VIOLA SUBGENUS NEOANDINIUM, PRELIMINARY MONOGRAPH

Published by Scottish Rock Garden Club with
International Rock Gardener ISSN 2053-7557
Second Edition

John Michael Watson, Ana Rosa Flores, Marcela Viviana Nicola and Thomas Marcussen.

VIOLA SUBGENUS *NEOANDINIUM*, PRELIMINARY MONOGRAPH

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

VIOLA SUBGENUS *NEOANDINIUM* PRELIMINARY MONOGRAPH

[1]John Michael Watson, [1]Ana Rosa Flores, [2]Marcela Viviana Nicola & [3]Thomas Marcussen.

[1]Email: john.anita.watson@gmail.com
Casilla 161, Los Andes, Aconcagua Province, Valparaiso Region, Chile.

[2] Email: mnicola@darwin.edu.ar
Instituto de Botánica Darwinion (IBODA, CONICET- ANCEFN), Labardén 200, Casilla de Correo 22, B1642HYD, San Isidro, Buenos Aires,
Argentina.

[3]Email: thmsmrcssn@gmail.com
CEES, Department of Biosciences, University of Oslo, P.O. Box 1066, Blindern, NO-0316, Oslo, Norway.

N.B. *Viola* subgenus *Neoandinium* Marcussen vs. *Viola* subgenus *Andinium* (W. Becker) Marcussen note.
We originally published this infrageneric name as *Viola* subgenus *Andinium* (W. Becker) Marcussen in the IRG special issue of October last year (2021), but for technical reasons I won't go into here our academic colleague and coauthor Thomas Marcussen discovered that our definition did not comply with Becker's 1925 original. He therefore altered it to the new version Viola subgenus Neoandinium Marcussen which has also been published in the IRG as a replacement, and is correct. *Viola* subgenus *Andinium* (W. Becker) Marcussen should therefore be ignored. J. M. W.

[Cover image *Viola aurata*, photo Ana Rosa Flores.]

Foreword : John M. Watson

So how did I happen to become to be involved with these South American Andinopacific rosulate violas [*Viola* subgen. *Neoandinium* (W. Becker) Marcussen] up to my eyebrows?

It might reasonably be presumed that to begin with I had an innate interest in natural history, excelled at science at school, in particular biology, and passed the examinations and interviews required to enter university as a botany student with flying colours. From there that my career continued in the herbarium of a botanical garden. Early on in that academic employment I searched for a relatively little known group of plants to study for my doctorate thesis, and someone recommended these violas to me, which I learned had been virtually ignored since the death of their last authority in 1928. Everything followed on logically from there including meeting Anita, a Chilean taxonomic botanist too, while I was familiarising myself with the subgenus in situ in Andean South America. Unlike others who have studied particular groups for a thesis and then no longer taken an interest in them, my passion for rosulate violas continued. Finally, it all tied up neatly by a qualified Anita and myself forming our life and working partnership. [figs.14a-14c].

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Except for an intense attraction to wildlife, nothing of the early part of that hypothesis could be further from the truth! Despite coming from completely different class backgrounds both my parents also had a deep-rooted interest in natural history dating back to long before they met, so the three of us shared a profound common passion. That was of particular value to me as I grew up. Our home bookshelves contained a number of books on various aspects of nature, among them one on British wildflowers [fig.1].


SWEET VIOLET.

THE SWEET VIOLET.

Viola odorata. Nat. Ord., Violaceæ.

SCARCELY any wild flower is so well known or such a general favourite as the sweet violet, the *Viola odorata* of the botanist. Its fragrance betrays it to the rambler by the country hedge-side, and has made it no less attractive to the townsman, for whose benefit hundreds of thousands of its flowers are regularly cultivated, the sale of which has become a recognised street industry.

The generic title has been by some writers assigned a Celtic origin, but as the plant is in Latin *Viola*, we need hardly, perhaps, look much farther afield for a derivation. The name was first bestowed on the genus by the great Linnæus, and as by far the greater number of the names he assigned to various plants are either Latin or Greek in their origin, we may reasonably assume that in the present case he more probably went to a classic than a Celtic source. *Odorata*, the specific name, also Latin, we need scarcely

5

1) *Viola odorata* on my parents' bookshelves. (JMW)

From a very early age an illustration of *Viola odorata* in this became one of my favourites. Cigarette card series were in vogue while I was young and a passion for collecting them grew in me. They covered many subjects, including cultivated plants, and the appeal of violas developing in me was strengthened by delightful cards of pansies in one of these.

2) Violas (pansies) on historic collectable cigarette cards. (JMW)

The family home in the leafy suburbs south of London which they bought just before I was born was newly built for them, and a garden had to be created from scratch.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

As a result they developed another penchant - for gardening. Among the floral contents they planted were those same colourful pansies [fig.3a], which fed my growing enthusiasm.

3a) A garden pansy. (JMW)

Then at age ten I suffered a shattering personal blow. I was found to be badly short-sighted and had to wear glasses. Higher education revealed me to be an utter dummy at science. Languages were my forte. In fact that ability proved surprisingly useful for understanding botanical Latin and other descriptions. As my schooling progressed and the demands of heavy study increased, my eyesight deteriorated rapidly and I was having to change to stronger lenses with alarming frequency. By now my interest in plants had focussed on the rock garden at home with its delightful and colourful dwarf mountain flowers, and growing these was taking up more and more of my spare time. I was seventeen and had to make a decision on my future before being called up for two years of military service. It was decided with the full agreement and support of my parents that an outdoor career in horticulture was the solution to my visual problems. Meanwhile I had come upon a book by a famous gardener who explored for wild plants in foreign countries. It lit an unquenchable fire in me to follow the same path. Until such time as that might be possible I kept my eye in by growing plants on the rock garden, where my pre-plant hunting affair with violas peaked when I fell in love with the pure orange pansy 'Chantreyland'. It came from Robinsons Hardy Plants, the nursery where I worked part-time for plants as payment.

3b) 'Chantreyland', the eye-catching orange pansy (Courtesy of the Internet)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

So in 1962, following several years in horticulture culminating in a course, I set off alone in a little Morris Minor station wagon for a two month exploration of Turkey and the Lebanon. Although my main interest at the time was orchids, I was thrilled to find my first wild violets and pansies.

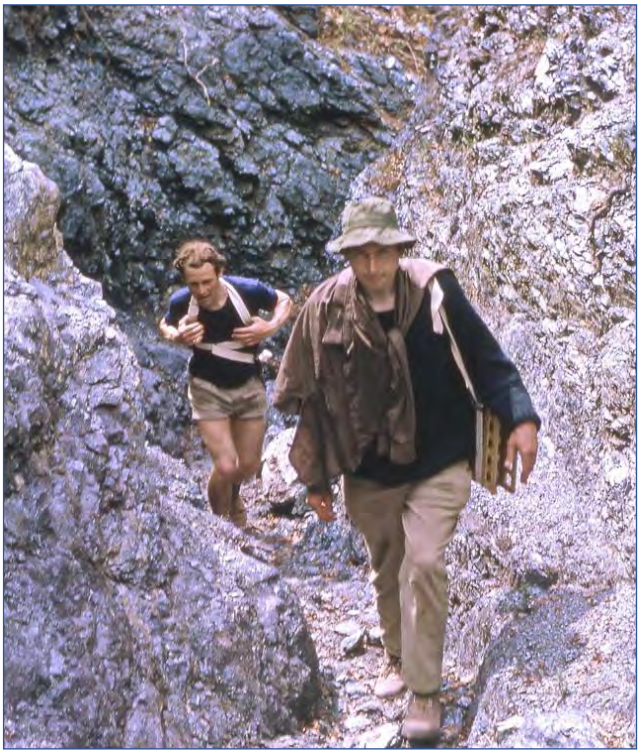
4) Mount Lebanon. (William Ellwanger)

Left: 5) *Viola libanotica* Boiss. April 1962. (JMW)

Right: 6) *Viola sieheana* W. Becker. Pontic Alps, N Turkey. May 1964. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

7) *Viola oreades* M. Bieb. Pontic Alps of N Turkey. May 1964. (JMW)



8a) Our early days. Yours truly following his collecting partner, the late, lamented Martyn Cheese. South Turkey, April 1966. (Sydney Albury)

8b) August 2005. The same two mulling over old times in Martyn Cheese's garden at Lee Downs, North Devon. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

9) Sydney Albury (seated, left) and Martyn Cheese, Turkey, 1966. (JMW)

The success of that first venture encouraged me to plan more ambitious collecting trips accompanied by others. It was while planning the second of these in 1965 at the house of one of those colleagues that he showed me a gardening book with black and white photos of rosulate violas taken in Patagonia [fig.10]. The die was cast. They became one of our main targets during a first exploration of Chile in 1971 and 1972 [figs.11-13].

10) *Viola coronifera* photographed at the moment of its discovery in Argentinian Patagonia. December 1926. (Harold Comber)

11) Our first rosulate encounter: *Viola atropurpurea* still in bud at the main road and rail pass (the latter now disused) to Argentina. November 1971. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

This was followed by another in 1988 and 1989 which included Patagonia, and was when Anita and I met [fig.14a]. It is certainly true that she had taken a university course in biology, went on to teach that subject, and then investigated botany academically with the intention of obtaining a doctorate. Poor Anita: tying up with me wrecked that sensible plan! From 1992, after a period of lengthy herbarium study, we decided to adopt subgen. *Neoandinium* as our principle focus of study, which has intensified to the present, above all after we become permanent residents of Chile in 1997.

12) This is how our first view of a rosulate viola, *Viola atropurpurea*, looked, but with a few buds. (Photo anon, courtesy of the Internet)

13) And this was the first Andean viola we ever saw in flower shortly afterwards, *Viola montagnei*, with its tiny dark corollas. December 1971. (JMW)

Note: I should point out that the above refers to the broad layout and main contents of the following by Anita and myself, as our professional fellow coauthors, Marcela and Thomas, have corrected 'technical' aspects in places and also added their own valuable data. J. W.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

14a) We were young once in body as well as in spirit. JMW and ARF. 1995. (Photo Marcela Ferreyra)

14b) Still together and still going flat out at the violas, even if more on paper these days than in the field as was here in December 2013. (Helga Petterson)

14c) The work continues. Watch this space. (Photo anon)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Why 'Preliminary'?

The present work will be an undeniable and vital landmark in the published advancement of scientific knowledge of this large, endemic South American subgenus of *Viola*. It is the only thorough coverage of the alliance after those by Reiche (1893, 1895, 1896), which were limited to Chile, and no previous review of the section as a whole exists other than the brief 'thumbnail sketch' by Becker (1925b).

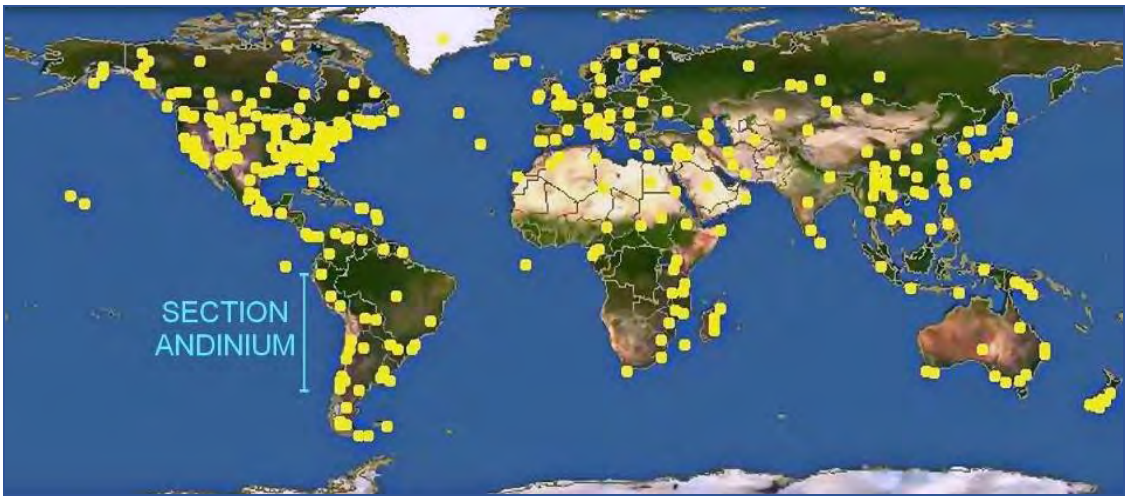
So without detracting from its fundamental importance in any way we should point out that although it covers a wide range of aspects, this attempt is still short of complete, above all for lacking formal written descriptions of the taxa listed. Inter alia it also requires future technological input in the form of the widest possible selection of molecular analyses to affirm or correct the relationships we propose here. Finally, a 'pukka' scientific monograph needs to be presented in a strictly scientific format, without the side-tracking, idiosyncratic self-indulgencies we have tacked on here!

Nevertheless, above everything else, the most urgent issue was for Anita and myself to get all our accumulated data ‘on the road’ as soon as possible, which has been the governing impulse for our decision to produce this semi-informal monograph.

The genus *Viola* L.

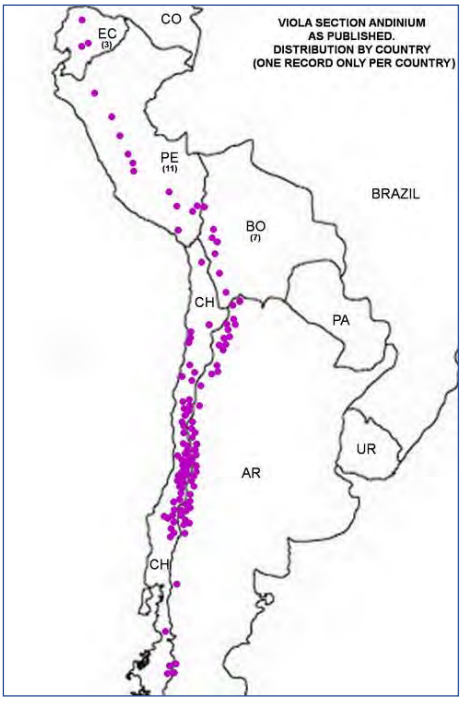
Viola is cosmopolitan and of mainly temperate and high tropical mountain distribution [fig.15]. With an estimated accepted 650 published and unpublished species it is the largest genus of its family, Violaceae Batsch, and consists of thirty sections, twenty endemic to the Northern Hemisphere (Wahlert et al. 2014, Watson & Flores 2019f, Marcussen et al., ms). The genus has been found by investigating authorities to have evolved ca. 35 Ma 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). The location of this early branching from the rest of the family has led to the conclusion that species of the earliest offshoots of the genus exist in the subcontinent in three of its systematic groups, two of which, including the one covered here, are endemic, the third being mainly distributed there as well.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557



15) World distribution of the genus *Viola* with the position and extent of subgenus *Neoandinium* indicated. (Courtesy of the Internet)

16) The extent of subgenus *Neoandinium* and countries it inhabits. Only one record of any taxon has been included per country. (Courtesy of the Internet)



Viola subgenus *Neoandinium* (W. Becker) Marcussen, stat. nov.

Basionym: *Viola* sect. *Andinium* W. Becker, Die natürlichen Pflanzenfamilien, Zweite Auflage 21: 374. 1925.

Syn.: Division *Rosulatae* Reiche, *Violae chilenses*. Ein Beitrag zur Systematik der Gattung *Viola*. Botanischer Jahrbücher für Systematik 16: 406. 1893, *nom. illeg*.

Type species: *Viola pygmaea* Juss. ex Poir., Encycl. 8: 630. 1808.

Distribution: The alliance covered in this work is endemic to western South America from Ecuador to Argentina.

Its 111 published taxa which have been published to date and are recognised by ourselves (IPNI 2021, Watson & Flores, as listed below), together with others waiting to be described or collected, are known coloquially as the Andean rosulate violas. With a distribution between the equator and southern Patagonia, a distance of ca. 5500 km when following the line of the Andes [fig.16], their full discovered complement amounts to a total of something over 150

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

species. This includes at least 38 known either as specimens, or in a few instances reliable photographs, which are as yet unpublished (Watson & Flores ined.).

Marcussen et al. (2015) have been able to calculate via the medium of molecular analysis that the evolutionary split of this division from the rest of the genus occurred as early as 29 Ma ago. That revelation, together with the specialised adaptation of these species to developing Andean uplift and more recent Mediterranean geoclimatic conditions, provides an explanation as to why so many of its taxa are uniquely unlike all other species of *Viola* in overall appearance (Watson & Flores 2012a, 2013a, 2013c). Furthermore, its long period of existence has enabled the development of a considerable range of physiological variations. Although there are important morphological disconnections with the early shrubby South American sections of *Viola*, i.e. the more northerly and widespread sect. *Leptidium* Ging. and the sympatric sect. *Rubellium* W. Becker, and the South African Cape ined. sect. *Melvio* Marcussen (ined.), phylogenies demonstrate that subgen. *Neoted* probably evolved from ancestors of these. *Viola fluehmannii* Phil. [fig.17] is shrubby, the only such example of these Andinopacific species still extant, and nothing else remotely similar in the genus as a whole exists at present from which it might otherwise have evolved. It may be reasonably assumed, bearing in mind the violent volcanic eruptions and rapid climate change in their area of origin, that all other early intermediate species were extinguished.

17) *Viola fluehmannii*: species elevation range: 1500-2500 m. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Reiche (1893) only had a restricted number of these Andinopacific violas to evaluate, those of Chile. Details of some important ones among those are not included in his definition:
"Eine zweite Gruppe ist dadurch gekennzeichnet, dass die Stiele der ausserordentlich gedrängt stehenden Blättern sich gegen das Ende des Stegels hin wesentlich verkürtzen, so dass es zur Bildung einer regelmässig, gebauten Rosette kommt, deren Centrum häufig im Grunde eines von den älteren, länger gestielten Blättern gebildeten Trichters liegt; es sind die *Violae rosulatae*." [= A second group is characterized by the stalks of the densely crowded leaves being considerably shortened towards the end of the shoot, resulting in the formation of a symmetrical rosette, the centre of which is often at the bottom of a depression formed by the older, longer-stalked leaves; these are the *Violae rosulatae*.]
In his key and descriptive section Reiche splits his division into *Annuae* and *Perennes*, but it is not clear whether this division was intended to be taxonomical or purely for convenience. In a paper written in 1890 but published later (Reiche 1895), his divisions are redesignated as sections, which is the legitimate rank now authorized by the ICN (Turland et al. 2018).

The later more authoritative and inclusive formal version of Becker (1925b) contains the protologue of what was then his section:
"Sekt. XI, *Andinium* W. Beckr. ined. Wurzelstock +/- senkrecht tief in die Erde gehend, im oberen Teile geteilt oder ungeteilt, meist regelmässig gebaute und dicht beblätterte Blattrosetten bildend; Achse der Rosette zuweilen +/- verlängert; jugendliche Blätter nicht eingerollt; Stip. meist häutig und klein oder fehlend; Bluten oft sehr zahreich, die Blätter nicht oder wenig überragend; Stylus keulenförmig, mit meist deutlichem Narbenschnabel und sehr verschieden gestalteten Anhängseln; aber auch ohne diese. ... Reiche l. c. geliedert die Gruppe in Untergruppen *Annuae* und *Perennes*." [= Sect. XI, *Andinium* W. Beckr. ined. Rhizome extending +/- vertically, deep into the ground, branched or undivided in the upper part, usually forming regularly composed and densely leaved rosettes; The axis of the rosette is sometimes +/- extended; juvenile leaves not convolute; stipules mostly membranous and small or absent; flowers often very numerous, only slightly or not exceeding the leaves; Style club-shaped with a distinct perforated rostrum and possessing a variety of very differently shaped appendages; but also without these. ... Reiche (loc. cit.) divided the group into the subgroups *Annuae* and *Perennes*.]

As can be seen from the following paragraph, a few anomalous but important subgen. *Neoandinium* species are not covered by either of these definitions.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

We can therefore expand the circumscriptions of Reiche and Becker as follows. These taxa differ from those of subgenus *Viola* by some critical combination of several morphological characters. The most widespread and important is the floral style crest, i.e. one, two or three well-developed lobes or flanges at the sides and/or on top of the swollen style apex. Very few other taxa exhibit this feature to any noticeable degree. The juvenile leaves are always plane, not laterally upcurved or involute, as with others in the genus and family. The next diagnostic character is a rosulate growth form with all the leaves emanating in a tight or loose spiral from one central axis, which is almost always a subacaulous caudex arising from an axial rootstock. It is this that has given them the popular name of rosulate violas. A very few species differ to a degree by a cauline habit. In this case all but one bear rosettes at the tip of the shoot, and for two also as sterile outgrowths at the base of the plant. The species considered here to have retained the most ancestral morphology is the dwarf ericoid shrublet *V. fluehmannii* [fig.17]. However it otherwise complies with the section in all critical respects bar the absence of rosettes. The final important aspect which is present for every taxon of this systematic aggregation without exception is production of a more or less level inflorescence ring, or else two or more very proximate parallel rings, of solitary flowers on short peduncles, either around the circumference of the rosette or rarely at the tip of the of the fertile shoot. The floral production of these may be simultaneous or consecutive.

18) *Viola dyris*: (Alan Keohane)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Concerning this context a most interesting and very relevant example of parallel evolution exists in the High Atlas mountains of North Africa. A single species there of sect. *Melanium* DC. ex Ging. (known popularly as pansies), *Viola dyris* Maire (1921) [fig.18], has adapted to alpine levels by means of a morphology equivalent to the Andean species of *Andinium*. It forms depressed, stemless rosettes with subimbricate rounded laminas. Flowers and capsule formation are also directly at the circumference of the foliage. But there the morphological similarity ends, as in other respects the African plant resembles sect. *Melanium* species in general. Although their adaptation is equivalent, the environmental geoclimatic backgrounds of *V. dyris* and the upper Andean taxa are totally distinct. The former is a very recent inhabitant of a stable, long established high mountain range surrounded by dry Mediterranean and semi-desert lowlands, whereas the taxonomic affiliation herein arose many millions of years earlier in terrain where active volcanic orogeny in combination with a changing climate was rapidly replacing almost continuous tree cover, as noted above.

Subgenus *Neoandinium*; its chronological scientific history

Informed human knowledge of these Andinopacific violas began with the discovery and publication of *V. pygmaea* Poir. (1808) [fig.19] It had been collected by the French naturalist Joseph de Jussieu in Peru. By a remarkable coincidence it was also described in that same year from their own specimen, also Peruvian, by the famous South American expedition team of Ruiz, Pavon and Dombey. But whichever had temporal priority is irrelevant, as the latter had been given the illegal homonym of *V. alpina*, an epithet which had already been applied four and a half decades earlier to a European species.

19 *Viola pygmaea*
3000-4900 m. (Photo anon, courtesy of the Internet).

Sixteen years elapsed before the next species, *V. cotyledon* Ging. (1824) [fig. 86], was described. It had been collected in Argentina and appeared in Gingins's overview of the genus, the first such to be published.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

20) *Viola cotyledon:* lateral style crest for comparison with that of similar *V. aizoon*. (ARF)

More species now began to be encountered at closer intervals, including the first Chilean endemic, *V. pusilla* Poepp. (1829) [fig.152]. John Gillies, a former British naval surgeon, moved to Argentina for health reasons and became a botanical explorer in that country, sending his specimens to a partnership of renowned Scottish and English botanists, who published two rosulate species as *V. congesta* Gillies ex Hook. & Arn. (1833) [figs. 80,81,203] and *V. volcanica* Gillies ex Hook. & Arn. (1833) [fig.191], both epithets having been created by Gillies himself. Between then and 1846 three more new species were described, two from Chile, the other from Ecuador. One of the former pair was another discovery by the first significant botanical explorer in Chile, the German Eduard Poeppig.

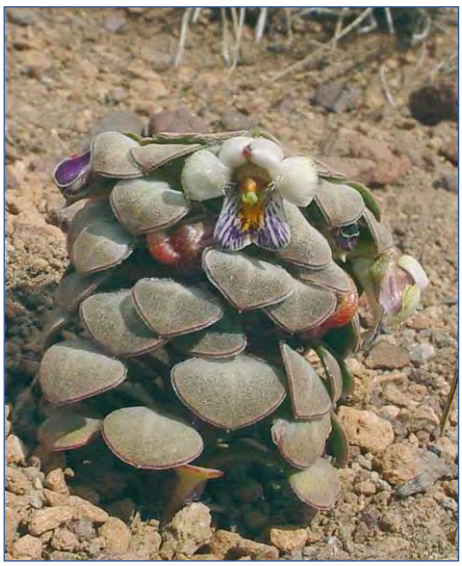
21) A wintery view of the subandean Chacabuco Pass habitat of *V. pusilla* near our home (John and Anita) at Los Andes in central Chile (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

The commencement of a new and important era in the developing accumulation of these violas was marked when the Chilean government commissioned a French naturalist, Claudio [Claude] Gay (1800-1873). His assignment was to explore the country thoroughly and widely, collecting and describing plants and other living organisms inter alia.

He edited and part-authored an eight volume flora which included the genus *Viola* (Gay 1846), where he described four species of the subgenus, two of them, *V. domeikoana* Gay (1846) [figs.22, 95] and *V. montagnei* Gay (1846) [fig.142], common and important elements of the country's wildflower inventory. The total of known *Neoandinium* category violas up to and including those of Gay amounted to eight from Chile, three from Argentina and one each from Peru and Ecuador.

22) *Viola domeikoana*: species elevation range: 3000-4100 m. (Kees Jan van Zwienen)



23) *Viola leyboldiana*: species elevation range 2750-3050 m. (JMW)

A whole decade without new taxa followed until in 1857 two trained academics of German origin took up residence in Chile and between them increased the published *Viola* flora in that country dramatically over the next forty years.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

One, Rodolfo Amando [Rudolph Amandus] Philippi (1808-1904), stands as the most prolific collector and publisher ever of the Chilean flora as a whole, including *Viola*.
Although this dedicated man was a tireless explorer himself, he received many specimens which had been collected by friends, colleagues and contacts who lived in various regions of the country or moved around there for one reason or another. Most or all of these he gratefully immortalized by publishing their names as the epithets of plants they had collected, not least violas. His collaborators amount in total to an almost unbelievable 69 persons (Muñoz 1960)! Just under half of them are well-known to some degree by those familiar with scientific names of the Chilean flora, a number with their surnames given to species of various genera they had collected.

Three violas listed below are commemorated with species homonyms. *V. leyboldiana* Phil. (1864) [fig.23] honours his botanical colleague Leybold [details as follow].
One of his 'regulars' in the south of Chile, Gustavo Flühmann, also of German origin, provided another, the aforementioned *V. fluehmannii* Phil. (1892) [fig.17]. [It was published as *V. flühmanii*, but diacritics are no longer permitted in botanical epithets (Nicola et al. 2018, Turland et al. 2018).] The third, Rosario Godoy, memorialized as *V. godoyae* Phil. (1892) [fig.33], was the nature loving wife of a railway engineer constructing a connection to a mine in near-northern Atacama Region. She accompanied him there and discovered the species while exploring the sector.

The forementioned Federico [Friedrich] Leybold (1827-1879) was already an established botanist in Europe before he emigrated to Chile. He had published such a generally well-known plant as *Daphne petraea*. Once settled in Chile he picked the Andean violas as his speciality, and over the next forty years, in tandem with his friend and colleague Philippi, he collected and published a considerable number. In fact it almost seems as though they were competing to see who could achieve the greater total! From the time they started in 1857 until 1892 they went neck and neck with one of them never more than three ahead of the other at any time, but in the end Philippi 'won' by four clear species in his last two papers.

The best known and most frequently encountered of Leybold's species is the first he published, *V. atropurpurea* Leyb. (1858) [figs: 55, 56]. It also happens to be the first of these *Viola* taxa one of us [J.W.] encountered in the wild in 1971 [fig.12].

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

The impressive total of violas accumulated from Chile by then, including also those of the *Viola* sections *Chilenium*, *Rostratae*, *Rubellium*, and *Tridens*, and with one or two introduced adventives which had been recorded meanwhile, formed the contents of the first monograph of the genus as recorded from the country by Reiche (1893) another German resident botanist. His full name is Carlos Federico [Karl Friedrich] Reiche (1860-1929). Shortly after, it became the basis for the entry of the genus in volume 5, the last published of his uncompleted Spanish language 'Flora de Chile' (Reiche 1896). In conjunction, these two works form the first and prime source of coordinated reference to the present for the subgenus. A vital factor governing this is the predominance of its taxa in Chile: 63 species, as opposed to 55 in Argentina, 15 in Peru, 6 in Bolivia and 3 in Ecuador. The ultimate three of Reiche's Chilean total were in his Flora (Reiche 1896) but not his monograph, the last listed being the mysterious *V. nassauvioides* Phil. (1893) [fig.30].

After another period when no additional species were published, this one lasting thirteen years, Wilhelm Becker (1874-1928) of Berlin, the greatest all-time authority to date on the subgenus, made his entry onstage. He had already been deeply involved with studying *Viola* from other parts of the world. His first paper on the genus was published in 1898 and, by the time his life was cut short far too soon at the age of 54, he had totalled 114, including 13 on the *Viola* flora of South America (Görz 1929). His output of then recently discovered taxa was no less impressive, including 37 as accepted herein.

Augusto (August) Weberbauer (1871-1948), also an academic at Berlin-Dahlem [B], was a contemporary of Becker and probably knew him personally. In 1901 he was dispatched to Peru to further botanical research there, and remained as a resident in the country for the rest of his long life (Ochoa 2004). He began to assemble a collection of specimens during his field explorations and sent the violas to Becker. This stimulated the latter, who by then had already published 27 papers on *Viola* (Görz 1929), to describe his first seven South American violas Three, all of subgen. *Neoandinium*, were from Weberbauer, including *V. weberbaueri* W. Becker (1906). The remaining four had already been deposited earlier in the Berlin herbarium and included one other of the section, now relegated to synonymy.

A year later Becker (1907) wrote a monograph on the shrubby section *Leptidium*, which extends from subtropical South America up to the Caribbean islands. He covered 19 taxa of it, ten of them described in the paper by himself. This exercise, together with other specimens he

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

had examined in the herbarium, must have familiarised him mentally with a partial picture of the South American *Viola* flora.

24) *Viola kermesina*: species elevation range: 4000-4500 m. (Hamilton Beltran)

Shortly after, he published two more Peruvian species discovered by Weberbauer, including the uniquely distinctive *V. kermesina* W. Becker (1909) [fig.24] with its remarkable reddish crimson, bright pink or orange flowers, and this ended his first burst of South American involvement. Then followed a thirteen year gap before he renewed publication of taxa from the region. In part this was due to concentration on violas from other parts of the world, but he was also called up for obligatory military service during the First World War.

That period of Becker's inactivity as far as this subgenus is concerned was filled by the Swedish botanist and explorer Carl Skottsberg (1880-1963), who published in the same paper three new species he had discovered in southern Patagonia. These included *V. auricolor* [fig.25] Skottsb. (1916), the most southerly of this complex. He was the only other person to publish any of the subsection during the twenty two years between the first and last of Becker's.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

25) *Viola auricolor.* The southernmost of all the *Neoandinium* violas, here in Argentinian Patagonia. Species elevation range: 780-1200 m. (JMW)

In 1922 Becker resumed describing these species from South America. From then until his death in 1928 he produced seven papers on them at regular intervals as well as an overview of *Viola* in which he published his section *Andinium* to replace Reiche's formally unranked *Rosulatae*. It should be pointed out here that Becker never travelled to explore in the subcontinent himself, and all his specimens were sent by collectors on the spot, predominantly from Argentina. Like Philippi before him he described plants from others' specimens, in his case exclusively so, although his providers were far fewer in number. Also like Philippi, he registered his appreciation by rendering their names as specific homonyms. Thus, as well as *V. weberbaueri* we have *V. hieronymi* W. Becker (1922), *V. niederleinii* W. Becker (1922), *V. spegazzinii* W. Becker (1925), *V. joergensenii* W. Becker (1926) [fig.123], *V. lilloana* W. Becker (1926) and *V. rodriguezii* W. Becker (1926), the dedicatees of those being natives or residents of Argentina. The following three, *V. johnstonii* W. Becker (1927) [fig.124] [Chile], *V. comberi* W. Becker (1928) [Argentina, Patagonia], and *V. hillii* W. Becker (1928) [fig.120] [Peru], were collected by visitors from other countries. The first of them was an American botanist, the other two Englishmen, a plant hunter and an academic. In fact the latter taxa were among the seven of the section which appeared in the final paper before his sudden and unexpected death ended his output long before he had published all his accumulated knowledge

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

in the form of comprehensive monographs, as he surely intended. Becker is the all-time historical authority to date not only of these violas, but of the genus as a whole. To sum up his achievements with respect to the numerical contents of subgen. *Neoandinium*, he published a total of 36 taxa as recognised by us, 6 from Peru, 11 from Chile and 19 from Argentina, those last over a period of a mere 7 years. In fact they are certainly his most significant national contribution considering that only six had been described previously from collections made in that country during the previous 98 years!

Apart effectively from its presence in two significant regional floras (Macbride 1941, Rossow 1988), and one published species from Peru, *V. weibelii* Macbr. ex Baehni & Weibel (1941) [fig.31], the taxonomic alliance was ignored botanically for six and a half decades following the death of Becker in 1928, with specialised study of the infrageneric alliance as a whole not resumed effectively until the mid-1990s.

A combination of several reasons can be proposed for this prolonged neglect:

[1] It seems obvious that Becker must have been a 'loner' who trained no acolytes to continue his work.

[2] The destruction at Berlin-Dahlem by a bomb during a Second World War air raid of Becker's large and important *Viola* collection from around the world (Hiepko 1987, Haagemann & Zepernick 1993). A significant number of important sect. *Andinium* type specimens were eradicated, a few of them without duplicates of any kind to this day.

[3] Relatively little botanical exploration, either academic or amateur, took place in the countries concerned during the vacant period, none of its few protagonists in any case being knowledgeable about our taxonomic category here (Coats 1970, Watson & Flores ined.).

[4] It is a large, difficult, geographically widespread and remote alliance (Watson & Flores 2014b), and was very poorly understood at the time, with as many as 50 described taxa unknown in the wild then. Add to that the difficulty of distinguishing between some taxa, as voucher specimens even more so than living plants, and it hardly recommended itself as a subject for a doctorate thesis, a process which has resulted in the investigation and monographic publication of many genera and other allied groups from a variety of families.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

26) *Viola roigii*: species elevation range: 3000-3200 m. (Roberto Kiesling)

Ricardo Rossow (1956-1995) initiated the beginning of the 'modern renaissance era' by the publication of a new species from Argentina, *V. roigii* Rossow (1993) [fig.26]. Even so it was a slow start, with another decade gone by before the next recent novelty, also from Argentina, *V. exsul* J.M. Watson and A.R. Flores (2003) [figs.104-106], the first on our personal list. Two more of ours from Argentina followed before a distinctive little species from Peru hit the publicity limelight as one of the smallest known species of the genus, the appropriately named *V. lilliputana* Ballard & Iltis (2012) [fig.133]. Despite their frequency in a number of the larger subgenus *Viola* sections, no hybrids were recognised among these Andinopacific species until our *V.* ×*blaxlandiae* J.M. Watson & A.R. Flores (2012a) [fig.69] from Patagonia, named for the great friend and fellow devoted 'viologist' who introduced us to the academic world of the Violaceae (Watson 2012). Ironically, in contrast to a great many other 'lesser mortals', Becker, the all time authority of the genus, had no viola named for him, only a species of another unrelated genus. We rectified this shameful omission with our fourth Andean rosulate novelty, *V. beckeriana* J.M. Watson & A.R. Flores (2013b) [fig.67].

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

In the same year the Peruvian output was resumed by Paúl Gonzales (Gonzales 2013) with two rarities known only from their type site, as with so many of the subgenus.

27) The Andean ridge to the north of our house in Los Andes. (John and Anita). 32º41'S. (JMW)

Sixteen more hitherto undiscovered species have been published in quick succession over the last three years, all except one from Argentina and Chile. The 'odd one out' is another rarity of southern Peru. Two additional hybrids were included in the other fifteen, *V.* ×*josephii* J.M. Watson & A.R. Flores (2019) [figs.127-129] and *V.* ×*zwienenii* J.M Watson & A.R. Flores (2019) [figs.196, 197]. The most recently described novelty as this is written is *V. uniquissima* J.M. Watson & A.R. Flores (2020) [fig.189], although several more are in the process of being prepared for submission, or are awaiting attention.

Country by country the latest balance for the subgenus of endemic and native species stands at:

Chile **63**, 40 of those endemic.

Argentina **57**, 34 of those endemic.

Peru **15**, 11 of those endemic.

Bolivia **5**, all native.

Ecuador **3**, 1 of those endemic.

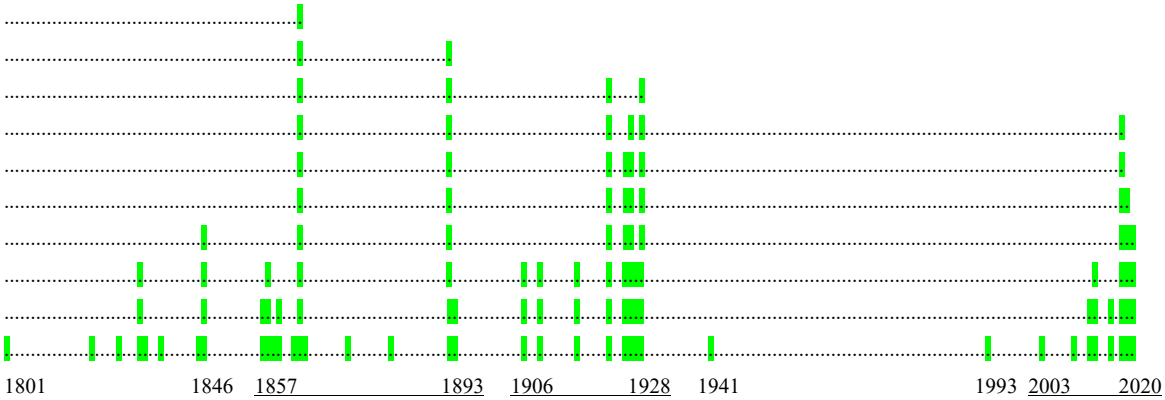
The spread of these may be seen on the accompanying map [fig.16].

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

NUMERICAL CHRONOLOGY OF SUBGEN. *NEOANDINIUM* TAXA

PUBLICATION AS RECORDED HEREIN

[The most active periods are underlined: i.e. 1857-1893, Philippi and Leybold; 1906-1928, Becker; 2003-2020, current resumption.]



Systematic publications of subgen. *Neoandinium*

Here we review national floras, relevant monographs, significant catalogue lists, and papers covering the origin and evolution of this taxonomic division. A few significant species are also mentioned. Our investigations have brought to light thirty-two publications in these categories.

The Swiss Frédéric Charles Jean Gingins de la Sarraz (1790-1863) was the first to monograph the genus *Viola* so far a it was known to that time; Gingins (1824). He was only able to include two species of the subgenus since those were all that had been discovered up to then. One of them he named and described himself.

During the first half of the Nineteenth Century extensive results of two early and important prominent pioneering explorations covering a number of South American countries were published. That led by Alexander von Humboldt (1769-1859) described in (Bonpland et. al. 1815-1825) contained new violas of relevance. The other, which details the discoveries in Chile of the German scientist Eduard Poeppig (1798-1868), as authored by himself and a colleague who did not accompany him (Poeppig & Endlicher 1838), described *V. rosulata* Poepp. & Endl. (1838) [fig.160], considered here to be the most ancestral species with foliar indumentum. It also included other species made known meanwhile, including **V. pusilla*

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Poepp. (1829) [fig.152], which holds priority over the homonymous species published by Hooker and Arnott four years later.

*The first taxon to make evident that apart from sect. *Melanium*, the pansies, this is the only alliance of the genus with both the violet and the yellow spectra of flower colours.

28) A typical Pacific littoral habitat of *V. pusilla* up beyond Coquimbo in near-northern Chile. (JMW)

A major advance occurred with the publication of the entry of 'Violeta – *Viola*' in the first Flora of Chile by Claudio Gay. He was the overall editor, but authored many families and genera himself, including *Viola* (Gay 1846). Despite only covering the genus in Chile, it represented the next significant step forward after Gingins. Gay listed ten species of this subgenus, three of them described there and then by himself. They were unranked, as were all his 22 *Viola* taxa in the work. However, he did group them under three short common diagnoses, the third of these being eight species described as 'Hojas amontonadas y dispuetas en roseta abierta' [= Leaves imbricate and arranged in an open rosette], this being the first accurate general delimitation of the alliance. However, *V. glacialis* Poepp. & Endl. (1838) and *V. bustillosia* Gay (1846) on his list came under another heading as 'Hojas esparcidas y dispuestas sin órden, tallos ningunos o herbáceos' [= Leaves separated and arranged randomly, stems either herbaceous or absent]. This group consisted of a pot pourri of ten species, the other eight from sections *Chilenium*,

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Melanium, *Tridens* and *Viola*. Thus began a confusion of *V. truncata* related taxa which continued partially up until its five species were compared and keyed as belonging in subgen. *Neoandinium* (Watson 2019).

