (1-4) in short inflorescences on the axils of the previous year's shoots, the calyx, up to 16 mm long, is inflated and quite durable. The pea-flowers are up to 20 x 8 mm in size and an unusual blue, very rarely pink or white in colour. The ten stamens are in three sets; 4 short, 3 medium long and 3 long. The pods are abundantly formed in culture; these are up to 20 mm long and usually contain four seeds. The flowering time in southern Spain depends on the altitude, at 1100 m it begins in late April or early May, the species rises to 2500 m, then blooms in June, and is found over limestone and dolomite; seldom over slate and silica-rich soils in areas of thorny cushion plants, the so-called “Hedgehog Zones” . The species is common in Spain and Portugal and a taller-growing subspecies is found in North Africa (Libya). In Central Europe, the Blue Broom is planted in most high-altitude Alpine gardens and does very well, planted in gravel or even in pure sand. It dislikes shade and confinement. My plants are in 80 to 120 cm of pure sand or sand-gravel mixtures. Our crevice garden is filled with pure quartz sand, so calcareous sand is not absolutely necessary.

Erinacea anthyllis at Sierra Magina.

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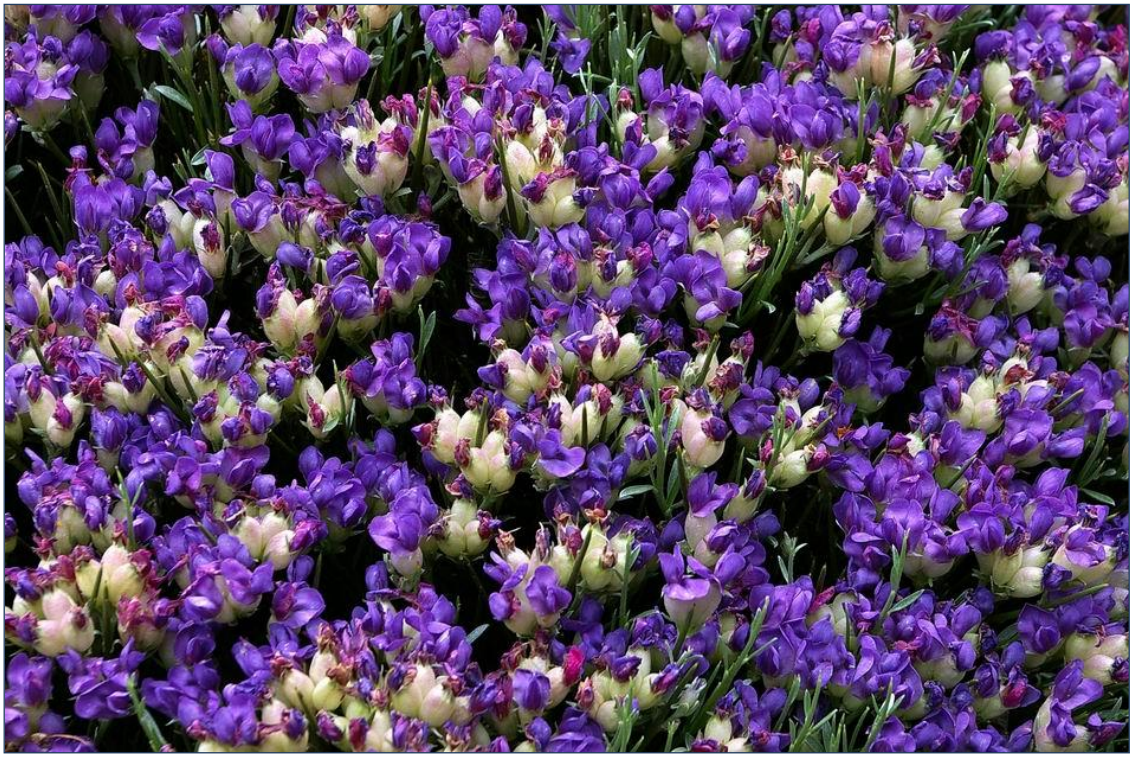
White form of *Erinacea anthyllis,* Granada, Sierra Nevada.

