

The Rosulate Viola Tour!

Highlights of an expedition to Northern Patagonia

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We made a botanical tour in Northern Patagonia between January 2nd and 19th 2010. During this trip we explored the Argentinian provinces Rio Negro and Neuquen. We started in San Carlos de Bariloche and gradually made our way to the North, finishing in the city Neuquen. The objective of this tour, which was organised by Ger van den Beuken, was to explore the alpine and steppe flora. For this reason we targeted the Andes and steppe areas immediately east of the Andes. Marcela Ferreyra, a biologist from Bariloche University was our botanical guide and Alfredo Gastambidez our driver. Our group was very international with Rick Lambert and Mark Childerhouse From England, Ger and Mariet van den Beuken and Kees Jan van Zwiene from the Netherlands, Elana Dobrzansk from Russia, Ingolf and Dorthe Bogo and Knud Thomsen from Denmark. In this article we will share the botanical highlights of this trip, concentrating on those plants that are very typical for this area and those that we feel will be of most interest for the members of the North American Rock Garden Society.

Climate and phytogeography

The precipitation in northern Patagonia decrease from west to east. This is the result of the rain-shadow effect from the Andes. Most precipitation in the Andes and the bordering steppe areas falls in winter.

Patagonia is divided in 4 phytogeographical provinces. These 'provinces' have nothing to do with Argentina's geographical provinces, but are distinguished by their climate, characterising plant species and vegetation types. For a proper understanding of the plants that we encountered and the conditions under which they grow, we will briefly discuss these phytogeographical provinces.

The climate in **Monte Province** is dry. Precipitation is usually less than 200mm and mainly occurs in winter and spring. The average temperature is more than 13°C. Typical Monte Province vegetation is characterised by thorny scrub vegetations, grasses are infrequent, which distinguishes this phytogeographical province from the steppe vegetations that are found in the phytogeographical province Patagonia. We did not spend much time in this province, since our main objective was the steppe and alpine flora.

The climate in **Patagonia** province is cold and dry. Annual precipitation varies between 116 and 600mm. The annual average temperatures is less than 13°C. The main vegetation types are steppe vegetations with grasses and the dwarf shrubs. The dwarf shrub *Mulinum spinosum* is very typical of Patagonia province. Within the steppe vegetations two types are distinguished. The first is the Subandean district, which borders the Andes. Due to its close proximity to the Andes it is less dry, it is recognisable by the presence of grasses. The second type, the eastern district, is dryer and characterised by a greater presence of dwarf shrubs like Junellia, and relatively few grasses.

De phytogeographical province **Altoandina** occurs above the tree line. The altitude where this phytogeographical province begins, depends on the latitude, usually it starts above the forests. In the north of the Patagonian Andes this is at about 2000m (in the far south in Tierra del Fuego the treeline is at about 500m). The climate in Altoandina is cold and in the rainshadow dry. In the eastern part of Altoandina the vegetation is similar to the steppe vegetations found in Patagonia province. Both provinces are situated near to each other,

being only divided by the province Subantarctica. Plants in Altoandina often have adaptations that are also very useful in the steppes of Patagonia province.

The Subantarctica Province is situated between the steppes of Patagonia Province and the high Andean vegetations of Altoandina Province. Subantarctica is relatively moist and mainly consist of forest. These can be roughly divided into a dry type in the transition zone with steppe. This is characterised by drought tolerant trees like *Austrocedrus chilensis* and *Araucaria araucana*. The other type is found under moister conditions, it is found in the transition zone with high Andean zone. It is characterised by the deciduous Nothofagus species *N. antarctica* and *N. pumilio*. Evergreen Nothofagus forests can also be found in Subantarctica, but these are restricted to the relatively mild climate that is found around some of the lakes.

Exploring the steppe between Bariloche and Pilcaniyeu

Our guide told us that the first excursion in the steppes east of Bariloche was going to be excellent since the steppes harvest a huge diversity of species and the timing was going to be perfect. We were not disappointed and will try restrict ourselves here to the very best plants.

