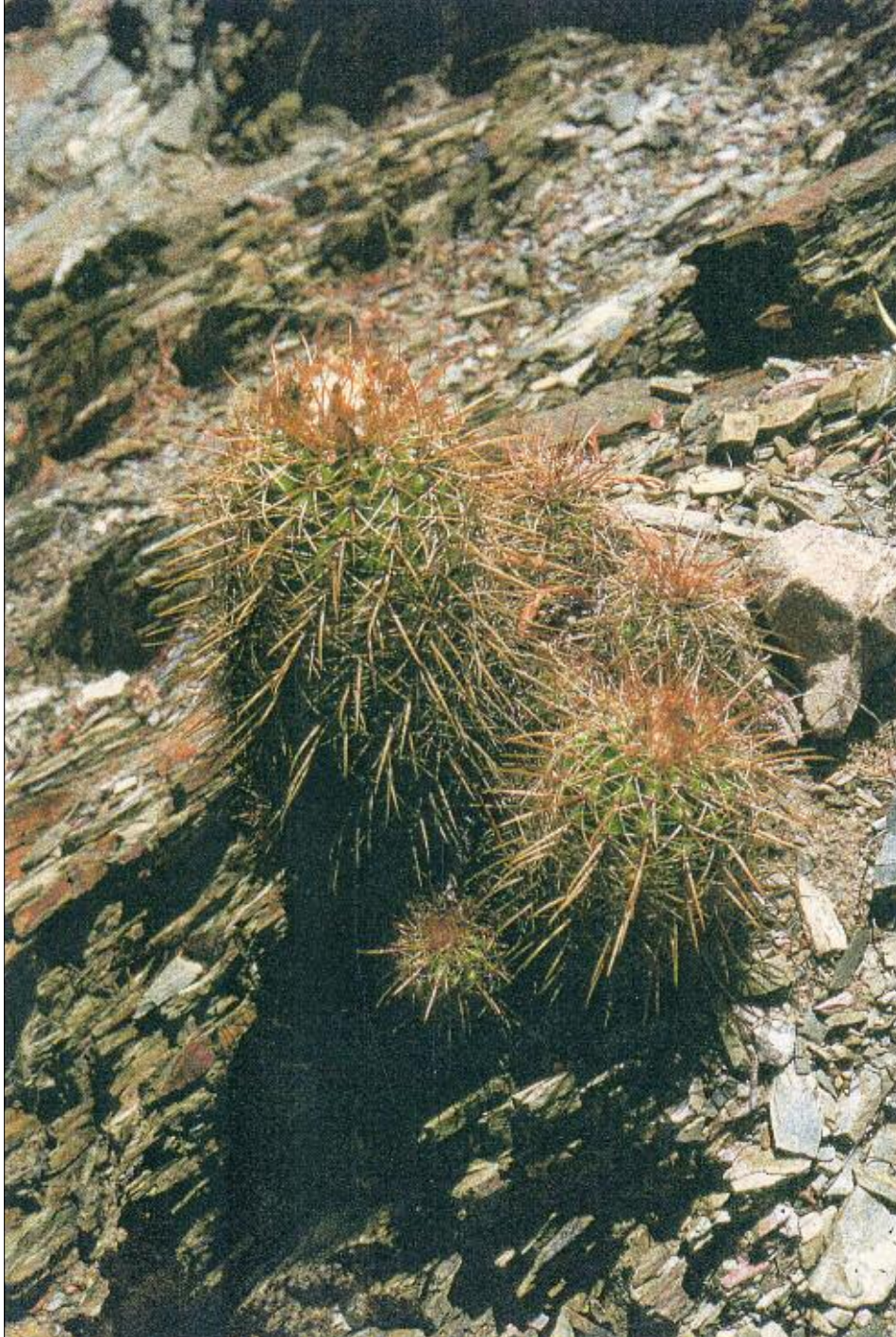


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Parodia camargensis
East of Villa Abecia, Bolivia

Photo:- F. Vandenbroeck



Photo:- F.Berger

Near Cacheuta de Potrerillos

Photo:-J. Lambert



Cuesta Miranda

Photo:- J. Lambert

North of Mendoza City

Photo:- K.Gilmer

Pyrrhocactus strausianus

FROM MENDOZA TO BARREAL By H. Kallenowsky

Coming over the Andes from Chile in mid-August, we made an overnight stop at Mendoza city. Next day we took the road leading from Mendoza to Uspallata which passes through Cacheuta and Portrerillos and then starts to enter a valley which becomes steadily narrower. The road follows the Rio Mendoza, which has cut its way through the Sierra Uspallata on the outer range of the Andean Cordillera. In places there are huge cliffs to be seen bordering the east side of the river but the road runs along the hillside on the west side of the river. There are no bridges across the river until one reaches the western side of the Sierra Uspallata.

The hillsides next to the road were occupied by a patchwork of dense clumps of shrubs and bare ground which was made up of earth and stones. Where the hillsides sloped less steeply there were occasional tall Denmoza which could be seen from the road, standing up above the shrubs. One of these was 1.7m tall.

In order to climb a hillside we had to look for a way of winding round the clumps of bushes. In places the hillsides are very steep and often the bare ground is covered in loose stones, whilst in other places it is less steep, but one still has to be very careful when walking over a hillside because of the loose stones. I did not go far uphill, only up to about 100m from the road. It was in this way that we came across some small plants of *Pyrrhocactus* growing between the stones. There were many young plants of Denmoza to be seen of barely ankle height, others knee- and waist- high, which were all hidden by the shrubs until you were nearly on top of them.

At the western end of the valley the road crossed the river to head towards Uspallata. We stopped where the road headed towards this bridge in order to climb up the hillside. Soon we found some green-bodied *Pyrrhocactus*, some of them in bud. There were no shrubs growing here, but we had to climb very carefully as the slope where these plants grew was covered with loose stones up to nearly football size with no signs of any earth. After we crossed the bridge, we found a lot of Denmoza, but none of them very tall.

We stopped overnight at Uspallata and the next morning it was snowing slightly. Near the hotel there was a tall Denmoza which was carrying a sprinkling of snow. We set off towards Villa Vicencio in the Sierra Uspallata, travelling over a very wide area of flat ground which carried a scattering of low growing bushes. We stopped where the ground was still flat but not far ahead of us we could see that the road was leading into a narrow canyon. Here, at 2200m altitude, we found some plants of *Pyrrhocactus* which grew only on patches of ground of very limited extent, where low hummocks of dark rocks rose only a meter or two above the flat ground. At first, I did not see these plants, because their bodies were a dark brown colour - almost the same colour as the rocks. They grew solitary, rather closer than half a meter from one another. The largest plants were about 4cm tall and 6cm in diameter, but I did not see any very small plants. At the time I was there, these *Pyrrhocactus* did not have any buds, fruit, or flowers.

Taking the road going due north from Uspallata eventually brought us to Barreal, driving through falls of snow for some of that time. The surroundings of Barreal were flat, with a covering of scattered bushes, of a very similar appearance to the ground to the north of Uspallata. Stopping here, we again found *Pyrrhocactus* growing on low hummocks of rocks, rising about one meter above the surrounding ground, in the middle of the flat plain. Most of the surroundings and also the rocky hummocks were covered in loose stones. Most of the *Pyrrhocactus* were to be seen growing up against the base of a shrub, which were about 1 to 1.5m tall. I think the reason that they were growing in this way is because they will have a better access to moisture and are also less exposed to the intensity of the sunlight. These plants were depressed globular, up to about 8cm in diameter and 5cm tall.

From here we continued on our journey, still heading north, going towards San Juan and Famatina.

.....from J. Lambert

I have seen plants of *Pyrrhocactus* whilst travelling along the road from Mendoza to Uspallata and north from there to Barreal and beyond, which are undoubtedly *P. strausianus*. My recollection of these plants which I have seen in the wild, and also when looking at the pictures which I took of them in habitat, is that they are always solitary, with but one or two rare exceptions, which may be due to their having been damaged.

Having driven north from Uspallata I can confirm that the nature of the flat plain not only extends from Uspallata to beyond Barreal, but continues as far as the Llanos de Chita in province San Juan.