During the next forty-seven years a great number of new taxa were described, but apart from the few species known from Ecuador which were included in his Flora of that country by Jameson (1865), no coordination of these violas appeared. Outstanding and significant though their combined total of new taxa was, neither Philippi nor Leybold ever came out in print with anything systematically comprehensive.

That was left to Reiche who, with the benefit of so many taxa which had been described meanwhile, made a great leap forward as detailed above, which stands as the basis of our modern understanding of this taxonomic order. In the German language monograph of the genus *Viola* in Chile (Reiche 1893), he divided the genus there into three main groups he called divisions, followed by a very few unplaced taxa. These were later corrected to sections (Reiche 1895), but this was written in 1890 and lacked several important taxa included in his two later works. Numerical statistics provide a measure of his major accomplishment regarding Division II Rosulatae, the accurate forerunner of Becker's section *Andinium*. He listed and described 37 species, together with a few infraspecific additions and synonyms. All except one of the species are accepted by ourselves, although 8 were homonyms or synonyms which have since acquired new or priority names. In addition to the 36, we recognise two of the synonyms-cum-varities he listed.

Of the total recorded in his works, three were newly described by himself, one of them not presently known in situ, with another, *V. decipiens* Reiche (1993), being so close to *V. philippii* Leyb. (1859) [figs.29, 146] that the two are difficult to tell apart in the field. The only relevant taxa of the complex as a whole then known and not included in his review were the further 8 species from Argentina, Bolivia and Ecuador, one now a synonym.

29) *Viola philippii*: species elevation range: 2000-4000 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

For all its great overall advance, a few major problems arose in the monograph (Reiche 1893) which became universally persistent. They were either continued from earlier or were initiated in the work. Two of the section's taxa we have included in his total, *V. bustillosia* and *V. glacialis*, the latter now a synonym of *V. truncata* Meyen (1834) [fig.185], continued Gay's error for being placed by Reiche in his Division I Sparsifoliae: 'Blätter sämtlich gestielt, mit Nebenblätter, an den enden des Rhizoms oder längs der Stengel verteilt, nie flache Rosetten oder strangförmig gerandete Stämmchen bilden' [= All leaves petiolate and stipulate, arising vertically from the crown of the root or spread along the stem, never forming flat rosettes or laminas with translucent borders], subdivision Bicaules: 'Die Blumen als 2. Achsen aus den Blattwinkeln eines unterirdischen Rhizoms' [= Flowers develop in the axils of leaves spreading from the caudex of an underground root]. Together with those two subgen. *Neoandinium* species he included five others, four of them the totally different yellow South American violets of sect. *Chilenium*.

Inexplicably however, he did place three others of the *V. truncata* group in the *Rosulatae*, these being [1] the nominate species as a synonym of his *V.* 'vulcanica', [2] *V. angustifolia* Phil. (1857) [fig.49], and [3] *V. acanthophylla* Leyb. ex Reiche (1893) [fig.44], a name published earlier but insufficiently by Leybold. How come Reiche placed the *V. truncata* alliance taxa either in one division or another, failing to notice the close similarity between the five and their significant distinctiveness compared? Becker (1922b) was the only botanical authority to recognise and correct the *V. truncata* error; unfortunately only as a short appendix to coverage of another South American *Viola* species from a different section. He was not yet the dominant figure for these violas that he would become, so his note passed unnoticed almost indefinitely.

More serious by far though was the total confusion between *V. volcanica* [fig.191] and *V. congesta* [figs.80, 81, 203] in the same work (Reiche 1893). He produced what we might call a hybrid error, relegating the epithet *V. congesta* to synonymy and accepting a taxon he mistakenly spelt and published as *V.* 'vulcanica' (sphalm), an illegal rendition of the original epithet *volcanica*. But it went further. The species he described under that name actually was *V. congesta*! His misunderstanding was continued almost universally until 2006, when an amateur colleague informed us [J. W. & A. F.] of the situation (K. Blaxland, pers. comm.), which we then published (Watson & Flores 2007). Again, it is difficult to fathom out how this gross fault occurred and continued for over 100 years, since the botanical drawings of both taxa by Hooker in the protologue illustrate their distinctive foliar and floral differences with total clarity.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

30) *Viola nassauvioides*, the type and only specimen at the herbarium of the Natural History Museum, Santiago. Species elevation not known, but estimated as between 900 m and 3000 m.

His third and last named grouping was Division III Confertae: 'Beblätterte Sprosse strangartig gerundet wegen der ungestielten oder gleichlang gestielten, in der Jugend flachen oder eingefalteten Blätter Stauden' [= Leafy shoots encircled by foliage, either sessile or long-petioled, lamina flat or folded when young]. Here he placed ericoid *V. fluehmannii* [fig.17] and the long- and erect-stemmed *V. nassauvioides* [fig.30], neither of which bear any remotely close resemblance to the other two* of sect. *Tridens* he placed in that division. (*They are now synonymised as a single species.)

Finally, of the five then recently published species he listed under 'Species incertae sedis' [= Uncertainly placed species], three belong in sect. *Andinium*, one being the priority name for a species also included in Division Rosulatae.

The *Viola* entry in Volume 5 of his 'Flora de Chile' in Spanish followed shortly afterwards (Reiche 1896). It only differed from the earlier work to any significant degree by three taxonomic additions, including another of his new species. This one, a homonym, has since been provided with a new name (Sanso, Seo & Xifreda 2007), but we consider it to be no more than a monocarpic form of an earlier species published as perennial, from which it differs in no morphological respect.

The leading role Wilhelm Becker played in the amplification and understanding of subgen. *Neoandinium* has already been covered above. Apart from the important consideration of providing a formal rank and description for it, however, his only publication covering its contents (Becker 1925b) cannot be regarded as anything more than a very brief outline, probably for an intended future monograph which never materialized. It has to be said that in no other way, except by adding some of the taxa published since and including species from all the countries concerned, does it represent any sort of advance on Reiche's achievement of 32 years earlier.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

The statistics speak for themselves. **Text**: Becker less than one page. Reiche more than 14. **Key**: Becker none, Reiche complete for Chile. **Descriptions**: Becker none. Reiche all. **Taxa named** [as recognised from Argentina, Bolivia, Ecuador and Peru herein, and to the dates of their publications]. Becker: [from all four countries] 48, but 17* others not included. Reiche: all as then known from Chile, 8 from other countries not included.
*Why Becker should have omitted three he had published himself, *V. araucaniae* W. Becker (1922), *V. lanifera* W. Becker (1922) and *V. santiagonensis* W. Becker (1925), is difficult to understand. It may be an indication that he had to prepare the work as an urgent priority and did not have time to check and revise it thoroughly.

Given its significant physical dissimilarity from all others of the subgenus, it is hardly surprising that neither Reiche nor Becker recognised *V. fluehmannii* as belonging therein. Furthermore, uniquely distinctive as it is, Becker did not even mention it by name at all in his overview of *Viola*.

Subsequent to Becker, the most important and significant systematic additions to these related taxa have been various general, national and localised floras as well as flora catalogues.

31a) *Viola weibelii*: species elevation range: ca. 4500 m. (Hamilton Beltran)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

31b) *Viola weibelii* (JMW)

The first of these to appear was that of Macbride (1941) for Peru, which keyed out and described 26 *Viola* taxa of that country. 12 of them belong in subgen. *Neoandinium*, including *V. weibelii* [figs.31a, 31b], which had been published slightly earlier in the same year and is named for one of the relevant authors.

The next and most recent relevant entry in a Flora of that country was by Liesner (1996). As far as the subgenus is concerned its contents are identical in every respect bar a minor one.

32) *Viola bangii*: species elevation range: 3500-4500 m. (Yamazaki San)

The earlier work had published *V. bangii* Rusby (1896) [fig.32] under its illegal homonym of *V. nivalis* Benth. (1845), and noted it as 'probably' occurring in the country. Its 1996 successor entered the legitimate name and stated that it is 'not known from Peru'.
An exhaustive coverage of the Chilean flora began with Carlos Muñoz (1913-1976), who

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

reviewed the genera of the country, giving examples of species in each (Muñoz 1966). He had already published an informative compilation of all the specimens Philippi had collected and deposited at SGO (Muñoz 1960). Marticorena & Quezada (1985) catalogued the entire Chilean vascular flora. The *Viola* entry is of significance to J. W. as they drew attention to an illegal homonym, *V. pusilla* Hook. & Arn, (1833), leading to its replacement new name *V. subandina* J. M. Watson (1998) [fig.174], the first taxon of the subgenus he published. Marticorena (1992) himself produced a bibliography of the Chilean flora with families and genera listed first, then beneath, cited in chronological date order, authors who had published information about these. They were listed alphabetically, with their relevant works again in chronological order. A supplement was published four years later (Marticorena 1996). We ourselves reviewed those of the subgenus which are endemic or native to Chile, covering and illustrating a selection of species (Watson & Flores 2007). Recently, we two have made our most formal taxonomic contribution with the authorship of *Viola* in the catalogue of the Chilean vascular flora (Rodriguéz & Marticorena 2019). Regional coverage is represented by three books, one with a supplement. That of Novoa (2013) contains the flora of Valparaiso Region and lists eleven species of the alliance, a few of which are doubtful for the sector. One other has also been added since (Watson & Flores 2020a). The staff of the herbarium at La Serena, Coquimbo Region, together with colleagues from other herbaria, have addressed thoroughly the important aspect of conservation both in their own region and that of adjacent Atacama (Squeo et al. 2001, 2008a, 2008b).

Three of these Andinopacific violas in the region are listed apart as "Especies en peligro" [= Endangered species], which would be good news were it not for the fact that not one of them is in fact in danger, two being very common and widepread, the third, *V. escarapela* J.M. Watson & A. R. Flores (2003) [fig.100], presented as its illegal homonym *V. pulchella* Leyb. ex Reiche (1892), being nothing more than vulnerable, albeit with a good, dense spread of localized populations (pers. obs.). In fact the following on their main species lists as known at the time do belong under species in danger, or are at the least very vulnerable: La Serena; *V. aurata* Phil. (1892) [fig.61], *V. philippiana* Greene (1889), *V. lanifera*, *V. ovalleana* Phil. (1892) [fig.143]: Atacama; *V. godoyae* [fig. 33], *V. vallenarensis* W. Becker (1927). Of those, *V. aurata* actually was labelled as EP [= endangered], but for some reason did not get on the special list.

The rest were simply not well enough known to assess, even though *V. ovalleana*, *V. godoyae* and *V. vallenarensis*, all unknown in the wild at the time and rediscovered since, were labelled

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

EX? [= possibly extinct]. Ironically *V. godoyae* is the only species of the subgenus so far to have been published as endangered by the Ministry of the Environment of the Chilean Government (Watson et al. 2018). We have analysed at length here the relevant species in those two volumes and their supplement to illustrate how little is known about the rosulate alliance as a whole, resulting in their consequent precarious situation.

33) *Viola godoyae*: species elevation 1000 m. (Ricardo Martini).

Argentina achieved its first ever general coverage with Flora Patagónica as edited by N. M. Correa, which included the entry by Rossow (1988) of the genus *Viola* in Volume 5. A key was provided and 16 species were included, 10 of them from subgen. *Neoandinium*. This was a significant event in the country's botanical history despite five errors by Rossow, three of them serious: [1] the continuation of *V. congesta* as Reiche's *V.* 'vulcanica', [2] the misidentification of *V. coronifera* Becker (1928b) and [3] total omission of *V. escondidaensis* Becker (1928b) (Watson & Flores 2013b, 2020b). But as we have explained, Rossow's competence cannot altogether be called into question as he was given insufficient time to study this difficult alliance. Three national floras have followed since (Xifreda & Sanso 1999, Nicola 2017, Nicola et al. 2018). But the contents of these are discussed in the following paragraph detailing a multinational Flora, where the same observations apply.

Flora del Conosur translates as 'the Flora of the Southern Cone', the Southern Cone being the tapering half of South America from the lower sector of the tropical zone down to Tierra del

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Fuego. Countries covered by the publication are Argentina, the extreme southeastern end of Brazil, Chile, Paraguay and Uruguay. As far as the presence of subgen. *Neoandinium* is concerned, only two of those nations possess any of its species, Argentina and Chile. Between them both however, 98 of its 111 described taxa as accepted here are either native or endemic. The Flora was first published in print (Sanso & Xifreda 2008) and has continued to be updated online since (www.darwin.edu.ar).

34) *Viola petraea*: species elevation range: 1600-2100 m. (ARF)

Only 93 of our current 111 had been published in 2008. Of those 93, 69 were published as they now stand or under their earlier accepted synonyms. A further 4 of the 98 appeared as their homonyms or synonyms which are not accepted here. The most recent online version differs little other than to add or consider the 14 more recently published species, two of which are rejected by the Argentinian authors. Of individual taxa the most serious omission is *V. mesadensis* W. Becker (1928a), which is completely absent from both versions.

Rossow's error regarding *V. escondidaensis* [fig.102] [meaning 'hidden', ironically!] was continued in the printed version, where it was at least named, but as a synonym of totally distinct *V. fluehmannii* ! [fig.17] It has now been rectified (Nicola 2017) and accepted online. The failure to recognise *V. petraea* W. Becker (1925a) [fig.34] as a distinct species rather than a synonym has continued to date despite the clear difference from related taxa as described in the protologue (Watson et al. 2018).

We consider that minor discrepancies between our view and that of Argentinian authors, such as whether *V. lologensis* (W. Becker) J.M. Watson (2011) [fig.35] is an accepted species, as we contend, or nothing more than a synonym, are essentially a matter of judgements and valid differences of opinion as is inevitable at times in many areas of taxonomy.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

35) *Viola lologensis*: species elevation: ca. 1000 m. (Harold Comber)

Contemporary Floras have also been published for Peru (Liesner 1996) and Ecuador (Jørgensen & Ballard 1999) , which only differ significantly from earlier versions by replacing homonyms with new names.

Bolivia contains no species described from there. Three floristic works include some or all of the species found in the country (Britton 1889, Foster 1928, Ballard et al. 2015).

A proposed chronological evolution

This aspect has essentially been covered above under the heading '*Viola* subgenus *Neoandinium* (W. Becker) Marcussen, stat. nov. Basionym: *Viola* sect. *Andinium* W. Becker, Die natürlichen Pflanzenfamilien, Zweite Auflage 21: 374. 1925. Syn.: Division *Rosulatae* Reiche, *Violae* chilenses. Ein Beitrag zur Systematik der Gattung *Viola*. Botanischer Jahrbücher für Systematik 16: 406. 1893, nom. illeg. Type species (designated here) *Viola pygmaea* Juss. ex Poir., Encycl. 8: 630. 1808.' A preliminary attempt by ourselves in three parts to work out the likely evolution of this systematic group was cited (Watson & Flores 2012a, 2013a, 2013c), being based on our own experience of its morphology and geoclimatic adaptations, together with what we could glean from the literature. The following paragraphs detail their contents.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

The most difficult aspect was divining from what earlier branch of the genus these violas evolved from what is now the southern sector of temperate South America (Clausen 1929, Ballard et al. 1999, Marcussen et al. 2012). It is also clear from its current life-forms, elevational ranges and adaptive features that the subgenus had essentially evolved rapidly in response to vulcanism and uplift of the young southern temperate Andean geological formations in combination with colder climatic conditions rising northwards from the Antarctic only ca. 5 million years later (T. Marcussen, ined.). The consequent environmental changes enabled its adaptations to occupy the hostile habitats, devoid of vegetation or almost so, these geological upheavals produced. But how had all this started? It seemed to us there was just one logical clue. We conjectured just one lone existing survivor from a quantity of original 'missing links' extinguished by the often devastating effects of massive eruptions and constant alteration of the local climate and environments which resulted from rapid orogeny. As explained above, that link is *V. fluehmannii* [fig.17].

36) Monkey puzzles (*Araucaria araucana*) in near-southern Chile, a predominant habitat of *V. fluehmannii*. (ARF)

The genus *Viola* evolved from the shrubby life forms of earlier Violaceae adapted for inhabiting open areas between overall tropical tree cover, and the earliest species were themselves shrubby (Hoyos 2010, Wahlert et al. 2014). Their descendants exist in two surviving sections, sect. *Rubellium* W. Becker, endemic to southern temperate South America and sect. *Leptidium* Ging. which extends from subtropical Argentina to as far north as the Caribbean islands. We can find no evidence that any herbaceous violas predated either those or

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

subgen. *Neoandinium*. The only reasonable hypothesis therefore is that an ancestral shrubby alliance gave rise to the rosulate violas via a taxon comparable to *V. fluehmannii*.
Subsequent temporal taxonomic progression is not so difficult to surmise. Considering the first available habitats for this section were newly created volcanoes, the adaptation they evolved for this was what we refer to as the sempervivoid life-form, as typified by *V. atropurpurea* [figs.55, 56]. That is, deeply axial-rooted, tightly imbricate, more or less succulent, glabrous rosettes without aerial stems, depressed or columnar, level with the ground basally, and the flowers within the edge of the foliage circumference. This form offers best protection against extreme cold, including fierce mountain winds, while at the same time presenting the maximum of foliage for photosynthesis, corollas exposed for pollination, and with relatively even temperatures at depth allowing effective anchorage and protection for the fine feeder roots, as well as sustenance and regular ground water.

The success of this morphology may be judged from the number of taxa from central Chile and Argentina southwards still employing it; 23, with at least 2 more still to be described. Other very similar species still inhabit the full range of this complex, although all but two of those occurring in the tropical Andes bear little close resemblance to one another or to the main disjunct temperate group. It seems likely that the continuing orogeny of the central Andes, terminating in the high and climatically hostile Altiplano probably extinguished all the glabrous perennials linking tropical species to the temperate ones and that those which survive from northern Argentina to Ecuador such as *V. polycephala* H.E. Ballard & Jørg. (1997) [fig. 148] are probably disjunct relicts. An apparent confirmation of this is the broken distribution over 2000 km of *V. bangii* [fig.32]. *V. micranthella* Wedd. (1864) [fig.139] almost certainly evolved from these speculative northern disjuncts as one of the first annuals of the section, if not the first.
These resourceful violas resolved the Altiplano blockage problem by the simple expedient of by-passing it lower down in survivable environments to the east and the west. Perennials took the eastern route and have effectively colonised the more outlying Andes there which receive adequate precipitation from weather systems moving in from the Atlantic. Annuals opted for the Pacific littoral to the west with its intermittant heavy ENSO [= El Niño. Southern Oscillation] phenomenon rainfalls ever few years and constant moist sea fogs.

As the Andes became more stable and offered less stressful habitats, the subgenus evolved accordingly in various ways, one of which was to produce flexible rather than rigid foliage,

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

almost invariably with a degree of pilosity or leaf margin ciliation, the most ancestral of these perhaps being *V. rosulata* Poepp. & Endl. (1838) [figs.159-161]. They have spread north as a second major expansion wave, evolving many adaptive forms as they went, and giving rise to a number of annuals, *V. frigida* Phil. (1860) [figs.114, 115] of the high Andes being one of the most common and widespread.

But the advent of a Mediterranean climate in central and northern Chile opened up the possibility of adapting to new habitats offered by this ambiance, including the coastal mist belt section of the otherwise arid Atacama desert. But erratic rainfall, sometimes not occurring for a number of consecutive years, rendered these lowlands uninhabitable for perennials, so annuals evolved, which could survive lengthy droughts as seed banks. We consider it likely that a relict group of these, among the best known of which is *V. huesoensis* Martic. (2000) [fig.37], evolved early from similar perennials which existed before conditions became too extreme for them.

37) *Viola huesoensis*: species elevation range: 0-500 m. (JMW)

The main developments are detailed above, but a few small, distinctive Andean groups are also known. These include a species from central and northwestern Argentina with short woody stems. We are unsure exactly what relationship it bears to other species, although the foliage

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

indicates it belongs in the variable, wide-ranging group with flexible, ciliate leaves. Its geographical position so far north of the section's location of origin also points to a fairly late origin. Five species from central to near-southern Argentina and Chile, among them *V. truncata* [fig.185], appear to be evolving towards a life-form similar to that of the herbaceous violets, which may indicate they are adapting to fertile but more densely vegetated habitats where their life-form enables them to compete more successfully. Unfortunately, repeated attempts to obtain funding for phylogenetical research on subgen. *Andinium* have proved unsuccessful. As a result, next to no molecular analysis has been able to be performed on taxa of the subgenus so far, with only five species completed, so our estimation above is based entirely on logical assessment. But at least those we have described are quite representative of the full range, and appear to support our conjectures. It is hoped to resume full-scale molecular analysis as soon as possible. J. W. & A. F.
(See also Postscript 1 on p. 193).

Field guides and popular presentations of Andinopacific violas

The only nations with general, regional or provincial field guides which include the 'non-scientifically' termed rosulate violas are Chile with ten and Argentina with four.

But in addition to those, entries in books of wider geographical scope were published early on. The first such work was by Sampson Clay (1937), in the unlikely medium of his 'The Present-day Rock Garden'. In fact it turned out to be of immense importance as it not only helped to fill the 'vacuum' following the demise of Becker, but also aroused interest in these plants by specialist gardeners and exploring plantsmen such as one of us, J. W. Without it, this account might never have been written! The second and the last of these wide coverages of the subgenus were as photos and descriptions in a specialist encyclopaedia (Watson 1994a), and an alpine garden journal outline of the complex (Watson 1994b).

A first personal plant exploration of Chile during 1971 and 1972 was recorded in fifteen parts containing descriptions and photographs of nine species in five of them (Watson 1974, 1975a, 1975b, 1976, 1977), all but one also as black & white photos. It included the rediscovery of *V. minutiflora* [fig.38] by the group's members, Beckett, Cheese & Watson.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

38) *Viola minutiflora*: species elevation range: 300-1100 m. (JMW)

Another by people recording plants they have encountered in Chile, a lavish 'coffee table book' on the flora of the Santiago Andes (Huyghe & Wembourne 2003), is illustrated with spectacular photos, including of three species listed here which inhabit those mountains.

Field guides inevitably draw their material from published botanical sources, although they may add illustrations and occasional important information such as new locations and, very rarely, even taxonomical data. To our best knowledge those relevant here started off with 'Flora silvestre de Chile: zona central' (Hoffmann 1978). The emblematic set covering the wildflowers of Chile, of which this forms one volume, was initiated and led by Adriana Hoffmann and sponsored and published by the Claudio Gay Foundation of Santiago. All but one other of the series covered areas where no rosulate violas grew, or if so they were not included. That exception, 'Plantas Andinas en la Flora Silvestre de Chile' (Hoffmann et al. 1998), was outstanding for its time. The new name *V. subandina* was presented in it. Commencement for Argentina began with a flora of Andean central Mendoza Province (Wingenroth & Suarez 1984) which contained *V. atropurpurea*, including a photo.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Following in the footsteps of the Claudio Gay Foundation series, Paulina Riedemann and Gustavo Aldunate, a retired married couple, together with the botanist Sebastián Teillier, produced a similar set, also of Chile, but illustrated by colour photos rather than botanical paintings. The basic title, 'Flora nativa de valor ornamental: identificación y propagación' reveals that it was aimed at encouraging gardeners to grow their native plants. Two of the set contain these violas, one covering the length of the Andes (Riedemann et al. 2008), the other the northern zone, including its second edition (Riedemann et al. 2006, 2016). Teillier was also the leading coauthor of two books giving very thorough textual and photographic coverage of all the flora recorded from locations in the Santiago Andes (Teillier et al. 2005, 2011).

The Patagonian flora, including subgen. *Neoandinium*, has been covered in two field guides (Ferreyra et al. 2006, Sheader et al. 2013). In the latter is a photo by A. F. of *V. rossowiana* Watson & Flores (2013b). Another included was identified by us as an new species, which has just been submitted for publication eight years later! Martin Sheader is by far the main coauthor. Although not a botanist, he was a biological scientist by profession before his retirement, and the book is so accurate and thorough it could equally pass for a flora.

It only remains to note three contributions to this list by ourselves [J. W. and A. F.]. Two detailing Chilean species only are relevant here, the first being 'Violas rosuladas en la flora de Chile' (Watson & Flores 2007), its text in Spanish for 'local consumption'. The other (Watson & Flores 2017) describes a short journey to Atacama Province, where we were shown two new species since named after their discoverers, *V. dandoisiorum* J.M. Watson & A.R. Flores (2018) and *V. marcelorosasii* J.M. Watson & A.R. Flores (2018).

Our most recent (Watson & Flores 2018c) involves three rosulate species from Argentinian Patagonia in a field context, two newly described at the time: *V. rubromarginata* J.M. Watson & A.R. Flores (2018) [fig.162] and *V. trochlearis* J.M. Watson & A.R. Flores (2018) [fig.182]. Both again appeared in Sheader et al. (2013) before formal publication.

We should add in passing an important final observation for this coverage of Andinopacific violas in situ. Species from all four countries are often mentioned in other recent journals, also on the Internet, by ecotour authors and interested individual visitors or residents (e.g. Belov 2012, Knowles & Knowles 2015, Sheader 2020, van Zwienen 2021).

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Published subgen. *Neoandinium* species as accepted by A.R. Flores and J.M. Watson at 1st October 2021

Abbreviation and colour print indications:

[E] = endemic.

Certainly or apparently extinct, or not presently known or located in situ.

Definitely present in situ, but exact location unknown by us or any of our informants.

Iconography: **[a]** = botanical drawings: details. **[b]** = botanical drawings or paintings: full plants. **[c]** = photos in situ. **[d]** = herbarium specimens.

auct. = author or authors. (NB. The plural *auctt*. is not employed here.)

N.B. Epithets which are misinterpreted, or do not conform to the accepted standards of their time are indicated in roman print, not italics: e.g. 'vulcanica' in error for '*volcanica'*.

39) *Viola abbreviata*: species elevation range: 2600-2700 m. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola abbreviata J.M. Watson & A.R. Flores, Int. Rock Gard. 110: 36. 2019. [figs.39-43]

Holotype: CONC.

Selected iconography: **[b, c & d]** J.M. Watson & A.R. Flores, Int. Rock Gard. 110: 13, figs. 21, 23; 17 fig. 28; 22, fig. 35; 26, fig. 43; 29, fig. 49: 30, figs. 50, 51; 31, fig. 53; 32, figs. 34, 35; 33, fig. 56; 38, fig. 61; 41, fig. 62; 42. 2019.

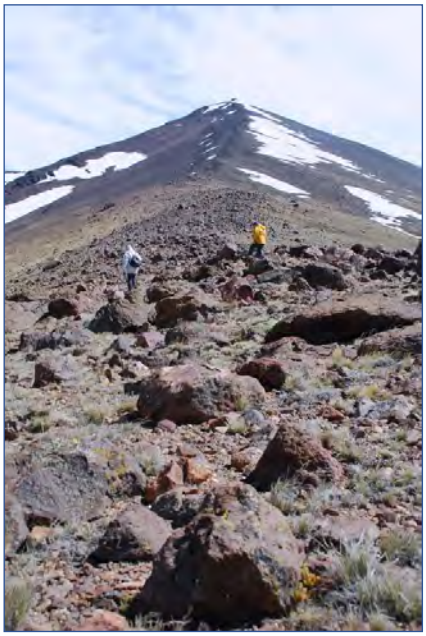
[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 44, fig. 51. 2020.

Nation and life duration: Andean N Patagonia, Argentina [E]. Perennial.

Notes: Six recorded populations in S Mendoza and Neuquén provinces. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

40) A comparison with standard vehicle keys to show the remarkable miniature growth form of *V. abbreviata*, by comparison with all other allied glabrous subgen. *Neoandinium* species. (JMW)



41) *Viola abbreviata*. Anita and Vilma, the wife of the proprietor of the guest house we were staying at, assessing the frequency of *V. abbreviata* at its type location, the northern ridge of the extinct volcano Cerro Wayle in Neuquén Province, Argentinian northern Patagonia. (JMW)

42) John and Vilma relaxing where *V. abbreviata* grows on the Cerro Wayle ridge. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

43) The Cerro Wayle ridge where *V. abbreviata* was discovered. (JMW)

44) *Viola acanthophylla*: species elevation range: 1600-2000 m. (Nicole Saavedre Fecci)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola acanthophylla Leyb., [1*]Revista Santiago 2: 286. 1873. Leopoldina 8: 56. 1873.[*1]

(Also later, and usually seen as the type publication: Leyb. ex Reiche, Bot. Jahrb. Syst. 16(3): 442. 1892.) [fig.44]. **Holotype**: SGO.

Syn.: *Viola truncata sensu auct*. *non* Meyen.[*2]

Selected iconography: **[a]** K. Reiche *Violae* chilenses: plate 7, fig. 6a-b. 1893. **[c]** S. Teillier, A. Marticorena & H.M. Niemeier. Fl. Andina Santiago: 437, fig. 2 (as *V*. *truncata*). 2011.

Nation and life duration: Andean **c**entral Chile [E]. Perennial.

Notes: [1*]Whichever of these two was published first legitimately, and accordingly is the protologue, needs to be established.[*1]

[2*]This taxon is illustrated as *V*. *truncata* in Teillier et al. 2011).[*2]

Scattered records of populations (fewer than seven) are known from the Metropolitan Region of Santiago. Photos by others.

Proposed conservation status: VU to EN.

Viola aizoon Reiche, Bot. Jahrb. Syst. 16(3): 443. 1892. [figs.45-48]. **Holotype**: SGO.

Syn.: *Viola cyathiformis* W. Becker, Repert. Spec. Nov. Regni Veg. 21: 355. 1925.

Selected iconography: **[b]** W.J. Hooker, Icon. Pl.: plate 8 (as *V*. *cotyledon*). 1836. **[a]** K. Reiche *Violae* chilenses: plate 7, fig. 11a-b. 1893. **[c]** J.M. Watson & A.R. Flores, Chagual 5: 41, fig 16i1; 42, fig. 19. 2007. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 45, fig. 53. 2020.

45) *Viola aizoon*: Species elevation range: 1800-1900 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Nation and life duration: Andean near-southern Chile [E]. Perennial.

Notes: Three recorded populations. Rather common at lower elevations of the Nevados de Chillán. Illustrated further south on Volcán Antuco in the same Bío Bío Region (Hooker 1836). The most recently encountered is located in Rancagua Province. Only possible to distinguish clearly from sympatric *V. cotyledon* by examination of the style crest. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU to EN.

46) *Viola aizoon*. apical style crest for comparison with that of similar *V. cotyledon*. (Marcelo Rosas)

47) The type habitat of *V. aizoon* at the Nevados de Chillán, near-southern Chile. (ARF)

48) Habitat of *V. aizoon* on the slopes of Volcán Antuco, further south in Chile than the type. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola angustifolia Phil., Linnaea 28(5): 612. 1857. [fig.49]. **Holotype**: SGO.

Syn.: *Viola wikipediae* J.M. Watson, Int. Rock Gard.117: 47. 2019, *nom. superfl. illeg*.

Nation and life duration: Andean central Chile [E]. Perennial.

Note: The best available information on this rare taxon may be found in Navas (1976). She cites its distribution as the Metropolitan Region of Santiago and neighbouring Colchagua Province to the S. Photos by others.

Proposed conservation status: VU to EN.

49) *Viola angustifolia*: species elevation range: ca. 1500 m.

Viola anitae J.M. Watson, Int. Rock Gard. 108: 89. 2018. [figs.50-54]. **Holotype**: CONC.

Selected iconography: **[c]** J.M. Watson, Int. Rock Gard. 108: 1; 68, fig. 13; 69, fig. 14; 84, fig. 42; 86, fig. 46; 87, fig. 47; 91, fig. 53; 92, fig. 54; 93, figs. 55-57; 94, fig. 59; 96, fig. 63. 2018.

Nation and life duration: Andean N Patagonia, Argentina [E]. Perennial.

Notes: An unmistakably unique rhizomatous taxon. Four fairly adjacent populations are recorded in N Patagonia. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

50) *Viola anitae*: species elevation range: 2200-2300 m. (JMW)

51) *V. anitae* at the exact spot of discovery on the Cerro Atravesada ridge in the south of Patagonian Neuquén Province, Argentina. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

52) *V. anitae* a few kms to the west in Neuquén Province on Cerro la Ventana, showing its distinctive rhizomatous habit as it grows through a cushion of *Azorella*. (JMW)

53) The highly unpromising-looking type location of *V. anitae* near the crest of the Cerro Atravesada ridge. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

54) John 'horsed up' and ready to go up to the Cerro La Ventana site of *V. anitae*. (ARF)

Viola araucaniae W. Becker, Repert. Spec. Nov. Regni Veg. 18: 181. 1922.

Holotype: B (destroyed).*[1]

Selected iconography: **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº15. 1925.

Nation and life duration: Lowland near-southern Chile [E]. Annual.

Note: Not encountered since the original collection.

[1]*No other type or specimens known.*[1]

Proposed conservation status: CR or EX.

Viola argentina W. Becker, Repert. Spec. Nov. Regni Veg. 18: 184. 1922.

Lectotype: CORD.

Nation and life duration: Andean NW Argentina [E]. Annual or perennial.*[1]

Note: [1]*Cited with doubt by Becker in the protologue as annual. Morphological affinities in the subgenus indicate it as a probable perennial.*[1]

Recorded as collected from three provinces but apparently not known at present in habitat.

Proposed conservation status: CR or EX.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola atropurpurea Leyb., Anales Univ. Chile 15: 158-159. 1858. [figs.11,12, 55-59].

Holotype: SGO.

Erratum: As *Viola skottsbergiana sensu auct. non* W. Becker. 1925.[*1]

Selected iconography: **[b]** F. Leybold, Anales Univ. Chile 1858: 158. 1858. **[c]** J.M. Watson, *Viola* p.p. In: Alpine Garden Society Encyclopaedia of Alpines 2: plate 523.1994. **[b]** A. Hoffmann, M.K. Arroyo, F. Liberona, M. Muñoz & J. Watson, Plantas altoandinas, fl. silv. Chile: 65, figs. 4, 7 [fig. 7 as *V. skottsbergiana*]. 1998. **[b]** R. Rossow, J.M. Watson & A.R. Flores, Fl. San Juan 2: 141, fig. 140. 2003. **[c]** E. Huyghe & G. Wembourne, Secretos de la cordillera de Santiago: 166-171, 188 [as *V. skottsbergiana*]. 2003. **[c]** J.M. Watson & A.R. Flores, Chagual 5: 36, figs. 5a-d; 41, fig. 16f. 2007. **[c]** M.P. Riedemann, G. Aldunate & S.Teillier, Flora nativa de valor ornamental, identificación y propagación: Chile, zona cordillera de los Andes: 599, 600. 2008. **[c]** S. Teillier. A. Marticorena & H.M. Niemeier, Fl. Andina Santiago: 436, figs. 1, 2. 2011. **[b]** M.V. Nicola, Fl. Argentina 17: 378. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard.106: 24, fig. 35. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 110: 13, fig. 22. **[c]** 2019; J.M. Watson & A.R. Flores, Int. Rock Gard. 113: 45, fig. 88. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 27, fig. 19; 43, fig. 49; 45, fig.52. 2020. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 19, fig. 23; 34, fig.55. 2020.

Nations and life duration: Andean central Argentina and adjacent central Chile. Perennial.

Notes: [1*]A colour form of common *V. atropurpurea* is erroneously determined as *V. skottsbergiana* in Hoffmann et al. (1998). The same form of *V. atropurpurea* is similarly misidentified as *V. skottsbergiana* in Huyghe & Wembourne (2003), where. *V. montagnei* is additionally named as *V. atropurpurea.*[*1]

Frequent and well established in both countries. Due to the long-standing inclusion as *V. atropurpurea* of recently published *V. turritella*, until now the range of the former has been erroneously recorded significantly further S, both in Chile and Argentina (e.g. Xifreda & Sanso 1999, Novoa 2013). Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

55) *Viola atropurpurea*: species elevation range: 2200-4300 m. (JMW)

56) *Viola atropurpurea,* uncommon yellow form. (JMW)

57) *V. atropurpurea* dormant beneath the snow at its habitat by the Laguna del Inca in Aconcagua Region, central Chile. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

58) *V. atropurpurea* Laguna del Inca location at flowering time. (JMW)

59) The same typical high Andean habitat *V. atropurpurea* in central Chile. (JMW)

Viola aurantiaca Leyb., Flora 47(3): 41. 1864. [fig.60]. **Holotype**: SGO.

Syn.: *Viola curicoensis* W. Becker, Repert. Spec. Nov. Regni Veg. 18: 183. 1922.

Selected iconography: **[a]** K. Reiche *Violae* chilenses. lam. 7, fig. 7. 1893.

[a] W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº 26. 1925.

Nation and life duration: Andean central Chile [E] Perennial.

Notes: Very rare and local.

Known as two populations only, one in Santiago Region and the other in O'Higgins Region. Recently rediscovered in situ for the first time since the middle of the last century.

Photo by others.

Proposed conservation status: CR.

60) *Viola aurantiaca*: species elevation range: 2000-3000 m.. (Samanta Leiva).

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola aurata Phil., Anales Univ. Chile 81: 492. 1892. [figs.61, 62] **Holotype**: SGO.

Selected iconography: **[c]** J.M. Watson & A.R Flores, Rock Gard. Quart. 71(2): 133. 2013.

Nation and life duration: Subandean near-northern Chile [E]. Annual.

Notes: Its limited number of main populations inhabit the lower Elqui valley of N Coquimbo Region where subject to potential detrimental anthropic disturbance. It has been classified there as EP [= threatened] (Squeo et al. 2001). The species was also recently discovered by M. Rosas as a small colony at a disjunct site in Atacama Region further north.
Known in situ by us.
Our photos and specimens.
Proposed conservation status: VU

61) *Viola aurata*: species elevation range: 900-1100 m. (JMW)

62) A small colony of *V. aurata* at its close-set distribution in the lower Elqui Valley, Coquimbo Region, near-northern Chile. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola auricolor Skottsb., Kungl. Svenska Vetenskapad. Handl. 56(5): 260. 1916. [figs.25, 78] **Lectotype**: SGO.*[1]

Selected iconography: **[a]** C. Skottsberg, Kungl. Svenska. Vetenskapad. Handl. 56(5): plate 20, figs. 1, 2; plate 22, fig. 27a-d.1916. **[b]** R.A. Rossow, Fl. Pat. 5: 174, fig. 135. 1988. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian mountains: 269. 2013. **[b]** M.V. Nicola, Fl. Argentina 17: 379. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 44, fig. 50. 2020.

Nations and life duration: Andean S Patagonia, Argentina, and adjacent Chile. Perennial.

Notes: [1]*Uppsala is the only herbarium where Skottsberg deposited his type collections which holds an extant syntype of *V. auricolor* (Watson et al. 2010).*[1] Securely established within its fairly confined distribution (fewer than seven populations), including under protection in a national park. Long considered to be an Argentinian endemic until recently discovered in adjacent Chile (Watson et al. 2010). Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

Viola auricula Leyb., Flora 47(3): 40. 1864. **Holotype**: SGO.

Erratum: As *Viola auriculata* Leyb. (publication data: same as for *V. auricula*).

Nation and life duration: Andean central Chile [E]. Annual.

Note: One of nine or ten species described from the Santiago mountains and not re-encountered subsequent to their type collection.

Proposed conservation status: CR or EX.

Viola bangii Rusby, Pl. Hartw.: 160. 1845. [fig.32]. **Holotype**: K.

Basionym: *Viola nivalis* Benth., Pl. Hartw. 160. 1845, *hom. illeg.*, *non* Vest. ex Roem. & Schult. 1819.

Selected iconography: **[a]** W. Becker, Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº22 [as *V. nivalis*]. 1925. **[c]** F.H. Schweingruber, M. Dvorský, A. Börner & J. Doležal, Violaceae. In: Atlas of stem anatomy of Arctic and alpine plants around the globe: 349. 2020.