Our first stop, not far from Bariloche yielded *Oreopolus glacialis*. An exquisite, cushion or mat-forming species in the Rubiaceae family, a family hardly known for exquisite species. The small yellow flowers have a long tube. They are produced in clusters from the centre of the rosette.

The pink *Oxalis adenophylla*, a well known plant in cultivation, was very common in grass steppe near Bariloche Airport. Oxalis is an important genus in Patagonia and we would see several species during our trip. The steppe around the airport is relatively humid and mainly consists of grass, quite unlike the steppe vegetation we would encounter further east where dwarf shrubs were much more plentiful than grasses. *Chloraea magellanica*, an exotic looking orchid, was also found here, a species that we would see regularly during our time in Patagonia.

Not much further, still in relatively moist steppe, we came across more orchids. One of the most beautiful was *Gavilea glandulifera*, about a meter tall with flowers in a combination of white, green and yellow. The most robust orchids that we would see during this trip was *Chloraea cylindrostachya* with green and white flowers. *Embothryum coccineum*, a member of the Proteaceae, is another common species in this part of Patagonia. It grows to about 2m and has fire red flowers with extremely long tubes.

The Fabaceae is a very diverse family in Patagonia. *Senna arnothiana* is one of the more distinct and showy examples. It grows to about 30cm and has large yellow flowers. *Fabiana imbricata*, a shrub about a metre tall and having white or lilac flowers, belongs to the Solanaceae. *Mulinum echinus* is a small dwarf shrub in Apiaceae that grows to about 20cm tall. It might be of interest for alpine gardens. *Mulinum microphyllum* is only about 5cm tall and would fit quite well in a trough. *Sisyrinchium macrocarpum* has bright yellow flowers, the petals have dark marks at their base. This is a very small and showy plant and seems well worth cultivating. The conifer *Austrocedrus chilensis* was scattered amongst these steppe plants. Bulbs are an important part of the flora in Patagonia. At this site we came across our first Rhodophiala, a south American genus in Amaryllidaceae. It has large, yellow Amaryllus like flowers. In small cluster on 30cm stems.

In a moister habitat at the base of a valley we found *Calceolaria biflora*, with Ramonda-like rosettes, *Mimulus glabratus*. *Pratia repens* was the only Campanulaceae (formerly Lobeliaceae) that we found during our trip, always in short grass in moist conditions.

Further on, *Grindelia* (*Haplopappus*) *prunelloides* made an attractive show. This is a creeping species with relatively large composite flowers that would make an attractive garden plant. *Tropaeolum incisum* was also found here, a tuberous plant with attractive grey foliage and large orange-yellow flowers.

Since we were travelling to the east the steppe was gradually becoming dryer. The vegetation was changing, less grass, and more dwarf shrubs. This was *Junellia* country! *Junellia* is a very diverse genus in *Verbenaceae*. We found many species during our trip and although all are attractive, we will be selective and only mention the most spectacular. *Junellia multinoides* is certainly in this category. It forms large cushions, very tight, but up to 2 m in diameter and about 50cm tall. *Junellia minutifolia* is a creeping species, with lavender flowers. There was also a taller form that looked very different and had both yellow and - reddish flowers. Marcela, an expert on *Junellia*, explained that *Junellia* was a genus in need of revision and that this was illustrated by these two distinct 'forms' of *Junellia minutifolia* growing together. The fact that conditions were much dryer than in Bariloche was illustrated by the presence of two cacti that made quite a show: some big mats of *Maihuenia patagonica* were in full flower, with yellow and pink flowers and *Austrocactus patagonicus* with flowers in various shades of yellow. The *Maihuenia* preferred the flat terrain and was found amongst the *Junellia*, while the *Austrocactus* was found between steeper, rocky terrain.