.....from H. Vertongen

I have been to Argentina on six occasions, visiting many parts from the province of Rio Negro in the south to the border of Bolivia. I now think that I know a little bit about the flora of Argentina. I have travelled the route from Mendoza to Uspallata, going north from there via Barreal to Calingasta and San Juan. The *Pyrrhocactus* which I found near Uspallata, and also further to the north of there up to Arrequeentin, and perhaps even further north still into the province of La Rioja, is a *Pyrrhocactus* from the higher altitudes and related to *P. strausianus*, which is a plant that grows at lower altitudes. In recent literature it is called *P. sanjuanensis*, but that is not correct as the name *sanjuanensis* is a Spegazzini name and refers to a plant from the neighbourhood of San Juan city. In the neighbourhood of Uspallata there is no *Pyrrhocactus* other than *P. strausianus*. My most recent discovery of a species from the genus *Pyrrhocactus* is from the Cordillera of La Rioja, where a new road is being built that runs to Laguna Brava, previously accessible only by 4 x 4 vehicles.

.....from J.Lambert, Succulenta 74 (1) 1995

The Llanos de Chita is a plateau at the foot of the Andean Cordillera, in the NW of the Argentine province of San Juan. During my first trip there in November 1983, I came across a *Pyrrhocactus* for the first time and photographed a specimen, which grew together with *Pterocactus*, but which remained quite sparse. In such circumstances a plant was naturally not dug up, but resignedly left alone at the spot.

On the one hand the plant appeared to be out of its flowering season, so that I could not identify the

species with any certainty. On the other hand, from the appearance of the plant and also in view of its finding place, however, I opted for *Pyrrhocactus strausianus* v. *sanjuanensis*.

Indeed, Spegazzini wrote that it was a "very scarce" sort which emanated from the dry mountains of the province of San Juan. However, I had made up my mind to search the district some day, at the first opportunity, to see if there were still somewhere any populations to be found in better numbers. At the end of ten years, in December of 1993, it was possible to find myself back at the Llanos de Chita. This time, however, I stopped at a more northward spot, where the plant growth still remained somewhat higher than further to the south. *Pterocactus* were not to be found here, but between the *Larrea* bushes, *Echinopsis leucantha* and *Tephrocactus aoracanthus* were certainly to be found. But by good luck a stop was made where there were *Pyrrhocactus* growing. They are not easy to find because they hide under bushes and sometimes grow in the middle of the foot of the latter, concealed between the intertwining twigs.

So seldom are they obvious here, or elsewhere, that I took a couple of specimens from that spot, and these were able to adapt successfully to the greenhouse conditions. In the summer of 1994 they had already flowered. On the other hand, on one of the plants, a fruit proceeded to ripen. In this way I was also able to sow seed straight away and a number of seedlings progressed to development.

Before one becomes too confident with *Pyrrhocactus*, the very close relationship with *P. strausianus* should be referred to. Already in 1925 (not in 1923 as misquoted by Ritter) Spegazzini himself put the question of whether *P. sanjuanensis* should not be a variety of *P. strausianus*. As to the differences he quoted between the two, on the one hand the finer spination (referring to the somewhat flattened radial spines?) and on the other hand the larger dimension of the flower. This latter, however, is clearly inaccurate. A flower height of 15 to 28mm is quoted by Schumann as well as by Spegazzini, but in numerous populations of *P. strausianus* seen in the provinces of Mendoza and La Pampa, we have always observed flowers of 35 to 45mm high, that is to say, fully comparable with those of *P. sanjuanensis*.

In regard to the trifling colour variations, the difference lies exclusively in the spination; the somewhat flattened central spines, with a globular thickened foot - with *P. strausianus* they are also indeed thickened at the foot, but not globular.

Such trifling differences justify my view that there is not the basis for separate species, but at least of varieties.

.....from K. Gilmer

As we were travelling north from Mendoza city on the fairly level ground at the foot of the Andes, we stopped several times as we gradually climbed from about 800 to 1200m altitude. At about 5km to the north of Mendoza we came across a population of *Pyrrhocactus* in flower. Most of these plants had pure yellow flowers but there were also some with flowers that had a tinge of red to the petals. There was one plant whose flowers were more reddish coloured than any of the others, the red colour most evident at the tips of the petals, merging into an orange-red at the base of the inner petals. The flowers on some other plants in this population had red tips to the petals, merging into orange and then into yellow at the base of the inner petals.

After stopping several times over a few kms to look at the cacti, we then took the road that climbed into the mountains which took us towards Villa Vicencio. We stopped shortly before Villa Vicencio at 1300m, shortly after that place at 1500m, still seeing the *Trichocereus candicans* that grew at the base of the mountains. Another stop was made at 2000m and finally at the pass at 3000m. At each of these stops there were *Pyrrhocactus strausianus* to be seen but at the pass the only other cactus growing there was *T. glomeratus*.

At the lowest level, on the plain, the plants of *Pyrrhocactus* grew columnar, mostly up to about 12cm high, but some as tall as 18 to 20cm. The higher we climbed, the height of the tallest *Pyrrhocactus* decreased until at the pass the *Pyrrhocactus* would be flattened globular, about 6-7cm in diameter and some 5-6cm high. During the climb we did see some *Pyrrhocactus* in flower in places, where we had the impression that it had rained in the course of the previous 2 or 3 weeks, but at some stops there were none of them in flower, this being where it looked as if it had been much longer since any rains had fallen.

When we were at 12km to the south of Pareditas in prov. Mendez, Dept. San Carlo, we also saw some flowering *Pyrrhocactus strausianus*, again mostly with yellow flowers but a few with flowers having reddish tips to the outer petals and orange tips to the inner petals, which merged with the yellow that occupied far more of the petal height than on the flowers seen when going towards Villa Vicencio.

.....from J. Lambert

I would say that the most typical form of the flowers on *P. strausianus* is evoked by the generic name, as *Pyrrhocactus* means fire-cactus. Or better still, flamed cactus, which corresponds quite well with the yellow flowers which are marked with reddish "flames" on the outside tepals.

.....from R. Ferryman

If one turns away from Calingasta, towards the east, you approach Pachaco where another form of *P. strausianus* is to be found. This is *P. pachacoensis*, an interesting plant, a *strausianus* to a "T" except when it flowers. The flower on *P. strausianus* would be around 5 to 7cm wide and tall, opening quite wide in hot sunshine. By comparison, the flower on *P. pachacoensis* is much smaller, around 25mm across and the petals do not fold back as much as they can do on *P. strausianus*. Looking at it in flower in the greenhouse, the outer petals are very short, with a brownish tinge to the petal colour.

There are a number of forms of *Pyrrhocactus* in the stretch from Termas Talacasto to Huaco (in prov. San Juan) that are difficult to determine when not in flower. Near Talacasto, to the north of Serra Villicum, the *Pyrrhocactus* were of the *pachacoensis* type.

The one distinction that I have seen to date is the choice of habitat - *pachacoensis* is much more likely to be found on scree or rocks on very steep slopes. By comparison, *P. strausianus* prefers flatter ground with a good level of soil

....from H. Vertongen

When travelling from San Juan to Calingasta, *Pyrrhocactus pachacoensis* was found some 8km prior to Pachaco. More of these plants were also found along the route from Pachaco to Calingasta, on the margins of the Rio San Juan, not quite as far as 3km prior to Pachaco. These plants are very dark with completely black spines - it is the blackest *Pyrrhocactus* that I have encountered. They are not easily reached as they grow on very steep hillsides which have a covering of small stones that evidently find their way down from further up the mountainsides. These small stones slip away from under the feet and due to the steep slope it can be very dangerous to try to gain access to these plants. Apart from the *Pyrrhocactus*, no other vegetation, not any herbs and not even thorny plants, grow on these slopes. This is unlike *P. strausianus* which prefers flatter ground and a good depth of soil.

In the literature the *P. pachacoensis* does not exceed the size of a fist and is the smallest plant in this genus. But here the plants were up to 20cm in height and become cylindrical.

.....from F. Vandenbroeck

The *Pyrrhocactus* near Pachaco were indeed growing on a huge sloping bed of big broken stones. Once we had come to the vicinity of Pachaco, we started to keep a look-out for these plants. This place is situated in the valley of the Rio San Juan. It is a huge canyon-like valley of somewhat eerie appearance because of its grey bareness and desolation. The road is winding along a steep side of the valley and is sometimes hewn into the rock. Past the military post of Pachaco, the valley is somewhat wider and we searched the slopes in the distance with binoculars. Amidst the bare grey stones in the distance we noticed some dark dots and arriving there we found the *Pyrrhocactus* which was growing without any other vegetation. The landscape around was awful but down in the valley, along the riverside, there was pretty dense vegetation - bushes and low trees with scattered vegetation growing up the lower sides of the valley.