Nations and life duration: High Andean Ecuador and Bolivia. Perennial.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Notes: One of the earliest of this tropical group to be described, the species occupies a disjunct distribution, not having been recorded in intermediate Peru (Liesner 1993). It is cited from seven provinces in Ecuador (Jørgensen & Ballard 1999), and no problems of conservation have been indicated. Photos by others.

Proposed conservation status: LC.

Viola beati J.M. Watson & A.R. Flores, Willdenowia 49(1): 36. 2019. [figs.63-66].

Holotype: B.

Selected iconography: **[d]** J.M. Watson & A.R. Flores, Willdenowia 49(1): 37, fig. 1A-F. 2019.

[d] J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig. 13. 2019.

Nation and life duration: Andean NW Argentina [E]. Perennial**.**

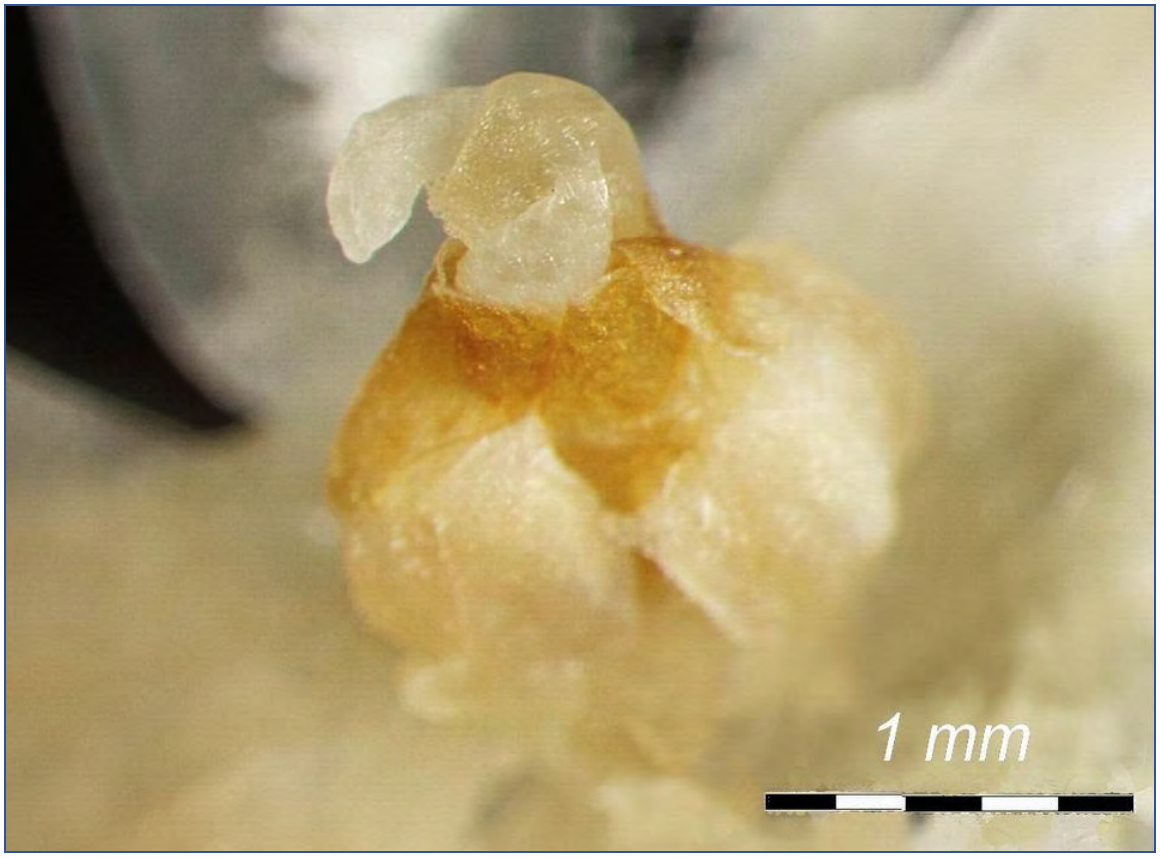
Note: Known as one minimal population only, which has not been revisited since the type gathering.

Proposed conservation status: CR.

63) *Viola beati*: species elevation: 3350 m. (Monika Lüchow).

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

64) *Viola beati.* Flower of specimen. (Monika Lüchow)



65) *Viola beati.* Style crest of specimen. (Monika Lüchow)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

66) The type spot of *V. beati* on an Andean ridge above Villa Vil, Catamarca Province, northwestern Argentina. (Urs Eggli)

Viola beckeriana *J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 166. 2013.* [figs. 67, 68]. **Holotype**: MERL.

Erratum: As *Viola portulacea sensu* W. Becker et al., *non* Leyb. 1865.*[1]

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 160, 161, 162, 163, 169, 172, 173. 2013. **[b]** M.V. Nicola, Fl. Argentina 17: 379. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 113: 43, fig. 86. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 47, fig. 56. 2020. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 12, fig. 9. 2020.

Nation and life duration: Central Andean Argentina [E]. Perennial.

Notes: This recently published narrow endemic only known from two dispersed, relatively adjacent populations, is locally common and probably more widespread.

[1]*Previously identified in error as *V. portulacea* (Becker 1928a).*[1]

Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

67) *Viola beckeriana*: species elevation range: 2900-3000 m. (JMW)

68) Below: The type site of *V. beckeriana* by the side of the old main pass road above Tunuyán in Mendoza Province, central Argentina near the frontier with Chile. (JMW)

Viola* ×*blaxlandiae J.M. Watson & A.R. Flores, Rock Gard. Quart. 70(4): 370. 2012. [fig.69]. **Holotype**: SGO.

Parentage: *Viola cotyledon* × *V. pachysoma*.

Erratum: As *Viola columnaris sensu* Rossow *et al*., *non* Skottsb. 1916. As *Viola cotyledon sensu auct*., *non* Ging. 1824.*[1]

Selected iconography: **[c]** R. Rolfe, Bull. Alp. Gard. Soc. 62(3): 253 [as *V. dasyphylla*]. 1994. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 70(4): 371, 372, 373, 374. 2012. **[c]** M. Ferreyra, C. Ezcurra, & S. Clayton, Flores de alta montaña de los Andes patagónicos: High mountain flowers of the Patagonian Andes: 180 [as *V. columnaris*]. 2006. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian moutains: 271 [as *V. columnaris*]. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 101: 54, fig. 26. 2018. **[c]** J.M. Watson, A.R. Flores, M. Sheader & A.-L. Sheader, Phytotaxa 382(1): 122, fig. 2; 117, fig. 3; 121, fig. 5A-C. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 107: 27, fig. 4. 2018.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 46, fig. 55. 2020. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 15, fig. 16. 2020.

Nation and life duration: Andean N Patagonia, Argentina [E]. Perennial.

Notes: The first nothospecies to be recognised for the subgenus.

[1]*Forms of it have for long been confused in the literature (e.g. Rossow 1988, Watson 1994a, Watson 1994b, Xifreda & Sanso 1999, Ferreyra et al. 2006). The situation has been made more complicated by the universal misidentification of *V. pachysoma* (q.v.) as *V. columnaris* before 2014. This natural hybrid is known as fewer than seven populations, although locally relatively common and widespread within a provincial park across a wide area of Volcán Copahue and its surrounds where both parents (*V. cotyledon* and *V. pachysoma*) are in proximity, but it is impossible to distinguish from them by sight when its morphology is visually identical to one parent or the other*[1].

Probably in adjacent Chile. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

69) *Viola x blaxlandiae.* The type plant. Species elevation range: ca. 2000 m. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola bustillosia Gay, Fl. Chile [Gay] 1: 211-212. 1846. **Holotype**: P.

Nation and life duration: Andean central Chile [E]. Perennial.

Notes: The only *V. truncata* group species with entire leaves. In its protologue it was associated with taxa not belonging to subgen. *Neoandinium*. Reiche (1893, 1896) formalised this unfortunate situation by including it in the *Bicaules* subset of his division *Sparsifoliae* rather than in his division *Rosulatae*, which is now a section of of subgen. *Neoandinium*. Watson (2019) published the correct systematic placement. *V. bustillosia* may have been collected for a second time at the end of the 19th century (orig. incogn.), but is not currently known in the wild.

Proposed conservation status: CR or EX.

Viola calchaquiensis W. Becker, Repert. Spec. Nov. Regni Veg. 23: 226. 1926.

Lectotype: LIL.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Note: Not presently known in the field or encountered since the type gathering.

Proposed conservation status: CR or EX.

Viola chamaedrys Leyb., Flora 47(3): 41. 1864. [figs.70, 71]. **Holotype**: SGO.

Selected iconography: **[c]** J.M. Watson & A.R Flores, J. Scot. Rock Gard. Club 133: 97-99. 2014. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 103: 40, fig. 40. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 27, fig. 39. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 21, fig. 9. 2020.

Nation and life duration: Central subandean Chile [E]. Annual.

Notes: Recently rediscovered at its main locality (Watson & Flores 2014a). Known from four relatively approximate populations, but although locally abundant at one, is nevertheless potentially threatened due to specialised habitat adaptation and narrow endemism within an area of potential anthropogenic intervention. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

70) *Viola chamaedrys*: species elevation range: 1300-1900 m. (JMW)

71) The semi-bare clay patch systems at the Chacabuco Pass where *V. chamaedrys* was rediscovered. Aconcagua Province, central Chile. (JMW)

72) The type location of *V. cheeseana* above the Laguna del Maule to the north of Maule Region, near-southern Chile. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola cheeseana J. M. Watson, Int. Rock Gard. 117: 40. 2019. [figs.72-75].

Holotype: B (destroyed). **Neotype**: G.

Basionym: *Viola truncata* Meyen var. *glandulifera* W. Becker, Repert. Spec. Nov. Regni Veg. 18: 186. 1922.

Erratum: As *Viola glacialis sensu auct. non* Poepp. & Endl. 1838.*[1]

Selected iconography: **[b]** A. Hoffmann, M.K. Arroyo, F. Liberona, M. Muñoz & J. Watson, Pl. altoandinas fl. silv. Chile: 65, fig. 1. 1998 [as *V. glacialis*].

[c] J.M. Watson & A.R. Flores, Chagual 5: 37, fig. 6. 2007 [as *V. aff. glacialis*].

[c] J.M. Watson, Int. Rock Gard. 117: 1; 4, fig. 5; 31, fig. 49; 37, figs. 59, 60; 38, figs. 61, 62; 39, figs. 63, 64; 40, fig. 65. 2019.

[c] J.M.Watson & A.R. Flores, Int. Rock Gard. 124: 18, fig. 21. 2020.

Nations and life duration: Andean near-southern Chile and Argentinian N Patagonia. Perennial.

Notes: [1]*Very easy to confuse with *V. truncata* (syn. *V. glacialis*), their essential difference being the underleaf glands of *V. cheeseana*.*[1]

Only four populations are known, three in close proximity above the N shore of Laguna del Maule, the other somewhat to the S in Argentina, close to the international boundary. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

73) Anita, John and daughter Sarah moving past a late snowbridge just north of the Laguna del Maule on the way to the *V. cheeseana* type population. (Marta Molina)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

74) *Viola cheeseana*: species elevation range: 1900-2200 m. (JMW)

75) Anita has fallen into a burrow of a tunnelling mole-like rodent on the upper pumice flats at the type locality of *V. cheeseana*. Laguna del Maule, Maule Region, near-southern Chile. (JMW)

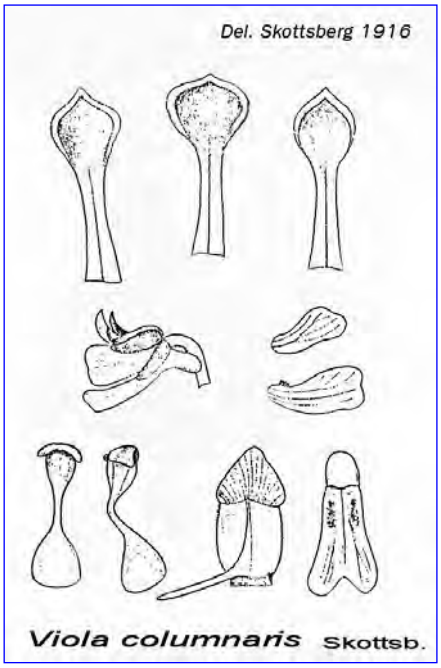
Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola columnaris Skottsb., Kungl. Svenska Vetenskapad. Handl. 56(5): 261. 1916. [figs.76-77]. **Lectotype**: S.

Selected iconography: **[a]** C. Skottsberg, Kungl. Svenska. Vetenskapad. Handl. 56(5): plate 20, figs. 3, 4; plate 22, fig. 28a-e.1916. **[b]** R.A. Rossow, Fl. Pat. 5: 174, fig. 134. 1988. **[b]** M.V. Nicola, Fl. Argentina 17: 381. 2017. **[b, c]** J.M. Watson, A.R. Flores, M. Sheader & A.-L. Sheader, Phytotaxa 382(1): 119, fig. 4A-D. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 48, fig. 59. 2020. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 14, fig. 14. 2020.

Nations and life duration: Andean N and S Patagonia, Argentina, and adjacent S Chile. Perennial.

Notes: Until recently considered universally to occupy a longer if interrupted range in Argentina covering much of Patagonia up to Neuquén Province (Rossow 1988). However the Neuquén populations were detected by Sheader et al. (2013) and Sheader & Sheader (2014a, 2014b) as a closely similar but distinct taxon, which is now published legitimately as *V. pachysoma* M. Sheader & J.M. Watson (2019). *V. columnaris* continues to be confused with *V. petraea* however, which is also from further north in Patagonia. The latter, a quite distinct species, is in fact clearly related in its floral characters to *V. cotyledon*. Furthermore, due to explicit or implicit misunderstanding of the type morphology, many recent reference sources have still failed to delimit accurately the range of *V. columnaris* (Rossow 1988, Xifreda & Sanso 1999, Ferreyra et al. 2006, Sheader et al. 2013, Sheader & Sheader 2014a).



76) *Viola columnaris*. (Carl Skottsberg)

V. columnaris has recently been found in flower in both northern and southern Patagonia, apparently not having been previously encountered in that state since the early part of the 20th Century (M. Sheader, in litt, M. Ferreyra, in litt.), but it has not been recorded in Chile since the type gatherings (Watson et al. 2010). The only known surviving type collection is at S (Watson et al. 2010). Photos by others.

Proposed conservation status: NT to VU.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

77) *Viola columnaris*: species elevation range: 800-1000 m. (Harry Jans)

78) Lago Vintter, one of the few locations of *V. auricolor*, southernmost of the subgen. *Neoandinium* species. Chubut Province, southern Patagonia, Argentina. (Harry Jans).

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola comberi W. Becker, Bull. Misc. Inform. Kew 1928(4): 136. 1928.

Lectotype: E.

Erratum: As *Viola cotyledon sensu* Rossow, *non* Ging. 1824.

Nation and life duration: N Andean Patagonia, Argentina [E]. Perennial.

Notes: One solitary plant, the type specimen, was found on the extensive and relatively level mountain top site by the original collector. Apart from slight but definite differences in corolla markings, the species is almost identical in facies to *V. coronifera*. Cerro Colohuincul, the mountain, is also the latter's type location. In fact they would be synonymous but for several distinct critical internal floral differences. This would suggest it as a natural hybrid of *V. coronifera*. However, no extant *Viola* species of the section in northern Patagonia or adjacent Chile possesses those distinct features, so its origin remains a mystery. *V. coronifera* is widespread and common on the mountain as confirmed by the various botanists and naturalists who have visited the mountain since including ourselves (pers. obs.). All explored the whole upper region thoroughly, including attempting to rediscover *V. comberi*, but without success. It is therefore not known in situ since the type collection.

Proposed conservation status: EX.

Viola congesta Gillies ex Hook. & Arn., Bot. Misc. 3: 144. 1833.*[2] [figs.79-81].

Holotype: K.

Syn.: *Viola chillanensis* Phil., Anales Univ. Chile 81: 347. 1892. [fig.201]

Erratum: As *Viola* vulcanica *sphalm*. (= *V. volcanica*) *sensu* Reiche et al. *non* Gillies ex Hook. & Arn. 1833.*[1]

Selected iconography: **[b]** 2*W.J. Hooker, Bot. Misc. 3: plate 47. 1833*[2]. **[c]** J.M. Watson, Bull. Alp. Gard. Soc. 43(3): 244. 1975. **[c]** J.M. Watson & A.R. Flores, Chagual 5: 39, figs. 11a, b. 2007. **[c]** M.P. Riedemann, G. Aldunate, & S. Teillier, Flora nativa de valor ornamental, identificación y propagación: Chile, zona cordillera de los Andes: 600, 601. 2008. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 101: 46, fig. 14; 47, fig. 15; 53, fig. 25. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard.117: 14, fig. 19. 2019. **[c]** J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 23, fig. 25. 2019. **[b & c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 10, fig. 4; 11, fig. 5. 2020.

Nations and life duration: Central to near-southern Andean Argentina and Chile. Perennial.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Notes: 1*As detailed in Watson & Flores (2020b), shortly after publication *V. congesta* became confused with other related but distinct taxa; first (for an insignificant period) as *V. truncata*, then, more persistently, with *V. volcanica* - often misspelled as "vulcanica" (Gay 1846, Reiche 1893, 1896, Watson 1994a, b).*1

2*A persistent failure to refer to the unambiguously clear protologue drawings by Hooker in Hooker & Arnott (1833) was clearly the underlying basis of the misconceptions.*2

Apart from one identification (Watson 1975b), the only correct interpretations of *V. congesta* and *V. volcanica* until recent years were by Becker (1922b) and Ruiz Leál & Roig (1965). In 2003 an amateur from the U.S. with an interest in the genus *Viola* informed the present authors of the long-standing error (K. Blaxland, in litt.), which we subsequently revealed and rectified (Watson & Flores 2007, 2012). Defining *V. congesta* and its distribution correctly still continues as a problem in some current reference works however. It is even omitted altogether, by name at least (Marticorena & Quezada 1985, Rossow 1988, Xifreda & Sanso 1999, Ferreyra et al. 2006, Nicola 2017). This is particularly inexplicable for Argentina considering the type was collected in Mendoza Province by John Gillies (Hooker & Arnott 1833), as also reiterated in Argentinian literature by Ruiz Leál & Roig (1965). Relatively common throughout its range. Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

79) Cryptically camouflaged *V. congesta* plants in a typical volcanic soil and rock habitat. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

80) *Viola congesta,* a rare and unusual green form. Species elevation range: 2000-2500 m. (ARF)

81) *Viola congesta,* a typical form. (JMW)

82) A level ashfield location of *V. congesta* above the Salto del Maule waterfall in the upper river valley. Maule Region, near-southern Chile. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola coronifera W. Becker, Bull. Misc. Inform. Kew 1928(4): 137. 1928. [figs.83-85].

Holotype: K.

Selected iconography: **[a]**. S. Clay (ex H. Comber), The present-day rock garden: plate 54. 1937. **[a]** J.M. Watson, *Viola* p.p. In: Alpine Garden Society Encyclopaedia of Alpines 2: plate 529. 1994. **[c]** Henrik Zetterlund, Bull. Alp. Gard. Soc. 62(3): 254. 1994. **[c]** P. Erskine, Bull. Alp. Gard. Soc. 62(3): 292. 1994. **[c]** M. Ferreyra, C. Ezcurra & S. Clayton, Flores de alta montaña de los Andes patagónicos: High mountain flowers of the Patagonian Andes: 181. 2006. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little, & A.-L.Sheader, Flowers of the Patagonian mountains: 271. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 105: 70, fig. 75; 71, fig. 76; 72, fig. 77. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 24, fig. 35. 2018. **[c]** J.M. Watson & A.R. Flores (ex H. Comber), Int. Rock Gard. 107: 25, fig. 1. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 108: 72, fig. 18. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 42, fig. 48. 2020. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124:14, fig. 13. 2020.

Nation and life duration: Subandean and Andean N Patagonia, Argentina [E]. Perennial.

Notes: A very distinctive species known from three locations, one in the south, the type site, the other two being ca. 100 km to the north and proximate. The main population is on the type site and at little or no risk. One of the others is very small and immediately by the roadside, and therefore not safely established. The third site, size unknown, is on a ridge and apparently distant from human activity.

Proposed conservation status: NT to VU.

83) The type site of *V. coronifera* on Cerro Colo Huincul, Argentinian north Patagonia. (Kees Jan van Zwienen)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

84) *Viola coronifera*: species elevation range: 600-2300 m. (JMW)

85) A site of *V. coronifera* somewhat further north. Anita during a late freeze at flowering time experiencing briefly what the poor plant will have to endure until a warmer spell arrives. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola cotyledon Ging., Prodr. [A.P. de Candolle] 1: 300. 1824. [figs.20, 86-88].

Neotype: SI.*[1]

Selected iconography: **[b]** J.W. Hooker, Icon. Pl. 1: fig, 13. 1836. **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº19. 1925. **[c]** J.M. Watson, Bull. Alp. Gard. Soc. 43(3): 231. 1975. **[b]** R.A. Rossow, Fl. Pat. 5: 174, fig. 136. 1988. **[a]** J.M. Watson, *Viola* p.p. In: Alpine Garden Society Encyclopaedia of Alpines 2: plate 530 1994. **[c]** J.M. Watson, Bull. Alp. Gard. Soc. 62(3): 332. 1994. **[b]** A. Hoffmann, M.K. Arroyo, F. Liberona, M. Muñoz & J. Watson, Plantas altoandinas, fl. silv. Chile: 64, figs. 3, 5 & 8. 1998.**[c]** M. Ferreyra, C. Ezcurra, & S. Clayton, Flores de alta montaña de los Andes patagónicos: High mountain flowers of the Patagonian Andes: 182, 183. 2006. **[c]** J.M. Watson & A.R. Flores, Chagual 5: 38, figs. 8a, b, 41, fig. 16i2, 42, fig.17a, fig. 18. 2007. **[c]** M.P. Riedemann, G. Aldunate, & S. Teillier, Flora nativa de valor ornamental, identificación y propagación: Chile, zona cordillera de los Andes: 601, 602. 2008. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 70(4): 369. 2012. **[c]** M.Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian mountains: 273. 2013. **[c]** J.M. Watson, A.R.Flores, M. Sheader & A.-L. Sheader, Phytotaxa 382(1): 122, fig 6C. 2018.**[b]** M.V.Nicola, Fl. Argentina 17: 383. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 24, fig. 34. 2018. **[c**] J.M. Watson & A.R. Flores, Int. Rock Gard. 117: 18, fig. 25; 19, figs. 26, 27. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard.122: 45, fig. 53; 46, fig. 54. 2020. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 16, fig. 17. 2020.

Nations and life duration: Central to subandean and Andean Patagonia, Argentinia. Central to near-southern Chile. Perennial.

Notes: [1]*A neotype has been published by Nicola et al (2018), although we have no evidence at present as to whether the original holotype of Gingins is still extant or not.*[1]

One of the most widespread, common and variable species in the alliance, ranging from Mendoza to Neuquén provinces in Argentina and Metropolitan Santiago to Araucania regions in Chile. It is nevertheless easily and accurately identified as a rule. Marginal confusions exist with probably extinct *V. lologensis* (q.v.) (Becker 1928b, Rossow 1988, Watson & Flores 2011) and *V. petraea* Becker (1925). Differentiating from *V. aizoon* and forms of *V.* ×*blaxlandiae* can present problems

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

where the taxa occur sympatrically, *V. cotyledon* being a parent of *V.* ×*blaxlandiae* Watson & Flores (2012). Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

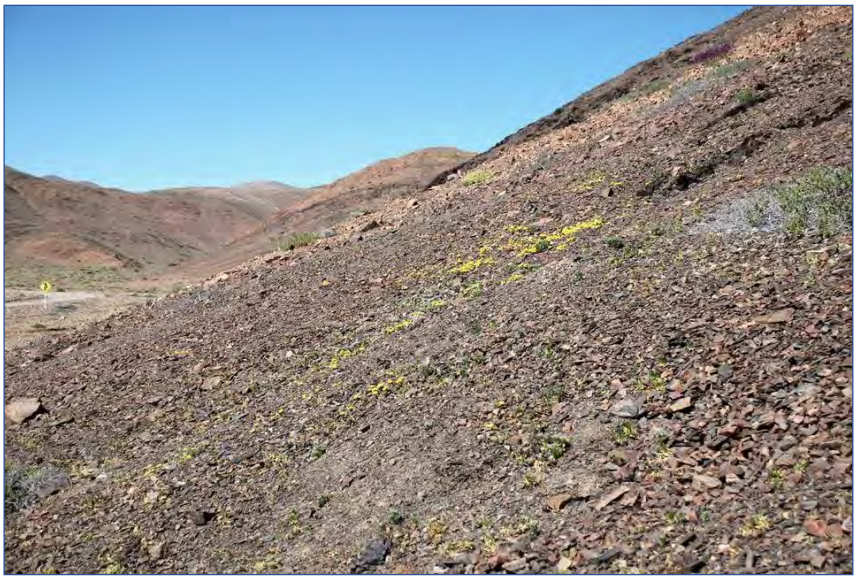
86) *Viola cotyledon*. A typical form of this polymorphic taxon. Species elevation range: 900-3300 m. (ARF)

87) Ash fields at the base of Volcán Llaima, southern Chile, one of many types of habitat occupied by *V. cotyledon*. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

88) Lago Teno, central Chile, one of the northernmost Andean sites of *V. cotyledon*. (ARF)

89) The *V. dandoisiorum* type location in the Andean foothills inland of Chañaral, Atacama Region near-northern Chile. (JMW)



Viola dandoisiorum J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 27. 2018. [figs.89-91]. **Holotype**: SGO.

Selected iconography: **[a** & **c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 23, figs. 48, 49; 24, figs. 50, 51, fig. 52; 25, fig. 53; 26, fig. 56; 31, fig. 65; 39, fig. 77. 2018.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Nation and life duration: Subandean near-northern Chile [E]. Annual.

Notes: This relatively rare recently discovered and described species is known from three very localised small populations in Copiapó Province, in the N of Atacama Region. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

90) *Viola dandoisiorum*: species elevation range: 680-1200 m. (JMW)

91) Anita between Philippe (above) and Claire Dandois, the couple who discoverered *V. dandoisiorum* and after whom it is named. The scree type site, with a large patch of yellow *Cruckshanksia pumil*a in view. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola dasyphylla W. Becker, Bull. Misc. Inform. Kew 1928(4): 135. 1928. [figs.92-94].

Holotype: K.

Selected iconography: **[b]** R.A. Rossow, Fl. Pat. 5: 178, fig. 139. 1988. **[c]** J.M. Watson, *Viola* p.p. In: Alpine Garden Society Encyclopaedia of Alpines 2: plate 534 [as *V. fluehmannii*]. 1994. **[c]** M. Ferreyra, C. Ezcurra, & S. Clayton, Flores de alta montaña de los Andes patagónicos: High mountain flowers of the Patagonian Andes: 184. 2006. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart.71(2): 163. 2013. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian Mts.: 273. 2013. **[b]** M.V. Nicola, Fl. Argentina 17: 384. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard.105: 33, fig. 12. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 108: 70, fig. 16. 2018. **[c]** J.M. Watson, A.R. Flores, M. Sheader & A.-L. Sheader, Phytotaxa 382(1): 121, fig. 5D. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 47, fig. 57; 53, figs. 68, 69; 54, fig. 70. 2020.

Nations and life duration: Andean N Patagonia, Argentina, and near-southern Chile. Perennial.

Notes: Not uncommon in Argentina, but only recently recorded as a small population in adjacent Chile at the international border (pers. obs.). Has been confused with *V. caviahuensis* [as *V. columnaris auct. non* Skottsb.]. Rossow (1988) was the first to cite *V. lologensis* as synonymous with *V. dasyphylla*. Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

93) *Viola dasyphylla*. (Kees Jan van Zwienen)

92) *Viola dasyphylla*: species elevation range: 1500-2500 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

94) A typical *V. dasyphylla* mid-Andean habitat in Neuquén Province, Patagonia, Argentina. Species elevation range 1500-2500. (ARF)

Viola decipiens Reiche, Bot. Jahrb. Syst. 16(3): 445. 1892. **Holotype**: SGO.

Selected iconography: **[a]** C. Reiche Violae chilenses. plate 7, fig. 14a, b. 1893. **[a]** J.M. Watson & A.R. Flores, Chagual 5: 41, fig. 16h2 [questionable, might be *V. philippii*]. 2007.

Nation and life duration: Andean central Argentina and Chile. Perennial.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Notes: Identical in facies with *V. philippii* [q.v.], therefore easy for the two to become confused without careful examination of distinctive micromorphological features. The similarity also complicates assessment of their frequencies and distribution, although authenticated determinations indicate that *V. philippii* is notably more common and widespread. No known reliably identified photos.

Proposed conservation status: LC to NT.

95) *Viola domeikoana*, uncommon violet form. (Courtesy of the Instituto Darwinion)

Viola domeikoana Gay, Fl. Chile [Gay] 1: 220. 1846. [figs.22, 95]. **Lectotype**: P.*1

Erratum: As *Viola* domeykoana, *nom. sphalm*. Reiche et al., *non* Gay 1846.*2

Selected iconography: **[c]** F.A. Squeo, R. Osorio & G. Arancio, Flora de los Andes de Coquimbo, Cordillera de Doña Ana: 30, fig. 15 [as *V. frigida*]. 1993. **[b]** A. Hoffmann, M.K. Arroyo, F. Liberona, M. Muñoz & J. Watson, Plantas altoandinas, fl. silv. Chile: 65, fig. 8 [as *V. auricula*]. 1998. **[b]** R. Rossow, J.M. Watson & A.R. Flores, Fl. San Juan 2: 143: fig. 143 [as *V.* domeykoana]. 2003. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 124. 2013. **[b]** M.V. Nicola, Fl. Argentina 17: 385. 2017.

Nations and life duration: Andean N to central Argentina and Chile. Annual.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Notes: [1]*Our citation, based on knowledge that Gay's Chilean specimens were deposited at P, needs confirmation*[1].

[2]*Spelled in error as 'domeykoana' by Reiche 1893, 1896) and continued as such until recently*[2].

From the southerly sector of the north of both countries to their central sectors. Differs by style crest morphology from *V. vallenarensis* [q.v.] (Watson & Flores 2007). As a result they have been confused and continue to be. A comprehensive study would define their populations and ranges. The entry as *V.* domeykoana in Squeo et al. (1994) describes the crest morphology of *V. vallenarensis*. Photos by others.

Proposed conservation status: LC.

Viola enmae P. Gonzáles, Phytotaxa 283(1): 87. 2016. [figs. 96, 97]. **Holotype**: USM.

Selected iconography: **[c & d]** P. Gonzáles & A. Cano, Phytotaxa 283(1): 86. fig. 2. 2016. **[c]** P. Gonzáles & J. Molina-Alor, Phytotaxa 451(3): 247, fig. 2B. 2020.

Nation and life duration: High Andean S Peru [E]. Perennial.

Notes: An extremely rare and localised species known only from its type site on almost bare, semi-desertic, gently sloping ground of the Altiplano at just over 4400 m, as also inhabited by the new taxon *V. ferreyrae* [q.v.] described in the same publication. Photos by others.

Proposed conservation status: CR.

96) *Viola enmae*: species elevation: 4301 m. (Paúl Gonzales).

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

97) *Viola enmae* flower (Paúl Gonzales).

Viola escarapela J.M. Watson & A.R. Flores, Gayana Bot. 60(2): 134. 2003. [figs.98-100].

Holotype: SGO.

Basionym: *Viola pulchella* Leyb. ex Reiche, Bot. Jahrb. Syst. 16(3): 438. 1892, *hom. illeg.*, *non* Salisb. 1796.

Selected iconography: **[c]** F.A. Squeo, R. Osorio & G. Arancio. Fl. Los Andes Coquimbo, Cordillera de Doña Ana: 30, fig. 14 [as *V. pulchella*]. 1993. **[c]** J.M. Watson & A.R. Flores, Chagual 5: 33, fig. 2. 2007. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 125, 127. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 107: 25, fig. 2. 2018.

Nation and life duration: Lowland to Andean near-northern Chile [E]. Annual.

Notes: Of relatively limited distribution, and classified as VU [= vulnerable] in Squeo et al. (2001), though in fact common to locally abundant (pers. obs.), and apparently only in places under potential anthropic threat. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

98) A large colony of *V. escarapela* by the roadside in the foothills of the mid-Elqui Valley, Coquimbo, near-northern Chile. (JMW)

99) below: Another location of *V. escarapela* higher up the Elqui Valley in the low Andes. (JMW)

100) *Viola escarapela*: species elevation range: 1500-4050 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola escondidaensis W. Becker, Bull. Misc. Inform. Kew 1928(4): 138. 1928. [figs.101, 102]. **Holotype**: K.

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 139. 2013. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian Mountains: 275. 2013. **[b]** M.V. Nicola, Fl. Argentina 17: 385. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 105: 30, fig. 6. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 20, fig. 28. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 108: 95, figs. 61, 62. 2018. **[c]** J.M.Watson & A.R. Flores, Int. Rock Gard. 110: 4, fig. 5. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 13, fig. 11. 2020.

101) Typical bunch grass habitat of *V. escondidaensis* in Neuquén Province, Argentinian north Patagonia. (JMW)

Nation and life duration: N Argentinian Patagonia [E]. Perennial.

Notes: Uniquely distinctive, but omitted from Flora Patagonica (Rossow 1988) as he later regretted on encountering it in situ (R. Rossow, pers. comm.). As a result it was subsequently synonymised in regional lists under *V. fluehmannii* (Xifreda & Sanso 1999, Xifreda & Sanso 2008), but is now widely and correctly recognised, however (Watson 1994a, b, Watson & Flores 2007, 2011, Sheader et al. 2013, Nicola 2017, Nicola et al. 2018). Recorded as several scattered colonies in two Argentinian provinces. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

102) *Viola escondidaensis*: species elevation range: 900-2000 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

103) *Viola evae*: Species elevation range: 3000-4500 m.

Viola evae Hieron. ex W. Becker, Repert. Spec. Nov. Regni Veg. 18: 182. 1922. [fig.103]. **Lectotype**: G.

Selected iconography: **[b]** M.V. Nicola, Fl. Argentina 17: 386. 2017.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Notes: A very narrow endemic collected from a few locations but probably not presently known in the wild. It is based on the invalid epithet *Viola flos-evae* Hieron., *nom. nud*. The later published var. *flossdorfii* Hicken (Darwiniana 1: 31.1922), *nom. illegit*. may be found as accepted in reference sources (Xifreda & Sanso1999, Xifreda & Sanso 2008, Nicola 2017, Nicola et al. 2018). The variety is, however, based on a specific epithet *in sched*., which had never been published. Its original specimen exists and should be investigated. Becker (1922a), adopted and described the species itself, altering the intended name of Hieronymus to *V. evae*.

Proposed conservation status: VU-EN.

Viola exilis Phil., Linnaea 28(5): 612. 1857. **Holotype**: B (destroyed).*[1]

Syn.: *Viola volcanica* (as *V.* vulcanica, *nom. sphalm.)* Gillies ex Hook. & Arn. var. *exilis* (Phil.) Reiche, Anales Univ. Chile 90: 905. 1895.

Nation and life duration: Andean central Chile [E]. Perennial.

Notes: [1]*No other collected material known to be extant.*[1]

One of nine or ten *Viola* species described from the Santiago mountains and not re-encountered subsequent to their type collection. It was discovered at or near what has become a large modern mining operation, so may reasonably be considered as probably extinct until encountered elsewhere in habitat, if ever.

Proposed conservation status: EX.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola exsul J.M. Watson & A.R. Flores, Fl. San Juan 2: 145. 2003. [figs.104-106].

Holotype: SI.

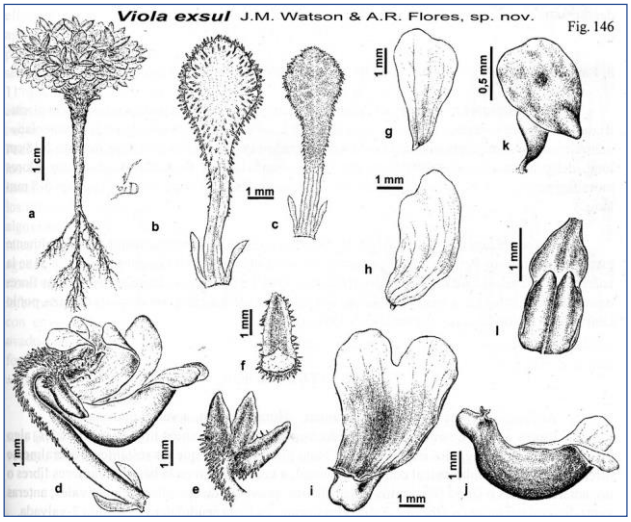
Selected iconography: **[b]** R. Rossow, J.M. Watson & A.R. Flores, Violaceae. In: R. Kiesling (ed.), Fl. San Juan 2: 145, fig. 146a-l. 2003. **[b]** M.V. Nicola, Fl. Argentina 17: 387. 2017.

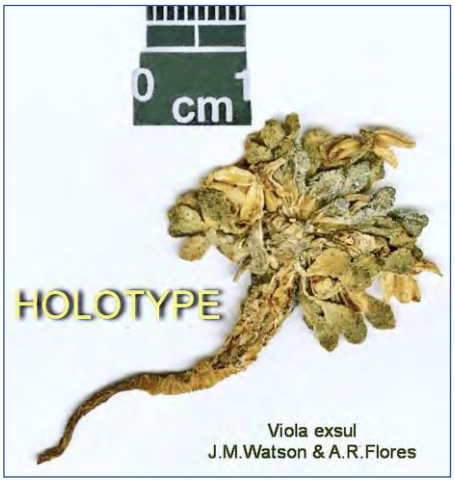
Nation and life duration: Andean central Argentina [E]. Perennial.

Notes: A recently described species. Known only from the remote type site, it was searched for unsuccessfully there several years later by the present authors [J.W. & A.F.] together with the discoverer, Roberto Kiesling. Although the population is remote from human activity, the formal conservation classification of *V. exsul* inevitably relates to its single site status and smallish reported population.

Proposed conservation status: CR.

104) *Viola exsul*: type specimen at the San Isidro herbarium, Buenos Aires.





105) *Viola exsul:* species elevation: 4250 m.

106) Roberto Kiesing, the discoverer, took us to the type locality here of *V. exsul* at Aguas Negras in the high Andes of San Juan Province, central Argentina near the border with Chile. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

107) A colony of *V. farkasiana* at the type site which lies just above the Laguna de las Lajas on the lower slopes of the Antuco volcano, Bío Bío Region, near-southern Chile. (ARF)

108) *Viola farkasiana*: species elevation range: 1400-2000 m. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola farkasiana J.M. Watson & A.R. Flores, Int. Rock Gard. 101: 43. 2018. [figs.107-109]. **Holotype**: CONC.

Erratum: As *Viola congesta sensu auct. non* Gillies ex Hook. & Arn. 1833.*[1]

Selected iconography: **[b]** R.A. Rossow, Violaceae. In: M.N. Correa (ed.), Fl. Pat. 5: 187, fig. 147 [as *V.* vulcanica].1988. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian mountains: 275 [as *V.* aff. *congesta*]. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 101: 42, fig. 5; 43, fig. 8; 44, figs. 9, 10; 45 figs. 11-13; 49, fig. 19; 52, fig. 23; 55, figs. 27, 28. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 105: 34, fig. 13. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 33, fig. E. 2018. **[c]** J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 22, fig. 23. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 11, fig. 8. 2020.

Nations and life duration: Low Andean N Patagonia, Argentina, and near-southern Chile. Perennial.

Notes: [1]*From the earliest botanical explorations of its distribution area to the time it was described for science, this taxon was taken for a form of *V. congesta* (also misidentified as *V.* vulcanica (*nom. sphalm.*).*[1]

Six populations are known from Neuquén Province, Argentina and Bío Bío Region, Chile, the latter including the type colony in the Laguna las Lajas National Park. Some populations are quite numerous, and over its entire range it is not uncommon or under any evident threat. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

109) A ridge near the type location with a large number of *V. farkasiana* rosettes. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola ferreyrae P. Gonzáles, Phytotaxa 283(1): 84. 2016. [figs,110, 111].

Holotype: USM.

Selected iconography: **[c** & **d]** P. Gonzáles & A. Cano, Phytotaxa 283(1): 85, fig. 1; 89, fig. 3. 2016. **[c]** P. Gonzáles & J. Molina-Alor, Phytotaxa 451(3): 247, fig. 2C. 2020.

Nation and life duration: High Andean S Peru [E]. Perennial.