Near the railway track just before the small village of Picalniyeu, situated in the middle of nowhere, we found a few more exciting plants. *Nastanthus patagonicus*, a rather weird member of the *Calyceaceae* was in flower here. This rosette forming species seems to be monocarpic.

Just passed Picalniyeu, we found yet another small *Junellia*: *J. patagonica* var. *morenonis*. Small mats of grey foliage and exquisite pale-lavender flowers. Although we certainly have no intention to write a complete review of the area and want to focus on the highlights instead, we will make one exception here. The title of our article indicates that *Viola* species featured prominently during this tour. Most were of the rosulate, type, a group of *Viola*'s that have a mythical status in the alpine scene. Many are very beautiful, and all are extremely difficult to grow – hardly any of them are established in cultivation. This all goes to introduce our first rosulate *Viola* of the tour, *V. escondidaensis*. This is not one in the exquisitely beautiful category though, growing rather loose and having small, rather insignificant white flowers.

Cerro Cathedral

The high Andean zone is easily reached on Cerro Cathedral by cable car and chairlifts.

Cerro Cathedral is named for the Cathedral-like rock formations. *Ranunculus semiverticellatus* was plentiful in some scree and in perfect condition. It's quite a variable species. The flowers are huge and are set off beautifully by the finally divided grey foliage.

Oxalis erythrorhiza was also on its best on a windswept ridge. This is a very tight mat or cushion-forming species with hairy foliage and stemless, large yellow flowers. This perfect species however is disappointing in our Dutch climate because it very quickly loses its compactness. The bloom is also often disappointing. *Viola sacculus* clearly enjoyed similar conditions. This is a very beautiful species in the rosulate group, having pure white flowers that are in nice contrast with the very dark leaves.

We walked down a chairlift section, since we spotted a beautiful clump of *Tristagma patagonica*. *Ourisia fragrans* is a lovely example of an entirely southern hemisphere genus. It has relatively large white or lavender flowers and only grows to about 5cm at any shady areas. *Ourisia alpina* was also found on the Cathedral, however with smaller pink flowers on

somewhat taller stems. The rosulate *Viola columnaris* was found here in a form that is quite different from those we would find later on during our trip. *Mulinum leptacanthum* is a small cousin of *M. spinosum*, the omnipresent species in the steppe. Our *Tristagma patagonica* was finally found. This is a white flowering species about 10cm tall.

Passo Cordoba: the hunt for *Viola volcanica*

The next day was a transfer day from San Carlos de Bariloche to San Martin Los Andos. Marcela told us *Viola volcanica* was the main objective. *Viola volcanica* and some of its close relatives in what we will loosely call the 'volcanica' group, are difficult to spot in the field. They strongly mimic the volcanic sand and rock fragments in which they grow. The colour of the leaves and the sand is very similar. We wonder whether this could be an adaptation to herbivores. Consequently it took a while before we finally found this species on Passo Cordoba. We were delighted to find it after quite a bit of searching on Passo Cordoba and decided it was also a good place to celebrate Ger's 63 anniversary with very nice cakes and coffee. *V. volcanica* is a short-lived perennial that forms a flat rosette. It has glands on the underside of the leaves to attract ants. Plants at this location were both in flower and fruit. The white flowers are rather small, this really is primarily a foliage plant.

Later that day we found it on a different location in the roadside, just after Passo Cordoba. Another plant that was found in the volcanic sand was *Nastanthus aglomeratus*

When we descended Passo Cordoba and made our way toward San Carlos de Bariloche we came across a delightful *Calceolaria*, *C. tenella*, that grew by a small stream in evergreen *Nothofagus* forest. This is quite a fragile looking species just only common on very wet spots.

Cerro Chapelco

The high Andean zone is just as easily reached on Cerro Chapelco as on Cerro Cathedral. Cerro Chapelco has many species in common with Cerro Cathedral, so we will restrict ourselves to some of the most interesting 'new' species. The first is yet another rosulate *Viola*, *V. dasyphylla*. This is not the most spectacular rosulate *Viola*, but has a quiet charm. Unlike the species in the volcanica group, this species forms many side rosettes and has green leaves. The flowers are white, but we found a very interesting and beautiful form with pale yellow flowers.