.....from R. Ferryman

There are several different species of *Pyrrhocactus* to be found in western Argentina, of which the most widespread and most abundant is *P. strausianus*. These plants are to be found on the eastern slopes of the Andes and on their foothills, over a distribution area extending from the south of province Mendoza - close to the border with Neuquen - through San Juan and into the province of La Rioja. My own acquaintance with these plants in habitat extends from the area round Mendoza city, southwards as far as Malargue, and northwards into province La Rioja.

Even in the area round Mendoza city, the *P. strausianus* are to be found in a wide range of habitats extending from the hot, dry pre-Andean foothills at ca.800m altitude to an equally harsh but quite different climate up at 2800m, amongst alpine flora, where it is cold at best, freezing at worst, with cold winds continually battering the area. Little surprise, then, that *P. strausianus* is a very variable species since it has evolved to suit different climatic conditions. Indeed, it is hard to believe the alpine forms are the same species as the plants from lower altitudes.

On the hot, dry plains near Mendoza it can become columnar, up to about two feet tall. Close to Mendoza, west of the city, near Cacheuta, again at low altitude, this plant reaches 75cm in height, with flowers that are yellow or reddish. But on the road to Villa Vicencio (to the NW of Mendoza city) as one climbs into cooler conditions, at about 1800m altitude they continue to grow taller than broad, but rarely exceed 15cm in height.

Going further up towards Villa Vicencio, which lies in alpine territory at about 2800m altitude, these *Pyrrhocactus* gradually become less elongated and more globular in their growth form, whilst at their highest altitude they rarely get much above the ground, appearing as cushions rather than as globular plants. Near Villa Vicencio, at a small place known to the locals as El Barro (but not marked on any maps that I have seen), the *P. strausianus* are very small indeed. Whatever the differences in body size and proportions, they all have the same form of flowers and the same globular fruit. They are very difficult to find in either flower or fruit, as the flowers appear to open for only a short period in the afternoon. Plants seen near Villa Vicencio had clear yellow flowers with no wool or bristles on the flower tube, but near Hotel Villa Vicencio we found plants in flower that displayed reddish outer petals with a dark central stripe. This was a broader flower with a lot of bristle-like hairs on the flower tube.

All these forms of *P. strausianus* look quite different to one another and require very different cultural treatment. They have evolved to a point where the two extremes will not interbreed - does that make them a different species? It is too easy to say that they are simply populations, as it is their evolution that has separated them. Bringing both forms (tall and cushion-like) into cultivation will not change that.

The compact cushion-like forms which are to be seen at El Barro were also to be found when travelling from Chile to Mendoza, prior to reaching Uspallata. I have also seen these small forms in the inter-cordillera valley which runs north from Uspallata, at about 2000 to 2100m. altitude, going as far as Calingasta in prov. San Juan. During my field trip in Nov.-Dec. of 1999 along this route, most of these *Pyrrhocactus* were in flower. Some 20 km. or so to the north of Uspallata there is a population of these plants whose spination varies from straw-coloured to black, with all intermediate colours in between, to be seen on different plants. They have been described as *P. multicolorispinus*. Stopping to look at them, a single one was seen to have an elongated fruit which had some sparse hairs, quite different to all other fruit seen here and elsewhere on *P. strausianus*.

At about 35km or so to the north of Uspallata, near Tambillos, there were *P. strausianus* to be seen in both flower and fruit, mostly at the base of bushes, quite close to what passed for a road. They were growing in company with *Pterocactus*, a clumping *Tephrocactus*, and *Tephrocactus clavarioides*. Taking an interesting looking track going east from there, both *Soehrensia* and *Denmoza* were to be seen on the slopes, but no *Pyrrhocactus*.

At Arrequeñin, a place which lies at about 2800m altitude, in prov. San Juan, on the road from San Jose de Jachal which goes over the Andes into Chile, there were very large hummocks of *Tephrocactus* to be seen as well as small padded *Tunilla*, together with short columnar *Soehrensias*, which were all growing in company with *P. strausianus* that remained very small and almost flush with the ground, maybe three inches in diameter and growing amongst small stones and boulders. The *Pyrrhocactus* here is much more selective in where it grows than the accompanying cacti. I have found *P. strausianus* in fruit here during October and in November, which suggests that it has an early flowering season as the *Opuntias* and *Soehrensias* were in flower at the time of these visits. I have grown this *Pyrrhocactus* from seed and it does have the yellow flower which is typical of this species.

Going still further to the north in prov. San Juan, beyond Villa Union, I travelled through Alto Jague where I stopped to find *Lobivia famatinensis* and then continued towards Laguna Brava, which is at much too high an altitude for any cacti to be found. But at about 10km to the W. of Alto Jague, I was amazed to find *P. strausianus* growing at 3,000m. altitude, beyond the last tall *Soehrensias*, with only *Tephrocactus* growing at a higher altitude. Surprisingly the plants that I found there were not growing flush with the ground - as I had seen at less high altitudes on the way there - although they were only small specimens up to 7cm high. The spination was strong, awl shaped and quite out of character with other mountain forms of this species, even though the area was quite dry - on the occasion of my visit there, it could have been said to be parched. By comparison, where *P. strausianus* was seen near Arrequeñin, it could even be said to be relatively wet there.

EXPLORING SIERRA FAMATINA From M.Lowry

During our visit to western Argentina we arranged to pay a visit to Famatina, from where we planned to take the road that climbed up the Sierra Famatina. The surroundings of Famatina were almost uniformly level and they had now been very largely given over to the growing of vines for wine making. But there were still patches of the original vegetation to be seen here and there - *Prosopis* trees of about 3m in height with sandy ground between them which was almost bare.

We set off from Chilecito, through these surroundings, in the direction of Famatina. We see a few *Trichocereus terscheckii* standing up above the trees and bushes, but the *Trichocereus strigosus* were only to be seen at a few places at the roadside as they branched from the base and grew to only about two feet tall. We also saw a few *Trichocereus* which also branched from the base but of somewhat different appearance, with stems growing up to about 1.5m tall or even a little taller. These would be the plants that had been named *Trichocereus cabreræ* by Kiesling, but it is now generally accepted that they are in fact a hybrid between the *T. terscheckii* and *T. strigosus*.

Quite soon we came to the turn-off near Carrizal where we started our ascent of the initially quite gentle lowermost slopes of the Sierra Famatina. As the slope steepened and the gradient of the road increased, the *Trichocereus* gradually petered out and the nature of the vegetation also changed gradually. There were now few tall trees but more bushes of about 1m in height, together with some grass and other low growing vegetation, so that it was really only possible to see any cacti that were growing, at the roadside.

However, we had been joined for this expedition by a botanist from Chilecito and he knew where it would be best to stop and take a look around. We did stop at four or five intervals on the climb, in order to walk around, although one had to be careful in making ones way between spiny bushes and avoid the inevitable spiny *Platyopuntia*. We came across *Trichocereus candicans*, but they were not in flower, so that I missed the chance of seeing a red flowering variety. The *Soehrensia formosa* and the *Denmoza rhodacantha* were mostly globular or not a great deal higher than wide and they, too, were not in flower. The *Pyrrhocactus strausianus* were globular or up to about twice as tall as wide, up to about 20cm tall. There were a few of these plants in flower, with reddish flowers, together with some fruit.

We continued to climb, noting that the surroundings were changing gradually. the vegetation slowly tending to become less in height. At our stop at 2400m altitude there were only dwarf bushes, which were much sparser than before, so that it was now much less difficult to walk around between them, especially as there was an absence of spiny bushes. There were now no *Pyrrhocactus* to be found here, but there were plants of *Soehrensia formosa*, occasionally growing up to about 7 ft. tall, together with *Denmozas* up to an occasional about 5 ft. tall. one or two of the *Denmozas* being in flower.

Continuing to climb, we made a stop at 2500m altitude, again with sparse low growing bushes, with a fair amount of grass between the rocks. Once again we found *Pyrrhocactus strausianus* here. Accompanying it at this spot we also came across *Lobivia thionantha*, *Lobivia famatinensis*, cushions of *Tephrocactus*, and more *Soehrensia* and *Denmoza*. Finally we reached 2850m where we saw only the clumping *Tephrocactus*, *Lobivia famatinensis*, and *Soehrensia formosa*, with some of the *Soehrensias* in flower. Here, the road was closed ahead, so we had to turn round and descend along the same road back to Famatina

On the following day we drove north from Famatina. As the road went over some rather more elevated terrain shortly before we reached Angulos, we met with *Trichocereus terscheckii* again, but here we also came across *Lobivia huascha*, *Denmoza rhodacantha*, and *Pyrrhocactus strausianus*, a few of which again displayed red flowers.