Notes: An extremely rare and localised taxon, recently discovered and known only from its type site on almost bare, semi-desertic, gently sloping ground of the Altiplano at just over 4400 m, as also inhabited by the new species *V. enmae* [q.v.]. Photos by others.

Proposed conservation status: CR.

110) *Viola ferreyrae*: species elevation: 4301 m. (Paúl Gonzales)

111) *Viola ferreyrae*. (Paúl Gonzales)

112) *Viola flos-idea:* species elevation range: 2000-3500 m. (Courtesy of Instituto Darwinion)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola flos-idae Hieron. Bol. Acad. Nac. Ci. Cordoba 4(1): 5-7, 6. 1881. [fig.112].

Lectotype: CORD.

Syns.: *Viola acanthophylla sensu* W. Becker, *non* Leyb. 1873, var *tontalensis* W. Becker, Repert. Spec. Nov. Regni Veg. 18: 183. 1922. *Viola flos-idae* Hieron. var. *pseudovolcanica* Hieron. Bol. Acad. Nac. Ci. Cordoba 4(1): 7. 1881.

Erratum: As *Viola* vulcanica *nom. sphalm. sensu auct. non* Gillies ex Hook. & Arn. (= *V. volcanica* Gillies ex Hook. & Arn.). 1833.

Selected iconography: **[b]** R. Rossow, J.M. Watson & A.R. Flores, Fl. San Juan 2: 142, fig. 142. 2003. **[b]** M.V. Nicola, Fl. Argentina 17: 389. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 115: 44, figs. 72, 73. 2019.

[c] J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig. 14. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 128: 47, figs. 65, 66. 2020.

Nations and life duration: Andean NW to central Argentina and Andean N Chile. Perennial, but possibly also facultatively monocarpic.

Notes: Variable in foliar morphology. It differs from *V. congesta*, *V. roigii* and *V. volcanica* by a trilobed style crest and the position of lamina undersurface glands when present, and from the last by a more northerly distribution (Rossow et al. 2003). More recently it was found to be nearly indistinguishable, if not identical, with *V. joergensenii* [q.v.] (pers. obs.). It may be intermediate or a hybrid between the *V. volcanica* alliance *sens. strict.*, and Becker's unranked *Triflabellatae*. This situation probably requires molecular investigation. The location of the recent record from Chile is adjacent to the national border and lacks a supporting collected specimen. But, the present authors received a high quality photo, and the source is utterly reliable, so the record is considered to be valid beyond doubt.

Proposed conservation status: VU.

Viola fluehmannii (published legitimately as *V.* flühmannii, before diacritics were ICN banned) Phil., Anales Univ. Chile 81: 346. 1892. [figs.17, 36, 113]. **Lectotype**: SGO.

Errata: As *Viola* flühmannii *nom. sphalm.* [ICN Art. 60.7], Xifreda & Sanso, Catálogo de las plantas vasculares de la República Argentina 2: 1174. 1999.

As *Viola escondidaensis sensu* Xifreda & Sancho, *non* W. Becker 1928.

Selected iconography: **[a]** K. Reiche *Violae* chilenses: plate 7, figs. 16a, b. 1893.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

[c] J.M. Watson, Bull. Alp. Gard. Soc. 42(3): 224. 1974. **[b]** R.A. Rossow, Fl. Pat. 5: 187, fig. 149. 1988. **[b]** A. Hoffmann, M.K. Arroyo, F. Liberona, M. Muñoz & J. Watson, Plantas altoandinas, fl. silv. Chile: 64, fig. 6. 1998. **[a** & **c]** J.M. Watson & A.R. Flores, Chagual 5: 35, figs, 4a, 4b; 41, fig. 16a. 2007. **[c]** M.P. Riedemann, G. Aldunate, & S. Teillier, Flora nativa de valor ornamental, identificación y propagación: Chile, zona cordillera de los Andes: 597, 598. 2008. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 70(4): 2012. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian mountains: 275. 2013. **[b]** M.V. Nicola, Fl. Argentina 17: 389. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 19, fig. 27. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 13, fig. 11. 2020.

Nations and life duration: Andean N Patagonia, Argentina, and adjacent near-southern Chile. Perennial.

Notes: This very distinctive species has a localized and limited overall distribution, but with several large, well-established populations. Rare in Argentina. Without close relatives in the subgenus. The well recognised, although totally dissimilar *V. escondidaensis* has been listed as a synonym (Xifreda & Sanso 1999) consequent to it having been omitted entirely from Flora Patagonica (Rossow 1988). Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

113) Our dear fellow 'viologist', the late Kim Blaxland, photographing *V. fluehmannii* among *Araucaria araucana* saplings. (ARF)

Viola friderici W. Becker, Repert. Spec. Nov. Regni Veg. 21: 359. 1925.

Holotype: B (destroyed).*[1]

Nation and life duration: Andean central Chile [E]. Perennial.

Notes: [1]*No other specimens known to exist.*[1]

One of nine or ten *Viola* species described from the Santiago mountains and not re-encountered since their type collection.

Proposed conservation status: CR or EX.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola frigida Phil., Fl. Atacam. 9. 1860. [figs.114, 115]. **Lectotype**: SGO.

Syns.: *Viola borchersii* Phil., Anales Univ. Chile 81: 494. 1892. *Viola frigida* Phil. var. *borchersii* (Phil.) Reiche, Bot. Jahrb. Syst. 16(3): 438. 1893. *Viola molfinoana* W. Becker, Repert. Spec. Nov. Regni Veg. 22: 351. 1926.

Selected iconography: **[b]** R. Rossow, J.M. Watson & A.R. Flores, Fl. San Juan 2: 144, fig. 145. 2003. **[c]** M.P. Riedemann, G. Aldunate, & S. Teillier, Flora nativa de valor ornamental, identificación y propagación: Chile, zona cordillera de los Andes: 605, 606. 2008. **[b]** M.V. Nicola, Fl. Argentina 17: 390. 2017.

Nations and life duration: Andean N Argentina and Chile. Annual.

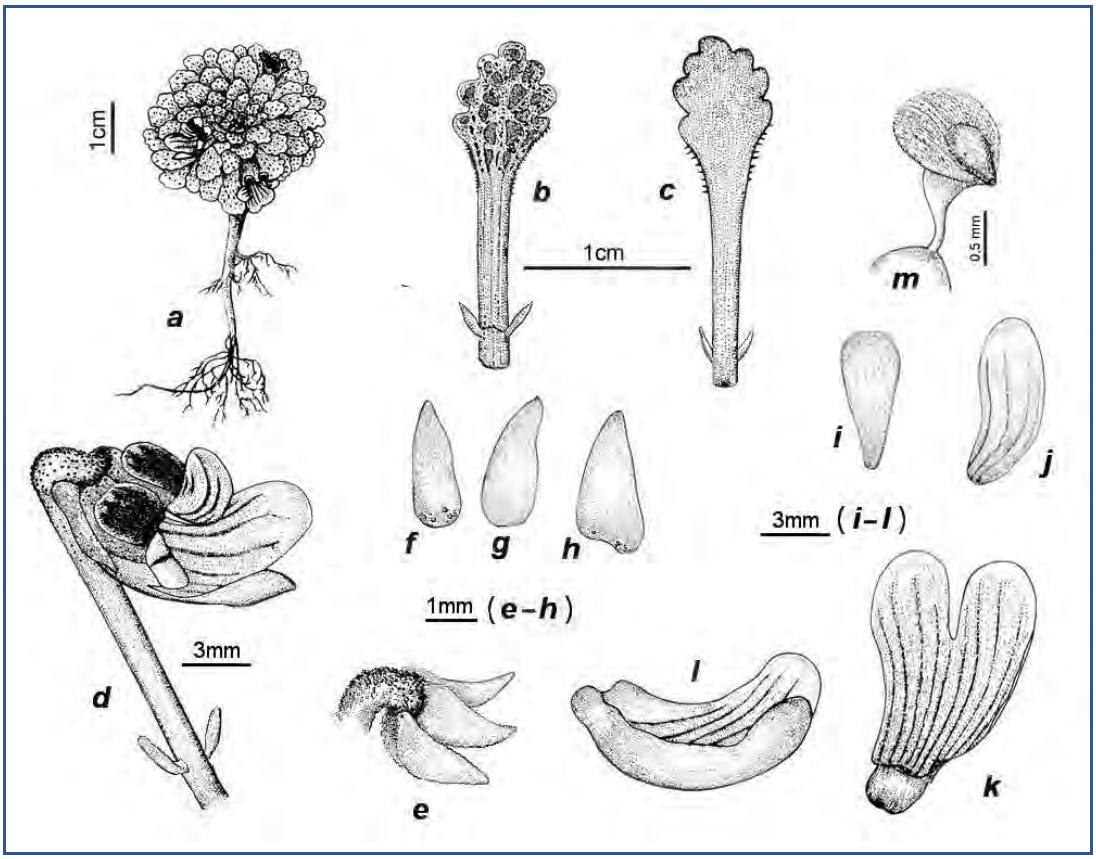
Notes: Widespread and well established in the high Andes. Photos by others.

Proposed conservation status: LC.

114) *Viola frigida*: species elevation range: 3000-4100 m. (Marijn van den Brink).

115) The high Altiplano of far-northern Chile and Argentina which *V. frigida* inhabits. (Marijn van den Brink)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557



116) *Viola gelida.* (Pedro Arias)

117) *Viola gelida:* species elevation range 4740-4850 m. (María Paz Cárdenas)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

118) The *V. gelida* type site in the high Andes of Atacama Region, near-northern Chile. (María Paz Cárdenas)

Viola gelida J.M. Watson, M.P Cárdenas & A.R. Flores, Gayana Bot. 70(2): 390. [figs.116-118]. **Holotype**: CONC.

Selected iconography: **[b]** J.M. Watson, M.P. Cárdenas, A.R. Flores, J. Macaya, H. Jímenez & J. Barría, Gayana, Bot. 70(2): 391, fig. 1; 392, fig. 2A-C. 2013. **[c]** J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig. 17. 2019.

Nation and life duration: Andean near-northern Chile [E]. Perennial.

Note: A recently described species only known from two remote sites in the high Andes of Atacama Region. One population consists of fewer than ten individuals observed. The species is precariously sited in an area projected for near future open-cast mining operations. Photos by others.

Proposed conservation status: CR.

Viola glechomoides Leyb., Flora 47: 40. 1864. **Holotype**: SGO.

Nation and life duration: Andean central Chile [E]. Annual.

Note: One of nine or ten *Viola* species described from the Santiago mountains and not re-encountered subsequent to their type collection.

Proposed conservation status: CR or EX.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola godoyae Phil., Anales Univ. Chile 81: 493. 1892. [fig.33] **Holotype**: SGO.

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 39, fig. 78. 2018.

Nation and life duration: Subandean near-northern Chile [E]. Annual.

Notes: Possibly only known from the type site, where recently rediscovered by R. Martini (in litt.), who has since passed away. Only he knew the exact location. Photos by others.

Proposed conservation status: CR.

Viola granulosa Wedd., Ann. Sci. Nat. Bot. sér. 5, 1: 292. 1864. [fig.119]. **Holotype**: P.

Selected iconography: **[b]** H.A. Weddell, Chloris Andina: plate 87A. 1861.
[c] P. Gonzáles & J. Molina-Alor, Phytotaxa 451(3): 247, fig. 2D. 2020.

Nations and life duration: High Andean S Peru, Bolivia, and extreme N Chile. Perennial.

Notes: Widespread, but not well known, partly due to its effectively cryptic appearance, and also as a consequence of one or more possibly similar, undescribed taxa as images published on the Internet. At present the only species of the subgenus known to lack a lower petal spur, as is defined in the type publication and described by Baehni & Weibel (Macbride 1941). This feature will readily identify reference specimens which accord with its general morphology. Photos by others.

Proposed conservation status: LC.

119) *Viola granulosa*: species elevation range: ca. 4000-4500 m. (Photo Anon, courtesy of the Internet)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola hieronymi W. Becker, Repert. Spec. Nov. Regni Veg. 18: 185. 1922.

Lectotype: CORD.*[1]

Selected iconography: **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº27. 1925.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Notes: [1]*The accompanying botanical drawing of the lectotype at CORD as cited by Nicola (2017) shows a a trilobed style crest, whereas in the protologue and also in the description by Nicola that feature is indicated as entire, and truncate. It is therefore essential to investigate the crest of the actual proposed lectotype. If it is indeed truncate the lectotypification would hold good. If not, and it is identical with the drawing, it would identify as *V. triflabellata*. The two species are sympatric.*[1] Not presently known in the field.

Proposed conservation status: CR or EX.

Viola hillii W. Becker, Bull. Misc. Inform. Kew 1928(4): 134. 1928. [fig.120].

Holotype: K.

Nation and life duration: Andean extreme S Peru [E]*[1]. Perennial.

Notes: [1]*The presence of this species in Bolivia has been noted but not substantiated and is not generally accepted.*[1]

A very rare and little known narrow endemic, only recorded from a few localities close to the border with Bolivia.

Photos by others.

Proposed conservation status: CR.

120) *Viola hillii*: species elevation range: 4000-4500 m. (Daniel Montesinos)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

121) Pacific coastal range habitat of *Viola huesoensis* at Taltal, Antofagasta Region, far-northern Chile. (JMW)

Viola huesoensis Martic., Gayana Bot. 57(2): 191. 2000. [figs.37, 121]. **Holotype**: SGO.

Synonym: *Viola litoralis* Phil., Fl. Atacam. 9. 1860, *hom. illeg.*, *non* Spreng. 1818.

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Chagual 5: 40, fig. 14. 2007.

[c] Rock Gard. Quart. 71(2): 131. 2013.

[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 40, fig. 79. 2018.

Nation and life duration: N Chilean Pacific littoral [E]. Annual.

Notes: A narrow endemic of the immediate coastal hinterland of southern Antofagasta Region consisting of fewer than seven populations. It is apparently well established within its fairly limited range. Its full area of occupation has been proposed for a National Park, but is not accepted as such so far. Somewhat variable, especially respecting foliar indumentum. A relict member of a fragmented alliance of annuals spread though northern Chile from Antofagasta to Atacama regions (Watson & Flores, ined.). Known in situ by us. Our photos and specimens. See also *V. johnstonii*.

Proposed conservation status: VU.

122) Photographing *V. joergensensii* on the roadside verge where we found a small colony near the type site, Cerro el Globo, Catamarca Province, Andean north-western Argentina. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola joergensenii W. Becker, Repert. Spec. Nov. Regni Veg. 22: 353. 1926. [figs.122, 123]. **Lectotype**: BAF.

Erratum: As *Viola triflabellata sensu* Nicola, *non* W. Becker 1925.

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 107: 61, fig. 63. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 119: 106, fig. 72. 2019. **[c]** J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig. 15. 2019.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Notes: Encountered recently in the close proximity of its type locality (pers. obs.), making its recorded locations up to two. A comparative study of their morphologies indicates that *V. joergensenii* may be synonymous with *V. flos-idae* [q.v.] (pers. obs.). Known *in situ* by us. Our photos and specimens.

Proposed conservation status: EN to CR.

123) *Viola joergensenii:* species elevation range: 3000-3300 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola johnstonii W. Becker, Repert. Spec. Nov. Regni Veg. 24: 110. 1927. [figs.124, 126]. **Syntypes**: CONC, GH, K.*[1]

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Chagual 5: 40, fig. 13. 2007. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 131. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 40, fig. 80. 2018.

Nation and life duration: N Chilean Pacific littoral [E]. Annual.

Notes: [1]*In the protologue Becker cites collections but no holotype. One of his is given for Herb. Viol. W. Bekr. which presumably became part of the collection at B and so was destroyed in WW2 (Hiepko 1987, Hagemann & Zepernick 1992). Apparently no lectotype has been cited.*[1]

A narrow endemic recorded from two locations in the immediate coastal hinterland of southern Antofagasta province. Sympatric with, and morphologically very similar to, *V. huesoensis*, from which it differs consistently in lamina apex configuration and corolla outline. One authority considers it synonymous with *V. huesoensis* (M.O. Dillon, pers. comm.). Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

124) *Viola johnstonii:* species elevation range: 300-500 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

125) A Pacific littoral habitat of *V. johnstonii* above Paposo, Antofagasta Region, far-northern Chile. (ARF)

126) John contemplating the view of the Pacific Coast at Paposo from the *V. johnstonii* habitat there. Antofagasta Region, far-northern Chile. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

127) *Viola* ×*josephii* as we first saw it. Species elevation range: 3018-3675 m. (ARF)

Viola* ×*josephii J.M. Watson & A.R. Flores, Int. Rock Gard. 119: 98. 2019. [figs.127- 132]. **Holotype**: CONC.

Parentage: *Viola triflabellata*.

Erratum: As *Viola triflabellata sensu non* W. Becker. 1925, as cited formerly by Watson & Flores and currently by [1]*Kew Science: Plants of the World Online.*[1]

Selected iconography: **[c]** J.M. Watson, Journ. Alp. Gard. Soc. 77(2): 238 [as *V. triflabellata*]. 2009. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 135 [as *V. triflabellata*]. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 115: 13, fig. 19 [as *Viola* sp.]. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 119: 72, figs. 5, 6; 73, fig. 7; 78, figs 16, 17; 79, figs. 18, 19; 80, fig. 20; 83, figs. 25, 26; 88, figs. 35, 36; 89, figs. 37, 38; 90, figs. 39, 40; 101, fig. 61; 102, figs. 62, 63; 103, figs. 64, 65; 104, figs. 66-68; 105, figs. 69, 70; 106, fig.73. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 128: 49, fig. 69. 2020.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Notes: [1]*Following its publication and clarification as distinct in 2019, it is hard to understand why Kew placed this clearly evident nothospecies as a synonym of *V. triflabellata* without experience of these Andean violas and certainly without having seen our hybrid or its parents in the field. This is the most effective means of assessing, as our illustrations in the protologue, which are cited above, clearly demonstrate. Furthermore, Becker's type description of his *V. triflabellata* differs beyond doubt from all populations of *V.* ×*josephii*, albeit from some even more than others.*[1]

128) *Viola* ×*josephii*, a form with strong violet corollas and ciliate laminas. (ARF)

Understandable pre-publication confusion arose when we first saw just one small colony on its own and had never seen true *V. triflabellata* (Watson 2009). Our misidentification was based on an earlier collection at the Lillo herbarium in Tucumán from exactly the same location (B. Sparre, in sched.). Later, while exploring the area extensively and thoroughly we encountered all its other wide

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

variations and recognised the various populations immediately as being of the same hybrid origin. We still maintained our original population as *V*. *triflabellata* until discovering a true population that taxon in the field shortly after, which was at one of the very locations cited by Becker (1927). *V*. ×*josephii* is the latest of three *Neoandinium* natural hybrids we have published (see also *V*. ×*blaxlandiae* and *V*. ×*zweinenii* in this review). Recognising all its variations presents no problems as neither parent is present in or near its population. *V*. *triflabellata* is undoubtedly one, but the other is unknown and may be undiscovered as yet or extinct. This taxon is so polymorphic that no other option than hybrid origin is reasonable. Although only known to occur as five or six populations in a line over a maximum distance of nine km on the same mountain complex, it is quite plentiful collectively, and under no obvious anthropic or overgrazing threat. We might add here that we find it regrettable when nothospecies are not included in floras as they form an important and significant part of their genera and its ongong evolution. Known in situ by us. Our photos and specimens.

Proposed conservation status: NT.

129) *Viola* ×*josephii* with the darkest and most incised laminas we recorded. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

130) The high plateau at the Vega Altos de Muñoz, the highest area of the *V.* ×*josephii* distribution in Tucumán Province, north-western Argentina. (ARF)

131) The small llama herding community on the Vega Altos de Muñoz where we spent the night while investigating *V.* ×*josephii*. Tucumán Province, north-western Argentina. (ARF)

132) John and our local friend, host and guide Mario saddling up for the ride up to explore the habitat of *V.* ×*josephii* on the Vega Altos de Muñoz, Tucumán Province, northwestern Argentina. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola kermesina W. Becker, Repert. Spec. Nov. Regni Veg. 7: 124. 1909. [fig.24].

Holotype: B (destroyed).*[1]

Nation and life duration: Andean central Peru [E]. Perennial.

Selected iconography: **[c]** P. Gonzáles & J. Molina-Alor, Phytotaxa 451(3): 247, fig. 2E. 2020.

Notes: [1]* No other type material known to exist.What purported to be an isotype was donated from B to Kew in the 1930s, after Becker's death, but before the destruction of the main B *Viola* collection during the Second World War (Hiepko 1987, Hagemann & Zepernick 1992, H. Ballard in litt.). However, examination of well-detailed images of this specimen clearly reveal that it does not correspond in several critical features with the description in Becker's protologue (pers. obs.).*[1]

Until a few years ago *V. kermesina* was not known in situ since Weberbauer's type gathering despite two thorough searches at the site he recorded (pers. obs., R. Rolfe, in litt.). However, recent more numerous and widespread explorations of its area in the Andes of central Lima Province revealed several locations [supported by photographs], although not from the actual type site at Yauli. Photos by others.

Proposed conservation status: VU.

Viola lanifera W. Becker, Repert. Spec. Nov. Regni Veg. 18: 183. 1922.

Holotype: B (destroyed). **Isotypes**: K, SGO.

Nation and life duration: Andean near-northern Chile [E]. Perennial.

Notes: Not confirmed in situ beyond doubt since the type collection until found in recent years at a new location (M. Rosas, in litt.). Specimen photos by others.

Proposed conservation status: EN to CR.

Viola leyboldiana Phil. Linnaea 33: 16. 1864. [fig.23]. **Holotype**: SGO.

Selected iconography: **[a]** K. Reiche Violae chilenses: plate 7, fig. 12. 1893.

[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 48, fig. 60. 2020.

Nations and life duration: Andean near-southern Argentina and Chile. Perennial.

Notes: Although not re-encountered in the wild in Chile since the original type collection, the species has recently been identified twice at different localities in the extreme S of Mendoza Province, Argentina (pers. obs., M. Sheader, in litt.). The discovery by the present authors dates back to 1987, and between then and 2008,

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

when accurately identified, it was thought to be an undescribed taxon. Known in situ by us. Our photos and specimens.

Proposed conservation status: CR.

Viola lilliputana Iltis & H.E. Ballard, Brittonia 64(4): 355. 2012. [fig.133].

Holotype: MO.

Selected iconography: **[a** & **f]** H.H. Iltis & H.E. Ballard. Brittonia 64(4): 355, fig. 1 (inset), 356, fig. 2. 2012.

Nation and life duration: Andean S Peru [E]. Perennial.

Notes: Although the type site is not recorded precisely, and it is not now known from there, it has recently been encountered and photographed at another location nearby (P. González, in litt.). Due to its miniscule size of 1 cm or less, *V. lilliputana* is probably not perceptible for a person in the upright position, and was only originally discovered by accident when another plant was being examined closely. This cryptic physical aspect makes knowledge of its distribution and assessment of its precise conservation status difficult (H.E. Ballard, in litt.). Photos by others.

Proposed conservation status: CR.

133) *Viola lilliputana*: species elevation: ca. 4300 m. (Paúl Gonzales)

Viola lilloana W. Becker, Repert. Spec. Nov. Regni Veg. 23: 225. 1926.

Lectotype: BAF.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Note: Not presently known in the field or encountered since the type gathering.

Proposed conservation status: CR or EX.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola llullaillacoensis W. Becker, Repert. Spec. Nov. Regni Veg. 24: 109. 1927. [fig.134]. **Isotypes**: CONC, K, M.*[1]

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 115: 43, fig. 71. 2019.

[c] J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig. 16. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 128: p. 49, fig. 70.

[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 128: 49, fig. 70. 2020.

Nation and life duration: High Andean N Chile [E]. Perennial.

Notes: [1]*No holotype was cited by Becker and no lectotype is known.*[1]

A narrow endemic of the Altiplano and adjacent mountains near the border with Argentina. It is apparently safely established with a number of populations within its fragmented, linear, longitudinal range of ca. 275 km at 4000-4100 m. Unlikely to be confused superficially with morphologically similar species due to its extreme geographical and elevational isolation from them. Photos by others.

Proposed conservation status: VU.

134) *Viola llullaillacoensis*: species elevation range: 4000-4200 m. (Veronica Pardo).

Viola lologensis (W. Becker) J.M. Watson, Gayana Bot. 68(2): 302. 2011.*[1] [fig.35].

Holotype: K.

Basionym: *Viola cotyledon* Ging. subsp. *lologensis* W. Becker, Bull. Misc. Inform. Kew 1928(4): 135. 1928.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Syns.: [As subsp.] *Viola dasyphylla sensu* Rossow *non* W. Becker.1928. [As sp.] *Viola dasyphylla sensu* Nicola *non* W. Becker.1928.

Selected iconography: **[c]** S. Clay (ex H. Comber), The present-day rock garden: plate 55. 1937. **[c]** J.M. Watson & A.R. Flores (ex H. Comber), Int. Rock Gard. 107: 25, fig. 1. 2018.

Nation and life duration: Andean N Patagonia, Argentina [E]. Perennial.

Notes: [1]*Not accepted as a distinct species by Argentinian botanists (Xifreda & Sanso 2008, Nicola 2017, Nicola et al. 2018). Our own knowledge and extensive investigation of this taxon, including of its specimens at K, leaves us in no doubt whatever that its morphology is an equal mix of significant features of *V. cotyledon* and *V. dasyphylla*. This is supported by the identification of it as a subspecies of *V. cotyledon* by the highly experienced Becker (1928b) in the original protologue. In addition it inhabits a geographical sector exactly midway between the nearest populations of those two species, yet well apart from both. Consequently, according to our taxonomic understanding it cannot be placed as a variant or synonym of either. With little doubt *V. lologensis* represents a stablized original natural hybrid between those two species. Future molecular analysis, if ever possible, should define its exact status.*[1]

A very narrow endemic known only from Harold Comber's type collection in Neuquén Province and another made by him nearby (pers. obs. at K). Despite meticulous extensive and exhaustive searching there in recent years by ourselves [J. W. & A. F.] it has not been found again and may reasonably be presumed as extinct.

Proposed conservation status: EX.

Viola marcelorosasii J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 11. 2018. [figs.135-137]. **Holotype**: SGO.

Erratum: As *Viola rhombifolia sens. auct., non* Leyb. 1859.

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 94: fig. 22. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 13, fig. 19; 14, figs. 20, 21; 15, figs. 22, 23; 16, figs. 24, 25; 17, figs. 27-29; 18, figs. 30, 31; 38, fig. 76. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 117: 44, fig. 67. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 11, fig. 7. 2020. **[d]** J.M. Watson & A.R. Flores, Int. Rock Gard. 128: 48, fig. 68. 2020.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Nation and life duration: Subandean near-northern Chile [E]. Annual.

Notes: Encountered as two proximate populations in Vallenar Province, S Atacama Region. One is sizeable and safely established, the other comprises very few individuals. Known in situ by us. Our photos and specimens.

Proposed conservation status: EN to CR

135) *Viola marcelorosasii*: species elevation range: 1600-2280 m. (JMW)

136) The clay levels type site of *V. marcelorosasii* in the Andean foothills to the north-east of Vallenar, Atacama Region, near-northern Chile. (JMW)

137) Anita with our host and guide Juan Alegria and his fiancée taking a break at the *V. marcelorosasii* location. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola membranacea W. Becker, Repert. Spec. Nov. Regni Veg. 7: 123. 1909. [fig.138].

Holotype: B (destroyed).*[1]

Selected iconography: **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº21. 1925.

Nation and life duration: Andean Peru [E]. Perennial.

Notes: [1]*No other type material is known, but a collection of the species is lodged at K, and certainly other collections in Peru have been made. If not already done, one of these should be published as a neotype.*[1]

Recorded from four northern-central and southern departments (Liesner 1993), so may be considered as securely established. Photos by others.

Proposed conservation status: VU.

138) *Viola membranacea*: species elevation range: 3000-4500+ m. (Photo Anon, courtesy of the Internet)

Viola mesadensis W. Becker, Repert. Spec. Nov. Regni Veg. 24: 363. 1928.

Holotype: CORD.

Nation and life duration: Andean NW Argentina [E]. Annual.

Notes: Not presently known in the field or encountered since the original gathering despite a search by us [J. W. & A. F.] at the type site, although admittedly in unfavourable weather conditions. It is omitted completely from the Argentinian taxa (Xifreda & Sanso 2008, Nicola 2017, Nicola et al. 2018).

Proposed conservation status: CR or EX.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola micranthella Wedd., Ann. Sci. Nat., Bot. sér. 5, 1: 291. 1864. [fig.139].

Lectotype: P.

Nations and life duration: Andean S and central Peru, Bolivia and extreme N Argentina. Annual.

Selected Iconography: **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº18. 1925. **[b]** M. Sanso, E. Simonetti & C.C. Xifreda, Darwiniana 41(1-4): 88, fig. 1. 2003. **[b]** M.V. Nicola, Fl. Argentina 17: 395. 2017.

Notes: Distinct, with an intermittent but extensive range, and well established within it. Photos by others.

Proposed conservation status: LC.

139) *Viola micranthella*: species elevation range: 1500-4700 m. (David Haselgrove)

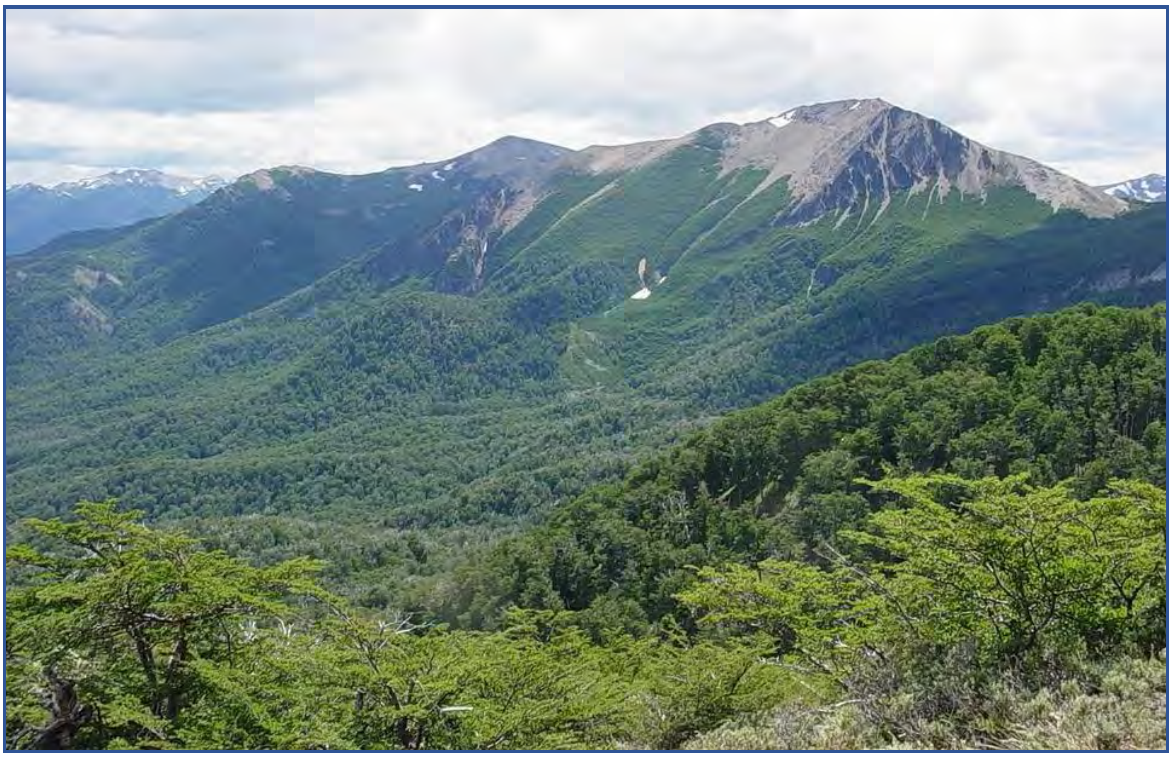
Viola minutiflora Phil., Anales Univ. Chile 81: 493. 1892. [figs.38, 140]. **Holotype**: SGO.

Selected iconography: **[c]** J.M. Watson, Bull. Alp. Gard. Soc. 43(1): 80. 1975. **[c]** J.M. Watson & A.R. Flores, Chagual 5: 37, fig. 7. 2007. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 128. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 23, fig 33. 2018.

Nation and life duration: Lowland to subalpine near-southern Chile [E]. Annual.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Notes: A very rare, small-sized narrow endemic. Not seen again since its type gathering until 1971, when rediscovered by Beckett, Cheese and Watson (Watson 1975a), but also collected or recorded from two other locations in recent years (G. Aldunate, D. Santos in litt.). Its lowland wooded habitats are situated in areas of considerable human activity and this should be taken into account when assessing its potential conservation status. Known in situ by us. Our photos and specimens.
Proposed conservation status: EN to CR.



140) Southern beech (*Nothofagus antarcticus*) woodland in Bío Bío Region, near-southern Chile, one of the habitats of *V. minutifolia* there. (ARF)

Viola montagnei Gay Fl. Chil. [Gay] 1: 222. 1846. [figs.141,142]. **Holotype**: P ?

Syns.: *Viola montagnei* Gay var. *glandulosa* Phil., Linnaea 33(1): 15. 1864.
Viola bicolor Reiche, Anales Univ. Chile 90: 889. 1895 *hom. illeg.*, *non* Hoffm. 1804.
[1]**Viola cano-barbata* Leyb., Flora 49: 285. 1866 syn. nov.*[1]. *Viola flos-mariae* Hieron., Bol. Acad. Nac. Cordoba 4: 8. 1881. *Viola flos-mariae* Hieron. var. *nivea* Hieron., Bol. Acad. Nac. Cordoba 4: 10. 1881. *Viola flos-mariae* Hieron. var. *virescens* Hieron., Bol. Acad. Nac. Cordoba 4: 10. 1881.
Viola cano-barbata Leyb. var. *albiflora* W. Becker, Repert. Spec. Nov. Regni Veg. 21: 360. 1925, syn.nov.. *Viola karlreicheana* Sanso, M. Seo & Xifreda, Darwiniana 45 (2); 241. 2007.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Erratum: As *Viola atropurpurea sensu* Huyghe & Wembourne, *non* Gay 1846.

Selected iconography: **[a]** K. Reiche *Violae* chilenses: plate 7, fig. 3. 1893. **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº30 [as *V. flos-mariae*]. 1925. **[c]** J.M. Watson, Bull. Alp. Gard. Soc. 45(3): 230 [as *V. canobarbata*].1977. [c] M.Wingenroth & J. Suarez, Flores de los Andes. Alta montaña de Mendoza: 128 [as *V. cano-barbata*]. **[b]** A. Hoffmann, M.K. Arroyo, F. Liberona, M. Muñoz & J. Watson, Plantas altoandinas, fl. silv. Chile: 65, fig. 3 [as *V. canobarbata*]. 1998. **[b]** R. Rossow, J.M. Watson & A.R. Flores, Fl. San Juan 2: 144, fig, 144. 2003. **[c]** F.A. Squeo, R. Osorio & G. Arancio, Fl. Los Andes Coquimbo, Cordillera de Doña Ana: 30, fig.13. 1993. **[c]** E. Huyghe & G. Wembourne, Secretos de la cordillera de Santiago:172, 189 [as *V. atropurpurea*]. 2003. **[c]** J.M. Watson & A.R. Flores, Chagual 5: 39, fig 10a, b. 2007. **[c]** M.P.Riedemann, G. Aldunate, & S. Teillier, Flora nativa de valor ornamental, y identificación propagación: Chile, zona cordillera de los Andes: 602. 2008. **[c]** S. Teillier, A. Marticorena & H.M. Niemeier. Fl. Andina Santiago: 436, fig. 3. 2011. **[b]** M.V. Nicola, Fl. Argentina 17: 396. 2017. **[c]** J.M. Watson &A.R. Flores, Int. Rock Gard. 106: 26, fig. 38. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 31, fig. 27. 2020.

Nations and life duration: Andean near-northern to central Argentina and Chile. Perennial and also facultatively monocarpic or annual in the Santiago Andes.

Notes: [1]*****V. *cano-barbata* is synonymous with *V. montagnei* in our opinion. Both possess identical styles, a major critical determining feature, and similar-shaped very small corollas. *V. cano-barbata* has glabrous laminas, those of *V. montagnei* having indumentum. This is the only difference cited by all who studied both (e.g. Reiche 1893, 1896), or who implicitly accept *V. cano-barbata*. That feature is extremely polymorphic both between and within *V. montagnei* populations (pers. obs.) however, so does not serve as an effective taxonomic distinction for us (J. W. & A. F). *V. cano-barbat*a as recognised is fully sympatric with *V. montagnei*. Xifreda & Sanso (1999) cite the former for Argentina, whereas Nicola (2017) and Nicola et al. (2018) do not. And why the enigmatic, contradictory specific epithet? What possessed Leybold to call it *cano-barbata*, a compound word derived from *canus* (greyish-white, usually applied to hair-covering) and *barbatus* (bearded, provided with tufts of long, weak hairs) (Stearn 1966), when it is described as totally glabrous? In fact that description accurately fits forms of *V. montagnei* with hoary-hairy laminas.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Surely it was not intended as some kind of in-joke?*[1]

Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

141) Anita and our neighbour Helga photographing *V. montagnei* at the Paso del Agua Negra near the border with Chile in the high Andes of San Juan Province, central Argentina. (JMW)

142) *Viola montagnei*: species elevation range: 2900-4200 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola nassauvioides Phil., Anales Univ. Chile 81: 346. 1892. [fig.30]. **Holotype**: SGO.

Selected iconography: **[a]** K. Reiche *Violae* chilenses: plate 7, fig. 17a**,** b. 1893.

[a] W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº20. 1925.

[a] J.M. Watson & A.R. Flores, Chagual 5: 41, fig, 16j. 2007.

Nation and life duration: [1]* Andean south-central Chile [E].*[1] Perennial.

Notes: Only indicated by Philippi in the protologue as having been collected with *V. cotyledon* in the central cordilleras

[1]*No precise location was given, nor was the collector, evidently not Philippi, named. *V. nassauvioides* must therefore be presumed to occur somewhere between southern Santiago Region and Maule Region, this being the distribution of *V. cotyledon* in central Chile.*[1]

Not seen in the wild since the type gathering. A remarkably distinct species which can only be rediscovered by chance if still extant.

Proposed conservation status: CR or EX.

Viola niederleinii W. Becker, Repert. Spec. Nov. Regni Veg. 18: 184. 1922.

Neotype: CORD.

Selected iconography: **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº28. 1925.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Note: Not presently known in the field or encountered since the type gathering.

Proposed conservation status: CR or EX.

Viola nobilis W. Becker, Bot. Jahrb. Syst. 37(5): 590. 1906. **Lectotype**: Z.*[1]

Nation and life duration: Andean Central Peru [E]. Perennial.

Notes: [1]*No type material known. The holotype at B was destroyed*[1]

Becker (1925b) did not mentioned this taxon in his review of *Viola*. However, his type description accords with the circumscription of this alliance, including by possession of a style crest. Also in Macbride (1941), it is keyed among the rosuate species. Not presently known in the field or encountered since the type gathering.

Proposed conservation status: CR or EX.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola nubigena Leyb., Flora 47(3): 40. 1864. **Holotype**: SGO.

Nation and life duration: Andean central Chile [E]. Annual.

Note: One of nine or ten species described from the Santiago mountains and not re-encountered subsequent to their type collection.

Proposed conservation status: CR or EX.

143) *Viola ovalleana*: species elevation range:1000-2600 m. (Marcelo Rosas)

Viola ovalleana Phil., Anales Univ. Chile 81: 494. 1892. [fig.143]. **Holotype**: SGO.

Erratum: As Viola ovalleana sensu Hoffmann et al.1998, non Phil. 1892.*[1]

Selected iconography: **[a]** K. Reiche *Violae* chilenses: plate 7, fig. 2a, b. 1893.

Nation and life duration: Subandean to Andean near-northern Chile [E]. Annual.

Notes: [1]*A closely similar taxon from an unknown location in the same Coquimbo Region was misidentified as *V. ovalleana* in Hoffmann et al. (1998). As yet no specimen of the former exists and it therefore remains undescribed for science.*[1] True *V. ovalleana* from central Coquimbo Region was not rediscovered in the field

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

until quite recently (M. Rosas, in litt.), to the extent that it was cited as possibly EX [extinct] by Squeo et al. (2001). More recently still a pink form was discovered higher up in the nearby Andes (M. Rosas, in litt.) raising the recorded populations to at least three. Photos by others.