Nassauvia lagascae ssp. *lagascae* was found on Cerro Chapelco. This is a genus in the composite family that is quite diverse in Patagonia. In this case the stems are quite short, a small high alpine plant that we would see on many other mountains that we would visit during our the following days. The flowers, as usual in this genus are white.

A more spectacular plant was *Calandrinia caespitosa* ssp. *skottsbergii*, with large, orange-yellow flowers and green rosettes. This is a very beautiful species, more established in cultivation and easier to cultivate than many other South American Alpines. The flower colour is more of the bedding type variety and might be considered 'out of place' in an alpine environment. This is true for quite a few of the Patagonian alpines, like the exotic looking *Chloraea alpina* and *Viola coronifera*.

Cerro Colohuincul

The next day was going to be a tough day including a long steep walk up to the summit of the Cerro Colohuincul to see *Viola coronifera* in bloom. We started in steppe country, amidst orchids like *Gavillea glandulifera* and *Chloraea magellanica*. One of the first new species of the day was *Rhodophiala elwesii*, which is distinguished from *R. mendocina* that we found on our first day by the dark base of the yellow petals. We also found *Rhodophiala andicola* in large numbers. This species is shorter and has pink flowers, only one per stem. *Perezia pilifera*, a charming small Asteraceae with white flowers was seen in small numbers.

One of the highlights of the entire trip was the unusual *Valeriana moyanoi*. This is a tiny monocarpic species with a relatively large inflorescence. Rosettes are only about 4 cm in diameter and the inflorescence is about 5cm tall.

Oxalis nahuelhuapiensis is a small yellow Oxalis, related to *Oxalis compacta* but with more or less glabrous rather than hairy leaves. It was found quite regularly during our trip.

Ephedra frustillata is a tiny shrub with interesting brown fruits. It's a typical species of the high Andean zone.

After a hard climb we reached a ridge where we finally found *V. coronifera*. But it took quite some time and a bit more climbing to find some specimens in flower. The flower colour of *Viola coronifera* is waxy orange-yellow, a very unusual colour in high alpine plants in most parts of the world, although Patagonia harbours quite a few alpines with such unusual colours. The day was well worth the effort!

Around Moquehue

The next day we had a transfer from San Carlos de Bariloche to Moquehue. Moquehue is a tiny place near the Chilean border and was going to be our base for the next few days. We crossed spectacular Araucaria forests on our way, but the first high alpines were to be found in a flat valley more or less in front of our Hosteria. *Viola cotyledon*, the first of the tour, was found in very small numbers and a number of other interesting alpines were found without any climbing involved. This would change the next day though.

Next on the menu was the Volcano Batea Mahuida, not far from Moquehue. Half of the caldera rim of this Volcano had disappeared, but the crater was still there, filled with water. This was going to be one of the best days of our trip. One of the highlights of the day was *Viola cotyledon*, which was present in large numbers. It was quite variable and plants often formed rather big clumps. *Calceolaria borsinii* was perhaps the most striking *Calceolaria* we found during the trip. It was quite plentiful up on the caldera rim. It is related to the variable and widespread *Calceolaria polyrhiza*, but it is somewhat shorter and has larger flowers.

Nassauvia revoluta was quite common on the plateau on the Caldera rim as well.

Chaetanthera villosa was found on a very steep scree in small numbers. Unfortunately there was no sign of the large composite flowers. But even out of flower this is a spectacular plant. It forms silver rosettes that are covered in long, silver hairs. *Adesmia longipes*, is a beautiful small plant with yellow flowers. It was found in volcanic, pumice like material on the way back.