With regard to the surroundings where *Pyrrhocactus* grew in the Sierra Famatina, the plants we saw seemed to prefer more open locations with only sparse cover of other vegetation. However, they were to be found both in the open and under shrubs, the ones growing under shrubs being slightly larger. Flower colour was quite variable, from yellowish through orange-pink to red.

I now have some plants of flowering size in cultivation which have been grown from cuttings or seed

collected on Serra Famatina. The flowers on these plants are similar in colour but they do vary somewhat, mostly having a yellow throat and the upper part of the petals being red. The yellow throat does not extend upwards to the same extent on all flowers. Some have the red colour over more of the length of the upper part of the petals, than others. This is probably simply an indication of the variability to be found in the flowers of *P. strausianus*. However, I do feel inclined to describe the flowers as red.

.....from R.Ferryman

There is a climb which starts near Famatina and heads for Alto Carrizal and La Mejicana, which I have taken on several occasions. This road goes to the highest mine at La Mejicana and even beyond. It passes through the home of Backeberg's *Pyrrhocactus andreaeanus*. These plants tend to grow taller than round and can reach 25cm high, mostly in the range of 2000 to 2800m altitude. Interestingly they continue to grow semi-columnar even at their highest altitude. They prefer to grow amongst shrubs and other vegetation and are rarely seen exposed on open ground. The flowers are described as red, but I have seen that this flower colour is not consistent. In most populations the flowers are light yellow with some red infusion in the petals.

There is a lot of history to the name *andreaeanus*, which was originally described by Backeberg as having red flowers. Since we now know a number of red flowering populations of *P. strausianus*, I have concluded that *P. andreaeanus* is merely a form of *P. strausianus*.

.....from G.Charles

Our travels in western Argentina have taken us through much of the distribution area in which *Pyrrhocactus strausianus* is to be found, from the Rio Malargue in the south to the Sierra Famatina in the north. Within this extensive area the *P. strausianus* which we have seen certainly displayed differences in its appearance from place to place, not just in ranging from depressed globular to distinctly taller than wide, but also in the degree of robustness of the spination and especially in the colour of the flowers. We have seen some plants with fairly long and less robust upswept spines, which almost obscure sight of the body, whilst other plants have shorter but still more or less robust spines with the centrals standing outwards at various angles and the radials following the curvature of the body, and all variations between.

The flowers can be a clear yellow, or have a yellow throat and pinkish-red petals with either a shorter or longer length of red colour over the outer length of the petals. The *P. strausianus* which we saw on the Sierra Famatina did not show any distinguishing feature or features which would justify their separation as *P. andreaeanus*. The picture of *P. andreaeanus* (as a *Neochilenia*) in Backeberg *Die Cactaceae III Tafel 132*, with a red flower, does not display any distinction which would put it outside the range of *P. strausianus*.

.....from J.Lambert

Backeberg describes the flowers of *P. andreaeanus* as red with a yellow border, instead of the reverse as appears clearly on his picture. Climbing Cuesta Miranda, there were sparse bushes and grasses to be seen where *P. andreaeanus* was to be found. I collected these plants twice, first at an altitude of 2000m and then at about the highest point of the road and shortly afterwards also at Corrales, at an altitude of 2100m.

.....from G.Hole

The *Pyrrhocactus andreaeanus* that I have seen on the slopes of the Sierra Famatina were mostly solitary, only occasionally forming clumps. They were usually seen growing close to bushes where they were presumably in the shade, as I did not see any growing out in the open. They grew up to about 8 to ten inches in height and about 2 to 3 inches in diameter. The *P. strausianus* that we saw elsewhere in Mendoza were mostly small globular plants, only a few taller than broad, nowhere near the height of *P. andreaeanus*, and with dark grey or dark brown bodies.

.....from F.Ritter, *Kakteen in Südamerika Vol.III. 1980*

According to Backeberg in his *Die Cactaceae Vol.3*, his "*Neochilenia*" *andreaeanus* has a "habitat Chile, exact location unknown". Most probably the "habitat Chile" is erroneous since the appearance of the plant in his colour print *Abb.132* suggests that it is from Argentina and synonymous with *Pyrrhocactus catamarcensis*. In the pictures which I took of *P. catamarcensis*, the flower is nearly identical with the flower of Backeberg's "*Neochilenia*" *andreaeanus*. Also in regard to the colour of the petals, which are somewhat red and only yellow below, whilst in my colour pictures of the flower of *P. catamarcensis*, the inner petals were yellow. Even in this species the colour of the petals is variable.

.....from H.Middleditch

In *Englera 16* there are five habitat locations given for FR9 *Pyrrhocactus catamarcensis*, all of which are within the distribution area for *P. strausianus* including one from "west of Famatina". The foregoing comments from Ritter on flower colour would appear to apply to what we would today call *P. strausianus*.

A VISIT TO ANTOFAGASTA By K.Schrier & P.Weisser. From K.u.a.S. 26(4) 1975

About 50km before we reached Antofagasta a thunderstorm drew across the desert with furious haste and it emptied a rainstorm of such intensity as one can only rarely witness in Germany. According to the assertions of the local inhabitants this occurred at the outside only every fifty years, otherwise there would be no saltpetre deposits in the desert.

The city of Antofagasta is the liveliest town in the north. In the surroundings there are a number of mines. Even sulphur is mined. It is a puzzle to me how it comes about that so many pigeons and dogs come to be living here.

Whilst our vehicle was being repaired, we went by taxi to the Quebrada Chimba, the well known habitat location for *Copiapoa echinoides*. At about 400m above sea level there grows there numerous *Eulychnias* and

these blue-grey Copiapoas. Yesterday's rain had been sufficient to stir some plants into flowering. In the afternoon we went to Cerro Colosso, the bleached habitat location of *Neochilenia echinus*. Unfortunately after a very exacting ascent I could only enjoy a fascinating panorama. Even the Wessner family did not succeed in finding a trace of vegetation. On that account we decided to go to the peninsula with the mountain ridge of the Cerro Moreno. Above Punta Lopez, a tiny fishing village on the outermost tip of the peninsula, we saw through the binoculars in the fading daylight up in the mist zone, Copiapoas standing up on the ridge like small dwarfs.

It was the greatest drudgery of the whole trip, struggling against the strong offshore wind, to work our way up to about 300m. As dusk fell, we could easily distinguish the almost black plants from the equally dark background. According to Buining this is a Copiapoa invalidly described by Ritter under the provisional name of "boliviana".

A VISIT TO MORRO MORENO By P.Hoxey

In February 2001 we met with Alfred Lau in Iquique in order to undertake a trip through northern Chile. After three days in the region to the north of Antofagasta, we reached Morro Moreno just to the north of the city, close to the airport. The mountain is on the southern end of the Mejillones peninsula, close to the ocean and is often surrounded by mist and clouds and therefore supports a good cactus flora.

Our initial ascent was from the south, near the village of Juan Lopez, in the afternoon of 7 February. Starting from near sea level, we climbed up a steep rock slope with some difficulty due to the steepness and also to the loose conditions underfoot. From the initially barren environment we found our first plants at about 150m altitude. We identified them as *Copipoa atacamensis*, generally small plants with a few heads, usually 1 to 3 but occasionally up to 10. The plants were stressed by the arid conditions, the dark bodies shrunken back and the lower part of the stem being woody with the epidermis having flaked off. Some stems were elongated, to 1m in length, hanging pendulantly down the slope.

As we climbed higher, the plants became more numerous and showed improvements in condition and health. At about 350m altitude, we decided to halt our ascent due to the increasing steepness of the slope causing us some concern over safety. Here the Copiapoas were at their most abundant and one open flower was seen. It was also here that a few scattered plants of *Eulychnia* were seen. Ritter described this plant as *E.morromorensis* but it is now generally considered as a synonym of *E.iquiquensis*. The weather conditions were overcast with clouds covering the higher slopes of the mountain.