Proposed conservation status: VU to EN.

Viola pachysoma M.Sheader & J.M. Watson, Phytotaxa 382(1): 114. 2018. [figs.144, 145]. **Holotype**: Herb. Sheader. **Isotype**: BCRU.

Syns.: *Viola copahuensis* M. Sheader & A.-L. Sheader, Alpine Gardener, Bull. Alp. Gard. Soc. 82(2): 210. 2014, *nom. illeg*. *Viola caviahuensis* M. Sheader & A.-L. Sheader, Alpine Gardener, Bull. Alp. Gard. Soc. 82(3): 245. 2014, *nom. illeg*.

Erratum: As *Viola columnaris sensu* Rossow et al. *non* Skottsb.*[1]

Selected iconography: **[c]** M. Ferreyra, C. Ezcurra & S. Clayton, Flores de alta montaña de los Andes patagónicos: High mountain flowers of the Patagonian Andes: 180 [as *V. columnaris*]. 2006. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 70(4): 369 [as *V. columnaris*]. 2012. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little, & A.-L.Sheader, Flowers of the Patagonian mountains: 270, 271 [as *V. copahuensis*]. 2013. **[c]** J.M. Watson, A.R. Flores, M. Sheader & A.-L. Sheader, Phytotaxa 382(1): 116, fig. 2; 117, fig. 3; 121, fig. 5A-C. 2018.
[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 110: 35, fig. 60. 2019.
[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 48, fig. 58; 54, fig. 71; 57, fig. 75. 2020. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 15, fig. 15. 2020.

Nation and life duration: Low subandean to Andean N Argentinian Patagonia [E]. Perennial.

Notes: [1]*Long considered a northern extension of the *V. columnaris* range, and still often indicated as such (Rossow 1988, Watson 1994b, Xifreda & Sanso 1999, Ferreyra et al. 2006, Nicola 2017, Nicola et al. 2018).*[1]
One parent of highly variable *V.* ×*blaxlandiae*, forms of which are readily confused with *V. pachysoma*. It is common within its limited range. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

144) Habitat of *V. pachysoma* at its centre of distribution on the surround of Volcán Copahue, Neuquén Province, Argentinian north Patagonia. (Kees Jan van Zwienen)

145) *Viola pachysoma*, near Copahue. Species elevation range: 1600-2050m.
(Kees Jan van Zwienen)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola petraea W. Becker, Repert. Spec. Nov. Regni Veg. 21: 354. 1925. [fig.34].

Lectotype: BAF.

Syn.: *Viola petraea* W. Becker forma *albida* W. Becker, Bull. Misc. Inform. Kew 1928(4): 136. 1928.

Errata: As *Viola columnaris sensu* Rossow et al., *non* Skottsb. 1916. As *V. copahuensis* M. Sheader et al., *non* M. Sheader & A.L. Sheader. 2014. As *Viola cotyledon sensu* Nicola, *non* Ging. 1824.*[1]

Selected iconography: **[c]** Clay, S (ex H. Comber), The present day rock garden: plate 55. 1937. **[c]** M. Ferreyra, C. Ezcurra & S. Clayton, Flores de alta montaña de los Andes patagónicos: High mountain flowers of the Patagonian Andes: 180 [as *V. columnaris*]. 2006. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little, & A.-L.Sheader, Flowers of the Patagonian mountains: 270 [as *V. copahuensis*]. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 25, fig. 36. 2018. **[c]** J.M. Watson, A.R. Flores, M. Sheader & A.-L. Sheader, Phytotaxa 382(1): 122, fig 6A,B. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 50, fig. 64. 2020. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 17, fig. 20. 2020.

Nation and life duration: Andean N Patagonia, Argentina [E]. Perennial.

Notes: [1]*A rare localized species not recognised in much relevant recent and present literature (Rossow 1988, Xifreda & Sanso 1999, Xifreda & Sanso 2008, Ferreyra et al. 2006, Sheader et al. 2013, Nicola 2017, Nicola et al. 2018), being omitted by name altogether or cited as a synonym of *V. cotyledon*, *V. columnaris* or *V. copahuensis*. Nevertheless, Becker's protologue provides a circumscription which shows it as distinct and discontinuous from all related others, as clearly recognisable in wild populations (Watson et al. 2018).*[1]

It is only recorded from three localities in the Lago Nahuel Huapi sector. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

Viola philippiana Greene, Pittonia 2(7): 14. 1889. **Holotype**: SGO.

Basionym: *Viola chrysantha* Phil., Linnaea 33(1): 15. 1864, *hom. illeg.*, *non* Hook. 1836.*[1]

Syns.: *Viola toroensis* Martic., Gayana Bot. 57(2): 192. 2000. *nom. illeg. superfl.*[*2]

Selected iconography: **(c)** F.A. Squeo, R. Osorio & G. Arancio, Flora de los Andes de Coquimbo, Cordillera de Doña Ana: 52, fig. 80b [as *V. chrysantha*]. 1993.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Nation and life duration: Near-northern Chile [E]. Annual.

Notes: [1]*Originally published with the illegitimate name of *V. chrysantha* (Philippi 1864), the species was subsequently given the new name *V. philippiana*.*[1]

[2]*Understandably unaware of Greene's correction, Marticorena (2000) later supplied the *nom. illeg. superfl.* of *V. toroensis*.*[2]

This rare, narrow endemic is known for certain only from the general area of its type site in upper Elqui Province. Coquimbo Region. Its record in Squeo et al. (2001) as FP (not endangered) is probably an unintentional mistake. Based on formal conservation criteria it must be considered endangered at least. Photos by others.

Proposed conservation status: EN to CR.

Viola philippii Leyb., Anales Univ. Chile 16: 681. 1859. [fig.29, 146]. **Lectotype**: SGO.

Syns.: *Viola microphylla* Phil., Linnaea 28(6): 611. 1858, *hom. illeg.*, *non* Roem. & Schult. 1819. *Viola arbuscula* Phil., Anales Univ. Chile 81: 491. 1892. *Viola philippii* Leyb. var *arbuscula* (Phil.) Reiche, Anales Univ. Chile 90: 909. 1895.

Selected iconography: **[a]** K. Reiche *Violae* chilenses: plate 7, fig. 13a, b. 1893. **[b]** A. Hoffmann, M.K. Arroyo, F. Liberona, M. Muñoz & J. Watson, Plantas altoandinas, fl. silv. Chile: 65, fig. 5. 1998. **[c]** E. Huyghye & G. Wembourne, Secretos de la cordillera de Santiago: 172, 189. 2003. **[c]** J.M. Watson & A.R. Flores, Chagual 5: 45, fig. 22. 2007. **[c]** M.P. Riedemann, G. Aldunate, & S.Teillier, Flora nativa de valor ornamental, identificación y propagación: Chile, zona cordillera de los Andes: 603. 2008. **[c]** S. Teillier, A. Marticorena & H.M. Niemeier, Fl. Andina Santiago: 436, fig. 4. 2011. **[b]** M.V. Nicola, Fl. Argentina 17: 390. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 28, fig. 41. 2018.

Nations and life duration: Andean central Argentina and Chile. Perennial.

Notes: Relatively common and well established within its range. Impossible to confuse with any other except the much less frequent sympatric *V. decipiens*, which is identical in facies. They require examination to determine by their distinguishing style crests and underleaf glands, present in *V. decipiens* by contrast with the eglandular state of *V. philippii* , which also lackes a crest (Reiche 1893, 1896). Known in situ by us. Our photos and specimens.

Proposed conservation status: NT.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

146) Lagunillas, Santiago Province, central Andean Chile. The small ski centre where a very few *V*. *philippii* can be seen. (JMW) (JMW)

147) The Chimborazo volcano just south of the equator in Ecuador. *V*. *polycephala* inhabits its flat surrounds. (Photo Anon, courtesy of the Internet)

Viola polycephala H.E. Ballard & P. Jørg., Novon 7(1): 13. 1997. [figs.147, 148].

Holotype: K.

Basionym: *Viola parvifolia* Benth., Pl. Hartw. (Bentham) 161. 1845, *hom*. *illeg*., *non* Roem. & Schult. 1819.

Selected iconography: **[c]** M. Sheader, Alpine Gardener, Journ. Alp. Gard. Soc. 88(3): 254, 270 [as *V*. *parvifolia*]. 2020.

Nation and life duration: High Andean N to central Ecuador [E]. Perennial.

Notes: A distinctive endemic at elevations of 3500 m and above on volcanoes of four provinces (Jørgensen & Ballard 1999). Not uncommon and apparently safely established. Photos by others.

Proposed conservation status: LC to NT.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

148) *Viola polycephala*: species elevation range: 3500-4500+ m. (Photo Anon)

149) A typical coastal habitat of *V. polypoda* throughout its extended distribution along the northern Chilean Pacific littoral. (JMW)

Viola polypoda Turcz., Bull. Soc. Imp. Naturalistes Moscu 36(1): 555. 1863. [figs.149-151]. **Holotype**: KW [probably]. **Isotype**: BM.

Syns.: *Viola psammophila* Phil., Linnaea 33(1): 14. 1864. *Viola pseudasterias* Reiche, Bot. Jahrb. Syst. 16(3): 435. 1892. *Viola pseudasterias* Reiche var. *psammophila* (Phil.) Reiche, Anales Univ. Chile 90: 900. 1895. *Viola calderensis*

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

W. Becker, Bot. Jahrb. Syst. 37(5): 588. 1906. *Viola werdermannii* W. Becker, Repert. Spec. Nov. Regni Veg. 23: 222. 1926. *Viola werdermannii* W. Becker var. *glaberrima* W. Becker, Repert. Spec. Nov. Regni Veg. 23: 223. 1926. *Viola werdermannii* W. Becker var. *typica* W. Becker, Repert. Spec. Nov. Regni Veg. 23: 223. 1926. *Viola werdermannii* W. Becker forma. *glandulifera* W. Becker, Repert. Spec. Nov. Regni Veg. 23: 223. 1926.*[1]

Selected iconography: **[a]** K. Reiche *Violae* chilenses: plate 6, fig. 14. [*as V. pseudasterias*] 1893. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 132. 2013. **[c]** P. Riedemann & G. Aldunate, Flora nativa de valor ornamental, identificación y propagación: Chile, zona norte, 2 ed.: 408, 409. 2016. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 7, fig. 11; 28, figs. 57, 58; 37, fig. 74. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 23, fig. 32. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard.115: 6, fig. 4. 2019.

150) *Viola polypoda*: species elevation range: 10-1000 m (JMW)

Nation and life duration: N Chilean littoral and interior lowland [E]. Annual.

Notes: [1]*Two taxonomical problems exist for this species. In the first place it is so similar to *V. pusilla* Poepp. [q.v.], with which it is possible sympatric in Atacama Region, that only examination of the style crest [seldom visible in photos] can define the difference between the two when the record is from the sector where both species could occur, or when the provenance is unknown.

Secondly, together with *V. pusilla*, and even more so, it is the most polymorphic by far of these Andinopacific violas. This has led to the publication between 1864 and 1926 of nine species or varieties as recognised for the concept herein. Our own extensive investigations of many populations where these variants occur has convinced us beyond doubt that as a whole there is such variation both between and within populations that they represent nothing but one highly polymorphic species.*[1]

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

The present authors have not been able to investigate the synonym holotypes to check which are *V. polypoda* and which *V. pusilla* for certain as described by Philippii and Reiche. But we have cited from the publications by Reiche (1893, 1896), who did examine them personally. This species is superabundant by the standards of almost all the *Neoandinium* taxa, and in all likelihood the most widespread and frequent of them. Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

151) Near Copiapó, central Atacama Region of northern Chile, one of the fairly infrequent interior locations of *V. polypoda*. (JMW)

Viola portulacea Leyb. Anales Univ. Chile 26: 718. 1865. Flora 48: 381. 1865.

Holotype: SGO.

Nation and life duration: [1]*Subandean central Chile [E].*[1] Perennial.

Notes: [1]**V. portulacea* is recorded for Argentina from the provinces of Mendoza and Neuquén (Xifreda & Sanso 1999), but these records are partly based on Becker's 1928 misidentification of *V. beckeriana* (Becker 1928a, Watson & Flores 2013d), and should only be accepted if authoritatively confirmed. Recorded by Nicola (2017) as doubtful for Argentina.*[1]

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

The name has also been erroneously applied to *V. skottsbergiana* (Watson 1976). One of nine or ten species described from the Santiago mountains and not known *in situ* subsequent to the original collection despite exhaustive recent searching at the type site (Watson & Flores pers. obs.). However, the sector is now entirely covered in low scrub and its presence there appears to have been temporary, and is attributed by us to a landslip from significantly higher ground immediately above, where it may still exist. *V. portulacea* was collected and described in its reasonably distinctive sterile state, supported by no more than a casual and incomplete first-hand visual description of the flowers (Leybold 1865). No subsequent collection of a subgenus *Neoandinium* taxon has been made which corresponds with these features.

Proposed conservation status: CR or EX.

Viola pulvinata Reiche, Bot. Jahrb. Syst. 16(3): 434. 1892. **Holotype**: SGO.

Selected iconography: **(a)** K. Reiche *Violae* chilenses. plate 6, fig. 12a, b. 1893.

Nation and life duration: Andean central Chile [E]. Annual.

Note: One of nine or ten *Viola* species described from the Santiago mountains and not re-encountered subsequent to their type collection.

Proposed conservation status: CR or EX.

Viola pusilla Poepp., in Froriep, Notiz. Gebiet Natur-u. Heilk. Ser. 1, 23: 277. 1829. [figs.21, 28,152]. **Holotype**: [not yet known by us].

Syns.: *Viola stellata* Miers, Trav. Chile 2: 531. 1826, *nom. nud. Viola asterias* Hook. & Arn., Bot. Misc. 3: 145, plate 99. 1833. *Viola miersii* Bertero ex Steud., Nomencl. Bot. [Steudel], ed. 2. 2: 772, 1841, *nom. inval.* [1]**Viola asterias* Hook. & Arn. var. *atacamensis* Phil., Anales Univ. Chile 81: 492. 1892. *Viola asterias* Hook. & Arn. var. *caulescens* Phil., Anales Univ. Chile 81: 491. 1892. *Viola asterias* Hook. & Arn. var. *depauperata* Phil., Anales Univ. Chile 81: 492. 1892. *Viola asterias* Hook. & Arn. var. *genuina* Reiche, Anales Univ. Chile 90: 899. 1895. *Viola asterias* Hook. & Arn. var. *glabra* Phil ex Reiche, Anales Univ. Chile 90: 899. 1895.*[1]

Selected iconography: **[b]** W.J. Hooker, Bot. Misc. 3: plate 49 [as *V. asterias*]. 1833. **[a]** K. Reiche *Violae* chilenses: plate 6, fig. 13a, b [as *V. asterias*]. 1893. **[a]** W. Becker, Natürl. Pflanzenfam. ed 2a. 21: 371, fig. 159 Nº14 [as *V. asterias*]. 1925. **[b]** L.E. Navas, Flora de la cuenca de Santiago de Chile 2: 509, fig. 47P, Q

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

[as *V. asterias*]. 1976. **(c)** P. Novoa, Flora de la Región de Valparaiso: 267. 2000.

[b] A. Hoffmann, Fl. Silv. Chile, Zona Centr., 5 ed.: 226, fig. 1 [as *V. asterias*]. 2012.

[c] J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 131. 2013.

[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 103: 30, fig. 10. 2018.

[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 37, fig. 73. 2018.

Nation and life duration: central and southern Chilean littoral to subandean interior [E]. Annual.

Notes: [1]*For synonym information see *V. polypoda*.*[1]

An extremely common, widespread and polymorphic species recorded between Atacama and Bío Bío regions. Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

152) *Viola pusilla*: species elevation range: 10-1500 m. (ARF)

Viola pusillima Wedd., Ann. Sci. Nat., Bot. sér. 5, 1: 291. 1864.

Holotype: [not yet known by us].

Nations and life duration: Andean S.Peru & Bolivia. Perennial.

Notes: Apparently uncommon and not known in habitat at present according to information available to the present authors. Also it may readily be confused with similar and much more widespread *V. pygmaea* [q.v.].

Proposed conservation status: EN to CR.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola pygmaea Juss. ex Poir., Encycl. 8: 630. 1808. [fig.19]. **Holotype**: P.

Syns.: *Viola alpina* Ruiz & Pav. ex Ging., Prodr. [A.P. de Candolle] 1: 300. 1824, *hom. illeg*., *non* Jacq. 1762. *Viola orbignyana* J. Rémy, Ann. Sci. Nat. Bot. sér 3(6): 353. 1846.

Selected iconography: **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº23. 1925. **[b]** M. Sanso, E. Simonetti & C.C. Xifreda, Darwiniana 41(1-4): 89, fig. 2. 2003. **[c]** J.M. Watson & A.R. Flores Rock Gard. Quart. 70(4): 366. 2012. **[b]** M.V. Nicola, Fl. Argentina 17: 398. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 21, fig. 29. 2018.

Nations and life duration: Andean central S Ecuador, Peru, Bolivia and extreme N Argentina. Perennial.

Notes: Common and polymorphic but distinct. Easily recognised by its linear leaves, a feature only shared among tropical species of the section by much rarer and more geographically restricted *V. pusillima*, from which *V. pygmaea* differs at least by the presence of stipules (Macbride 1941). Photos by others.

Proposed conservation status: LC.

Viola regina J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 33. 2020. [figs.153, 154].

Holotype: SGO.

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 25, fig. 16; 26, fig. 17; 27, fig. 18; 32, fig. 32; 35, figs, 33-35; 36, figs. 36, 37; 37; figs. 38, 39; 38, figs. 40-42; 39, figs. 43, 45; 50, fig. 65; 51, fig. 66. 2020.

Nation and life duration: Andean central Chile [E]. Perennial.

Notes: A recently described and rare single-site endemic. Unfortunately the discoverer has died meanwhile. Nobody else has visited the location, so the exact whereabouts of *V. regina* is unknown. The population was intermittently dispersed over a considerable area and relatively plentiful compared with many other of these Andinopacific violas. Others photos and specimens [C. Celedón], now with us.

Proposed conservation status: CR.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

153) *Viola regina*: species elevation: 3020 m. (Carlos Celedón)

154) The type location of *V. regina* on the southern lateral ridge of the Andes above the Aconcagua valley, central Chile. (Carlos Celedón).

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola replicata W. Becker, Bot. Jahrb. Syst. 37(5): 589. 1906.

Holotype: B (destroyed).*[1]

Selected iconography: **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº29; 375, fig. 161. 1925.

Nation and life duration: Andean central Peru [E]. Perennial.

Notes: [1]*No other collected material extant.*[1]

Not re-encountered subsequent to the type collection.

Proposed conservation status: CR or EX.

Viola rhombifolia Leyb., Anales Univ. Chile 16: 680. 1859. [fig.155].

Holotype: [Not yet known by us].

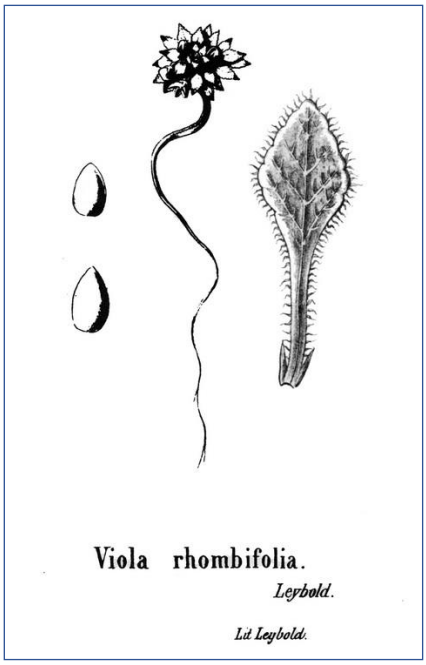
Selected iconography: **[a]** K. Reiche *Violae* chilenses: plate 7, fig. 1a, b. 1893.

[b] J.M. Watson & A.R. Flores, Int. Rock Gard. 104: 20, fig. 38. 2018.

Nation and life duration: Andean central Chile [E]. Annual.

Note: One of nine or ten *Viola* species described from the Santiago mountains and not re-encountered subsequent to their type collection.

Proposed conservation status: CR or EX.



155) *Viola rhombifolia:* species elevation: 2000 m. (Federico Leybold)

156) *Viola rodriguezii*: species elevation range: 3500-4500 m. (Photo Anon, courtesy of the Internet)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola rodriguezii W. Becker, Repert. Spec. Nov. Regni Veg. 22: 350. 1926. [fig.156].

Lectotype: BAF.

Syn.: *Viola munozensis* W.Becker, Repert. Spec. Nov. Regni Veg. 23: 226. 1926.

Selected iconography: **[b]** M.V. Nicola, Fl. Argentina 17: 399. 2017.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Note: Its location in situ is not known to ourselves at present.

Proposed conservation status: CR.

Viola roigii Rossow, Hickenia 2(21): 95. 1993. [fig.26]. **Holotype**: SI.

Selected iconography: [a] R.A. Rossow, Hickenia 2(21): 96, fig. 1. 1993.

[b] R. Rossow, J.M. Watson & A.R. Flores, Fl. San Juan 2: 141, fig. 141. 2003.

[b] M.V. Nicola, Fl. Argentina 17: 400. 2017. **[c]** J.M. Watson & A.R. Flores [ex R. Kiesling], Int. Rock Gard. 115: 45, fig. 75; 49, fig. 75a. 2019.

[c] J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig. 18. 2019.

Nation and life duration: Andean central Argentina [E]. Perennial.

Notes: A very narrow endemic of a few closely adjacent colonies. It inhabits an outlier to the east of the main Andean chain. The locality is well recorded and the species was collected fairly recently, but is now inaccessible due to the area being fenced-off as as a sector for telecommunication aerials. (R. Kiesling, pers. comm.). Photos by others.

Proposed conservation status: CR.

157) A small group of the well scattered type population of *V. rossowiana* at the northern end of the Cordillera del Viento, Neuquén Province, Argentinian Patagonia. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola rossowiana J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(1): 59. 2013. [figs.157, 158]. **Holotype**: BAB.

Erratum: *Viola coronifera sensu* Rossow, *non* W. Becker. 1928.*[1]

Selected iconography: **[b]** R.A. Rossow, Fl. Pat. 5: 174, fig. 133 [as *V. coronifera*]. 1988. J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(1): 59. 2013. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A.Little & A.-L. Sheader, Flowers of the Patagonian mountains: 273. 2013. **[b]** M.V. Nicola, Fl. Argentina 17: 401. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 105: 49, figs. 39, 40. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 42, fig. 47. 2020. **[c]** J.M. Watson &A.R. Flores, Int. Rock Gard. 124: 13, fig. 12. 2020.

Nation and life duration: Andean N Patagonia, Argentina (E). Perennial.

Notes: [1]*A recently recognised and published species which has been misidentified as the totally distinct *V. coronifera* (Rossow 1988). Other than the shared feature of a long inferior petal nectar spur, the two species are completely distinct in floral morphology, as may be established from their respective protologues.*[1]

A very narrow and endemic recorded from three fairly closely adjacent localities in the Cordillera del Viento at the upper northwestern limit of Neuquén Province. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU to EN.

158) *Viola rossowiana*: species elevation range: 1600-2800 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola rosulata Poepp. & Endl., Nov. Gen. Sp. Pl. [Poeppig & Endlicher] 2: 49. 1838. [figs159-161]. **Holotype**: [not yet known by us]. **Isotypes**: BR, M.

Selected iconography: **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 375, fig. 162. 1925. **[c]** J.M. Watson, Bull. Alp. Gard. Soc. 42(3): 235. 1974. **[b]** A. Hoffmann, M.K. Arroyo, F. Liberona, M. Muñoz & J. Watson, Plantas altoandinas, fl. silv. Chile: 65, fig. 9. 1998. **[c]** J.M. Watson & A.R. Flores, Chagual 5: 33, fig. 1. 2007. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 101: 53, fig. 24. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 25, fig. 37; 31 fig.A; 32, fig.B. 2018.

Nations and life duration: Subandean to Andean near-southern Chile and adjacent Argentinian N Patagonia. Perennial.

Notes: A rather uncommon narrow endemic. Best known at the Nevados de Chillán, where it is not infrequent locally over a wide elevation range, despite having been seen as gathered in quantity and sold as folk medicine (pers. obs.). The discovery of a small colony at one site in Argentina is very recent (Watson & Flores 2018d). It is considered to be a possible parent in natural hybridization (Watson & Flores, ined.). Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

159) *V. rosulata* growing on typical volcanic ash at Shangri La in the general type location area of the Nevados de Chillán, Bío Bío Region, near southern Chile. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

160) *Viola rosulata*: species elevation range: 1550-2800 m. (ARF)

161) Anita and neighbour Helga approaching the Shangri La location through a towering volcanic rock gateway. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola rubromarginata J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 14. 2018. [figs.162-164]. **Holotype**: CONC.

Selected iconography: **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian mountains: 273. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 105: 28, fig. 3. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 11, fig. 15; 12, figs. 16-18; 30, fig. 43; 31, fig. 44. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 110: 5, fig. 6. 2019. **[c]** J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig. 22. 2019.

Nation and life duration: Andean N Patagonia, Argentina [E]. Perennial.

Notes: This recently described species has a limited distribution in Neuquén Province amounting to four recorded populations, although one other has also been reported. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

162) *Viola rubromarginata*: species elevation range: 1200-1500 m. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

163) The eastern end of the Epulauquén lakes, one of several scattered localities in Neuquén Province where small colonies of *V. rubromarginata* are to be found. Argentinian northern Patagonia. (JMW)

164) Anita photographing an Epulauquén *V. rubromarginata* on windswept dry grassland. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola rugosa Phil. ex W. Becker, Repert. Spec. Nov. Regni Veg. 18: 182. 1922. [figs.165, 166]. **Neotype**: SGO.*[1]

Selected iconography: **[a]** W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 15 Nº25. 1925. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 105: 38, fig. 20. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 8, fig. 8; 9, figs. 9, 10; 10, figs. 10, 11. 2018. **[c]** J.M. Watson & A.R. Flores, bioRxiv http://dx.doi.org/10.1101/787564: 19, fig. 21. 2019.

Nations and life duration: Andean N Patagonia, Argentina, and near-southern Chile. Perennial.

Notes: [1]*The holotype and only specimen was destroyed by a bomb during WW2, and the species has never been found since at its original site or elsewhere in Chile. In 2003 the present authors encountered a small colony inhabiting a remote corner of the Andes in extreme NW Neuquén Province, Argentina (Watson & Flores 2018d). We were looking for a known undescribed species there which we encountered. It seemed the small colony represented another new species, but when we came to compare it with similar known species we realised it was in fact *V. rugosa*. One of our specimens accordingly became the neotype.*[1]

An extremely rare species described from an 1860 collection made by Philippi in the remote mountains of Linares Province, S. Maule Region in Chile. He deposited the specimen sheet in B, naming it *Viola rugosa*, with the intention to describe it for science, which he never did. Becker came upon it sixty years later and published it with Philippi's epithet. This taxon is therefore only recorded from our Argentinian location and the type site. Known in situ by us. Our photos and specimens.

Proposed conservation status: CR.

165) The Argentinian location of *V. rugosa* at the northern extremity of the Cordillera del Viento, Neuquén Province, Argentinian Patagonia. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

166) *Viola rugosa*: species elevation range: 1500-1700 m. (JMW)

167) *Viola sacculus*: species elevation range: 1000-2100 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola sacculus Skottsb., Kungl. Svenska Vetenskapad. Handl., n.f. 56(5): 261. 1916. [figs.167, 168]. **Lectotype**: S.

Syns.: *Viola auritella* W. Becker, Repert. Spec. Nov. Regni Veg. 21: 356. 1925. *Viola patagonica* W. Becker, Repert. Spec. Nov. Regni Veg. 21: 356. 1925. *Viola squamulosa* W. Becker, Bull. Misc. Inform. Kew 1928(4): 138. 1928.

Selected iconography: **[a]** C. Skottsberg, Kongl. Svenska. Vetenskapad. Handl. 56(5): plate 23, fig. 5a-g; 1916. **[b]** R.A. Rossow, Fl. Pat. 5: 187, fig. 148. 1988. **[c]** J.M. Watson, *Viola* p.p. In: Alpine Garden Society Encyclopaedia of Alpines 2: plate 537. 1994. **[c]** J.M. Watson, Bull. Alp. Gard. Soc. 62(3): 339. 1994. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 138. 2013. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flora of the Patagonian mountains: 277. 2013; **[b]** M.V. Nicola, Fl. Argentina 17: 401. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 21, fig. 30. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 108: 94, fig. 60. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 110: 3, fig. 4. 2019.

Nations and life duration: Andean N and S Patagonia, Argentina, and adjacent subandean and Andean S Chile. Perennial.

Notes: This very distinctive species has an intermittent but lengthy distribution in Patagonia which covers the section's entire range there. It is common and well established in Argentina, but rare and very occasional in Chile at the southern limit of its occurrence. A yellow form from central Patagonia in Argentina was published by Becker (1925a) as *V. auritella*, but has not been recorded since. Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

168) Habitat of *V. sacculus* high on Cerro Catedral in Río Negro Province, Argentinian north Patagonia. (Kees Jan van Zwienen)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola santiagonensis W. Becker, Repert. Spec. Nov. Regni Veg. 21: 353. 1925.

Holotype: B (destroyed). **Isotype**: CONC.

Nation and life duration: Andean central Chile [E]. Perennial.

Note: One of nine or ten species described from the Santiago mountains and not re-encountered subsequent to their type collection.

Proposed conservation status: CR or EX.

Viola sempervivum Gay, Fl. Chile [Gay] 1: 226. 1846. **Holotype**: P.

Nation and life duration: [1]*Andean central Chile [E].*[1] Perennial.

Note: [1]*A difficult taxon to assess or place geographically. Gay (1846), the collector, published its location as a now very thoroughly explored sector of Coquimbo Region where it has not been encountered subsequently, and has been noted as possibly extinct [EX] (Squeo et al. 2001). The present authors have examined the holotype and have also seen what is firmly believed to be a black and white photograph of *V. sempervivum* taken in the Cordillera de Santiago which is captioned as *V. atropurpurea* (Rauh 1988). The strong likelihood exists that the type site was given in error, and Gay's specimen in fact originates from the Santiago Andes, as assumed herein. Gay also noted that it was common between Coquimbo and Santiago, which must be considered as some kind of confusion on his part since no such locations have been recorded, despite extensive exploration of much of the sector since.*[1]

If our assessment is correct, then this is the tenth species described from Santiago Region which is not at present known in situ. Given the difficulty of determining species of its alliance, the recorded presence of *V. sempervivum* in Argentina (Xifreda & Sanso 1999) should be regarded as provisional and unlikely unless authoritatively confirmed. Most recently Nicola (2017) correctly cites records of it as doubtful in that country.

Proposed conservation status: CR or EX.

Viola singularis J.M. Watson & A.R. Flores, Phytotaxa 2: 20. 2009. [fig.169].

Holotype: MERL.

Selected iconography: **[d]** J.M. Watson & A.R. Flores, Phytotaxa 2: 21, fig. 6. 2009.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Notes: Known only from the type gathering and not seen since. The original field note did not provide sufficient detail to allow accurate geographical placement, with the result that this was estimated erroneously in the protologue. The separate field note

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

book was subsequently reported to us by Roberto Kiesling (Méndez & Azpillaga 2013), allowing the locality to be corrected (Watson & Flores 2014b). Nicola (2017), in the new Flora of Argentinia, reduces *V. singularis* to the status of doubtful species. Her support for this is that we, the authors, were the only ones to have examined it, that it was fixed in adhesive (as we ourselves indicated in the protologue), so could not be examined thoroughly, and also that we had compared it with *VV. montagnei* and *volcanica*, and there was no indication of a clear distinction from them. To reply to those arguments one at a time. In the first place, no few accepted species have only ever been examined by their original authors before publication and at times after as well: ergo this is not a scientifically valid point. Secondly, despite its immobility we had no difficulty whatever examing all its critical features, as our description makes plain. Finally, *V. montagnei* has entire laminas, those of *V. singularis* being crenate, while *V. volcanica* has an apical crest as opposed to opposite lateral lobes.

Proposed conservation status: CR.

169) *Viola singularis*. The type and only specimen at the Ruiz Leal herbarium, Mendoza. Species elevation: ca. 4000 m.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola skottsbergiana W. Becker, Repert. Spec. Nov. Regni Veg. 21: 352. 1925. [figs.170-173]. **Holotype**: B (destroyed). **Isotype**: SGO.

Selected iconography: **[a]** C. Skottsberg, Kungl. Svenska. Vetenskapad. Handl. 56(5): plate 22, fig. 29a-c [as *V. portulacea*]. 1916. **[c]** J.M. Watson, Bull. Alp. Gard. Soc. 44(1): 41 [as *V. portulacea*]. 1976. **[c]** J.M. Watson - In: Hypertufa Containers. Timber Press: 199. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 110: 34, fig. 58. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 48, fig. 61. 2020. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 19, fig. 22. 2020.

Nation and life duration: Andean central Chile [E]. Perennial.

Notes: A narrow endemic of five recorded populations which inhabits Curicó Province adjacent to the border with Argentina and is probably present in that country. Common within its very limited range. The epithet has been assigned in error to *V. atropurpurea* (Hoffmann et al. 1998, Huyghe & Wenbourne 2003). *V. skottsbergiana* in the sterile state has been considered independently to be *V. portulacea* and published as such (Skottsberg 1916, Watson 1976). Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

170) *Viola skottsbergiana:* species elevation range: 2000-2900 m. (ARF)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

171) John and Mikhail Belov photographing *V. skottsbergiana* in the only area where it is known, the upper Teno sector, Andean central Chile. (ARF)

172) Anita and our neighbour Helga photographing *V. skottsbergiana* at the upper Teno sector, Andean central Chile. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

173) Anita focussing in on our best specimen of *V. skottsbergiana* with *Schizanthus grahamii* behind. (JMW)

Viola spegazzinii W. Becker, Repert. Spec. Nov. Regni Veg. 21: 351. 1925.

Holotype: BAF.

Selected iconography: **[b]** M.V. Nicola, Fl. Argentina 17: 402. 2017.

Nation and life duration: Andean NW Argentina [E]. Annual.

Notes: Known from the high Altiplano near the border with Chile. Very few collections exist and the species is apparently unknown in the wild at present.

Proposed conservation status: CR.

Viola subandina J.M. Watson, Pl. Altoandinas Fl. Silv. Chile: 66. 1998. [figs.174, 175].

Isotype: K.*[1]

Basionym: *Viola pusilla* Hook. & Arn., Bot. Misc. 3(8): 145. 1833, *hom. illeg.*, *non* Poepp. 1829.

Selected iconography: **[a]** C. Reiche *Violae* chilenses: plate 6, fig. 15. 1893; W. Becker. Natürl. Pflanzenfam. ed. 2a. 21: 371, fig. 159 Nº17 [as *V. pusilla*]. 1925. **[b]** L.E. Navas, Flora de la cuenca de Santiago de Chile 2: 509, fig. 47K-O [as *V. pusilla*]. 1976. **[b]** A. Hoffmann, M.K. Arroyo, F. Liberona, M. Muñoz & J. Watson, Plantas altoandinas, fl. silv. Chile: 65, fig. 2. 1998. **[c]** M.P. Riedemann, G.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Aldunate, & S. Teillier, Flora nativa de valor ornamental, identificación y propagación: Chile, zona cordillera de los Andes: 606, 607. 2008. **[c]** S. Teillier, A. Marticorena & H.M. Niemeier. Fl. Andina Santiago: 437, fig. 1. 2011. **[c]** J.M. Watson & A.R. Flores, Rock Gard. Quart. 71(2): 123. 2013. **[b]** M.V.Nicola, Fl. Argentina 17: 403. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard.103: 54, fig. 80. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 22, fig. 31. 2018 **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 17, fig. 19. 2020.

Nations and life duration: Andean central Argentina and subandean to Andean central Chile. Annual.

Notes: [1]*This requires confirmation.*[1]

Widespread and common. Rather variable in several morphological features, but should not present problems of confusion with any other published taxon. Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

174) *Viola subandina*: species elevation range: 1100-2400 m. (ARF)

175) Lagunillas, Santiago Province, central Andean Chile, an Andean location of *V. subandina*. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

176) Taltal, a small fishing community in Antofagasta Region of far-northern Chile is the centre of the restricted Pacific littoral distribution of the eponymous species, *V. taltalensis*, seen here in habitat. (ARF)

Viola taltalensis W. Becker, Repert. Spec. Nov. Regni Veg. 23: 223. 1926. [fig.176, 177].

Holotype: B (destroyed). **Isotype**: SGO.

Syn.: *Viola taltalensis* W. Becker var. *glaberrima* W. Becker, Repert. Spec. Nov. Regni Veg. 23: 224. 1926.

Selected iconography: **[c]** P. Riedemann & G. Aldunate, Flora nativa de valor ornamental, identificación y propagación: Chile, zona norte, 2 ed.: 408, 409. 2016.

Nation and life duration: Littoral and immediate hinterland of N Chile [E]. Annual.

Notes: A narrow, somewhat variable endemic of southern Antofagasta Region. Apparently well established within its sector. Easily determined by its distinct range of corolla colours compared with close relatives. The possibility that these may be no more than colour forms of *V. polypoda* requires investigation. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

177) *Viola taltalensis*: species elevation range: 10-500 m. (ARF)

Viola tectiflora W. Becker, Bull. Misc. Inform. Kew 1928(4): 139. 1928. [fig.178].

Holotype: K.

Selected iconography: **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian mountains: 273. 2013. **[b]** M.V. Nicola, Fl. Argentina 17: 403. 2017. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 105: 31, fig. 8. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 110: 7, fig. 8. 2019.

Nation and life duration: Argentinian N Patagonia [E]. Annual.

Notes: *V. tectiflora* is quite closely related to *V. volcanica*, from which it may be distinguished by the always annual life form and clearly narrower laminas. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

178) *Viola tectiflora*: species elevation range: 900-1800 m. (JMW)

179) *Viola tovarii*: species elevation: 4660 m. (Johanny Molina Alor)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola tovarii P. Gonzáles & J. Molina-Alor, Phytotaxa 451(3): 248. 2020. [fig.179].

Holotype: USM.

Selected iconography: **[c** & **d]** P. Gonzáles & J. Molina-Alor, Phytotaxa 451(3): 246, fig. 1I-M; 247, fig. 2A. 2020.

Nation and life duration: High Andean S Peru [E]. Perennial.

Note: A rare cryptic species known only from the type site at over 4500 m in terrain of stony soil between rock ourcrops.

Proposed conservation status: CR.

180) *Viola triflabellata*: species elevation range: 2000-4500 m. (ARF)

Viola triflabellata W. Becker, Repert. Spec. Nov. Regni Veg. 21: 357. 1925. [figs.180, 181]. **Lectotype**: LIL.

Selected iconography: **[b]** M.V. Nicola, Fl. Argentina 17: 406. 2017.

[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 115: 35, fig. 58. 2019.

[c] J.M. Watson & A.R. Flores, Int. Rock Gard. 119: 107, fig. 74. 2019.

[c] J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig. 12. 2019. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 128: 48, fig. 67. 2020.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Notes: Although with fewer than seven populations in total, it is the commonest and most widespread of its small alliance, which is in urgent need of a thorough review. *V. triflabellata* is one of four of that alliance identified and confirmed as existing in the field at present. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU.

181) *Viola triflabellata*. Cerro Mesada where the southernmost population of *V. triflabellata* is situated. La Rioja Province, northwestern Argentina. (ARF)

Viola trochlearis J.M. Watson & A.R Flores. Int. Rock Gard. 106: 16. 2018. [figs.182-184]. **Holotype**: CONC.

Selected iconography: **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of the Patagonian mountains: 275. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 105: 59, fig. 53. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106: 1; 15, figs. 21, 22; 16, figs. 23, 24; 29, fig. 42. 2018. **[c]** J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig. 20. 2019.

Nation and life duration: Low subandean N Patagonia, Argentina [E]. Perennial.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Notes: Closely related to *V. rubromarginata*, but lacking the distinctly coloured lamina margins of that species. Also its distribution is more southerly. It has only been found in seven locations. Known in situ by us. Our photos and specimens.