When you see large stands in full bloom for the first time, you are surprised by the variety of blue and violet shades. In culture, special shades are quite rare. The pure white 'Alba' is very rare, as are the magnificent selections of Michael Kammerlander.

I asked Michael Kammerlander to tell me something about the Würzburger Blauginster, he writes: "In 1970 I planted about six *Erinacea* in the rock garden of the Würzburg Botanic Garden, plants propagated by cuttings from the Botanic Garden of München. At the beginning of August 1972, I was on an excursion to southern Spain and brought with me some seeds from *Erinacea*, collected in the Sierra Nevada at 2100 metres above sea level. Around 1977, I planted six plants grown from this seed in the rock garden. One of these plants had a particularly intense colour. Hans Simon wanted cuttings from this plant, so in 1985 we gave it the varietal name 'Granada'. From the beginning of the 80s, many seedlings grew at this site through self-sowing. Around 1990 I called a particularly rich blue-violet seedling, 'Alhambra'. "



Close-up of *Erinacea anthyllis* 'Granada'

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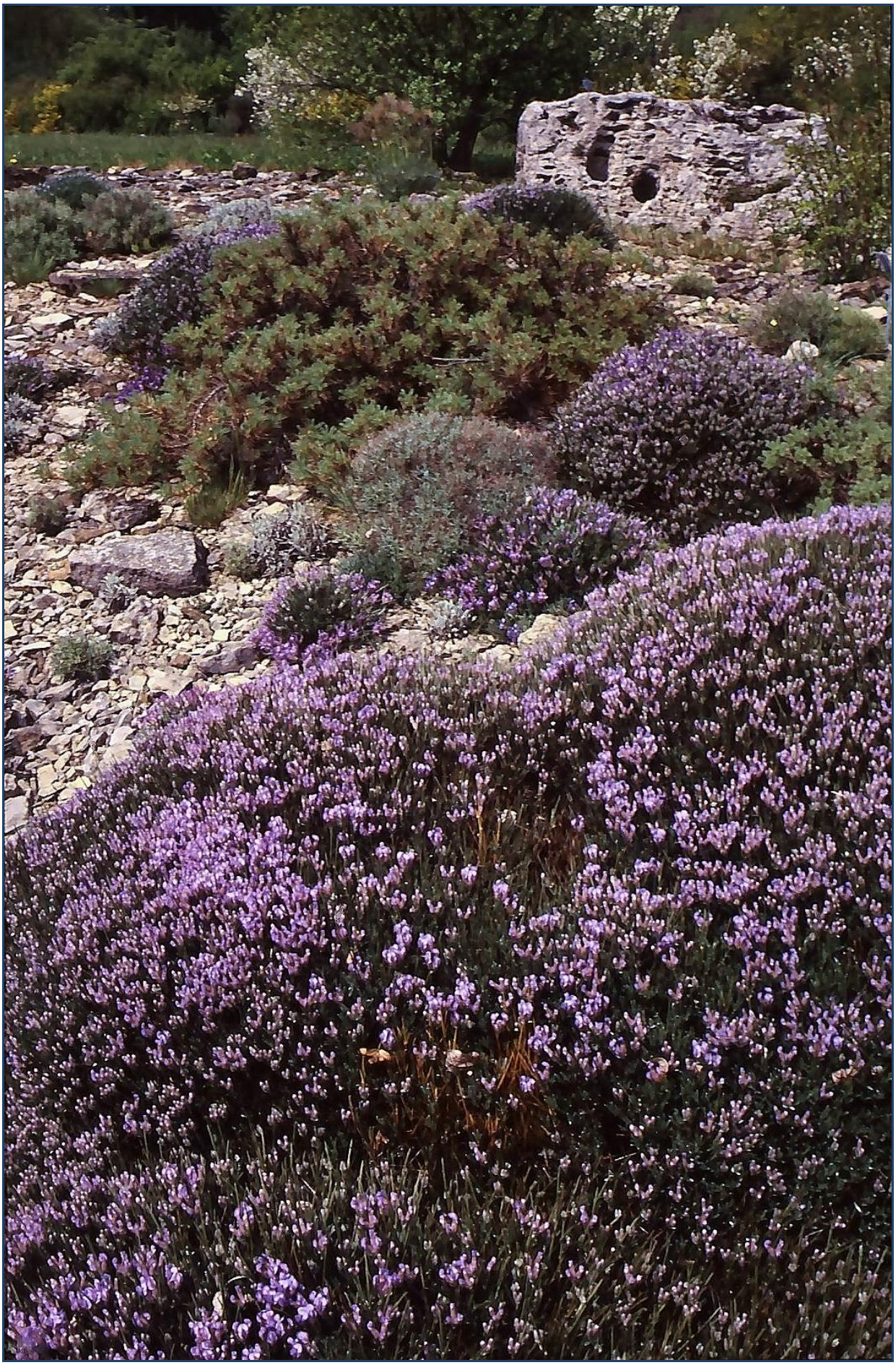