The next day we started out early and decided to make another attempt at climbing higher up the Morro. We carefully selected a ridge, which looked as if it would allow an easier climb to higher altitudes and then started our ascent. This time with a more gentle, easier, climb we made faster progress. At 300m we found our first specimens of *Copipoa atacamensis* and *Eulychnia iquiquensis* in a similar dehydrated condition as on the previous day. Walking higher, the condition of both species improved. Between 400m and 500m quite a few Copiapoa seedlings from 2cm in diameter were seen. Approaching 700m in altitude the slope levelled off. Here the specimens of *Eulychnia* were in excellent health and had ripe fruit attached. Further fruits were lying around on the ground, apparently untouched by any local wildlife. The fruits are a spherical shape, approximately 6cm in diameter and covered in white wool. Inside, hundreds of small black seeds are embedded within a white translucent flesh. They are edible and are eaten by the local people who call them "guillave".

The *Eulychnia* were substantial plants with several stems branching from the base to a height of up to 3m tall. They grew in large numbers on slopes and ridges on the Morro and also on nearly level ground. They did not appear to have any specific requirements with regard to substrate or slope. Only moisture availability from the coastal mists determined the distribution of these plants.

On the level area the ground was covered in grit and gravel with a few rocky patches. Here and there we found largely hemispherical hummocks of *Copipoa atacamensis* with up to 100 heads and reaching up to 1m across. These plants had a very grey epidermis and black spines, with a few flowers in evidence. Although having a very different appearance from the plants lower down, I consider this effect to be due to climatic conditions with these high altitude plants having more moisture.

On a small rocky patch we found our first specimen of *Neochilenia vexata*. Ritter originally used the genus *Pyrrhocactus* to describe this plant, although it may now be more commonly found in the genera *Neoporteria* or *Eriosyce* under the name of *recondita*. Only a few scattered plants were found, some growing on rocky patches, some on pebbles, some in finer grit.

Carefully searching the flat areas of gravel we found, with some difficulty, near spineless plants flush with the surface of the ground, growing in grit. However, quite a few plants were found once we had our "eye in". Our first thoughts considered these plants to be a *Neoporteria* in the *Thelocephala* group, due to the habitat and mode of growth. They reached up to 4cm across. There was evidence of flowering so this is not a juvenile form. We believe that these are forms of *Neochilenia vexata* and Ritter does illustrate both spiny and spineless forms in his book (Abb.881 to 883). An interesting theory is to consider the near spineless plants to be a transitional form to *Thelocephala*, showing the evolutionary route taken by that distinctive group of *Neoporteria*. Reducing the size of the body and increasing the size of the root is a good adaptation to the dry environment, to minimise water loss.

Further exploration revealed a few intermediate forms, growing more hummock shaped, with an occasional spine. No flowers were in evidence during our visit but some ripening fruits were observed.



*Eulychnia
iiquensis*
at 700m

*Neochilenia
vexata*
at 700m



*Copiapoa
atacamensis*
at 700m

Morro Moreno, near Antofagasta, Chile

Photos:- P. Hoxey

We did not attempt to climb further up the mountain but on the highest slopes we could see extensive stands of *Eulychnia* covering the hillsides, no doubt receiving substantial moisture from the mist and clouds. Having achieved our primary objective of finding *Neochilenia vexatus*, we returned down the ridge to the car. Although a sunny day in mid summer, the temperatures had never been that high due to a pleasantly cool sea breeze.

The three accompanying photographs were taken on a second ascent of the Morro Moreno in December of 2006. At that time, about two months earlier than my original visit in 2001, the *Neochilenia vexata* were in full flower, as were the *Eulychnia* and the *Copiapoa*. All the plants appeared to have received some moisture and were in very good condition. The pictured plant of *Neochilenia vexata* is the form found in areas of grit, but it is unusually large and spiny.

.....from N.Rebmann

The vegetation is becoming rare in the vicinity of Antofagasta, especially on account of the dryness becoming more and more pronounced. Some species of cacti exist on the Cerro Coloso, to the south of Antofagasta, on the mountainsides to the north-east of the town, and on the Morro Moreno, a mountain mass situated just to the north of the town.

On the Cerro Coloso, in October 1996, I found *Neoporteria paucicostata*, very dry plants, hidden in the cracks of the rocks at 765m altitude, as well as *Copiapoa atacamensis* which were in a fairly good state of health, starting at 790m. I did not see any flowers on either of these two species.

On the sides of the mountain, to the north-west of Antofagasta, the *Copiapoa atacamensis* and *Eulychnia iquiquensis* are covered with lichen, but the intensity of the camanchaca mists coming from the Pacific Ocean is not sufficient to allow the development of the vegetation. In 1996, only the *Copiapoa atacamensis* was in good condition, probably on account of their napiform root which enabled them to stock water. The *Eulychnia iquiquensis* were mostly dead and 90% of the survivors were in a precariously unhealthy condition. I have not been back to this location since 1996.

The Morro Moreno is a huge granite massif which rises to over 1,000m, to the north-west of Antofagasta, whose summit is also moistened by the camanchaca, carried by the mist coming from the Pacific Ocean. I have had occasion to visit this mountain massif several times, in 1995, 1996, 2001 and 2008. Three species of cacti grow in these mountains. *Copiapoa atacamensis*, *Eulychnia iquiquensis*, and *Neoporteria recondita*. On account of the increasing drought, few other species are able to develop. From 0 to 300m altitude, not one species survives, it is bare desert. From 400m, in 2001, there began *Lycopersicon* sp., a species of the family of Malvaceae - *Cistanthe* sp., and some other species. In 2008 I could only find the *Lycopersicon* sp. and then in poor condition.

The cacti also exist only with more and more difficulty. On several visits I have explored the mountainous area and the quebradas behind the little village of Lopez Mateo. In 1995 and 1996 the *Copiapoa atacamensis* were present on the bottom of the quebrada but today they are all dead up to an altitude of about 300m. Up to 400m the clumps are in a very poor condition and are declining, but nevertheless flowering. It is necessary to climb to above 500m in order to find clumps in a good condition. The *Eulychnia iquiquensis* which were growing fairly well in 1995 and 1996, are now also in poor condition - they were dying off branch by branch.

I have not climbed above 500m, not having either the time nor even finding a path easy enough to climb. It is said by R.Schutz that the summit, at 1100m. altitude, bathed by the camanchaca, is always rich in numerous species - magnificent clumps of *Copiapoa atacamensis* and of miniature cacti - *Neochilenia recondita* - and other species of which he does not quote the names.

WE FIND ECHINOPSIS OBREPANDA From K.Preston-Mafham

During my trip to Bolivia we arrived at Cuchu Punata, which lies not far to the east of Cochabamba, where we found a population of *Echinopsis obrepanda* in full flower. Many of these plants were solitary, with individual heads of up to one foot across - but a number of them were forming clumps, some of the clumps being as much as two feet across. They were growing on a slope, where they tended to stand up from the ground. This was probably the second show of flowers for the season, as we were able to find both ripe fruit and flowers on these plants. The flowers were much larger than those we sometimes see on *E.obrepanda* in cultivation, where they can be only half the size of those we saw at Cuchu Punata. It was a nice warm day with the temperature in the seventies fahrenheit, with bumble bees visiting the flowers, but I did not manage to get a picture of a bumble bee in one of the flowers. I had always previously thought that they were a moth pollinated flower. Some of the flowers had their stamens set in a neat ring, but others had stamens drooping to one side of the flower.

The seed from each of the collected fruits was sown separately so that we expected to be able to find out what range of flower colour came from one fruit. All told there will be about 700 seedlings coming along to flowering size. Some of the flowers we saw in habitat had more pointed petals than others, whilst the spination on the body also varied within the population. There was one pure scarlet flower, mostly the flowers were in various shades of salmon, pink, or magenta; one was white. The seedlings which have flowered to date - about 100 of them - have produced either magenta or red flowers.

We also found a population of *E.obrepanda* outside Sucre, growing with *Sulcorebutia caniguerallii*. These *Echinopsis* were not in flower, but they did carry fruits which were not ripe, so we were not able to collect any seed here. The fruit was very elongated - most unusual. Then near Zudañez, on flat ground just outside the town, we found more large clumps of *E.obrepanda* which were just coming into bud. Some of these clumps

would be as much as 3 feet across, all the heads hugging close to the ground - much larger clumps than those seen at Cuchu Punata. More *Echinopsis obrepanda*, which formed multi-headed clumps of some two to three feet across, were found on the way to Aiquile, growing in company with *Sulcorebutia oenantha*. These were neither in flower nor fruit, but in bud. Ed Aguilar, who was my guide, said that these plants had carried both red and magenta flowers when he was here on a previous occasion.