Proposed conservation status: VU

182) *Viola trochlearis*: species elevation range: 1600-1700 m. (ARF)

183) Anita photographing a small colony of *V. trochlearis* in the back garden of the house where we lodged at Primero Pinos; watched by the daughters of the owners. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

184) *Araucaria araucana* (monkey puzzle) open woodland marking the type site of *V. trochlearis*. Primeros Pinos,Neuquén Province, Argentinian northern Patagonia. (JMW)

185) *Viola truncata*: species elevation range: 1500-2300 m. (Marcelo Rosas).

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola truncata Meyen, Reise Erde 1: 314. 1834. [fig.185]. **Holotype**: B (destroyed).*[1]

Syns.: *Viola glacialis* Poepp. & Endl. Nov. gen. sp. pl. [Poeppig & Endlicher] 2: 49. 1838. *Viola volcanica* (as *V*. vulcanica, *nom*. *sphalm*.) Gillies ex Hook. & Arn. var. *truncata* (Meyen) Reiche, Anales Chile 90: 905. 1895. *Viola truncata* Meyen var. *glaberrima* W. Becker, Repert. Spec. Nov. Regni Veg. 18: 187. (1922).*[2]

Selected iconography: **[b]** E. Poeppig, Nov. Gen. Sp. Pl. 2: 49, plate 165 [as *V. glacialis*]. 1838. **[d]** J.M. Watson, Int. Rock Gard. 117: 45, fig. 69; 46, fig. 71. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 11, fig. 6. 2020.

Nation and life duration: Subandean to low Andean central and near-southern Chile [E]. Perennial.

Notes: [1]*No other type material known to exist. A lectotype is required.*[1]

[2]*This species concept has been a constant source of confusion since its publication. The only type specimen was destroyed during WW2 (Hagemann & Zepernick 1992, Hiepko 1987). Meyen's protologue and a subsequent short description by Walpers (1843) are somewhat contradictory and totally inadequate. Subsequently, the "*V. truncata*" concept was directly associated with the more distantly related taxa *V. congesta* (as *V*. vulcanica (sic) *sensu* Reiche, *non* Gillies ex Hook. & Arn.) and *V. volcanica* (Gay 1846, Reiche 1893, 1896). Becker (1922b) examined the types of *V. truncata*, *V. glacialis* at Berlin-Dahlem and found them to be conspecific, wiith priority therefore retained by *V. truncat*a. Due to uncertainty following destruction of all the latter type material, the present authors designated *V. glacialis*, which has an unambigous circumscription, as the accepted name for the taxon (Watson & Flores 2007). *V. truncata* was then considered to be a doubtful name taxonomically. But after a careful re-reading of Becker (1922b), we accepted his interpretation. *V. truncata*, which now requires a neotype, has since been maintained as the prior epithet, including by ourselves. Marticorena & Quezada (1985) listed both *V. truncata* and *V. glacialis*. *V. truncata* Meyen is not included in The Plant List (Royal Botanic Gardens, Kew & Missouri Botanical Garden 2013), whereas *V. truncata* Becker, an illegal homonym for a different taxon is, as a synonym.*[2]

The species is relatively infrequent, its conservation status uncertain. Known to us in situ. Our photos.

Proposed conservation status: VU to EN.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola tucumanensis W. Becker, Repert. Spec. Nov. Regni Veg. 22: 352. 1926.

Erratum: As *Viola triflabellata sensu* Nicola, *non* W. Becker 1925.

Lectotype: BAF.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Note: Not presently known in the field or encountered since the type gathering.

Proposed conservation status: CR or EX.

186) This is what it took to get my (John) creaking bones up to the *V. turritella* type site, where we were taken by Mikhail Belov! (JMW)

Viola turritella J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 11. 2020. [figs.186-188]. **Holotype**: SGO.

Errata: [1]*As *Viola atropurpurea auct. non* Leyb. 1858. As *Viola skottsbergiana* A. Hoffmann, M. Kalin Arroyo, F. Liberona, M. Muñoz & J. Watson, *non* W. Becker 1925.*[1]

Selected iconography: **[b]** A. Hoffmann, M. Kalin Arroyo, M. Muñoz & J. Watson, Pl. Altoandinas Fl. Silv. Chile: 67, fig. 6. 1998 [as *V. skottsbergiana*]. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of Patagonian Mts.: 268, 269 [as *V. atropurpurea*]. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 21, fig. 24; 22, figs. 25-28; 33, fig. 50; 34, fig. 55; 35, fig. 57; 36, figs. 58-60; 37, figs. 61-63; 38, figs. 64, 65. 2020.

Nations and life duration: Subandean to Andean near-southern Argentina and Chile. Perennial.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Notes: [1]*Since its first discovery in Argentinian Patagonia, probably in the middle of the last century, this species was almost universally identified as *V. atropurpurea* by botanical investigators and amateurs until 2020, as may be told not only from illustrations but also published distributional data (e.g. Xifreda & Sanso 1999, Sheader et al. 2013, Novoa 2013, Nicola 2017, Nicola et al. 2018). [The species is not recorded in any form in Flora Patagonica (Rossow 1988)].

187) *Viola turritella*: species elevation range: 2400-2850 m.
(JMW)

The one known exception was in Hoffmann et al. (1998), where the difference between it and *V. atropurpurea* was recognised, but not that it was an undescribed taxon. It was therefore erroneously taken as the then unfamiliar *V. skottsbergiana*.*[1] Although recorded from fewer than seven locations, it is fairly numerous in at least two of them. Known in situ by us. Our photos and specimens.
Proposed conservation status: NT.

188) The type site of *V. turritella* at Paso Pehuenches, Maule Region, near southern Chile, near the Andean watershed.
(Helga Petterson)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola uniquissima J.M. Watson & A.R. Flores, Int. Rock Gard. 128: 40. 2020. [figs.189, 190]. **Holotype**: SGO.

Syn.: *Viola unica* J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 14, *nom. inval.*

Selected iconography:

[d] J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 14, figs.1-4. 2019. **[d]** J.M. Watson & A.R. Flores, Int. Rock Gard. 128: 43, figs. 59-61; 50, fig. 71. 2020.

Nation and life duration: High Andean N Chile [E]. [1]*Probably perennial.*[1]

Notes: This species was encountered as a solitary herbarium specimen at SGO, but with no details other than its location and month and year of collection. It inhabits a remote area of the Altiplano subject to open-cast mining operations. The size of its type population and whether it occurs at any other site is unknown. It is only possible therefore to conjecture that it is probably rare and under serious threat.

[1]*The specimen consists of a solitary rosette with a quite slender vertical axial rootstock. It could be either annual, or recently germinated and perennial. Evidence for the latter is strong in the form of live cotyledons, and also that its nearest relatives and all but one of the other violas which inhabit these high Andes are in fact perennial.*[1]

Proposed conservation status: CR.

189) *Viola uniquissima*: species elevation: ca. 4200 m. (ARF)

190) One of several open cast mines in the general proximity of the only known *V. uniquissima site*. Tarapacá Region, the high Altiplano of far northern Chile. (Anon, courtesy of the Internet)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola vallenarensis W. Becker, Repert. Spec. Nov. Regni Veg. 24: 111. 1927.

[fig.191] **Holotype**: B (destroyed). **Isotype**: CONC.

Selected iconography: **[c]** [1*]F.A. Squeo, R. Osorio & G. Arancio, Fl. Los Andes Coquimbo, Cordillera de Doña Ana: 52, fig. 81 [*as V. domeikoana*]. 1993.[*1]

[c] M.P. Riedemann, G. Aldunate, & S. Teillier, Flora nativa de valor ornamental, identificación y propagación: Chile, zona cordillera de los Andes: 607. 2008.

Nation and life duration: Andean near-northern Chile [E]. Annual.

Notes: Identical in facies to the yellow and possibly albino forms of *V. domeikoana* [q.v.], differing only in the morphology of the style crest (Watson & Flores 2007).

[1*]Only previously known from the type site in Atacama Region until a taxon determined as *V. domeikoana* in Squeo et al. (1994) from the N of Coquimbo Region was described with the entire style crest of *V. vallenarensis*.[*1]

Careful examination of an extensive selection of material from San Juan, Argentina (Rossow et al. 2003) only indicated *V. domeikoana*. An exhaustive investigation of all collected specimens everywhere of the complex is required to determine accurately the distribution and frequency of both taxa. Photos by others.

Proposed conservation status: EN.

191) *Viola vallenarensis*: species elevation range: 4000-4030 m. (Paulina & Gustavo Aldunate)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola volcanica Gillies ex Hook. & Arn. Bot. Misc. 3: 145. 1833. [fig.192].

Lectotype: K.

Syn.: *Viola pseudovulcanica* W. Becker, Repert. Spec. Nov. Regni Veg. 21: 358. 1925.

Errata: *Viola* vulcanica p.p., *nom. sphalm*. (= *volcanica*) Reiche *et al*. *Viola congesta auct*., *non* (Gillies) ex Hook. & Arn. 1833.*[1]

Selected iconography: **(b)** W.J. Hooker, Bot. Misc. 3: plate 48. 1833.

[a] W. Becker. Natürl. Pflanzenfam. ed 2a. 21: 371, fig. 159 Nº24 [as *V*. vulcanica]. 1925. **[b]** R.A. Rossow, Fl. Pat. 5: 184. fig. 144. [as *V*. *pseudovulcanica*]. 1988. **[c]** R. Rolfe, Bull. Alp. Gard. Soc. 57(4): 299 [as *Viola* sp.]. 1989. **[c]** J.M. Watson, *Viola* p.p. In: Alpine Garden Society Encyclopaedia of Alpines 2: plate 534 [as *V*. vulcanica]. 1994. **[c]** J.M. Watson, Bull. Alp. Gard. Soc. 62(3): 337 [as *V*. *congesta*].1994. **[b]** J.M. Watson & A.R. Flores, Chagual 5: 40, fig. 12; 41, fig. 16k. 2007. **[c]** M. Sheader, C. Brickell, P. Erskine, H. Little, A. Little & A.-L. Sheader, Flowers of Patagonian Mts.: 275. 2013. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 106. 27, fig. 40. 2018. **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 115: 43, fig. 70. 2019.

[c] J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 23, fig. 24. 2019. **[b** & **c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 124: 10, figs. 2, 4. 2020.

Nations and life duration: Subandean to Andean central to N Patagonian Argentina and Andean near-southern Chile. Perennial or facultative monocarpic.

Notes: [1]*As explained in Watson & Flores (2020b), and above under *V*. *congesta*, much confusion and erroneous identification existed for *V*. *volcanica* from shortly after its publication until the mistake was explained and rectified (Watson & Flores 2007). The true range of *V*. *volcanica* is now established as between Mendoza and Neuquén provinces in Argentina (Nicola 2017, Nicola et al. 2018), and Bío Bío Region at least in Chile (M.Sheader, in litt.). However, the chronic misidentification created such problems in Chilean herbarium collections that a thorough investigation is required to clarify its actual distribution there*[1]

Known in situ by us. Our photos and specimens.

Proposed conservation status: LC.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

192) *Viola volcanica*: species elevation range: 1200-2000 m. (JMW)

Viola weberbaueri W. Becker, Bot. Jahrb. Syst. 37(5): 588. 1906.

Holotype: B (destroyed). **Isotype**: MO.

Nation and life duration: Littoral and low subandean extreme SW Peru [E]. Annual.

Notes: Confined as a very few populations within a limited area by the coast and just inland. Apparently not currently known in habitat.

Proposed conservation status: CR or EX.

Viola weibelii J.F. Macbr. ex Baehni & Weibel, Candollea 8 (preprint: 32): 221. 1941. [figs.31a, 31b]. **Holotype**: F.

Nation and life duration: Andean central Peru [E]. Perennial.

Notes: A very rare narrow endemic of the interior tropical mountains, probably not exceeding three populations. Seen at Cerro de Pasco in its precarious and threatened type location on the periphery of a high elevation extensive urban refuse disposal sector (pers. obs.). Its conservation status at that particular point is CR without doubt. Known in situ by us. Our photos.

Proposed conservation status: CR.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

193) *Viola xanthopotamica*: species elevation range: 1900-1800 m. (JMW)

Viola xanthopotamica J.M. Watson & A.R. Flores, Int. Rock Gard. 115: 37. 2019. [figs.193, 194]. **Holotype**: CONC.

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 115: 25, fig. 40; 28, fig. 47; 36, fig. 60; 39, fig. 64; 40, fig. 65; 41, figs. 66-68; 45, fig. 74; 46, fig. 76; 49, fig. 76a. 2019.

[c] J.M. Watson & A.R. Flores, bioRxiv: http://dx.doi.org/10.1101/787564: 19, fig.19. 2019.

Nation and life duration: Andean NW Argentina [E]. Perennial.

Notes: A rare species only known from two closely proximate locations in the Sierra de Famatina foothills of La Rioja Province. R. Ferryman (in litt.) informed us of it. The type site, where small colonies are scattered over a wide area, consists of flat, stony margins of a small river flowing down from mountains to the west. It also exists slightly higher up the valley to the west on flat rock outcrops at the base of a foothill slope between steep mountainsides where the same vehicle track continues that passes through the type locality. That second colony is very small, consisting of fewer than ten individuals. Known in situ by us. Our photos and specimens.

Proposed conservation status: EN to CR.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

194) The Río Amarillo type location of *V. xanthopotamic*a at the eastern base of the Cordillera de Famatina, Famatina Province, northwestern Argentina. (ARF)

195) Our first view of a *V.* ×*zwienenii* plant at the type site. Vallecitos, Mendoza Province, Andean central Argentina. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

196) The ski lift at Vallecitos on the other side of the track directly opposite the *V.* ×*zwienenii* type site. (JMW)

Viola* ×*zwienenii J.M. Watson & A.R. Flores, Int. Rock Gard. 113: 35. 2019. [figs.195-200]. **Holotype**: CONC.

Parentage: *Viola atropurpurea* × *V. beckeriana*.

Selected iconography: **[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 113: 13, figs. 18, 19; 14, fig. 20; 15, fig. 21; 16, fig. 22; 27, fig. 57; 38, figs. 80, 81; 39, fig. 82; 40, fig. 83; 41, fig. 84; 43, fig. 87; 45, fig. 89. 2019.**[c]** J.M. Watson & A.R. Flores, Int. Rock Gard. 122: 49, figs. 62, 63. 2020.

Nation and life duration: Andean central Argentina [E]. Perennial.

Notes: The second named natural hybrid (nothospecies). As with *V.* ×*blaxlandiae* its parentage is unmistakeable and can be recognised readily from its range of morphological variations. At one extreme is *V. beckeriana* with its depressed, prostrate green rosettes. That species inhabits just one sector 45 km to the southeast. Columnar *V. atropurpurea*, the other parent with its darker foliage, occurs in various relatively proximate sectors. Although most variants have either flattened green rosettes or are darker and columnar, intermediates have also been encountered (pers. obs.). We found one main dispersed, numerous population near a small ski

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

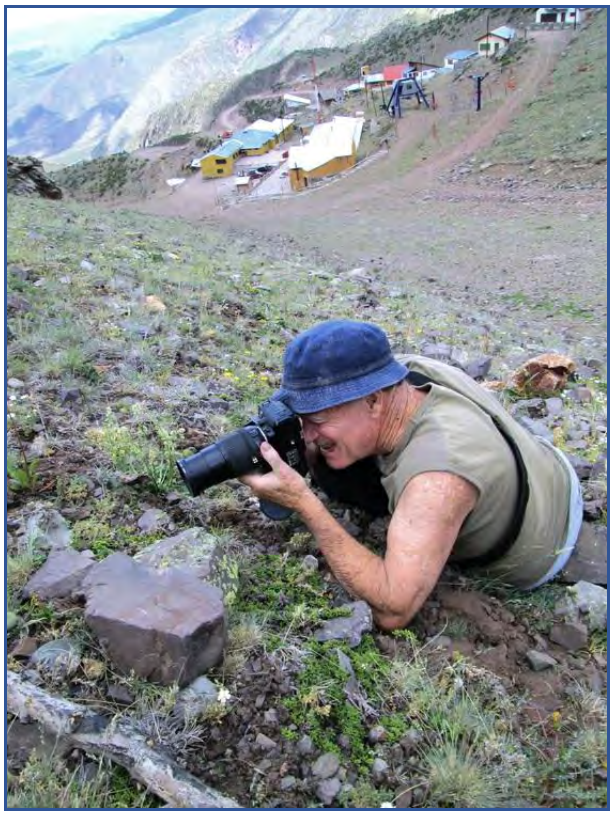
centre where the type material was collected, and another very small colony just to the north over an intervening ridge. A local resident informed us of a third, high above immediately to the south. Known in situ by us. Our photos and specimens.

Proposed conservation status: CR.

197) *Viola* ×*zwienenii*, columnar form with dark foliage, showing *V. atropurpurea* parentage. Species elevation range: 3000 m. (ARF)

198) *Viola* ×*zwienenii*, with depressed green rosettes, as inherited from its *V. beckeriana* parent. (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

199) Anita photographing *V.* ×*zwienenii* at the type site. (JMW)

200) John photographing *V.* ×*zwienenii* at the type site. (Sarah Watson)

TOTAL: 111 legitimate species accepted by J.W. & A.F. at 1 August 2021, (IPNI 2021).

Note: Images on personal websites have not been included in the iconographies.

Infraspecific ranks [subspecies, varieties or forms] as in the synonym list below are not accepted in this overview. Several important reasons govern this exclusive approach, which in general is followed to some degree or other by other current relevant authorities.

The first thoughtful outsider opinion we heard on this issue was by the late Prof. David Moore (as pers. comm.) of Reading University, botanical explorer in the subantarctic sector of the Southern Hemisphere and author of the 'The vascular flora of the Falkland Islands' (Moore 1968), also 'The vascular flora of Flora of Tierra del Fuego' (Moore 1983). He informed us that he only accepted the rank of subspecies at infraspecific level because not only were lower distinctions insufficient to be granted taxonomic ranks rather than being regarded as polymorphism, but they almost invariably generated disagreement among the specialists of the groups concerned, which is nowhere more evident than in the Cactaceae. He pointed out that even the difference between subspecies and variety was controversial, since what British

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

authorities called subspecies their American counterparts considered to be varieties. Nevertheless the rank is significant and important however named, and he preferred the more substantial term 'subspecies'.

The uncertainty and disagreement over minor ranks has also been noted by Zachos (2013) as having potentially serious negative consequences on conservation assessment.

Details of proposed conservation status herein

Rating subgen. *Neoandinium* per species as above according to abundance or rarity, population sizes and distribution as well as actual or potential threats is essentially based on IUCN criteria and uses that organization's abbreviations (IUCN 2012), but does not and cannot include all the criteria required for formal acceptance. There are particularities relatively unique to many of these species, as well as other factors explained below, which render application of the total requirements of the criteria effectively impossible.

Our overall assessment, as noted for each species in the main list, is as follows:

LC - 16

atropurpurea, *bangii*, *congesta*, *cotyledon*, *dasyphylla*, *domeikoana*, *frigida*, *granulosa*, *micranthella*, *montagnei*, *polypoda*, *pusilla*, *pygmaea*, *sacculus*, *subandina*, *volcanica*.

LC to **NT** - 2

decipiens, *polycephala.*

NT - 3

×*josephii*, *philippii*, *turritella*.

NT to **VU** - 2

columnaris, *coronifera*.

VU - 28

abbreviata, *anitae*, *aurata*, *auricolor*, *beckeriana*, ×*blaxlandiae*, *chamaedrys*, *cheeseana*, *dandoisiorum*, *escarapela*, *escondidaensis*, *farkasiana*, *flos-idae*, *fluehmannii*, *huesoensis*, *johnstonii*, *kermesina*, *llullaillacoensis*, *membranacea*, *pachysoma*, *petraea*, *rosulata*, *rubromarginata*, *skottsbergiana*, *taltalensis*, *tectiflora*, *triflabellata*, *trochlearis*.

VU to **EN** - 6

acanthophylla, *aizoon*, *angustifolia*, *ovalleana*, *rossowiana*, *truncata*.

EN - 1

vallenarensis.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

EN to **CR** - 8

evae, *joergensenii*, *lanifera*, *marcelorosasii*, *minutiflora*, *philippiana*, *pusillima*, *xanthopotamica*.

CR - 21

aurantiaca, *beati*, *chillanensis*, *enmae*, *exsul*, *ferreyrae*, *gelida*, *godoyae*, *hillii*, *leyboldiana*, *lilliputana*, *regina*, *rodriguezii*, *roigii*, *rugosa*, *singularis*, *spegazzinii*, *tovarii*, *uniquissima*, *weibelii*, ×*zwienenii*.

CR or **EX** - 22

araucaniae, *argentina*, *auricula*, *bustillosia*, *calchaquiensis*, *friderici*, *glechomoides*, *hieronymi*, *lilloana*, *mesadensis*, *nassauvioides*, *niederleinii*, *nobilis*, *nubigena*, *portulacea*, *pulvinata*, *replicata*, *rhombifolia*, *santiagonensis*, *sempervivum*, *tucumanensis*, *weberbaueri*.

EX - 3

comberi, *exilis*, *lologensis*.

Our conservation ratings here are based on our own experience in the field and studies over a period of fifty years, the last thirty with the subgenus as our main focus of intensive investigation. A particular factor influencing our choice is the elevations these species inhabit. Those at Andean levels, i.e. approximately 2000 m and above on average, are mainly at risk from mining activity and heavy overgrazing, above all by goats. From 2000 m down to the littoral the actual and possible threats increase, being particularly intense in areas of high population and industrial development. It should be borne in mind that most of these can be no more than estimations, and that any could be subject to change, as some certainly will be, given potential relevant future critical information:

LC: Least concern. Species that are common, widespread as significantly sized populations, and under no overall threat.

NT: Near threatened. Where total populations that would otherwise be considered as being of least concern are exposed to widespread encroachment or other human activities.

VU: Vulnerable. When some combination of restricted distribution, low population numbers and densities might create a situation of possible high level risk.

EN: Endangered. This rank has been employed where significant human activity is present and could seriously affect the species as a whole.

CR: Having a serious combination of low total numbers and confined area of occupation which could lead to extinction.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

EX: Extinct in the wild. We have only applied this where all available reasonable evidence indicates that the taxon conerned seems no longer to be extant.

Note 1: Sometimes categories are paired. Where a species only collected as a type is not known now in situ and its potential area of occupation has not been fully explored we have noted CR or EX. That is; it may be extinct, but if not its situation is certainly critical. VU to CR or similar signifies that for some reason we cannot be sure which of those the species concerned belongs under. It may be one, it may be the other, or it may fall between the two.

Note 2: When taxa in more than one location exhibit considerable polymorphism, some variations may be limited to one or a few of the total locations. If this or these became extinct, then the variability of the species as a whole would be reduced. A case which exemplifies this is the yellow form of common *V. sacculus*, which is only recorded from one location and has not been rediscovered since its original gathering.

Without doubt climate change will be one of the most serious future threats to the survival of many of these Andean taxa, and in all probability the most serious.

We have already outlined the relevant conservation situation in Watson & Flores (2014b), explaining the difficulties of assessing species only known from a single site, often as one or a few individuals, many of them so well cryptically camouflaged that they can so easily be overlooked, even when their site is revisited by those who discovered them there.

As an indication of how relatively unexplored these vast Southern Hemisphere Andean mountains are [fig. 212], 25 of the 111 total for the taxa for the subgenus have been newly discovered and described from 1993 to 2020 [28 years]. This total excludes those given new names, or which had already been known but were misidentified as being existing published taxa.

The following centres of distribution contain those 25 as listed for each:

Four from **Peru**:

VV. enmae, *ferreyrae*, *lilliputana*, *tovari*.

Seven from **NW Argentina** and **N Chile**:

VV. beati, *dandoisiorum*, ×*josephii*, *marcelorosasii*, *singularis*, *uniquissima*, *xanthopotamica*.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Six from **central Argentina** and **central Chile**:
VV. *beckeriana*, *exsul*, *gelida*, *regina*, *roigii*, ×*zwienenii*.
Eight from **N Argentinian Patagoni**a and **near-southern Chile**:
VV. *abbreviata*, *anitae*, ×*blaxlandiae*, *farkasiana*, *pachysoma*, *rossowiana*, *rubromarginata*, *trochlearis*.

Only the distributional extremes of Ecuador, northern Peru and far-southern Patagonia have failed to yield novelties, and these contain very few endemic published species in any case.

Some twenty-five further novelties have been collected which await publication. Further undescribed taxa are known. Recent novelties and any to come are inevitably rare and from a single location or, as very few in close proximity. This automatically qualifies them as VU, CR or EN, as in fact applies to most taxa presented since Becker's final paper (1928b).

Little botanical exploration in many areas amounts to one of the difficulties of assessment. For example, nine or ten of the species described from the Santiago mountains have not been re-encountered since their type collection. One reason is the lack of effective exploration for most of the 20th Century, with just two species described up to the 1990s.

The difference between historical and modern exploration is an additional explanation for the number of taxa not recorded in situ since their type collection The former was largely conducted on horseback, allowing access to difficult terrain, being an environment which the least known violas almost invariably inhabit. With the advent of motorised vehicles and roads or tracks to accomodate them, recent collectors have largely depended on those conveniences and so not revisted many historical sites. Due to the considerable interest of many academic botanical and amateur naturalist collectors over recent years more are gradually being found again.
The following list records those rediscovered since 1970:

Seven in **Argentina**: *VV*. *coronifera*, *escondidaensis*, *joergensenii*, *leyboldiana*, *petraea*, *triflabellata*, *rugosa*.
Eight in **Chile**: *VV*. *aurantiaca*, *chamaedrys*, *cheeseana*, *godoyae*, *lanifera*, *minutiflora*, *ovalleana*, *philippiana*.
Three in **Peru**: *VV*. *hillii*, *kermesina*, *membranacea*.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

We conclude with the warning that there must be few such sizeable groups of allied plants anywhere so much in dire need of protection, yet not one of these 111 species is listed internationally and only one nationally (Watson et al. 2018). Some do in fact occur in national parks and reserves which offer some guarantee of safety. However, even in those grazing by stock animals where permitted, high numbers of visiting tourists, and uncontrolled herbivory by introduced alien wild animals can limit that benefit.

BASIONYM AND SYNONYM INDEX

Viola arbuscula Phil. [= *V. philippii* Leyb.].
Viola asterias Hook. & Arn. [= *V. pusilla* Poepp.].
Viola asterias Hook. & Arn. var. ***atacamensis*** Phil. [= *V. pusilla* Poepp.].
Viola asterias Hook. & Arn. var. ***caulescens*** Phil. [= *V. pusilla* Poepp.].
Viola asterias Hook. & Arn. var. ***depauperata*** Phil. [= *V. pusilla* Poepp.].
Viola asterias Hook. & Arn. var. ***glabra*** Phil. ex Reiche [= *V. pusilla* Poepp.].
Viola asterias Hook. & Arn. var. ***genuina*** Reiche [= *V. pusilla* Poepp.].
Viola atropupurea *pro parte auct*. [= *V. turritella* J.M. Watson & A.R. Flores].
Viola auritella W. Becker [= *V. sacculus* Skottsb.].
Viola borchersii Phil. [= *V. frigida* Phil.].
Viola calderensis W. Becker [= *V. polypoda* Turcz.].
Viola cano-barbata Leyb. [= *V. montagnei* Gay].
Viola cano-barbata Leyb. var. ***albiflora*** W. Becker [= *V. montagnei* Gay].
Viola caviahuensis M. Sheader & A.-L. Sheader
[= *V. pachysoma* M. Sheader & J.M. Watson].

201) *Viola chillanensis*. (Margarita Aldunate) Now recognised as *V. congesta.*

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola chillanensis Phil. [= V. congesta Gillies ex Hook. & Arn.].

Viola copahuensis M. Sheader & A.-L. Sheader
[= *V. pachysoma* M. Sheader & J.M. Watson].

Viola cotyledon Ging. subsp. ***lologensis*** W. Becker
[= *V. lologensis* (W. Becker) J.M. Watson].

Viola curicoensis W. Becker [= *V. aurantiaca* Leyb.].

Viola cyathiformis W. Becker [= *V. aizoon* Reiche].

Viola flos-idae Hieron. var. ***pseudovolcanica*** Hieron. [= *V. flos-idae* Hieron.].

Viola flos-mariae Hieron. [= *V. montagnei* Gay].

Viola flos-mariae Hieron. var. ***nivea*** Hieron. [= *V. montagnei* Gay].

Viola flos-mariae Hieron. var. ***virescens*** Hieron. [= *V. montagnei* Gay].

Viola frigida Phil. var. ***borchersii*** (Phil.) Reiche [= *V. frigida* Phil.].

Viola glacialis Poepp. & Endl. [= *V. truncata* Meyen].

Viola karlreicheana Sanso, M. Seo & Xifreda [= *V. montagnei* Gay].

Viola miersii Bertero ex Steud. [= *V. pusilla* Poepp.].

Viola molfinoana W. Becker [= *V. frigida* Phil.].

Viola montagnei Gay var. ***glandulosa*** Phil. [= *V. montagnei* Gay].

Viola munozensis W. Becker [= *V. rodriguezii* W. Becker].

Viola orbignyana J. Rémy [= *V. pygmaea* Juss. ex Poir.].

Viola patagonica W. Becker [= *V. sacculus* Skottsb.].

Viola petraea W. Becker forma ***albida*** W. Becker [= *V. petraea* W. Becker].

Viola philippii Leyb. var. ***arbuscula*** (Phil.) Reiche [= *V. philippii* Leyb.].

Viola psammophila Phil. [= *V. polypoda* Turcz.].

Viola pseudasterias Reiche [= *V. polypoda* Turcz.].

Viola pseudasterias Reiche var. ***psammophila*** (Phil.) Reiche [= *V. polypoda* Turcz.].

Viola pseudovulcanica W. Becker [= *V. volcanica* Gillies ex Hook. & Arn.].

Viola squamulosa W. Becker [= *V. sacculus* Skottsb.].

Viola stellata Miers [= *V. pusilla* Poepp.].

Viola taltalensis W. Becker var. ***glaberrima*** W. Becker [= *V. taltalensis* W. Becker].

Viola toroensis Martic. [= *V. philippiana* Greene].

Viola truncata Meyen var. ***glaberrima*** W. Becker [= *V. truncata* Meyen].

Viola truncata Meyen var. ***glandulifera*** W. Becker [= *V. cheeseana* J.M. Watson].

Viola unica J.M. Watson & A.R. Flores [= *V. uniquissima* J.M. Watson & A.R. Flores].

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Viola volcanica Hook. & Arn. [as *V*. vulcanica, *nom*. *sphalm*.].

var. ***chillanensis*** (Phil.) Reiche [= *V*. *chillanensis* Phil.].

Viola volcanica Hook. & Arn. [as *V*. vulcanica, *nom*. *sphalm*.].

var. ***exilis*** (Phil.) Reiche [= *V*. *exilis* Phil.].

Viola volcanica [as *V*. vulcanica, *nom*. *sphalm*.] Gillies ex Hook. & Arn.

var. ***truncata*** (Meyen) Reiche [= *V*. *truncata* Meyen].

Viola werdermannii W. Becker [= *V*. *polypoda* Turcz.].

Viola werdermannii W. Becker var. ***typica*** W. Becker [= *V*. *polypoda* Turcz.].

Viola werdermannii W. Becker var. ***glaberrima*** W. Becker [= *V*. *polypoda* Turcz.].

Viola werdermannii W. Becker fma. ***glandulifera*** W. Becker [= *V*. *polypoda* Turcz.].

Viola wikipedia J.M. Watson [= *V*. *angustifolia* Phil.].

AS HOMONYMS AND *SENSU NON*.

***Viola* acanthophylla** *sensu* W. Becker, *non* Leyb. var. *tontalensis* [= *V*. *flos-idae* Hieron].

Viola alpina Ruiz & Pav. ex Ging. [= *V*. *pygmaea* Juss. ex Poir.].

Viola bicolor Reiche [= *V*. *montagnei* Gay].

Viola chrysantha Phil. [= *V*. *philippiana* Greene].

***Viola* coronifera** sensu Rossow non W. Becker

[= *V*. *rossowiana* J.M. Watson & A.R. Flores].

***Viola* dasyphylla** *pro*. sp. *sensu* Nicola, *non* W. Becker. [= *V*. *lologensis* J.M. Watson].

***Viola* dasyphylla** W. Becker *sensu* Rossow, *non* W. Becker. [= *V*. *lologensis* J.M. Watson].

Viola litoralis Phil. [= *V*. *huesoensis* Martic.].

Viola microphylla Phil. [= *V*. *philippii* Leyb.].

Viola nivalis Benth. [= *V*. *bangii* Rusby].

Viola parvifolia Benth. [= *V*. *polycephala* H.E. Ballard & P. Jørg.].

Viola pulchella Leyb. ex Reiche [= *V*. *escarapela* J.M. Watson & A.R. Flores].

Viola pusilla Hook. & Arn. [= *V*. *subandina* J.M. Watson].

***Viola* truncata** *sensu auct*. *non* Meyen [= *V*. *acanthophylla* Leyb.].

***Viola* vulcanica** *nom*. *sphalm*. *sensu* Reiche, *non* Gillies ex Hook. & Arn.

[= *V*. *congesta* Gillies ex Hook. & Arn.].

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

KEY TO DIFFERENTIATE SUBGENUS NEOANDINIUM SPECIES

1. Foliage glabrous except occasionally for minute denticulation or ciliation along basal margins ... **Group A**
- Foliage with indumentum, or if glabrous, then plant annual with linear to narrowly lanceolate lamina ... **Group B**

Group A

1. Plant shortly or slightly extended subacaulous with more or less closely imbricate rosettes of rigid semi-succulent foliage minutely apiculate at apex ... Group A1
- Plant otherwise ... Group A2

Group B

1. Folige glandular beneath or in marginal sinuses ... Group B1
- Foliage eglandular ... Group B2

Group A1

1. Lamina clearly longer than wide ..... 2.
- Lamina more or less as wide as long or more ..... 5.

2. Style crest apical, solitary [Near-southern Chile, Bío Bío Region] ..... *V. aizoon*
- Style crest as two lateral lobes ..... 3.

3. Lateral petals with indumentum [Central Argentina to northern Patagonia. Central to near-southern Chile] ..... *V. cotyledon*
- Corolla glabrous ..... 4.

4. Plant minimally subacaulous, more or less depressed, foliage tightly imbricate [Argentina, northern Patagonia. Near-southern Chile] ..... *V. dasyphylla*
- Plant extended subacaulous, elevated. Foliage loosely covering stems except on face of rosette [Argentina, northern Patagonia] ..... *V. lologensis*

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

5. Corolla with spur 6 mm or more long ..... 6.
- Spur shorter than 5 mm ..... 9.

6. Inflorescence with yellow corollas facing upwards within circumference of rosette [Argentina, northern Patagonia] ..... *V. coronifera*
- Inflorescence with corollas facing outwards around circumference of rosette ..... 7.

7. Corolla yellow, small [Central Chile, Santiago Region] ..... *V. sempervivum*
- Corolla white, large ..... 8.

8. Anthers glabrous. [Argentina, northern Patagonia, Neuquén Province] ..... *V. rossowiana*
- Anthers ciliate. [Central Chile, Santiago Region] ..... *V. santiagonensis*

9. Corolla always or sometimes yellow ..... 10.
- Corolla other colour ..... 13.

10. Inflorescence with corollas facing upwards within circumference of rosette [Argentina, northern Patagonia, Neuquén Province] ..... *V. comberi*
- Inflorescence with corollas facing outwards around circumference of rosette ..... 11.

11. Corolla with dense, short capitate indumentum, always on upper longitudinal half of lateral petals, at times also on superior and inferior petals [Central Chile, Valparaiso and Santiago regions] ..... *V. atropurpurea*[1]
- Corolla indumentum other ..... 12.

12. Lateral petals short-bearded at base [Argentinia, southern Patagonia, Santa Cruz Province. Far-southern Chile, Aisen Region] ..... *V. auricolor*
- Corolla indumentum white, lengthy and flattened, covering length of two or more petals, or corolla glabrous [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Maule Region.] ..... *V. turritella*[1]

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

13. Corolla glabrous ..... 14.
- Corolla with indumentum ..... 18.

14. Rosette plane, depressed to ground level. Corolla light blue [Central Chile, Santiago Region] ..... *V. portulacea*
- Rosette more or less elevated to columnar ..... 15.

15. Corolla bluish to pale or deep violet, or brown and yellow, or white with violet inferior petal, never all-white [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Maule Region] ..... *V. turritella*[2]
- Corolla all-white, more or less veined violet ..... 16.

16. Plant and corolla significantly small, the latter ca. 5 x 5 mm [Central Argentina to northern Patagonia, Mendoza and Neuquén provinces] ..... *V. abbreviata*
- Plant and corolla of typical size, i.e. ca. 10 x 10 mm ..... 17.

17. Plant forming cushions. Lamina glaucous, with red petiole and base. Style crest large [Central Argentina, Mendoza Province] ..... *V. beckeriana*
- Plant usually columnar. Lamina cryptic olive or brownish, rarely green, no coloration of petiole or lamina base. Style crest small [Argentina, northern Patagonia, Neuquén Province] ..... *V. pachysoma*

18. Indumentum at base of inferior petal only [Argentina, northern to mid-Patagonia, Chubut to Neuquén provinces. Far-southern Chile, Aysen Region] ..... *V. columnaris*
- Indumentum always present on lateral petals ..... 19.

19. Rosette dome shaped. Inflorescence facing outwards within circumference of rosette [Central Chile, Valparaiso Region] ..... *V. regina*
- Rosette other form. Inflorescence facing outwards around circumference of rosette ..... 20.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

20. Gynoecium and androecium concealed in throat of corolla
[Argentina, northern Patagonia, Neuquén Province] ..... *V.* ×*blaxlandiae*
- Gynoecium and androecium clearly visible ..... 21.

21. Corolla with dense, short, white capitate indumentum, always on upper longitudinal half of lateral petals, at times also on superior and inferior petals [Central Argentina, San Juan and Mendoza provinces. Central Chile, Valparaiso and Santiago regions] ..... *V. atropurpurea*[2]
- Corolla indumentum other ..... 22.

22. Style crest as two lateral horizontal lobes and one short, erect central lobe [Central Argentina, southern Mendoza Province. Near -southern Chile, Bío Bío Region] ..... *V. leyboldiana*
- Style crest two lateral horizontal lobes only ..... 23.

23. Plant always distinctly depressed, never columnar. Corolla over twice as wide as lamina. Style crest lobes narrow, slender [Argentina, northern Patagonia, Río Negro and southern Neuquén provinces] ..... *V. petraea*
- Plant usually columnar. Corolla to twice as wide as lamina, usually less. Style crest broad, robust ..... 24.

24. Basic corolla colour dark reddish purple to dark violet, very rarely white with all-violet inferior petal, or white with superior and lateral petals densely hirsute [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Maule Region] ..... *V. turritella*[3]
- Basic flower colour white or light blue.
Lateral petals not bearded densely ..... 25.

25. Inflorescence contained within foliage around upper circumference of rosette. Inferior petal more or less equal in area to individual lateral petals [Near-southern Chile, Maule Region] ..... *V. skottsbergiana*
- Inflorescence around and clear of upper circumference of rosette. Inferior petal ca. twice area of individual lateral petals. [Central Argentina, Mendoza Province] ..... *V.* ×*zwienenii*[1]

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Group A2

1. Plant an ericoid subshrublet [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Bío Bío Region] ..... *V. fluehmannii*
- Plant other, herbaceous ..... 2.

2. Plant with depressed sterile basal rosettes. Fertile shoot elongated, erect-cauline, closely covered by short, rigid, triangular laminas. Inflorescence in ring round circumference of expanded rosulate apex of stem. [Southern central Chile, region unknown] ..... *V. nassauvioides*
- Plant other ..... 3.

3. Plant stoloniferous, erect-cauline [Argentina, northern Patagonia, Neuquén and Río Negro provinces] ..... *V. escondidaensis*
- Plant herbaceous, subacaulous, rosulate ..... 4.

4. Plant annual [Extreme northwestern Argentina. Bolivia. Central and southern Peru] .....*V. micranthella*
- Plants perennial ..... 5.

5. Style crest as one apical and two lateral elongated lobes, all of equal length ..... 6.
- Style crest lateral or apical ..... 8.