Planting of *Erinacea* in the Botanical Garden of Würzburg

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Typical “hedgehog zone”

The area of El Torcal in Malaga is a rich centre of diversity in *Erinacea anthyllis* colour forms - with striking scenery as well!

My wife Sefi and I have seen many beautiful blue tones but the colour of 'Granada' or 'Alhambra' is not found in nature. We have very rarely found any pure white plants and, at a single location in the province of Malaga, blooming specimens of a cloudy rose colour. The most beautiful we have taken into culture and called 'Andalusian Rose'. We are still missing beautiful pure blue examples with silvery hairs. When you get to know the species better, you also notice that there are flat-growing, spreading or upright growing, more compact-looking types.

The rosy-lilac form F&JK0823 – *Erinacea anthyllis* ‘Andalusian Rose’

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Erinacea anthyllis ‘Andalusian Rose’, *Daphne collina* and *Atraphaxis spinosa* in the garden.

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Sefi Kummert at El Torcal.

The rosy-lilac form at El Torcal - *Erinacea anthyllis* F&JK0823

In El Torcal Park

Erinacea anthyllis at El Torcal – with limestone rocks.

Variation in colour forms from El Torcal:

Further colour variations from El Torcal:

Propagation by October cuttings in pure sand is easy. At the end of June, the trays, which have kept under the bench in the Alpine house, and topped off with a glass or plastic cover, are best potted into 7 × 7 × 9 cm containers. The percentages of growth vary a lot; usually you get to 60 to 70%. If you have to take cuttings during flowering, you need to be satisfied with 5%! Handle them carefully; they often only make a single root.

Cutting material.

Seedlings.

You can also propagate wonderfully by sowing. I understand from my Sowing Record that I was already harvesting and sowing Seeds from my own Plants in 1976. They didn't germinate, though. There's no Seed Treatment noted, so I didn't know yet that if you don't sow until spring they react very well to hot Water Treatment. Seedlings bloom after three to four years; cuttings also take three years to get to the first bloom.

I have made some vegetation surveys in the lower reaches of the Sierra Nevada, where wonderful examples of long-lived gravel plantations can be found.The downside of these plantings is that many of these plants are not or only rarely commercially available. Blue Brooms are often found there, and we could wish for this long-lived plant in our gardens. It is one of the most beautiful and rewarding brooms for larger sunny rock gardens and it is a pure coincidence that *Genista horrida* (*Echinospartum horridum*) still lives from the original planting of 1865 in the oldest rock garden in the world, the Alpine Garden in the Belvedere in Vienna but not the lovely Blue Broom! F.K.

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