Going from Culpina to Inca Huasi, we reached the river opposite Inca Huasi. On level ground not far from the river, and only on level ground, we found some giant heads of *Echinopsis obrepanda*, with hooked spines. These heads were a good foot across, the largest ones possibly even somewhat bigger. Only when individual heads had reached this sort of size did the plants start to produce offsets and form a clump. They could have had up to 9 or 10 heads forming a clump of about two to three feet across. I have seen *Echinopsis obrepanda* at several places in Bolivia and northern Argentina and at not a single one of those places did the individual heads reach the size they did at Inca Huasi. Here it is isolated from all other *obrepanda* habitats and it probably deserves a varietal name. These plants were carrying plenty of ripe fruit so we made a good collection of seed. It was Christmas week when we were here and we reckoned that these plants probably flowered in early November. Back at home, this seed germinated well and most of the plants were sold. In due course we heard of several of these plants having flowered, all with white flowers. We did bring about half a dozen of these plants down here to Cornwall when we moved, which have now flowered here - with pink flowers on one plant and magenta flowers on another.

Growing above the *Echinopsis obrepanda*, on the same rocky slope along with the *R.albopectinata*, there were *Echinopsis mammillosa*. I was photographing these in the pouring rain - there were white and pink flowered forms.

I had the clear impression that the individual plants grew to a bigger size and the clumps were also of larger size, where these plants grew on level ground, by comparison with those that grew on slopes. I know of no *Echinopsis obrepanda* that will offset and form clumps in cultivation, other than the plants in cultivation here. The reason they form offsets here is because they are given a very generous pot size. We have some seed-raised plants originating from Inca Huasi which are in pots two feet across, providing very generous root room, and they are now forming clumps.

.....from G.R.Allcock.

I do have quite a large number of plants of *Echinopsis obrepanda*, including two in 4 inch pots which now have a small offset at the base.

.....from J.Arnold

I did obtain two or three of the KPM 182 *Echinopsis obrepanda* and I can distinctly recollect the flowers on one of these being a fairly reddish colour.

.....from R.Purslow

My own plant of *E.obrepanda* KPM 182 (from Culpina) was acquired from Ken Preston-Maffham. At present it is carrying a ripe fruit, green in colour, which is almost globular being about 28mm long and 25mm wide. Compared to my other *E.obrepanda*, this one has somewhat shorter flower tubes.

.....from J.Prantner.

Various plants of *Echinopsis obrepanda* affinity were seen on the hills behind the railway station at Aiquile, at an altitude of between 2250-2300m. All these plants were of rather similar appearance, some of them offsetting. None of these plants were in flower, but we were able to collect quite a lot of seed and there did not appear to be any good reason for keeping each collected fruit separate. Back home, this seed was shared with various friends, the resulting plants eventually bloomed with the widest range of flower colours imaginable. As you know, Rausch spent over seven years in Bolivia and his views about the various forms related to *Echinopsis obrepanda* are the most fundamental that are to be found in the Cactus literature and on that account need to be taken seriously. Thus Rausch writes on p.48 of his *Lobivia* 1,2,3, amongst other things, that "we still found yet another firmly established variation between Copachuncho, Totorá, and Aiquile, in which the both the plants and the flowers remain smaller and display an orange-red flower colour, so that a further variety *calorubra* is justified". But what am I to make of this view, since all the plants raised from seed collected close to Aiquile display long-tubed flowers in a great diversity of colours? Giving one species name to all these plants does not seem to me to be possible.

ECHINOPSIS OBREPANDA Salm Dyck From Allgemeine Gartenzeitung Vol.13. 1845

The body is almost globular, depressed above, and over five inches in diameter. The ribs, 17 in number, are light green, slightly shiny, markedly compressed, with sharp indents and projecting like a crest between the pectinate spine cushions. The spine cushions themselves are very flattened, disposed 9 - 10 lines apart [ca. 20mm] and are furnished with grey wool. Radial spines ten, of which eight are directed sideways and curved backwards, 6 - 8 lines long [ca. 15 mm], the lowermost, however is shorter, and the uppermost - together with the single central spine - stronger, over one inch long, standing upright and curved upwards. The spines are all unusually stiff, the younger ones yellowish brown, the older ones grey. This species, which Mr. Cuming had obtained in the course of the previous summer, originates from Bolivia.

.....from H.Middleditch

Hugh Cuming, who was resident in Santiago, Chile, had a yacht built in 1826 to enable him to cruise along the western coast of South America in order to indulge in his hobby of collecting shells. In the

September 1865 issue of The Gardners Chronicle and Agricultural Gazette, we find it reported that “five and twenty years” had elapsed since Hugh Cuming had enlarged his private collection by adding to it all the items he had collected in the Philippines. In this way it was indicated that Cuming had returned to England in 1840. None of the literature recording the life and activities of Cuming contains any suggestion that he travelled inland into Bolivia at any time, nor was there any suggestion that he left England after his 1840 homecoming.

Consequently, if Prince Salm-Dyck obtained his *Echinopsis obrepanda* from Cuming in England, then presumably Cuming must have acquired it from a visitor to Bolivia. Could this collector have been Bridges?

.....from Alice Coates, Quest for Plants

Thomas Bridges ... arrived at the port of Cobija in September 1844. He went via Calama and Potosi to Chuquisaca, the Bolivian capital [now Sucre] he stayed for three months at Cochabamba before setting out eastwards in April 1845 to cross ‘an enormous ridge’ and descend to the R.Mamore [in the Amazon forest]. He returned to London in June 1846.

.....from H.Middleditch

Which would plainly have been too late to convey a collected *E.obrepanda* to Salm-Dyck for him to publish it in 1845

.....from Curtis’s Botanical Magazine Plate 4521 1850

Specimens of this [*Echinopsis obrepanda*] were purchased from Mr.Bridges on his return from Bolivia in 1844.

.....from H.Middleditch

Since Bridges had married Cumings’ niece, it would hardly occasion any surprise if Bridges had been in touch with Cuming shortly after his return from Bolivia. Bridges could easily have put a plant of the then unnamed *E.obrepanda* into the hands of Cuming, from whom it appears to have gone to Salm-Dyck. The contemporary report from the 1850 Curtis’s Botanical Magazine of an 1844 date for Bridge’s return to England would appear to fit the circumstances, whilst Alice Coates’ date of 1846 for his return, which was published over a century later, does not.

.....from Allgemeine Gartenzeitung Vol. XI July 1843

Echinocactus cumingii. the described plant was collected by Mr.Bridges and sent here [Berlin Botanic Garden] last year by Mr.Cuming.

.....from H.Middleditch

Which might suggest that Cuming would be the recipient of any collected material sent in chests, by sea, whilst Bridges was in South America. Not too surprising, then, that he probably also had first refusal of any collected material which Bridges brought back to England.

In the account of Bridge’s collecting activities by Alice Coates, it is stated that after Bridges left Cochabamba, he descended into the Amazon basin, to the R.Mamora. Between Cochabamba and Tiraque there is a cleft in the eastern Cordillera through which a road passes today, going down to the R.Espiritu Santa and thence to the R.Mamora. It is the only such gap in the eastern Cordillera for a considerable distance to the east and west of that spot and such a route will continue in use from one century to another. It is therefore highly probable that Bridge’s original collection of *Echinopsis obrepanda* was made at no great distance from Cochabamba itself.

If it is accepted that the original *E.obrepanda* was indeed collected by Bridges in this part of Bolivia, then where is *E.obrepanda* to be found in that area?

.....from A.F.H.Buining, Succulenta 54.5.1975

At six o’clock in the evening of October 8th we arrived at Cochabamba, where we were greeted by our friend Roberto Vasquez and driven to his hospitable home, where we were warmly welcomed. Cochabamba is occupied by around 200,000 inhabitants and lies in a broad valley at about 2,650m altitude.

We ascended from Cochabamba up to 2850m to the vicinity of the growing place of *Sulcorebutia krugerae*. Close by here, too, were forms of *Echinopsis obrepanda*. On the following day we drove to the northeast, traversing the hill where *Parodia schwebsiana* grew. Around about 30km from the city we found *Lobivia caespitosa* and forms of *Sulcorebutia steinbachii* at 3,700m altitude. Here again arose the problem whether several species from the same genus can occur together, such as in this place, or whether the shape and colour of the plants and flowers should be considered only as varieties of the self-same sort. In my view only microscopic examination of the seeds and pollen and detailed crossing trials can perhaps provide a firm answer here. Anyhow, it was a pleasure to behold these plants at their own growing place. It is obvious that only those who frequented these growing places and studied there, such as Cardenas, Vasquez, Ritter, and Rausch, can offer a justifiable appraisal of these plants, although the opinions and judgements of these persons often lie miles apart from one another.