6. Lamina linear-elliptical, margin entire or irregularly few short-indented. Superior petals distinctly shorter than inferior petal [Northwestern Argentina] ..... *V. triflabellata*
- Lamina more broadly elliptical to obovate-elliptical, margin entire, or subentire, or deeply and regularly indented. Superior petals somewhat shorter than inferior petal ..... 7.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

7. Lamina margin shallowly crenate. Stipules glabrous, remotely short-dentate. Bracteoles remotely short-dentate [Northwestern Argentina, La Rioja Province] ..... *V. hieronymi*
- Lamina entire to indented. Stipules entire, margin ciliate. Bracteoles entire [Northwestern Argentina, Tucumán Province] ..... *V. ×josephii*[1]

8. Lamina linear to narrowly linear-lanceolate ..... 9.
- Lamina elliptical or ovate ..... 10.

9. Lamina with basal stipules [Extreme northwestern Argentina. Bolivia. Southern Ecuador. Peru] ..... *V. pygmaea*
- Lamina without basal stipules [Bolivia. Southern Peru] ..... *V. pusillima*

10. Rosette grey-glaucous. Superior and lateral petals yellowish to blackish olive, inferior petal pale yellow [Northern Ecuador] ..... *V. polycephala*
- Rosette and corolla other colours ..... 11.

11. Inferior petal shorter than superior and lateral petals ..... 12.
- Inferior petal longer than superior and lateral petals .... 13.

12. Peduncle without bracteoles [Peru, Junín Department] ..... *V. nobilis*
- Peduncle with bracteoles. [Argentina, southern to northern Patagonia. Far-southern Chile, Aysen Region] ..... *V. sacculus*

13. Androecium and gynaecium more or less concealed within throat [Bolivia. Ecuador] ..... *V. bangii*
- Androecium and gynaecium readly visible ..... 14.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

14. Plant rhizomatous [Argentina, Patagonia, southern Neuquen Province] ..... *V. anitae*
- Plant with vertical axial taproot [Central Argentina, Mendoza Province] ..... ×*zwienenii*[2]

Group B1

1. Plant with shortly branched, more or less woody caudex [Northwestern Argentina, Catamarca Province] ..... *V. singularis*
- Plant herbaceous ..... 2.

2. Lamina entire or subentire ..... 3.
- Lamina crenate or dentate ..... 20.

3. Centre of rosette with dense indumentum [Near-northern Chile, Coquimbo Region] ..... *V. ovalleana*
- Rosette without dense indumentum ..... 4.

4. Style crest as one apical and two lateral lobes, all equal ..... 5.
- Style crest other or absent ..... 6.

5. Lamina succulent, more or less rigid, narrowly elliptical to elliptical, lateral veins scarcely elevated if at all [Northwest Argentina, Tucuman Province] ..... *V.* ×*josephii*[2]
- Lamina flexible, broadly ovate, all veins of upper surface prominently raised [Northwestern to Andean central Argentina. Near-northern Chile, Atacama Region] ..... *V. flos-idae*[1]

6. Lamina linear lanceolate to rarely narrowly obovate ..... 7.
- Lamina broader ..... 9.

7. Lamina undersurface short or long pilose, at least along marginal border area [Near-northern Chile, Coquimbo Region] ..... *V. aurata*[1]
- Lamina undersurface glabrous ..... 8.

8. Style crest two lateral lobes [Near-northern to near-southern Chile] ..... *V. pusilla*[1]
- Style crest apical, solitary [Far- to near-northern Chile] ..... *V. polypoda*[1]

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

9. Lamina as wide as long or wider ..... 10.
- Lamina longer than wide ..... 16.

10. Plant annual [Far-northern Chile, Antofagasta Region] ..... *V. johnstonii*
- Plants perennial ..... 11.

11. Style crest absent [Northwestern to central Argentina. Near-northern to near-southern Chile] ..... *V. montagnei*[1]
- Style crest present ..... 12.

12. Lamina margin dull red. Basic corolla colour deep violet [Argentina, northern Patagonia, Neuquén Province] ..... *V. rubromarginata*
- Lamina surface and margin concolorous. Basic flower colour white, pink or pale violet-pink ..... 13.

13. Calyx glabrous ..... 14.
- Calyx pilose or ciliate ..... 15.

14. Corolla white, lined and streaked violet to violet-pink, densely so towards base of inferior petal, at times also at base of lateral petals [Argentina, northern Patagonia, Neuquén Province] ..... *V. trochlearis*
- Corolla all-pink [Near-northern to near-southern Chile] ..... *V. decipiens*

15. Lamina margin entire. Corolla white, reverse of petals blackish blue [Northwestern Argentina, La Rioja and Salta provinces] ..... *V. evae*[1]
- Lamina margin shallowly crenate towards apex. Face and reverse of corolla pink to pale violet-pink. [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Maule Region] ..... *V. rugosa*[1]

16. Lamina surface matt textured ..... 17.
- Lamina surface more or less lustrous ..... 18.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

17. Lamina broadly elliptical, sepals glabrous [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Bío Bío Region] ..... *V. rosulata*
- Lamina narrowly rhomboid, sepals densely white-pilose [Near-northern Chile, Coquimbo Region] ..... *V. lanifera*

18. style crest absent [Northwestern Argentina, Tucumán and Catamarca provinces] ..... *V. lilloana*
- Style crest present ..... 19.

19. Style crest apical, solitary, apex shallowly trilobed [Far-northern Chile, Antofagasta Region] ..... *V. huesoensis*
- Style crest three free elongated apical lobes [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Maule Region] ..... *V. cheeseana*

20. Lamina with glands at base of each marginal sinus ..... 21.
- Lamina without glands in sinuses of marginal crenations ..... 23.

21. Plant annual. Petals usually with small darker spots. Style crest entire [Near-northern Chile, Coquimbo and Atacama regions] ..... *V. escarapela*
- Plant perennial. Petals unmarked. Style crest trilobed ..... 22.

22. Lamina obovate to broadly flabellate-subrhomboid, apex obtuse. [Central Argentina to northern Patagonia, Mendoza and Neuquén provinces. Near-southern Chile, Maule Region] ..... *V. congesta*
- Lamina elliptical to narrowly rhomboid, apex acute [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Bío Bío Region] ..... *V. farkasiana*

23. Style crest as one apical and two lateral equal lobes ..... 24.
- Style crest other or absent ..... 26.

24. Lamina ovate-rhomboid, rarely broadly rhomboid [Northwestern Argentina, La Rioja Province] ..... *V. mesadensis*
- Lamina oblong to narrowly elliptical or oblanceolate ..... 25.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

25. Lamina elliptical to narrowly oblanceolate, upper surface veins not or hardly elevated, undersurface covered by linear, dark, evident glands [Northwestern Argentina, Tucumán Province] ..... *V.* ×*josephii*[3]
- Lamina oblong, upper surface veins strongly elevated, undersurface glands fewer and relatively inconspicuous [Northwestern Argentina, Catamarca Province] ..... *V. joergensenii*[1]

26. Lamina as wide as long or wider ..... 27.
- Lamina longer than wide ..... 29.

27. Corolla orange-yellow [Central Chile, Santiago and O'Higgins regions] ..... *V. aurantiaca*[1]
- Corolla white veined violet or pink ..... 28.

28. Style crest apical, solitary, entire [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Bío Bío Region] ..... *V. volcanica*
- Style crest apical, solitary, trilobed [Northern Chile, Antofagasta Province] ..... *V. llullaillacoensis*

29. Lamina margin strongly crenate-sinuous [Northwestern to central Argentina. Far-northern to central Chile] ..... *V. frigida*
- Lamina margin plane-crenate ..... 30.

30. Style crest absent [Central Chile, Santiago Region] ..... *V. pulvinata*
- Style crest present ..... 31.

31. Corolla yellow or rarely white, spotted darker [Near-northern Chile, Coquimbo Region] ..... *V. philippiana*
- Corolla lilac, violet or purple-violet, unspotted. If white, then heavily lined dark violet ..... 32.

32. Petiole without basal stipules. Style crest two short, lateral lobes [Northwestern Argentina, Salta Province] ..... *V. spegazzinii*
- Petiole with basal stipules, Style crest other ..... 33.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

33. Style crest apical, solitary ..... 34.
- Style crest with one apical and two lateral lobes ..... 35.

34. Plant perennial. Corolla glabrous [Southern Peru, Apurímac Department] ….. *V. tovarii*[1]
- Plant annual. Lateral petals bearded at base. [Argentina, northern Patagonia, Neuquén Province] ..... *V. tectiflora*

35. Plant annual. Lamina crenate. Style crest lobes all porrect and incurved [Near-northern Chile, Atacama Region] ..... *V. marcelorosasii*
- Plant perennial. Lamina pinnatifid. Style crest lobes straight, retrorse [Central Chile, Santiago Region] ..... *V. acanthophylla*[1]

Group B2

1. Lamina entire ..... 2.
- Lamina crenate or dentate ..... 18.

2. Style crest one apical and two lateral elongated lobes ..... 3.
- Style crest apical, solitary, or two lateral lobes ..... 4.

3. Rosette to 3 cm dia. Stipules long-fimbriate. Bracteoles long-cilate [Northwestern Argentina, Tucumán Province] ..... *V. tucumanensis*
- Rosette to 6 cm dia. Stipules shortly ciliate. Bracteoles glabrous [Northwestern Argentina, Tucumán Province] ..... *V. ×josephii*[4]

4. Plant annual ..... 5.
- Plant perennial ..... 25.

5. Corolla yellow ..... 6.
- corolla other colour ..... 12.

6. Plant short-cauline. Lamina undersurface short or long pilose, at least bordering margin [Near-northern Chile, Coquimbo Region] ..... *V. aurata*[2]
- Plant subacaulous. Lamina undersurface glabrous ..... 7.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

7. Lamina margin entire ..... 8.
- Lamina margin shallowly long-crenate ..... 11.

8. Corolla pale yellow. Style crest as three free apical lobes [Southern Peru, Arequipa Region] ..... *V. weberbaueri*
- Corolla bright yellow. Style crest solitary, apical, flabellate ..... 9.

9. Style crest apical, entire [Far- to near-northern Chile] ..... *V. polypoda*[2]
- Style crest apical, trilobed ..... 10.

10. Lamina linear to linear-spathulate. Inferior petal lined black or brown-black [Near-northern to near-southern Chile] ..... *V. pusilla*[2]
- Lamina narrowly elliptical. Corolla base spotted purple overall [Central Chile, Santiago Region] ..... *V. auricula*

11. Style crest apical, solitary, shallowly trilobed. [Central Argentina. Near-northern to central Chile] ..... . *V. domeikoana*[1]
- Style crest apical, solitary, entire [Near-northern Chile, Atacama and Coquimbo regions] ..... *V. vallenarensis*

12. Lamina margin with long, deflexed white cilia ..... 13.
- Lamina margin with short, patent cilia ..... 14.

13. Style crest absent [Near-northern Chile, Atacama Region] ..... *V. godoyae*
- Style crest one apical and two lateral elongated lobes [Near-northern Chile, Atacama Region] ..... *V. dandoisiorum*

14. Lamina broadly obovate to suborbicular [Northern and central Argentina. Near-northern to near-southern Chile] ..... *V. montagnei*[2]
- Lamina clearly longer than wide ..... 15.

15. Style crest apical ..... *V. taltalensis*
- Style crest lateral ..... 16.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

16. Lamina ovate ..... *V. subandina*[1]
- Lamina linear to narrowly linear-spathulate ..... 17.

17. Corolla white [Near-southern Chile, Bío Bío Region] …… *V. minutiflora*
- Corolla violet [Near-southern Chile, Araucania Region] ……... *V. araucaniae*

18. Lamina undersurface tomentose. [Bolivia. Extreme northern Chile, Arica and Parinacota regions. Southern Peru] ..... *V. granulosa*
- Lamina undersurface glabrous ..... 19.

19. Style crest two slender, elongated, retrorse lateral lobes [Central Argentina to northern Patagonia, Subandean to Andean central to near-southern Chile] ..... *V. subandina*[2]
- Style crest other ..... 20.

20. Style crest apical, trilobed ..... 21.
- Style crest apical, entire ..... 22.

21. Lamina margin deeply short-crenate [Subandean central Chile, Santiago and Valparaiso regions] ..... *V. chamaedrys*
- Lamina margin shallowly long-crenate [Central Argentina. Near-northern to central Chile] ..... *V. domeikoana*[2]

22. Lateral petals short-bearded basally [Northwestern to central Argentina] ..... *V. argentina*
- Corolla glabrous ..... 23.

23. Lamina elliptical. Corolla white shading to purple at apex [Central Chile, Santiago Region] ..... *V. nubigena*
- Lamina rhomboid. Corolla other colour ..... 24.

24. Corolla white to pale pink, spotted deeper pink overall [Central Chile, Santiago Region] ..... *V. glechomoides*
- Corolla pale blue, unmarked [Central Chile, Santiago Region] ..... *V. rhombifolia*

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

25. Corolla crimson, red, or dark orange [Central Peru, Junín Department] ..... *V. kermesina*
- Corolla other colour ..... 26.

26. One or both lamina surfaces with indumentum ..... 27.
- Lamina surfaces glabrous ..... 31.

27. Lamina with indumentum on both faces ... [Central Peru, Ancash Department] ..... *V. replicata*
- Lamina with indumentum on one surface only ..... 28.

28. Lamina with indumentum on face only ..... 29.
- Lamina with indumentum on undersurface only .... 30.

29. Pedicel stipulate. Corolla glabrous. Style crest solitary, apical, entire [Central Argentina, San Juan Province] ..... *V. exsul*
- Pedicel estipulate. Lateral petals bearded. Style crest two lateral lobes and one short erect frontal lobe [Northwestern Argentina, Tucumán Province] ..... *V. calchaquiensis*

30. Corolla distinctly small, blackish blue with white base, or rarely

all-white. Style crest absent [Northwestern to Central Argentina. Near-northern to near-southern Chile] ..... *V. montagnei*[3]
- Corolla average sized. Style crest solitary, apical, trilobed [Argentina, northern Patagonia, Neuquén Province. Near-southern Chile, Maule Region] ..... *V. rugosa*[2]

31. Style crest absent ... [Central Argentina, Mendoza Province. Central to near-southern Chile] ..... *V. philippii*
- Style crest present ..... 32.

32. Style crest one apical and two lateral elongated lobes ..... 33.
- Style crest apical or lateral ..... 37.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

33. Lamina entire Central Chile, O'Higgins Region] ..... *V. bustillosia*
- Lamina margin divided ..... 34.

34. Lamina suborbicular [Far-northern Chile, Tarapacá Region] ..... *V. uniquissima*
- Lamina longer than wide ..... 35.

35. Peduncle and calyx pubescent [Northwestern and central Argentina.
Near-northern Chile, Atacama Region] ..... *V. flos-idae*[2]
- Peduncle and calyx glabrous ..... 36.

36. Lamina matt, cryptic brownish green, margins thickened
[Northwestern Argentina, Cajamarca Region] ..... *V. joergensenii*[2]
- Lamina lustrous with evident coloration of green to dark brownish red,
margins unthickened [Northwestern Argentina, Tucumán Province] ..... *V. ×josephii*[5]

37. Plant caulescent, aerial base stems woody [Northwestern Argentina,
Catamarca Province] ..... *V. beati*
- Plant herbaceous, subacaulous ..... 38.

38. Corollas notably small, inferior petal
shorter than superior and lateral petals ..... 39.
- Corolla size distinctly larger. Inferior petal equal to
or longer than superior and lateral petals ..... 42.

39. Lamina laciniate ..... 40.
- lamina crenate ..... 41.

40. Lamina more or less plane [Central Peru, Junín Department] ..... *V. weibelii*
- Lamina conduplicate [Southern Peru, Ayacucho Department] ..... *V. lilliputana*

41. Lamina glabrous [Central Peru, Junín Department] ..... *V. membranacea*
- Lamina ciliate [Southern Peru, Puno Department] ..... *V. enmae*

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

42. Lamina entire ..... 43.
- Lamina margin divided ..... 44.

43. Lamina rotund to reniform. Style crest apical, trilobed [Northwestern Argentina, La Rioja and Salta Provinces] .....*V. evae*[2]
- Lamina oblong-spathulate. Style crest apical, entire [Northwestern Argentina, La Rioja Province] ..... *V. niederleinii*

44. Lamina margin pinnatifid ..... 45.
- Lamina margin other ..... 47.

45. Style crest apical [Central Chile, Santiago Region] ..... *V. acanthophylla*[2]
- Style crest two lateral lobes ..... 46.

46. Lamina margin glabrous, lobes linear, upcurved. [Southern Peru, Puno Department] ..... *V. hillii*
- Lamina margin ciliate, lobes lanceolate, patent. [Southern Peru, Puno Department] ..... *V. ferreyrae*

47. Lamina as wide as long or wider ..... 48.
- Lamina longer than wide ..... 49.

48. Corolla orange-yellow [Central Chile, Santiago and O'Higgins regions] ..... *V. aurantiaca*[2]
- Corolla violet [Central Chile, Santiago Region] ..... *V. exilis*

49. Petioles without basal stipules [Northwestern Argentina, Salta, Jujuy and Tucumán provinces] ..... *V. rodriguezii*
- Petioles with basal stipules ..... 50.

50. Style crest three free, elongated apical lobes [Central to near-southern Chile] ..... *V. truncata*
- Style crest other ..... 51.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

51. Inferior petal naviculate, much longer than superior and lateral petals
[Near-northern Chile, Atacama Region] ..... *V. gelida*
- Inferior petal plane, more or less equal in
length to superior and lateral petals ..... 52.

52. Corolla glabrous .....53.
- Lateral petals bearded .....54.

53. Lamina lobes rounded [Southern Peru, Apurímac Department] ..... *V. tovarii*
- Lamina lobes dentate, acute. [Central Chile, Santiago Region] ...,..... *V. angustifolia*

54. Style crest one short erect frontal lobe and two lateral lobes [Central
Chile, Santiago Region] ..... *V. friderici*
- Style crest entire apical ..... 55.

55. Lamina margin with four crenations per side [Northeastern
Argentina, La Rioja Province] ..... *V. xanthopotamica*
- Lamina margin with two to three crenations each side [Central
Argentina, San Juan Province] ..... *V. roigii*

Note 1: Figures [1-5] (superscript) after specific epithets indicate in running order how many times a morphologically variable taxon has been keyed.

Note 2: Countries are given in alphabetical order, distributions from north to south. All locations are at Andean elevations unless otherwise noted.

Botanical terminology in this key

As part-derived from Stearn (1966).

Apex. The tip of an organ. *Apical*. Relating to the tip of an organ.

Apiculate. With a minute but distinct point at the tip.

Bracteole. The small paired leaf-like organs at the base or lower sector of the flower stem.
Bracteolate. A stem bearing these.

Calyx. The organ which encloses the corolla before it opens or when it is closed. If divided it splits into divisions known as sepals.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Capitate. When the tip of a hair is swollen like a small drop, or a style tip has a distinct enlarged swelling bearing the stigma, and a crest, if present.

Caudex. A relatively short extention or branched extention [*caudices* pl.] at the crown of the rootstock.

Cauline. Having a stem.

Cilia. Marginal hairs. *Ciliate*/*ciliation*. Having a fringe around the margin.

Conduplicate. Folded together like the pages of a book when closed or nearly so.

Corolla. The petals of a flower without the central sexual organs.

Crenate. The leaf margin with regular rounded undulations or rounded lobes.

Cushion. A plant which forms a low, compact mound.

Denticulate/*denticulation*. Small toothing around the edge of an organ.

Depressed. The sense here is flat against the ground and somewhat somewhat sunken towards the centre.

Eglandular. Without glands [q.v.].

Elevated. The opposite of depressed. A plant whose vegetated part is clearly raised above ground level.

Entire. The outline of the organ concerned is straight without any kind of additions, divisions, indentations or inward curves.

Ericoid. With short, close-set, fairly thick, linear leaves around woody stems. Usually applied to small, compact shrublets.

Estipulate. A petiole without stipules [q.v.].

Face. The upper surface of a leaf.

Flabellate. A fan-shaped organ, its point of attachment at the narrow end.

Glabrous. Lacking any kind of hair, or other covering, or multiple solid protruberences.

Gland. A more or less gummy secretion, usually on the undersurface or margin of a leaf blade. It may have a small globular form or be linear, when long or short. Linear glands are almost always dark, whereas globular glands may be brown, red, amber-coloured or transparent. *Glandular*. Indicates the presence of these on a plant.

Herbaceous. A non-woody plant.

Imbricate. Closely and tightly set alongside and on top of one another like tiles on a roof.

Indented. With short, narrow marginal incisions.

Indumentum. Covering of hair or protrusions on a surface.

Inferior. The lowest [single] petal, or lower [two] sepals.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Inflorescence. When two or more flowers are clustered together on a stem, or the upper branches or tip of a stem. Or describing the placement of more than one individual solitary flower on a plant.

Lamina. The blade of a leaf without its attachment, the petiole [q.v.], when present.

Lateral. The side [two] petals or sepals.

Lustrous. More or less shiny, not dull, i.e.not matt [q.v.]. Describing the surface of a leaf which can reflect light.

Matt. A leaf surface which is so textured as to not reflect light, equivalent to fine, closely woven material, for example.

Naviculate. Boat-shaped. That is with the centre forming a keel [*carina*] longitudinally, its two ends being higher than the middle sector.

Organ. Any individual part of a plant, e.g. the root, the stem, the leaf, the calyx, the stamens, the stigma, etc.

Ovary. The swollen organ at the centre of the flower where the seeds develop.

Petiole. The slender, elongated, more or less rigid stalk which attaches a leaf to the stem.

Pilose. Hairy.

Pinnatifid. Where the lateral lobes of a leaf are divided almost to the central axis.

Plane. Flat.

Porrect. Directed laterally and forwards.

Pseudopetiole. Similar to a petiole [q.v.], but with narrow continuations of the lamina [q.v.] along both margins.

Pubescent. Downy.

Reverse. The back of a petal.

Rosette. A circle of leaves radiating from a central point.

Sepal. See calyx.

Sinuous. A leaf or petal with a wavy, undulating margin.

Sinus. The inward curve between two adjacent outward curves along the margin of a leaf.

Spur. The cylindrical rear extension of the lowest petal, its mouth open and tip closed. It contains the nectar which rewards pollinators.

Stamen. The fine stalk which carries the pollen bearing organ, the anther, at its tip.

Sterile. The foliar part of a plant, such as a rosette, when not bearing flowers.

Stigma. The receptacle aperture which admits pollen and allows it to reach the ovary.

Stipule. The small paired leaf-like organs at or near the base of the petiole.

Stipulate. A petiole bearing these.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Stolon. Spreading runners below the ground surface. *Stoloniferous*. A plant which produces stolons.

Style. The extension-stalk of the ovary. It contains the stigma [q.v.].

Style crest. One to three lobes or an entire round or flat fan shaped protrusion. Lobes are situated at the side or on top of the swollen end of the stigma [q.v.], or both. The flat protrusions are always on top only

Subacaulous. With one caudex [q.v.], or when branched as several, the caudices, i.e. rudimentary basal stems. These are usually so short that the plant appears to be stemless.

Superior. The upper [two] petals or [single] sepal.

Taproot. A vertical [axial] rootstock, usually thick, directed downwards from the centre of a plant, solitary above and branching into smaller roots towards the tip.

Tomentose. Woolly.

Note: Due to adaptive evolution to very specific and limited habitats, often well apart when there is a lack of suitable intervening habitats, in addition to their modes of dispersal, many subgen. *Neoandinum* taxa are closely similar. The number of clear critical distinctions is limited in this case: e.g. style crest presence and formation, annual or perennial life form, presence or absence of indumentum, presence or absence of foliar glands, herbaceous or woody, evidently cauline or shortly subacauline, inter alia. It is not difficult to sort them into main groups based on such morphological features. But these groups hold species with near-identical relevant characters which can only only be told apart by relatively minor features, in some cases nothing more than the texture and appearance of foliage or significant relative size of petals on the same corolla. This makes keying out their unique particularities problematical, even though they are undoubtedly quite different in appearance, and are accepted by relevant botanical authorities. However, synonymizing all such relatively similar taxa would involve so many that the whole structure of the section would collapse!

Historically, minor deviations from the type description of twelve species have in fact been given infraspecific denominations, most of which are not accepted by any modern authority, and none of them by ourselves. Apart from other considerations, there is often disagreement about infraspecific ranking of the same taxon, with some flora lists supporting one, while other lists support a different rank. This uncertainty, which can at times deteriorate into a chaos of synonyms is not good for taxonomy in our opinion. See further comments on this aspect above.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

On the other hand, although we have not published any as such, we consider that very distinct colour forms of the same species within the same population or adjacent ones where no intermediate colour forms are known should be ranked as forms. To support this, each colour is undoubtedly visited by exclusive pollinators which will inevitably lead eventually to speciation. Another problem arising in the construction of a key is the lack of detail in historical descriptions for plants which have not been re-encountered since their discovery or shortly afterwards. Frequently there is no indication of important critical features, meaning it is only possible to work from whatever information the authors of the time have provided.

Taxonomy

(Red print = not known in the wild).

Viola Subgenus *Neoandinium* (W. Becker) Marcussen.

Type species (designated here): *Viola pygmaea* Juss. ex Poir., Encycl. 8: 630. 1808.

Diagnosis: Defined by some exclusive combination of morphological features as follow. Perennial or annual herbs, usually forming subacaulous imbricate or loose rosettes, very rarely either erect-cauline, woody based, or dwarf ericoid subshrublet. Rootstock axial, vertical, or occasionally stoloniferous. Foliage glabrous or with indumentum. Juvenile laminas flat, not laterally upcurved or involute as in subgen. *Viola*. Inflorescence a ring or proximate parallel rings of solitary axial corollas borne at circumference of the rosette, rarely on face of rosette or at apex of fertile shoots. Floration simultaneous or consecutive. Peduncle bracteolate, shorter or long as mature laminas. Corolla glabrous or with indumentum. Style crest one, two or three lobes or flanges at sides or top of capitate style apex, very rarely absent.

Distribution: From the equator [Ecuador] to southern Patagonia [Argentina].

Etymology: *Neoandinium* refers to the majority of species of the subsection (90%) inhabiting the Andes mountains.

Section *Sempervivum* J.M. Watson & A.R. Flores, sect. nov.

Type species: *Viola atropurpurea* Leyb., Anales Univ. Chile 15: 158-159. 1858.

VV. abbreviata J.M. Watson & A.R. Flores, *aizoon* Reiche, *auricolor* Skottsb., *bangii* Rusby, *beckeriana* J.M. Watson & A.R. Flores, ×*blaxlandiae* J.M. Watson & A.R. Flores, *columnaris* Skottsb., *comberi* W. Becker, *coronifera* W. Becker, *cotyledon* Ging., *dasyphylla* W. Becker, *hieronymi* W. Becker, *leyboldiana* Phil., *lologensis* (W. Becker) J.M. Watson, *micranthella*

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Wedd., *nobilis* W. Becker, *pachysoma* M. Sheader & J.M. Watson, *petraea* W. Becker, *polycephala* H.E. Ballard & P. Jørg., *portulacea* Leyb., *pusillima* Wedd., *pygmaea* Juss.ex Poir., *regina* J.M. Watson & A.R. Flores, *rossowiana* J.M. Watson & A.R. Flores, *sacculus* Skottsb., *santiagonensis* W. Becker, *sempervivum* Gay, *skottsbergiana* W. Becker, *turritella* J.M. Watson & A.R. Flores, ×*zwienenii* J.M. Watson & A.R. Flores.

Diagnosis: Perennial or annual subacaulous, glabrous, imbricated rosette-forming herbs. Lamina entire or shallowly subcrenulate, apex acute to obtuse.

Distribution: The full range of the section is commensurate with that of the subgenus, extending from the Ecuador to southern Patagonia. Its centre of diversity occurs at Andean elevations between central Argentina and Chile in the north and northern Patagonia together with near-southern Chile, rarely descending to subandean levels.

Note 1: We have given those that range from Andean central Argentina and Chile southwards the informal name of sempervivoids from which the section name above is derived. It describes their similarity of form and texture to the genus *Sempervivum* (Crassulaceae).

Note 2: Here and as follows the description 'glabrous' refers to all foliar parts, but not floral organs."

Section *Ericoidium* J.M. Watson, A.R. Flores & Marcussen, sect. nov.

Type species: *Viola fluehmannii* Phil., Anales Univ. Chile 81: 346. 1892.

Diagnosis: Perennial dwarf ericoid subshrublets.

Distribution: The sole species of this section is limited mainly to the southern Chilean regions of Bío Bío, Araucania [its centre of concentration] and Los Rios. It also occurs rarely in adjacent Neuquén Province, Argentina.

Etymology: The epithet refers to the *Erica*-like appearance of the only species.

Section *Confertae* pro parte Reiche.

Type species: ***Viola nassauvioides* Phil., Anales Univ. Chile 81: 346. 1892.**

Diagnosis: Perennial erect, cauline, glabrous herb. Fertile stem enveloped in short, acaulous laminas, apex as expanded, imbricated rosette. Sterile rosettes basal, subacaulous, imbricated.

Distribution: One of the three sections of the subgenus with only one member, in this case as a single site rarity not known since its type gathering. Its exact location is also unknown.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

The field note on the specimens and indication in the type description, both by Philippi, state respectively: "Cordilleras centrales" [Central mountain ranges] and "Cum *Viola cotyledone* nescio quo loco Andium lecta fuit" [I do not know where in the Andes it was collected together with *Viola cotyledon*]. *V. cotyledon* has been recorded from the south of the Santiago Metropolitan Region down to Arauco. The evidence suggests it probably inhabits [or inhabited] somewhere from southern Santiago to northern Maule [Curico Province] regions.
Etymology: *Confertae*, meaning closely set, refers to the dense coverage of laminas.

Section *Rhizomandimium* J.M. Watson, A.R. Flores & Marcussen, sect. nov.

Type species: *Viola escondidaensis* W. Becker, Bull. Misc. Inform. Kew 1928(4): 135. 1928.

V. anitae J.M. Watson & A.R. Flores.

Diagnosis: Perennial rhizomatous, glabrous herbs.

Distribution: These two species are both Argentinian endemics with limited but sympatric ranges in northern Patagonia [Neuquén and Río Negro provinces].

Etymology: This pair are the only ones in the subgenus with a rhizomatous growth form, hence *Rhizomandinium*.

Section *Grandiflos* J.M. Watson, A.R. Flores & Marcussen, sect. nov.

Type species: *Viola truncata* Meyen, Reise Erde 1: 314. 1834.
VV. acanthophylla Phil., *angustifolia* Phil., *bustillosia* Gay, *cheeseana* J.M. Watson.
Diagnosis: Perennial subacaulous, rosette-forming herbs. Rosette loose, irregular, not imbricated, radiating, not depressed. Lamina narrow, oblanceolate-spathulate, flexible, acute, entire, dentate or pinnatifid, never crenate. Corolla large, prominent, ca. 1.5 x 1.5 cm, twice as wide as lamina or more.
Distribution: This small section is known from Santiago and O'Higgins regions, where mainly concentrated, southwards sporadically to Bío Bío Region. It inhabits subandean to mid-Andean elevations.
Etymology: *Grandiflos*, large-flowered, highlights the critical aspect of this group.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Section *Rosulatae* pro parte Reiche.

Type species: ***Viola rosulata* Poepp. & Endl., Nov. Gen. Sp. Pl. [Poeppig & Endlicher] 2: 49. 1838.**

VV. *argentina* W. Becker, *aurantiaca* Leyb., *calchaquiensis* W. Becker, *chamaedrys* Leyb., *congesta* Gillies ex Hook. & Arn., *decipiens* Reiche, *escarapela* J.M. Watson & A.R. Flores, *evae* Hieron. ex W. Becker, *exilis* Phil., *exsul* J.M. Watson & A.R. Flores, *farkasiana* J.M. Watson & A.R. Flores, *ferreyrae* P. Gonzáles, *friderici* W. Becker, *frigida* Phil., *gelida* J.M. Watson, M.P. Cárdenas & A.R. Flores, *glechomoides* Leyb., *granulosa* Wedd., *hillii* W. Becker, *kermesina* W. Becker, *lanifera* W. Becker, *lilloana* W. Becker, *llullaillacoensis* W. Becker, *montagnei* Gay, *niederleinii* W. Becker, *philippiana* Greene, *philippii* Leyb., *replicata* W. Becker, *rodriguezii* W. Becker, *roigii* Rossow, *rubromarginata* J.M. Watson & A.R. Flores, *rugosa* Phil. ex W. Becker, *singularis* J.M. Watson & A.R. Flores, *spegazzinii* W. Becker, *tectiflora* W. Becker, *tovarii* P. Gonzáles & Molina-Alor, *trochlearis* J.M. Watson & A.R. Flores, *volcanica* Gillies ex Hook. & Arn., *xanthopotamica* J.M. Watson & A.R. Flores.

Diagnosis: Perennial or annual subacaulous, more or less hairy rosette-forming herbs. Lamina flexible, elliptical, narrowly to broadly obovate, orbicular, or rhomboid, deeply to shallowly crenate, sinuous-crenate, dentate, incised, pinnatifid, or rarely entire when plant perennial.

Distribution: Its species are recorded between northern-central Peru and northern Patagonia, mainly at Andean elevations, but with a few down to subandean. There is no single centre of diversity, but significant concentrations occur in southern Peru, northwest Argentina, central Chile and Argentinian N Patagonia.

Etymology: *Rosulatae* describes the closely rosetted growth form of the species of this section.

Section *Xylobasis* J.M. Watson & A.R. Flores, sect. nov.

Type species: *Viola beati* J.M. Watson & A.R. Flores, Willdenowia 49(1): 36. 2019.

Diagnosis: Perennial hairy, rosette-forming herbs, shortly woody-branched from aerial rootstock crown.

Distribution: A monotypic section whose single-site component is an endemic of the Andes of Catamarca Province, northwestern Argentina**.**

Etymology: The epithet is derived from the Greek *Xylon*, meaning wood or woody in combination with *basis*, base or basal, and refers to the basal stems of the one known species.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Section *Triflabellium* J.M. Watson, A.R. Flores & Marcussen, sect. nov.

Type species: *Viola triflabellata* W. Becker, Repert. Spec. Nov. Regni Veg. 21: 357. 1925.

VV. flos-idae Hieron., *joergensenii* W. Becker, ×*josephii* J.M. Watson & A.R. Flores, *mesadensis* W. Becker, *tucumanensis* W. Becker, *uniquissima* J.M. Watson & A.R. Flores.

Diagnosis: Perennial rosette-forming herbs. Style crest as one apical and two lateral extended lobes.

Distribution: This group consists of one Chilean and five Argentinian endemics and one further species which inhabits both countries. The two species in Chile are adjacent to the border with Argentina. The total range is from northern Mendoza Province in Argentina to Tarapacá Region, Chile, the latter being a northernmost outlier. Tucumán and Catamarca provinces contain the main centre of diversity.

Note: This section is based on the informal, unranked alliance *Triflabellatae* of W. Becker (1926) which was comprised of: *VV. joergensenii* W. Becker, *triflabellata* W. Becker and *tucumanensis* W. Becker.

Etymology: The section epithet *Triflabellium* is based on the original name given to the group by Becker, referring to the diagnostic style crest consisting of one apical and two lateral flabellate, discrete lobes.

Section *Inconspicuiflos* J.M. Watson & A.R. Flores, sect. nov.

Type species: *Viola lilliputana* Iltis & H.E. Ballard.

VV. enmae P. Gonzáles, *membranacea* W. Becker, *weibelii* J.F. Macbr. ex Baehni & Weibel.

Diagnosis: Dwarf, cushion forming plants, glabrous or with indumentum. Corolla notably small, the upper and lateral petals distinctly larger than the inferior.

Distribution: The section is endemic to Peru.

Etymology: *Inconspicuiflos*, with flowers which are not easily seen, draws attention to the most significant common morphological feature of the alliance, which also differentiates taxa of the section from all others of subgen. *Neoandinium* with the same distribution.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Section *Relictium* J.M. Watson, A.R. Flores & Marcussen, sect. nov.

Type species: *Viola huesoensis* Martic., Gayana Bot. 57(2): 191. 2000.

VV. *dandoisiorum* J.M. Watson & A.R. Flores, *godoyae* Phil., *johnstonii* W. Becker, *marcelorosasii* J.M. Watson & A.R. Flores, *ovalleana* Phil.

Diagnosis: Annual rosulate herbs. Cilia long, surrounding entire lamina margin, strongly deflexed.

Distribution: An endemic Chilean section inhabiting the northern sector of the country from the central Coquimbo through Atacama to southern Antofagasta regions. It is limited to the littoral and immediate interior of the latter region and subandean elevations in Coquimbo and Atacama. The main concentration is found in Antfagasta and northern Atacama.

Etymology: *Relictium* refers to its origin as the apparent fragmentation of an earlier more integrated alliance.

Section *Subandinium* J.M. Watson & A.R. Flores, sect. nov.

Type species (designated here): *Viola subandina* J.M. Watson, Pl. Altoandinas Fl. Silv. Chile: 66. 1998.

VV. *araucaniae* W. Becker, *aurata* Phil., *auricula* Leyb., *domeikoana* Gay, *glechomoides* Leyb., *minutiflora* Phil., *nubigena* Leyb., *pulvinata* Reiche, *pusilla* Poepp., *polypoda* Turcz., *rhombifolia* Leyb., *taltalensis* W. Becker, *vallenarensis* W. Becker, *weberbaueri* W. Becker.

Diagnosis: Annual rosulate herbs. Lamina flexible, linear, oblanceolate or obovate, entire or shallowly long-crenulate.

Distribution: This widespread subandean to coastal section extends from Araucanía Region in southern Chile to Arequipa Department in southern Peru. Eleven or its taxa are Chilean endemics; one a Peruvian endemic; while two inhabit both Argentina and Chile.

Its inland Metropolitan Region of Santiago centre of diversity is compact in contrast to the dense Pacific littoral spread of two species along the regions of Coquimbo and Atacama and into Antofgasta of almost 1000 km.

Etymology: The section name *Subandinium* derives from the specific epithet of the type species. *V*. *subandina*, which occupies an intermediate elevation between the related high Andean and coastal species.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

KEY TO DIFFERENTIATE SUBGEN. *NEOANDINIUM*

SUBGENERIC RANKS

1. Foliage glabrous except occasionally for minute denticulation or ciliation on lower borders. Lamina usually more or less rigid ..... 2.
- Foliage with indumentum, or if very rarely not, with prominently raised veins on upper surface of lamina. Lamina flexible ..... 6.

2. Plant a shrublet ..... sect. *Ericoidium*
- Plants other ..... 3.

3. Plants rhizomatous ..... sect. *Rhizomandinium*
- Plants arising directly from central axial rootstock ..... 4.

4. Plant cauline ..... sect. *Confertae*
- Plants subacaulous, rosette forming .....5.

5. Inferior petal longer than or equal to superior and lateral petals ..... sect. *Sempervivum*
- Inferior petal much smaller than superior and lateral petals ..... sect. *Inconspicuiflos*[1]

6. Style crest as one apical and two lateral lobes ..... sect. *Triflabellium*
- Style crest lateral, or lateral and frontal, or apical only ... 7.

7. Plant with short woody aerial caudices ..... sect. *Xylobasis*
- Plants herbaceous ..... 8.

8. Corolla significantly large, twice as wide as lamina or more ..... sect. *Grandiflos*
- Corolla usual-sized or very small for subgenus ..... 9.

9. Cilia long, surrounding entire lamina margin, strongly deflexed ..... sect. *Relictium*
- Cilia short, more or less patent ..... 10.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

10. Inferior petal much smaller than superior and lateral petals,
these very small ..... sect. *Inconspicuiflos*[2]
- Inferior petal not noticeably different from others, petals not small..... 11.

11. Lamina entire, plane, shallowly long-crenulate, or short-incised ... sect. *Subandinium*
- Lamina clearly crenate or crenate-undulate ..... sect. *Rosulatae*

202) Close-up of ants on *Viola rubromarginata.* (ARF)

The question has arisen as to the purpose of the inferior and at times also marginal foliar glands of 35 of the sect. *Rosulatae* species. Philippi (1892) came up with the following rather implausible explanation, which is not shared by any others in the botanical world:
"... in the incision (of the lamina marginal crenations) is a black gland. ... one notices on many leaves oblong, dark glands scattered irregularly (on the undersurface), which in my opinion are nothing more than a fungi, such as the black glands of *V. maculata* Cass. ..."

So what in fact is the purpose of this morphological phenomenon? We do not know for sure, but can make a reasonable speculation based on available evidence.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

The very occasional presence of ants in Patagonian subgen. *Neoandinium* colonies as seen by A. F. and J. W. [figs.202 -205] might suggest the possibility of attraction to elaisomes on the seeds, not least because they will attack any intruder, including a human collector's hand! However, we have examined large numbers of seeds of many and varied species of the subgenus, and not one had produced elaisomes. On the other hand all species with ants present possessed underleaf glands. The conclusion therefore is mutualism, such as happens with *Acacia cornigera*, the bullhorn acacia, where the tree exudes nectar-gum which the insects feed on, fiercely protecting the precious sustenance against all comers (Hölldobler & Wilson 1994).