The next day we had an excursion to Primeros Pinos, or 'first pines'. Near a small river we found several interesting plants. First there was the white flowering *Calandrinia affinis*. At the same location we found the tiny blue *Gentiana prostrata*. A bit further we found *Tarasa humilis* in flower. This *Malvaceae* is only 5 cm tall and has purple flowers.

At this location we found two types of rosulate *Viola*. The first was *Viola* aff. *coronifera*, this population being possibly somewhat different from the plants we found on Cerro Colohuincul.

Azorella monantha seemed to be the most common of the *Azorella* species during our trip. It forms big, very hard cushions, often more than a metre in across. Despite the specific epithet *monantha*, it often had more flowers. There were two tiny *Plantago* species at this location, *Plantago uniglumis* and *Plantago sempervivoides*. *Maihuenia poeppigii* is a cactus that can be found up to 2500m in Patagonia. We found some spectacular, huge cushions with pale yellow flowers. *Calandrinia colchaguensis* has purple flowers and rather wide leaves.

Discaria nana is a tiny *Rhamnaceae*, forming low, spiny mats and having small white flowers.

Finally we reached Primeros Pinos where we found the objective of the day, *Viola trochlearis*. This rosulate *Viola* belongs to the *volcanica* group. The leaf margins are entire in this case and the flowers have pink veins. *Calandrinia dianthoides* has narrow leaves and bedding plant-like, large, pink flowers, that seem almost out of place in this alpine environment.

Volcano Copahue

The next day on transit to Lago Caviahue we photographed a spectacular specimen of *Azorella trifurcata*, in full flower, on a river bed. When we reached the Pino Hachado pass (1778m alt.) the weather was deteriorating, but a short excursion revealed some brilliant plants. The orange red *Mimulus cupreus* was found along small streams. This has large flowers and is only 10cm tall. Also found along the streams was *Pinguicula chilense*, a tiny carnivorous plants with sticky leaves and lavender flowers. This species avoided competition of other plants by growing vertically in the eroded, wet stream sides. Perhaps the highlight was a small and clearly distinct Calceolaria, *Calceolaria poikilanthos*. This species has small, flat rosettes and flowers with a very wide labellum with red dots on the underside. *Hypochoeris acaule*, was also present. This Asteraceae has rosettes with yellow, stemless flowers. We had hoped to find *Primula magellanica* in flower but only found a single rosette showing no signs of flowers or buds. In this part of Patagonia there had been much snow in winter, and the season was very late. In general timing was perfect for plants, but it was clearly too early for some species.

The next Stop was Pino Hachado, where Marcela had found *Saxifraga magellanica* in a basalt cliff environment. By now it was raining. Kees Jan did a short exploration of the basalt cliffs a bit higher up above the road. The *Saxifraga* was still there, although not in excellent condition, joined by *Glandularia araucana*, a yellow, 10cm tall Verbenaceae. Before we went on we found a good specimen of *Saxifraga magellanica* in the roadside.

We found some big mats of *Argylia bustillosii* between Primeros Pinos and Caviahue. This plant is in the Bigoniaceae family, it had large yellow flowers.

By now it was snowing rather than raining so we were all pleased to reach our hotel at Caviahue, with a beautiful view across the lake of the same name. The temperature in the hotel was quite warm, the entire village was on a Volcanic water heating system! We managed to make some photographs of the surrounding mountains covered in fresh snow and hoped this would not stop us from botanising the next days.

Caviahue and Lago Caviahue are situated on the lower slopes of volcano Copahue. This large stratovolcano has an altitude of 2997 m and is situated on the border between Argentina and Chile. It has several volcanic craters and has been quite active, with ejections of pyroclastic rocks and sulfur fragments in the twentieth century. The largest eruption in the last 100 years started on 1st July 2000. It involved eruption of lapilli, ash, and bombs. Bombs up to 13 cm in diameter, were ejected, apparently more than 8 km from the summit. Ash fell 100 km away. Our guide Marcela told us there used to be an evacuation plan at the information desk of the hotel, but this was no longer there, perhaps the owner feared it would scare tourists. The lake bordering the hotel is apparently extremely acidic.