A little further on we saw *Lobivia cinnabarina*. Near the village of Colomi at 3300m altitude there begins an enormous reservoir. After this village we saw everywhere examples of how carefully the indians tended their land, often on very steep mountain slopes. After the reservoir we drove through huge ravines and came suddenly at 2650m altitude into the rainforest region of the Amazonica. Here in this region, which counts among the richest in the world for rain, there falls between 10 and 20 metres per annum. The trees hang full of Tillandsias and all sorts of other epiphytes and there is a great variety of plants between the trees and upon the mountain slopes.

Above the elevated valley of Cochabamba the Tunari mountain extends up to about 5000m. We drove via the indian village of Quillacollo towards the foot of the giant mountain. First we saw forms of *Cleistocactus buchtienii* and a splendid flowering *Passiflora umbilicata*. At 3200m there were two indians leading a group of llamas over the mountain. Suddenly at 3320m we stood before groups of flowering *Trichocereus tunariensis*. A fine, deep-red flowering *Echinopsis* stood close besides these plants. Vasquez regarded this *Echinopsis* as a

red flowering form of *Echinopsis obrepanda*. At 3420m we were able to admire flowers of *Passiflora pinnatistipula* and at 3650m we arrived at the growing place of *Sulcorebutia tunariensis*.

On October 18th we left Vasquez's hospitable house en route for Santa Cruz. Already at 8km outside the city we found the interesting *Lobivia taratensis* at 2610m. Proceeding on our way we passed along the other side of the above-mentioned reservoir and there we could admire the cultivation of the indian farmers, all at 2700m. Everywhere we saw mottled cattle and sheep, tended by women. After a good 50km we left the extensive Cochabamba valley and drove into the mountains where a splendid Andean mountain landscape unfurled before our eyes, in continually changing colours and heights. The mountain slopes were initially overgrown with *Cleistocactus*, *Corryocactus*, *Lobivia*, and *Echinopsis obrepanda*.

.....from W.Gertel

I know well the area around Cochabamba and would agree with everything that Buining has written about it. *Echinopsis obrepanda* was to be found at a great many places to the north of Cochabamba, on the mountain slopes between 2700 and 3300m altitude. In lower areas they grow together with *Echinopsis huotii* which is not to be found above about 2900m. I was not able to find *Sulcorebutia krugerae* there, maybe because the outward expansion of Cochabamba city had swallowed up that location. A great deal of the "elevated basin of Cochabamba" mentioned by Buining is today one huge city with very little free space remaining.

Going north out of Quillacollo in the direction of Morochata, shortly before reaching Banos de Liriumi at about 3200m, I also found *Echinopsis obrepanda* with white to slightly pinkish flowers. Some 2km further on along the same road, there were *E.obrepanda* with red, pink, and violet flowers, which were growing in company with *Trichocereus tunariensis*, *Opuntias*, and all kinds of other vegetation.

.....from H.Middleditch

This last location would have been within a one day trip on horseback out of Cochabamba in the 1840's, but there may well be other locations equally accessible from Cochabamba where Bridges may have collected his *Echinopsis obrepanda* that he despatched to Europe, which subsequently produced flowers of various colours.

.....from T.Marshall.

On our very first trip to Bolivia we drove south out of Cochabamba. The city of Cochabamba is expanding rapidly and we were not far beyond a building site on the southern outskirts of the city, when we came upon a sloping area of what looked like waste ground on the east side of the road. The ground was mostly stony, mostly grit or pebbles and stones, a few of the stones perhaps up to football size. There were quite a number of bushes and other low growing vegetation scattered over the slope, but not many bushes on the lower part of the slope near the road, from where they had probably been gathered for firewood. Further up the slope, where there were more bushes, the *Cleistocacti* grew up among the branches, in the shade of the bushes, or exposed. Nearer to the top of the slope, the *Trichocereus* and *Roseocereus* projected well above the tops of the bushes.

There were chains of *Opuntia sulphurea* pads here and there, in sufficient quantity to make it difficult to walk up the slope in places. The sparsity of grasses and herbs meant that on the lower part of the slope we could see numerous heads of *Echinopsis obrepanda*. There were fewer of them near the road, but they were more in evidence as we walked further away from the road, up the slope. Mostly these were single, up to about large grapefruit size, but we did see a few which were forming clumps. There were buds on these *E.obrepanda* which looked as though they would open in a day or two, as well as some open flowers of purplish colour. Also on the lower part of the slope, we found some smaller plants of *Echinopsis cochabambensis* with their typical dirty white flowers. As well as occasional plants of *Lobivia taratensis v.roseiflora*, appearing in somewhat smaller numbers, with open pink flowers.

.....from Curtis's Botanical Magazine 76.1850 Plate 4521

Echinopsis cristata.

Specimens were purchased from Mr.Bridges In 1846 the individual [plant] which blossomed here produced purple flowers. That which bloomed the following year (1847) bore white ones

.....from H.Middleditch

And do any of the populations of *Echinopsis* to be found in the near or far surroundings of Cochabamba display flowers of more than one colour? All recent comments from members who have seen *E.obrepanda* in habitat observe that no populations with both white and coloured flowers have been seen.

.....from W.Rausch. Ibid. [In English]

There are numerous locations where flower colours - white, purple, or orange-red, are mixed and in addition the perianth can be found either funnel form or rotate.

.....from H.Middleditch

Unfortunately these last few words regarding flower form are far from clear to me, as I understand that a rotate flower is basically symmetrical about its long axis and so could be a funnel-form shape.

.....from J.Prantner

Obviously my own copy of *Lobivia* 1,2,3 by W.Rausch is in German, where the perianth of *E.obrepanda* is described as "trichter- bis tellerformig".

.....from H.Middleditch

According to my German-English dictionary, "tellerformig" is plate-shaped, presumably indicating a flower with the petals which are spread out almost flat. It is hardly uncommon for flowers on many cacti to display varying degrees of petal opening, depending upon such as temperature, intensity of sunshine, etc.

.....from G.R.Allcock

I have an old plant of what I take to be *Echinopsis callichroma*, so named by me chiefly by elimination of

other possible names! The form of its flower is strikingly different from that of *E. obrepanda* or *E. obrepanda v. purpurea*, for while the latter show a wide funneliform or trumpet form, the *E. callichroma* shows the shape of a wheel mounted on the end of an axle.

In trying to think of some handy way to describe this flower form, I looked up “wheel” in my Latin dictionary, only to find the word “rotate”. It would appear therefore that the correct adjective to use in respect of these wheel-shaped flowers is “rotate”, as used in this connection in *Lobivia 1* p.48.

.....from H.Middleditch

Prompted by this comment I referred to Ivimey-Cook’s glossary of succulent plant terms, there to find rotate defined as “Shaped like a wheel, used especially of corollas whose petals spread out flat” At least I can now accept the term as used in *Lobivia 1* for the flowers of *E. obrepanda*.

.....from R.Allcock

For quite a long time I was puzzled over the meaning of the word ‘obrepanda’. In botanical matters the adjective ‘repand’ means wavy, but does not appear to give any indication as to what particular respect the implied waviness is realised. The Shorter Oxford Dictionary tells us that “In modern scientific Latin, and hence in English, in Botany, etc., ob- is prefixed to adjectives in the sense “inversely”, or “in the opposite direction”.

In 1845 when *Echinopsis obrepanda* was first described, by Salm-Dyck, the *Echinopsis* most common in Europe at that time were forms of *oxygona*, *multiplex*, and *eyriesii* whose rib edges when seen in profile would often show a waviness, consisting of a sinking between the areoles. This repand construction would have as its obverse, a raising between the areoles, or *obrepanda*. This interpretation would fit the present case perfectly, since it covers both those cases where, in full frontal view, the furrow between adjacent ribs is straight, and also those cases where the rib comprises a series of tubercles, each one offset sideways from the tubercles immediately above and below. Consequently I have for some time understood that it must be the profile view to which the word *obrepanda* actually refers.