203) Ants on *Viola rubromarginata.* (JMW)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

204) Ants on *Viola trochlearis.* (ARF)

M. N. has experienced a similar phenomenon when examining the thinly gum-coated leaves of *Azorella prolifera*, a South American spiny cushion member of the Apiaceae. As she touched it, ants swarmed out and bit her. Without doubt it was the edible gum they were defending.

205) Our viola ant, *Dorymyrmex pogonius*. (Photo Anon, courtesy of the Internet)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Postscript 1. Concerning the evolution of *Viola*

Violaceae is almost entirely tropical in distribution. Only *Viola* is temperate and frost tolerant. The earliest evolution of *Viola*, before the split of two subgenera, appears to coincide with the global cooling event ca. 34 that lasted ca. 8 million years (Zachos et al. 2001) which is associated with the sundering of the land bridge between South America and Antarctica (Marcussen et al. Violaceae paper currently under preparation). T. M.

Postscript 2. Subgenus *Neoandinium* in cultivation

To our knowledge, the first introduction of any seeds of the subgenus ocurred in 1972 as a result of the 1971/72 collecting expedition of Beckett, Cheese & Watson to Chile, from the near-north to the near-south of that country. In fact attempts were made by influential people to dissuade potential investors from supporting the venture as, according to them, almost all Andean plants from the subcontinent anywhere north of Patagonia were bound to fail in cultivation.

In fact although not true as a generality, that forecast did hold good for the *Neoandinium* violas on that initial occasion. Fortunately though, our venture did in fact obtain sufficient financing! Another positive aspect was stimulating the urge for people to see these unfamiliar plants for themselves, which led eventually to the present spate of ecotours. Although not one of these violas has ever proved sufficiently adaptable to find its way into commercial horticulture, several species have been raised and flowered since by skilled and devoted specialist growers. We have heard or read of success with the following, the first two annual, the rest perennial: *VV*. *pusilla*, *subandina*; *atropurpurea*, *congesta* [fig.206], *coronifera*, *cotyledon* [fig.207], *farkasiana*, *fluehmannii* [fig.208], *joergensenii* [fig.209], *montagnei*, *pachysoma* [fig.210], *skottsbergiana* [fig.211].

These results have been obtained in the following countries; Britain, France, Norway, Sweden and Canada. The Gothenburg Botanical Gardens (GB) has been particularly successful in growing *VV. atropurpurea, columnaris, cotyledon, montagnei* (as *canobarbata*) and *volcanica* (as *pseudovulcanica*).

A recent article with full details of raising these tricky and demanding plants from seed may be found in The Rock Garden, by van Beuken and O'Sullivan (2021).

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

206) *Viola congesta*. RHS Wisley, raised from our F. & W. 11249.

207) *Viola cotyledon* from P. & W. (Pern & Watson) seed. (J. Ian Young)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

208) *Viola fluehmannii* from P. & W. seed. (J. Ian Young)

209) *Viola joergensenii* raised from our F. & W. seed by a skilled French expert.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

210) *Viola pachsoma* raised from Archibald seed. (Mike Kintgen)

211) *Viola skottsbergiana* from seed sent from the country of origin by Michail Belov. (Martin Sheader)

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Acknowledgements

First in line for inclusion here is our very special friend the Editor, who has accepted this and many other of our articles already published. Above all she produces the professional layout of both the text and illustrations. But her sharp eyes also spot errors that we 'experts' overlook. We look forward to a long and productive continuing cooperation. Thank you, Margaret.

Our expert *Viola* colleague Jiří Danihelke not only kindly illuminated a very important point of taxonomic procedure in the title, but also drew attention to my (J. W.) careless errors in the German copied from Reiche and Becker as well as making invaluable suggestions which have added significantly to the contents and quality of our work.

Authors of photographs and botanical drawings are noted above after their illustrations or on captions and are thanked gratefully for adding importantly to the very comprehensive visual records herein.

We are indebted to the following for providing specimens, photos or information on the locations of new species, or for having led us to them: Kim Blaxland, Maria Paz Cárdenas, Carlos Celedón, Claire and Philippe Dandois, Arve Elvebakk, Roger Ferryman, Roberto Kiesling, Beat Leuenberger, Marcelo Rosas, Ricardo Rossow and Kees Jan van Zwienen.
Drs Mats Hjertson of UPS, Arne Anderberg of S and Claes Persson of GB provided invaluable information about the collections of Carl Skottsberg. The staff at K library answered queries during our original research phase in 1993 as well as photocopying and printing out all the relevant literature for our record files. We also greatly appreciate the help given us over the years during visits to the following herbaria: B, BAB, CONC, K, LIL, MERL, P, SGO, SI, ULS
Authors of photographs and botanical drawings are noted above after their illustrations or on captions and are thanked gratefully for adding importantly to the very comprehensive visual records herein.

Nor could we forget those in the botanical world, too many to name, who, when we [J. W. and A. F.] were infected by Covid, inspired the resumption of this work after a few years of inactivity. The pandemia brought to the fore the fragility of human lives, especially of those like ourselves who have reached retirement age. We were exhorted to make publication of this monograph an urgent priority and not risk our unique fifty-four years of field and desk study of

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

this *Viola* alliance being lost to the world, twenty-seven of them with it as a fully dedicated speciality.

John wishes to record that while he was away in Chile on the first occasion his ex-wife Adrienne contacted the son of Sampson Clay, who sent a first edition of his father's 'The Present-day Rock Garden' with all its valuable information on rosulate violas.

As usual, many sites on the Internet have been an invaluable sources of written and visual information without which our work would have been far more difficult and in some instances impossible.

References & Bibliography

Arroyo, M.T.K. & Marticorena, C. (1985) Additions to the flora of Chile: new records for the Altiplano. Gayana Botánica 42(3): 6.

Baehni, C. & Weibel, R. (1941) Revision des Violacées Péruviennes. Candollea 8(8): 190-221

Ballard, H.E., de Paula-Souza, J. & Seidel, R. (2015) *Viola*. In: Jørgensen, P.M., Nee, M.H. & Beck, S.G. (eds.), Catálogo de las plantas vasculares de Bolivia. Monographs in systematic botany from the Missouri Botanical Garden 127: 1255-1256. Missouri Botanical Garden Press, St. Louis, Missouri, U.S.A.

Ballard, H.E., jr., Sytsma, K.J. & Kowal, R.R. (1999) Shrinking the violets: Phylogenetic relationships of infrageneric groups in *Viola* (Violaceae) based on internal transcribed spacer DNA sequences. Systematic Botany 23: 439-458.

Becker, W. (1906) Violae andinae. Botanischer Jahrbücher für Systematik 37: 587-592.

Becker, W. (1907) Systematische Bearbeitung der Violen-Sektion Leptidium (Gilg. pro parte maxima) W. Becker. Beihefte zum botanischen Centralblatt 22(2): 78-96.

Becker, W. (1922a) Violae novae Americae meridionalis. Repertorium Specierum Novarum Regni Vegetabilis 18: 180-186.

Becker, W. (1922b) *Viola huanucoensis* Bckr. und *Viola truncata* Meyen. Repertorium Specierum Novarum Regni Vegetabilis 18: 186-187.

Becker, W. (1925a) Beiträge zur Kenntnis der südamerikanischen Violae. Repertorium Specierum Novarum Regni Vegetabilis 21: 351-360.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Becker, W. (1925b) *Viola*. Violaceae, Melchior, H. pro parte. In: Engler, A. & Prantl, K.A.E. (eds.), Natürlichen Pflanzenfamilie 2a. ed 21: 363-376.

Becker, W. (1926) Beiträge zur Violenflora Argentiniens. Repertorium Specierum Novarum Regni Vegetabilis 22: 352–354.

Becker, W. (1927) Zur Veilchenflora Nord-Chiles. Repertorium Specierum Novarum Regni Vegetabilis 24: 109-112.

Becker, W. (1928a) Ein Beitrag zur Violenflora Argentiniens und Chiles. Repertorium Specierum Novarum Regni Vegetabilis 24: 363-366.

Becker, W. (1928b) Bulletin of Miscellaneous Information, Royal Gardens, Kew 1928: 134-140.

Belov, M. (2012) www.chileflora.com/Florachilena/FloraEnglish/ECompany.htm

Bonpland, A., von Humboldt, A. & Kunth, K.S. (1815-1825) Nova genera et species plantarum: quas in perigrinatione ad plagam aequinocialem orbis novi collegerunt / descripserunt, partim adumbraverunt Amat. Bonpland et Alex. de Humboldt; ex schedis autographis Amati Bonpland in ordinem digessit Carol. Sigismund Kunth, 7 vols. Chrisophori Plantini, Antwerp, Belgium.

Britton, N.L. (1889) An enumeration of the plants collected by Dr. H.H. Rusby in South America 1885-1886, 4: 17-18. Bulletin of the Torrey Botanical Club 16.

Clay, S. (1937) The present-day rock garden: 656-665, 667.

Clausen, J. (1929) Chromosome number and relationships of some North American species of *Viola.* Annals of Botany 63: 741-764.

Coats, A.M. (1970) The plant hunters: being a history of the horticultural pioneers, their quests and their discoveries from the Rennaisance to the Twentieth Century. McGraw-Hill, New York, London and international. 400 pps.

Ferreyra, M., Ezcurra, C. & Clayton, S. (2006) *Viola*. In: Flores de alta montaña de los Andes patagónicos: High mountain flowers of the Patagonian Andes. Editorial LOLA, Buenos Aires, Argentina.

Foster, R.C. (1928) A catalogue of the ferns and flowering plants of Bolivia. Contributions to the Gray Herbarium 184: 91-102. (Exact page location not known.)

Gay, C. (1846) *Viola*. In: Gay, C. (ed.), Historia fisica y politica de Chile según documentos adquiridos en esta república durante dos años de de residencia en ella y publicado bajo los auspicios del supremo gobierno. Botánica 1: 205-227.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Gingins de la Sarraz, F.J.C. (1824) Violarieae. In: de Candolle, A.P. (ed.), Prodromus Systematis Naturalis Regni Vegetabilis: 287-316.

Görz, R. (1929) Wilhelm Becker. Verhandlungen des Botanischen Vereins der Provinz Brandenburg 71: 142-150.

Haagemann, I. & Zepernick, B. (1993) On the history of the Berlin Botanic Garden. In: (transl. Smith, L.) The Berlin-Dahlem Botanic Garden: 9-11. Förderkriess der naturwissenschaftlichen Museen Berlins e. V.

Heironymus, G. (1881) Sertum sanjuaninium. Descripciones y determinaciones de plantas fanerógamous y criptógamas vasculares recolectadas por el Dr. D. Saile Echegaray en la Provincia de San Juan. Boletín de la Academia Nacional de Ciencias en Córdoba 4: 5-9.

Hicken, C.M. (1922) *Viola flos-evae* var. *flossdorfii*. Darwiniana 1: 31.

Hiepko, P. (1987) The collections of the Botanical Museum Berlin-Dahlem (B) and their history. Englera 7: 219-252.

Hoffmann, A., Arroyo, M.K., Liberona, F., Muñoz, M. & Watson, J. (1988) *Viola*. In: Plantas altoandinas en la flora silvestre de Chile: 64-67. Ediciones Fundación Claudio Gay, Santiago de Chile.

Hoffmann, A. (1989) *Viola*. In: Flora silvestre de Chile: zona central 2 ed.: 226, 227. Ediciones Fundación Claudio Gay, Santiago de Chile.

Hölldobler, B. & Wilson, E.O. (1994) Journey to the ants: 200-202. The Bellknap Press of Harvard University, Cambridge. Massachusetts, U.S.A, and London, U.K.

Hooker, W.J. & Arnott, G. (1833) Contributions towards a flora of South America and the islands of the Pacific. Botanical Miscellany 3: 144, 145.

Hooker, W.J. (1836) Icones Plantarium 1, tab. 13.

Hoyos, S.E. (2010). Towards the understanding of the evolution of Violaceae from an anatomical and morphological perspective. Thesis, University of Missouri, St. Louis, Missouri, U.S.A. 69 pps.

Huyghe, E. & Wembourne, G. (2003) Secretos de la cordillera de Santiago: 166-173, 188, 189. Travesia Ediciones, Santiago de Chile.

IPNI, The International Plant Names Index. (2021) Published on the Internet http://www.ipni.org.

IUCN. (2012) IUCN red list categories and criteria: Version 3.1. Second edition.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Jameson, W. (1865) Synopsis plantarum aequitoriensium, exhibens plantas praecipue in regione temperata et frigida crescentes, secundum systematam naturalem descriptas viribus medicatis et usibus oeconomicis plurimarum adjectis 2: 25, 26.

Jørgensen, P.M. & Ballard, H.E. (1999) *Viola*. In: Jørgensen, P.M. & León-Yánez, S. (eds.), Catalogue of the vascular plants of Ecuador: 945, 946. Monographs in systematic botany from the Missouri Botanical Garden 75. Missouri Botanical Garden Press, St. Louis, Missouri, U.S.A.

Knowles, L. & G. (2015) Dirt roads and dust in the Chilean Andes. The Rock Garden 135: 52-71. http://files.srgc.net/journals/SRGC135.pdf

Liesner, R.L. (1996) *Viola*. In: Brako, L. & Zarucchi, J.L. (eds.), Catalogue of the flowering plants and gymnosperms of Peru. Monographs in systematic botany from the Missouri Botanical Garden 45: 1182-1184. Missouri Botanical Garden Press, St. Louis, Missouri, U.S.A.

Macbride, J.F. (1941) *Viola*. In: Macbride, J.F. (ed.), Flora of Peru Vol. 13, Part 14(1): 70-80.

Maire, R. (1921) *Viola dyris*. In: Bulletin de la Société d'histoire naturelle de l'Afrique du nord 12: 181.

Marcussen, T., Heier, L., Brysting, A.K., Oxelman, B. & Jakobsen, K.S. (2015) From gene trees to a dated allopolyploid network: insights from the angiosperm genus *Viola* (Violaceae). Systematic Biology 64(1): 84–101. http://dx.doi.org/10.1093/systbio/syu071.

Marcussen, T., Jakobsen, K.S., Danihelka, J., Ballard, H.E., jr., Blaxland, K., Brysting, A.K. & Oxelman, B. (2012) Inferring species networks from gene trees in high polyploid North American and Hawaiian violets (*Viola*, Violaceae). Systematic Biology 61: 107–126. http://doi.org/10.1093/systbio/syr096.

Marticorena, C. (1992) Bibliografía botánica taxonómica de Chile. Monographs in systematic botany from the Missouri Botanical Garden 74. Missouri Botanical Garden Press, St. Louis, Missouri, U.S.A. 587 pps.

Marticorena, C. (1996) Bibiografía botánica taxonómica de Chile. Suplemento 1. Gayana Botánica 53(1): 1-263.

Marticorena, C. (2000) Nuevos nombres y nuevos combinaciones en la flora de Chile. Gayana Botánica 57(2): 191-192.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Marticorena, C. & Quezada, M. (1985) *Viola*. In: Catálogo de la flora vascular de Chile. Gayana Botánica 42: 78, 79, 152.

Méndez, E. & Azpillaga, M.E. (2013) Tipos de plantas vasculares conservados en el herbario Mendoza Ruiz Leal (MERL). Boletin de la Sociedad Argentina de Botánica 48(1): 143-160. (Exact page location not known.)

Moore, D.M. (1968) The vascular flora of the Falkland Islands. British Antarctic Survey Scientific Reports 60: 1-202. NERC, London, U.K.

Moore, D.M. (1983) Flora of Tierra del Fuego. Anthony Nelson, Shropshire, U.K. and Missouri Botanical Garden Press, St. Louis, Missouri, U.S.A. 396 pps.

Muñoz Pizarro, C. (1960) Las especies de plantas descritas por R.A. Philippi en el siglo XIX. Ediciones Universidad de Chile, Santiago, Chile.189 pps.

Muñoz Pizarro, C. (1966) Sinopsis de la flora chilena. Claves para la identificación de familias y géneros. Ediciones Universidad de Chile, Santiago, Chile. 840 pps. (Exact page location not known.)

Navas, L.E. (1976) *Viola*. In: Flora de la cuenca de Santiago de Chile 2: 311-314, 508, 509.

Nicola, M.V. (2017) *Viola*. In: Zuloaga, F.O. & Belgrano, M.J. (eds), Flora vascular de la República Argentina 17: 371-408. Estudio Sigma S.R.L., Buenos Aires, Argentina. http://www.floraargentina.edu.ar.

Nicola, M.V., Salomón, L. & Zuloaga, F.O. (2018) Nomenclatural and taxonomic study in species of *Viola* (Violaceae) from Argentina. Phytotaxa 338(2): 151-176. http://dx.doi.org/10.11646/phytotaxa.338.2.1.

Novoa, P. (2013) Flora de la Región de Valparaiso: 76, 267. Fundación Jardín Botánica Nacional, Valparaiso, Chile.

Ochoa, C.M. (2004) Potatoes of South America: Peru: the wild species: 3. International Potato Center, Lima, Peru.

Philippi, R.A. (1864) Plantarum novarum chilensium. Centauriae inclusis quidusdam Mendocinis et Patagonicis. Linnaea 33(1): 15.

Philippi, R.A. (1892) Plantas nuevas chilenas de las familias Crucíferas, Bixáceas, Violáceas, Poligáleas. Anales de la Universidad de Chile 81: 347.

Poeppig, E.F. & Endlicher, S.L. (1838) Nova genera ac species plantarum, quas in regno Chilensi Peruviano et in terra Amazonica: annis MDCCCXXVII ad MDCCCXXXII 2: 49, t.165. Sumptibus F. Hofmeister, Leipzig, Germany.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Rauh, W. (1988) Tropische hochgebirge Pflanzen, Wuchs- und Lebensformen. Springer Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo. 206 pps. (exact page location not known.)

Reiche, C. (1893) Violae chilenses. Ein Beitrag zur Systematik der Gattung *Viola*. Botanischer Jahrbücher für Systematik 16: 404-452, tabs. 6, 7.

Reiche, K.F. & Taubert, P. (1895) Violaceae. In: Engler A. & Prantl, K., Die natürlichen Pflanzenfamilien 3(6): 322-336. Verlag von Wilhelm Engelmann, Leipzig, Germany.

Reiche, C. (1896) Flora de Chile 1: 143, 138-162.

Reverté, S., Retana, J., Gómez, J.M. & Bosch, J. (2016) Pollinators show flower colour preferences but flowers with similar colours do not attract similar pollinators. Annals of Botany 118: 249-257.

Riedemann, M.P., Aldunate, G. & Teillier, S. (2008) Flora nativa de valor ornamental: identificación y propagación: Chile, zona cordillera de los Andes: 596, 607. Chagual, Santiago de Chile.

Riedemann, M.P., Aldunate, G. & Teillier, S. (2016) Flora nativa de valor ornamental: identificación y propagación: Chile, zona norte 2 ed.: 408, 409. Chagual, Santiago de Chile.

Rossow, R.A. (1988) *Viola*. In: Correa, M.N. (ed.), Flora Patagónica 5: 171-189. Instituto Nacional de Tecnología Agropecuaria (INTA), Buenos Aires, Argentina.

Rossow, R.A., Watson, J.M. & Flores, A.R. (2003) *Viola*. In: Kiesling. R. (ed.), Flora de San Juan, República Argentina 2: 139-146. Estudio Sigma, Buenos Aires, Argentina.

Royal Botanic Gardens, Kew & Missouri Botanical Garden (2013) *Viola glacialis*. In: The Plant List, version 1.1.

Ruiz Leal, A. & Roig, F. (1965) Itinera gilliesiana. Excursiones botánicas gilliesianas. Flórula y vegetación de Alto de los Manatiales. Boletín de Estudios Geográficos 12: 178, 181, 187.

Rusby, H.H. (1896) On the collections of Mr. Miguel Bang in Bolivia 3. Memoirs of the Torrey Botanical Club 6(1): 5.

Sanso, A.M., Seo, M. & Xifreda, C.C. (2007) Un nuevo nombre en Violaceae. In: Zuloaga, F.O., Morrone, O. & Belgrano, M. (eds.), Novedades taxonómicas y nomenclaturales para la flora vascular del Cono Sur de sudamérica. Darwiniana 45(2): 241.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Sanso, A.M., Simonetti, E. & Xifreda, C.C. (2003) New records of species of *Viola* (Violaceae) for northwestern Argentina. Darwiniana 41(1-4): 87-91.

Sanso, A.M. & Xifreda, C.C. (2008) *Viola*. In: Zuloaga, F.O., Morrone, O. & Belgrano, M. (eds.), Marticorena, C. & Marchesi, E. (assoc. eds.), Catálogo de las plantas del Conosur (Argentina, southern Brazil, Chile, Paraguay y Uruguay) 3. Monographs in systematic botany from the Missouri Botanical Garden 107: 3158-3169. Missouri Botanical Garden Press, St. Louis, Missouri, U.S.A.

Sheader, M. (2020) A maiden voyage to Ecuador. Alpine Gardener: Journal of the Alpine Garden Society 88(3): 266-275.

Sheader, M., Brickell, C., Erskine, P., Little, H., Little, A. & Sheader, A.-L. (2013) Flowers of the Patagonian mountains: 268-277. Alpine Garden Society, AGS Centre, Avon Bank, Pershore, Worcs., WR10 3JP, U.K.

Sheader, M. & Sheader, A.-L., (2014a) A trio of new species from the wilds of Patagonia. Alpine Gardener: Journal of the Alpine Garden Society 82(2): 202-211.

Sheader, M. & Sheader, A.-L. (2014b) In: Letters. Alpine Gardener: Journal of the Alpine Garden Society 82(3): 245.

Skottsberg, C. (1916) Die Vegetationsverhältnisse längs der Cordillera de los Andes s. von 41º S. Br. Ein Beitrag zur Kenntnis der Vegetation in Chiloé, Westpatagonien, dem andinen Patagonien und Feuerland. Kungliga Svenska Vetenskapsakademiens Handlingar 56(5): 1–366.

Squeo, F.A., Arancio, G. & Gutiérrez, J.R. (2001) Libro roja de la flora nativa y los sitios prioritorios para su conservación: Región de Coquimbo. Ediciones Universidad La Serena, La Serena, Chile. 372 pps.

Squeo, F.A., Arancio, G. & Gutiérrez, J.R. (2008a) Libro roja de la flora nativa y los sitios prioritorios para su conservación: Región de Atacama. Ediciones Universidad La Serena, La Serena, Chile. 466 pps.

Squeo, F.A., Arancio, G. & Gutiérrez, J.R. (2008b) Libro roja de la flora nativa y los sitios prioritorios para su conservación: Región de Atacama. Ediciones Universidad La Serena, La Serena, Chile. 72 pps.

Squeo, F.A., Arancio, G. & Rodriguéz, R. (1994) Flora de los Andes de Coquimbo, Cordillera de Doña Aña: 30, 52, 128-130.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Stearn, W.T. (1966) Botanical Latin. Thomas Nelson & Sons, Ltd, London, U.K.; Melbourne, Australia; Johannesburg, South Africa; Ontario, Canada; Camden, New Jersey, U.S.A. 566 pps.

Taylor, C.M. (2007) Taxonomy is the tool that measures diversity—and our level of knowledge. BGjournal 4(1): 8-11.

Teillier, S., Aldunate, G., Riedemann, P. & Niemeyer, H. (2005) Flora de la Reserva Nacional Río Clarillo. Guía de identificación de especies: 212, 365, figs. 1-3, 5. Universidad de Chile & CONAF, Santiago de Chile.

Teillier, S., Marticorena, A. & Niemeyer, H.M. (2011) Flora Andina de Santiago. Guia para la identificación de las especies de las cuencas del Maipo y del Mapocho: 267, 268: 436, figs, 1-4; 437, figs. 1, 2. Universidad de Chile, Santiago de Chile.

Turland, N. J., Wiersema, J.H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T.W., McNeill, J., Monro, A.M., Prado, J., Price, M.J. & Smith, G.F. (eds.) (2018) International Code of Nomenclature for algae, fungi, and plants (Shenzen Code) adopted by the Nineteenth International Botanical Congress, Shenzen, China. July 2017. Regnum Vegetabile 159, Koeltz Botanical Books, Glaashütten, Germany. https://doi.org/10.12705/Code.2018

van den Beuken, G. & O'Sullivan, A. (2021) Beauties & challenges of rosulate violas. The Rock Garden, Journal of the Scottish Rock Garden Club 147: 110-116.

van Zwienen, K.J. (2021) https://keesjan.smugmug.com.

Wahlert, G.A., Marcussen, T., de Paula-Souza, J., Feng, M. & Ballard H.E., jr. (2014) A phylogeny of the Violaceae (Malpighiales) inferred from plastid DNA sequences: implications for generic diversity and intrafamilial taxonomy. Systematic Botany 39: 239-252.

Walpers, G. (1843) Violariaceae. In: Meyen, F.J.F., Observationes botanicas in itinere circum Terram institutas: 300. Berlin, Germany.

Watson, J.M. (1974) Andes 1971 and 1972: part 2. Quarterly Bulletin of the Alpine Garden Society 42(3): 227-234.

Watson, J.M. (1975a) Andes 1971 and 1972: part 4. Quarterly Bulletin of the Alpine Garden Society 43(1): 78-83.

Watson, J.M. (1975b) Andes 1971 and 1972: part 6. Quarterly Bulletin of the Alpine Garden Society 43(3): 230-239.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Watson, J.M. (1976) Andes 1971 and 1972: part 8. Quarterly Bulletin of the Alpine Garden Society 44(1): 34-38.

Watson, J.M. (1977) Andes 1971 and 1972: part 14. Quarterly Bulletin of the Alpine Garden Society 45(3): 221-231.

Watson, J.M. (1994a) *Viola* pro parte. In: Beckett, K. & Grey-Wilson, C. (eds.), Alpine Garden Society Encyclopaedia of Alpines 2: 1375-1393. Alpine Garden Society, AGS Centre, Avon Bank, Pershore, Worcs, WR10 3JP, U.K.

Watson, J. (1994b) Awarding rosettes: *Viola*. In: Watson, J. & Erskine, P., South American alpines. Quarterly Bulletin of the Alpine Garden Society 62(3): 327-342.

Watson, J. (2009) Riding the storm. The Alpine Gardener, Quarterly Bulletin of the Alpine Garden Society 77(2): 237, 238.

Watson, J.M. (2012) Violas, Kim and us—a celebration. Rock Garden Quarterly, Bulletin of the North American Rock Garden Society 70(3): 230-240.

Watson, J.M. (2018) Out of the wild blue yonder. Or discovering an unknown viola in Argentinian Patagonia while dogged by the perils of exploration. International Rock Gardener 108: 55-97. e-published December 2018. www.srgc.org.uk/logs/logdir/2018Dec241545672053IRG108_December2018.pdf

Watson, J.M. (2019) Lest we forget. A new identity and status for a *Viola* of section *Andinium* W. Becker; named for an old and treasured friend and companion. Plus another ... International Rock Gardener 117: 3-52. e-published September 2019. www.srgc.org.uk/logs/logdir/2019Oct041570226421IRG-117-September.pdf

Watson, J.M., Cárdenas, M.P., Flores, A.R., Macaya, J., Jímenez, H. & Barría, J. (2015) *Viola gelida*, a new, rare and vulnerable rosulate species from the high Andes of Atacama Region, Chile. Gayana Botánica 70(2): 390-394.

Watson, J.M. & Flores, A.R. (2003) A new name in section *Andinium* W. Becker of the genus *Viola* L. (Violaceae). Gayana Botánica 60(2): 134.

Watson, J.M. & Flores, A.R. (2005) Lilliputian wonders in the rosulate violas (sect. *Andinum*) of southern South America; Abstracts 31: 170. 17th International Botanical Congress, Vienna, Austria.

Watson, J.M. & Flores, A.R. (2007) Violas rosuladas en la flora de Chile. Chagual 5: 33-47.

Watson, J.M. & Flores, A.R. (2009) A new and rare rosulate species of *Viola* (Violaceae) from Argentina. Phytotaxa 2: 19-23.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Watson, J.M. & Flores, A.R. (2011) Study and rehabilitation of some endemic Argentinian taxa in the genus *Viola* L. (Violaceae), and lectotypification of a Peruvian species. Gayana Botánica 68(2): 297-308.

Watson, J.M. & Flores, A.R. (2012a) Fire and ice: rosulate viola evolution. Part One—The stage is set. Rock Garden Quarterly, Bulletin of the North American Rock Garden Society 70(4): 360-366.

Watson, J.M. & Flores, A.R. (2012b) A new nothospecies in section *Andinium* W. Becker of *Viola* L. (Violaceae) endemic to southern Argentina. Rock Garden Quarterly, Bulletin of the North American Rock Garden Society 70(4): 367-377.

Watson, J.M. & Flores, A.R. (2013a) Fire and ice: rosulate viola evolution. Part Two—The drama unfolds. Rock Garden Quarterly, Bulletin of the North American Rock Garden Society 71(1): 42-53.

Watson, J.M. & Flores, A.R. (2013b) A new species of *Viola* L. (Violaceae) from section *Andinium* W. Becker endemic to Argentinian Patagonia. Rock Garden Quarterly, Bulletin of the North American Rock Garden Society 71(1): 54-65.

Watson, J.M. & Flores, A.R. (2013c) Fire and ice: rosulate viola evolution. Part Three—A merry life and a short one. Rock Garden Quarterly, Bulletin of the North American Rock Garden Society 71(2): 118-141.

Watson, J.M. & Flores, A.R. (2013d) A new endemic Argentinian species of *Viola* L. (Violaceae) of the section *Andinium* W. Becker. Rock Garden Quarterly, Bulletin of the North American Rock Garden Society 71(2): 160-173.

Watson, J.M. & Flores, A.R. (2014a) Viola hunting season kicks off with a bang. The Rock Garden, Journal of the Scottish Rock Garden Club 133: 97-101. http://srgc.net/viewpage.asp?documentid=1224

Watson, J.M. & Flores, A.R. (2014b) Upping their number, addressing their risk. *Viola singularis* (Violaceae) revisited, and an evaluation of sect. *Andinium*, its higher taxonomic group. Phytotaxa 177: 177-182 https://doi.org/10.11646/phytotaxa.177.3.

Watson, J.M. & Flores, A.R. (2017) The Chilean flowering desert. International Rock Gardener 94: 2-22. e-published October 2017. www.srgc.org.uk/logs/logdir/2017Oct261509039468IRG94.pdf

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Watson, J.M. & Flores, A.R. (2018a) A new species of rosulate viola (sect. *Andinium*. Violaceae) from the mid-southern Andean sector of Chile and Argentina. International Rock Gardener 101: 39-58. e-published May 2018. www.srgc.org.uk/logs/logdir/2018Oct251540501603IRG106October2018.pdf

Watson, J.M. & Flores, A.R. (2018b) Two new rosulate annual species of *Viola* (Violaceae) from the initial and upper Andean foothills of Atacama Region, Chile. International Rock Gardener 104: 1-47. e-published August 2018. www.srgc.org.uk/logs/logdir/2018Aug301535657804IRG104-August2018.pdf

Watson, J.M. & Flores, A.R. (2018c) More rosulate scooping. International Rock Gardener 105: 27-73. e-published September 2018. www.srgc.org.uk/logs/logdir/2018Sep271538076603IRG_105_Sept2018.pdf

Watson, J.M. & Flores, A.R. (2018d) Triple alliance: new and rediscovered species of *Viola* section *Andinium* from Argentina. International Rock Gardener 106: 2-33. e-published October 2018. www.srgc.org.uk/logs/logdir/2018Oct251540501603IRG106October2018.pdf

Watson, J.M. & Flores, A.R. (2019a) The expanding kingdom of an Incredible Shrinking Violet (give or take a mm): a new diminutive-flowered rosulate *Viola* (section *Andinium*) from Argentina. International Rock Gardener 110: 2-42. e-published February 2019. www.srgc.org.uk/logs/logdir/2019Feb211550781214IRG110.pdf

Watson, J.M. & Flores, A.R. (2019b) Those damned promiscuous rosulates. A second new wild hybrid for *Viola* L. section *Andinium* W. Becker, also an Argentinian endemic. International Rock Gardener 113: 3-50. e-published May 2019. www.srgc.org.uk/logs/logdir/2019May311559296345IRG113.pdf

Watson, J.M. & Flores, A.R. (2019c) Follow the yellow quick flow. Another new species of *Viola* sect. *Andinium* from Argentina this one from the country's mountainous northwest. International Rock Gardener 115: 3-53. e-published July 2019. www.srgc.org.uk/logs/logdir/2019Jul251564083758IRG115.pdf

Watson, J.M. & Flores, A.R. (2019d) *Viola*. In: Rodríguez, R. & Marticorena, A. (eds.), Catálogo de las plantas vasculares de Chile: 403-408. Editorial Universidad de Concepción, Concepción, Chile.

Watson, J.M. & Flores, A.R. (2019e) One new to science for our coming generation. *Viola* ×*josephii* of sect. *Andinium* W. Becker from the Andes of northwestern Argentina. International Rock Gardener 119: 69-115. e-published November 2019. www.srgc.org.uk/logs/logdir/2019Nov281574975266IRG_119.pdf

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Watson, J.M. & Flores, A.R. (2019f) *Viola unica* (Violaceae L.), a very rare, high elevation, single-site new species endemic to the northern semi-desert Altiplano of Chile. *bioRxiv*. e-published. http://dx.doi.org/10.1101/787564

Watson, J.M. & Flores, A.R. (2020a) Queen of all she surveys. A remarkable and distinct new rosulate viola (section *Andinium* W. Becker), a single-site endemic from the central Andes of Chile. International Rock Gardener 122: 17-59 e-published February 2020. www.srgc.org.uk/logs/logdir/2020Feb271582840900IRG122.pdf

Watson, J.M. & Flores, A.R. (2020b) *Viola atropurpurea* it's not. Introducing *Viola turritella*, yet another case of mistaken identity in the rosulate ('rossie') violas (sect. *Andinium* W. Becker). International Rock Gardener. 124: 9-46. e-published April 2020. www.srgc.org.uk/logs/logdir/2020Apr24158765747IRG124.pdf

Watson, J.M. & Flores, A.R. (2020c) Meet our most unique viola and its Andean habitat. A renamed new species endemic to the northern semi-desert Altiplano of Chile. International Rock Gardener 128: 3-52. e-published August 2020 www.srgc.org.uk/logs/logdir/2020Aug2715985611041IRG128.pdf

Watson, J.M., Flores, A.R. & Arroyo-Leuenberger, S. (2019) A new *Viola* (Violaceae) from the Argentinian Andes. Willdenowia 49(1); 35-41.

Watson, J.M., Flores, A.R., Leon, P. & Squeo, F.A. (2018) *Viola godoyae* Phil. Ficha 60 de antecedentes de especie. Ministerio del Medioambiente, Gobierno de Chile. 6 pps.

Watson, J.M., Flores, A.R., Sheader, M. & Sheader, A.-L. (2018) *Viola pachysoma* (Violaceae), a new name for a rosulate species endemic to the Andes of Argentinian Patagonia. Phytotaxa 382(1): 113-124. https://doi.org/10.11646/phytotaxa.382.1

Watson, J.M., Rojas, G. & Saldivia, P. (2010) Recent and attested historical records for Chile of three *Viola* L. (Violaceae L.) species first described by Carl Skottsberg in 1916. Boletín del Museo Nacional de Historia Natural, Chile 59: 9-16.

Wingenroth, M. & Suarez, J. (1984) Flores de los Andes. Alta montaña de Mendoza: 128, 129. Instituto Argentino de Nivología y Glaciología (IANIGLA), Mendoza, Argentina.

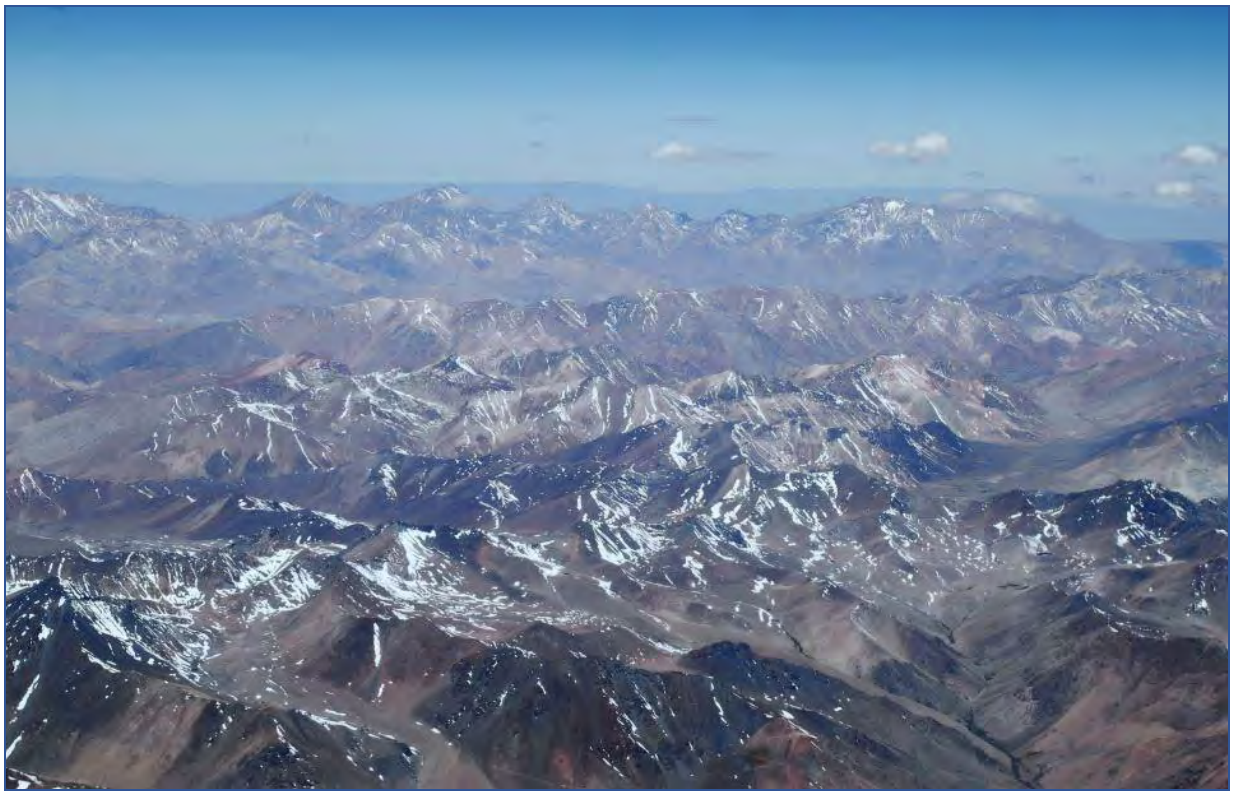
Xifreda, C.C. & Sanso, A.M. (1999) *Viola*. In: Zuloaga, F.O. & Morrone, O. (eds.), Catálogo de las plantas vasculares de la República Argentina 2. Monographs in systematic botany from the Missouri Botanical Garden 74: 1173-1177. Missouri Botanical Garden Press, St. Louis, Missouri, U.S.A.

Published by Scottish Rock Garden Club with International Rock Gardener © ISSN 2053-7557

Xifreda, C.C. & Sanso, A.M. (2008) *Viola*. In: Zuloaga, F.A., Morrone, O. & Belgano, M. (eds.) and Marticorena, C. & Marchesi, E. (assoc. eds.), Catálogo de las plantas vasculares del Cono Sur (Argentina, southern Brazil, Chile, Paraguay y Uruguay). Monographs in systematic botany from the Missouri Botanical Garden 107: 3158-3169. Missouri Botanical Garden Press, St. Louis, Missouri, U.S.A. www.darwin.edu.ar

Zachos, F.E. (2013) Taxonomy: species splitting puts conservation at risk. Nature 494: 35. http://dx.doi.org/10.1038/494035c

Note: Issues of the International Rock Gardener may also be reached via the Internet by keying in 'International Rock Gardener', when a solitary page will screen up. Scroll down the page and all issues will appear by months in year columns. Simply click on the required monthly issue for its pdf.



212) A section of the vast and insufficiently explored Andes south of the equator. (JMW)

Cover image: *Viola aurata,* photograph ARF.

Edit and Design: Margaret Young.

The Scottish Rock Garden Club thanks the authors for so generously sharing their knowledge in this open-access publication.