The next morning the weather was fine, but still rather cold. There was still quite a bit of fresh snow in the mountains so we decided to explore the steppe vegetation near *Puente del Agrio*. *Grindelia anethifolia*, a 50cm tall Asteraceae was spectacular. And there was yet another *Rhodophiala*, *R. araucana*. This species, named after this region, is quite similar to *R. mendocina* and *R. elwesii*, but distinguished from these allies by the orange apex of the tepals. It also has more flowers per stem and more leaf development. Perhaps the flowers were also slightly smaller. *Chuquiraga* is a genus of which we found quite a few species during our trip. Here *Chuquiraga straminea* was spectacular, even though it was still in bud. A little bit further was Salto del Agrio, a spectacular waterfall. *Ourisia microphylla*, a popular alpine among alpine connoisseurs the UK perhaps a decade ago, but now very rarely seen, was spotted in a cliff near the waterfall with binoculars. This was apparently the only known location of this species in Argentina. It was well protected by its choice of location here. Not only was it on a cliff, it was under an overhang – the sort of place where you would expect *Dionysia*'s if you were in Iran rather than Patagonia. *Tropaeolum incium* was found in more accessible terrain.

We drove up a sand road to the village Copahue, which is situated at about 2000 meters altitude, surrounded on three sides by hills. The village is named after the Volcano of the same name. The village is a health resort, which is just open during the southern

hemisphere summer, since it is covered by metres of snow in winter. It has lots of warm baths, mud baths etc. and is apparently world famous. The contrast between the warm baths and the snow and ice was amazing, because at this altitude the snow had far from melted. We managed to photograph some nice specimens of *Viola cotyledon*, amidst the snow, but were quite frustrated that nearly all plants were under the snow. There was no point in spending much time here today and we hoped conditions would be much better the next day.

We drove back to Lago Caviahue and drove up to Cascades del Agrio, beautifully set amidst mature *Araucaria* trees. Species of note at this location are the tiny *Gunnera magellanica*, along a small stream, and a Pampas grass, *Cortaderia pilosa*, that was about 50cm tall.

Our last stop of the day was just south of Lago Caviahue. Here we found *Viola volcanica* again and *Oxalis compacta*, both out of flower. Despite the acidity of Lago Caviahue some interesting birds were spotted by some of us, including a small group of Chilean Flamingo!

The next day the higher grounds above the village of Copahue were on the menu and we were not bothered by snow. Alfredo would transfer us to a trail head behind the Village of Copahue, from where we would walk to near the Chilean border and then on to Laguna las Mellizas 'or twin lakes' where Alfredo would collect us.

One of the first plants we found was the widespread *Calceolaria polyrhiza*. But we were more excited by *Viola columnaris*, which was quite different from *V. columnaris* on Cerro Chapelco. It was much more columnar here, sometimes to about 10cm tall. Clearly old plants.

A bit further on we found spectacular specimens of *Nassauvia revoluta*. There was also a new *Azorella*, the tiny *A. lycopodioides*.

A relatively small population of the pale-yellow *Olsynium frigidum* was found. A beautiful species with spreading, long, narrow leaves and short stemmed flowers. The leaves were often eaten by a large, smelly insect.

The highlight of the day were some extensive colonies of *Viola cotyledon*. A beautiful species in its best forms, with hairy fringes to the petals. Although its very easy to differentiate this species from *V. columnaris* in their typical forms, some forms and populations are much more difficult and seem to be intermediate. *Viola cotyledon* is not columnar in typical forms and the flowers tend to be larger. *V. cotyledon* also tends to form much more side rosettes, often forming large clumps of about 15-20cm across. The flowers in *Viola cotyledon* vary from white to quite dark blue and they tend to be paler in *Viola columnaris*. Having said this, we found some intermediate forms that were hard or impossible to identify with any certainty. The two species tended to grow in isolation rather than occurring sympatrically though.

Gaultheria caespitosa is an exquisite dwarf Ericaceae that was found near snow patches. It forms mats of only a centimetre or so and has small, pale pink flowers.

Olsynium junceum was found frequently during our time in Patagonia, but here we found a spectacular clump of the white form (blue forms are also quite frequent in this part of Patagonia). We were lucky to have excellent weather this last day on Volcano Copahue.

Transfer from Caviahue to Chos Malal

We came across rather big numbers of the Burrowing parrot (*Cyanoliseus patagonus*). While descending a pass before El Cholar we found *Chuquiraga straminea* again, but this time in perfect flower. This is a shrub of up to a metre with orange flowers. Nearby some of us were distracted by two *Cactaceae*: *Maihuenia patagonia* and *Austrocactus patagonicus*.

Near El Cholar, still in the steppe zone, we came across a tiny population of *V. tectiflora*. This is an annual species in the 'volcanica' group. The plants were smaller than *V. volcanica* and the related *V. trochlearis*. The leaves of *V. tectiflora* are much narrower than in its relatives. *V. tectiflora* has glands on its leaves to attract ants for pollination. *Junellia spathulata*, about 30cm tall and with blue flowers was much more common.

Between El Cholar and Chos Malal we descended to much lower elevations. Chos Malal, situated at only 974 m has a continental climate, with cold winters and hot summers.

This area belongs to the Phytogeographical Monte Province, which harbours a diverse vegetation (although desert rather than alpine) but is at its best earlier in the year.

The next day we set off to Tromen Volcano. This is yet another strato volcano, with an elevation of 3,978 m. Unlike Copahue Volcano it is apparently extinct now and is said to be last active 2000 years ago.

Just south of Volcano Tromen we found some very interesting cacti: *Pterocactus hickenii*, *Maihueiopsis darwinii* var. *hickenii* and *Maihuenia patagonica*. *Maihueiopsis darwinii* was collected by Charles Darwin during his Beagle trip and described by John Henslow as *Opuntia darwinii* (Henslow, 1837).

We gradually climbed from a plateau. While still in the steppe zone we found *Junellia micrantha* in volcanic sand. A very short and beautiful species with lavender flowers. Growing nearby was *Viola tectiflora* again, this time in much larger numbers. It was again hard to spot, successfully mimicking the volcanic sand. This proved an excellent location, we found the yellow *V. compacta* for the first time in flower and there were plants where we were by now well acquainted with, such as *Azorella monantha*.

We had lunch at Laguna del Tromen, situated between two volcanic cones. *Montiopsis* aff. *dianthoides*, with strong pink, large flowers was quite common. There was also a different *Junellia*, *J. spissa*, with pale-yellow flowers. Still a bit higher up, at the foot of the Volcano's cone, we found *Maihuenia poeppigii*, the only Patagonian cactus that grows in the high Andean zone.

The alpine purists amongst our group were delighted to find the very low *Nassauvia ulicina* in flower. The yellow composite *Hypochaeris hookeri* and *Arjona tuberosa*. A very exciting discovery was a specimen of the yellow *Rhodophiala montana*, even though it wasn't in brilliant condition. This species was previously only known from Chile and is quite similar to *R. elwesii*, *mendocina* and *araucana*, but clearly distinguished by its narrow tepals. This was going to be the last 'new' *Rhodophiala* during our trip, which made a total of 5 different species of this beautiful genus in the Amaryllidaceae.

A few specimens of *Pantacantha ameghinoi* were found, another exciting discovery since this species is endemic on Volcano Tromen. It is a small Solanaceae that has spiny leaves and white-yellowish flowers.

During the next two days the last alpine excursions of our trip were due. The first was a long trip to the area Natural Protegida Epu Lauquen. En route we found exciting plants like *Viola trochlearis* and *Rhodophiala elwesii*. Just before the entrance of the park purple blue-forms of *Solenomelus segethii* were found. The main botanising of the day was done near Laguna Superior. First the hunt for *Viola congesta* was on. This rosulate *Viola* has white flowers and quite soft leaves. Its population, the only one known, was tiny. This species is known for about a decade now and the population used to be much larger. It seemed to be under threat by succession of the vegetation, with *Nothofagus* and bamboo growing close to what might have been a much more open habitat in the past. Marcela was quite distressed by the demise of the population and gave the GPS coordinates to a local ranger, hopefully action will be taken to rescue this unique species from extinction. It seems to be yet another short-lived species in the 'volcanica' group, although the flowers are more substantial than in other species of this group.

Oxalis squamata with strong pink flowers was found. *Alstroemeria diazii* was one of two *Alstroemeria*'s we would see this day. It had pink flowers and grew up to 30cm tall. Its relative *A. aurea* was quite similar, but had orange flowers. We were excited to find *Tropaeolum leptophyllum*, a species that was new to us. *Rhodophiala montana* was here again, perhaps another new Argentinian record for this 'Chilean' species. The yellow *Oxalis valdiviense*, probably a weedy species in cultivation, was found in a roadside as was the yellow-flowering *Loasa tricolor*, a near relative of *Caiophora*.

The last spot of the day was a more open situation where we found *Mutisia linearifolia*, about 10cm tall and orange flowers. A rare plant and very beautiful. Marcela really was in

ecstasy at the sight of this species. Never before had they seen this species in the wild. At the same location was *V. trochlearis* and *Junellia minutifolia* forma *rosulata*.

Time flies when you are having fun and the next day was going to be our last day in the Patagonian mountains. It would be a long trip to Andacolla, Las Oviejas and a geyser at Los Tachos. The first exciting plant of the day was an unknown rosulate *Viola* that has possibly affinities with *V. cotyledon*. Unfortunately it was out of flower. It formed small groups of greenish and brown rosettes. Growing at the same location was *Viola trochlearis*, clearly a quite widespread species in northern Neuquen province.

We had lunch near the geysers at Los Tachos, where *Junellia minutifolia* was of note. It was a short walk to the geyser site and on our way we found *Calceolaria volckmanii*.

On the way back to Chos Malal we explored a ridge and some cliff faces. One of the most exciting plants of the entire trip was found here: the exquisite *Ourisia microphylla*. This dwarf shrub was thriving on a cliff face, not unlike *Dionysia* in Iran. The flowers of this species are large and pale pink. *Calceolaria dentata*, with dentate cliffs was found at the base of the cliffs, as was a spectacular herbaceous perennial, the sunflower-like *Viguiera revoluta*.

These final long days north of Chos Malal revealed exciting species that we had not seen further south. Marcela explained this was due to the fact that here were plants to be found from different phytogeographical regions.

End words

The trip was very successful. From the botanical point of view the *Viola*'s were amazing. We have seen such a diverse range of plants in excellent condition. The season was relatively late this year and we feel sure November or December would have been much too early to have seen the alpine and steppe plants of Northern Patagonia at their best. Many thanks are due to Ger van den Beuken, organiser of this expedition, our botanical guide Marcela Ferreyra and to Alfredo Gastambidez, our driver. They all were excellent.

Useful information

Kees Jan's botanical website

If you would like to see more pictures, go to Kees Jan's website: <http://keesjan.smugmug.com> and have a look at the extensive "Patagonia, January 2010" gallery. More than 4000 pictures from this trip are indexed. You can search for pics of particular species or select all pics of a given plant family.

Marcela Ferreyra, Cecilia Ezcurra, Sonia Clayton (2005), *High Mountain Flowers of the Patagonian Andes*, Editorial Lola, Buenos Aires.

People who are interested in additional information about this trip or have interest in one of our upcoming expeditions to Argentina may feel free to email gervandenbeuken@versatel.nl