.....from W.Rausch, *Lobivia 1,2,3*, *Echinopsis obrepanda*

In 1845 Salm-Dyck described a plant with compressed crinkled ribs and incurved spines which he named *Echinocactus obrepandus* The bodies of these sorts are applanate to globose, attaining a diameter of 20cm, later forming large clumps; the ribs are mostly crooked, rarely straight continuous and with more or less hooked spines.

.....from Curtis’s Botanical magazine No.76, Plate 4521, 1850

Echinopsis obrepandus (from the Latin description) provided with ribs more or less continuous vertical (repand, *obrepanda*, or crenulate), or discontinuous (with tubercles and areoles somewhat separated obliquely).

.....from H.Middleditch

The “discontinuous” arrangement of each tubercle being slightly offset from the tubercles above and below, is hardly uncommon among *Lobivia*. Perhaps it is this feature of a discontinuous rib which Rausch chooses to describe as “crooked”?

.....from K.Preston-Mafham

The offset tubercles were a typical feature of the *Echinopsis obrepanda* that we saw. Also on *E. obrepanda*, the very long flower is quite distinct, the tube tapering in diameter very little along its length until it finally enlarges rapidly into the funnel-shaped flower opening.

.....From G.R.Allcock

The alternative designation of this plant as *Echinopsis cristata* was published by Salm-Dyck in 1849. Did Salm-Dyck have a plant of a somewhat different form from this very polymorphic complex, and so wanted a different name? Otherwise, why would he introduce a new name when he had already made an excellent name of this own with his *obrepanda* of 1845? I do not have any understanding of the possible meaning of “*cristata*” in the present connection. The word usually implies an endowment with a crest, e.g. with a long strip of tufted or prominent growth, etc. I cannot see any such sort of crest on these *Echinopses*!

.....from H.Middleditch

For *cristata*, Stearn’s Botanical Latin offers two or three alternative meanings, one of these being ‘terminal tuft’. Looking at the various drawings of *Echinopsis obrepanda* which appeared in the 19th century in Curtis’s Botanical Magazine, and Edwards Botanical Register, (reproduced in *Lobivia 1,2,3*) the areoles around the crown of the plant each display a projecting tuft or line of spines, in each of which the spines diverge only slightly from one another; those who wished to do so could perhaps see them as a form of a crest. There are quite a number of plants in my own collection where the depression round the growing point is virtually spineless and only on the areoles at about the highest point of the body around the central depression, are there spines worthy of the name.

.....from Curtis’s Botanical Magazine 76. 1850 Plate 4521

Echinopsis cristata v. purpurea.

.....the highest areoles with a single, long, erect-curving central spine.

.....from H.Middleditch.

Meaning the areoles at the highest point of the body, presumably, which would be at roughly half body diameter around the growing point. On quite a number of my plants it is about this position that the spines start to change from a decidedly juvenile form. But not every plant of the same sort is identical in this respect: for whatever reason, one may display relatively strong spines much closer to the growing point than another. If it so happened that Salm-Dyck’s original *obrepanda* was rather weakly spined in the crown area, and another more strongly spined, he may have chosen to regard the latter as having a “*cristata*” spination.

.....from Echinopsis obrepanda Salm-Dyck, Allgemeine Gartenzeitung 13 1845.

(from the Latin)ribs compressed, with marked obrepanda crests between areoles,

.....from H.Middleditch

Which might suggest that it was the protruding tubercles or crests (like a mountain crest) which were the reason for selecting the 1849 designation of "cristata". But that might suggest that the 1845 plant did not display such crests, which is hardly likely since the 1845 description specifically refers to the protruding tubercles as crests.

On the Curtis's Botanical Magazine Plate 4521 of Echinopsis cristata, both the large drawing and the small sketch do display crested tubercles. Yet on the subsequent Plate 4687 of E.cristata there is very much less rise (or crest) on the tubercles in both the large drawing and the small sketch. A different artist? Or not the same plant? But in any case it appears to be reasonable to regard this E.cristata simply as E.obrepanda.

.....from G.R.Allcock

My own E.obrepanda are plants which, except sometimes in extreme old age, are flattened globular, with a rib count of around 14 to 18 although the highest that I have seen so far is 23 ribs. Discounting any areoles that may be present on the lower, highly shrunken and vegetatively inactive, portion of the stem of an old plant, an areole count of 4 to 6 areoles per rib on specimens in 4 inch pots is common. On obrepanda the spines are always subulate and more or less curved, there is never more than one central spine, or central spines may be absent - but if present it is always upwardly curved.

.....from M.Muse.

I have a number of provenanced plants of Echinopsis obrepanda from various locations, all of which display the ribs with prominent hatchet-shaped tubercles. There are other Echinopsis names which I would be inclined to consider as forms of E.obrepanda. For example, I have various provenanced plants of E.calorubra, again from various locations, all of which similarly display hatchet shaped tubercles between consecutive areoles on a rib, Only on this form have I seen flowers with a green stigma. It was in the 1980's when I acquired some E.roseo-lilacina which I was told had been raised from seed taken off plants collected in habitat by Cardenas, and they also have hatchet shaped tubercles, But the bluish-gey colour of the body of these plants is quite different to all my other E.obrepanda.

.....from G.R.Allcock.

In my own collection I have grown plants of Echinopsis obrepanda from various seed sources which show a bewildering array of forms. The body colour may be very dark green, green, light green, or even grey-green. The spines may be stiff and fairly stout, or thin and relatively flexible. Flowers may be white, pink, red, magenta, lilac or carmine. But all those with the varietal names of purpurea, frankii, rubriflora, calorubra, toralapana, have obrepanda ribs which are not quite as prominent on v.calliantholilacina. On my E.calorubra the flowers have a green stigma.

....from R.Martin

In the course of our field trip to Bolivia we set off from Cochabamba, heading west for Sucre. We had travelled about 90km from Cochabamba, not yet having reached Epizana, when we stopped to look round, having caught sight of a population of Echinopsis in flower. On looking closely at the flowers, I gained the impression that they were not as large as I might have expected to see on obrepanda, so they were recorded as E.calorubra. This was one large population, extending over quite a large area, with plants displaying flowers of pale pink, orange pink, or red in colour, which were to be seen intermingling with one another. A picture was taken of plants with flowers of two different colours that were growing within about one foot of each other. At one locality the full range of flower colour were to be seen all within a span of twenty feet. It is possible that where plants of a similar flower colour were clustered together that this was probably more to do with where seeds fell, rather than anything else.

All the plants we examined here displayed ribs which consisted of tubercles which were taller than wide, projecting fairly well out from the body but with areoles set on the body, more or less level with the base of each tubercle. The tubercles did not lie in a straight vertical line on the plant bodies, but each tubercle was offset sideways from the next tubercles above and below, some plants showing somewhat greater offsetting than others.

Another one-day excursion which took us south from Tarija, was made to Padcaya, when again we came across some Echinopsis, not in flower, but these were much bigger plants, up to about 20-25cm in diameter but less than 10cm high, which also displayed offset tubercles

.....from H.Middleditch

Two early illustrations of Echinopsis obrepanda are reproduced from the Curtis's Botanical Magazine in the Rausch Lobivia 1 of 1975, which are drawn with tubercles arranged vertically one above the other in a straight rib. But the Rausch sketch of an obrepanda on his page 49 has a body covered with short vertical lines which at first sight appear to lack any clear pattern of disposition. But on closer examination they may well be intended to represent tubercles set vertically on the body but offset to the right or left of the next tubercles above and below.

I do have an E.obrepanda of some three inches in diameter which does display tubercles that are set vertically on the body but are offset from the next ones above and below. But not by any great distance, varying only from about 3 to 5mm. But I have seen an obrepanda which has tubercles that collectively lie in a line more or less vertically up and down the body, but the individual tubercles lie at an angle to the vertical. Is this an odd one out?

.....from M.Muse

The first description of Echinopsis calorubra by M.Cardenas appeared in the NCSJ in 1957, where it was stated to originate from Prov. Valle Grande, Bolivia, en route from Comarapa to San Isidro. The flower was

described as being of an orange-red colour. I have three plants in my collection of *E.calorubra*, all raised from habitat collected seed. All three have flowered and these are indeed all of an orange-red colour. The oldest of these plants is globular, about 3 inches across, but then I am not over-generous in watering my plants. It was grown from seed obtained from Kohres in 1984 which was stated to originate from Valle Grande. A second plant was grown from seed of HS 133 obtained from Kohres in 1990, and a third plant from seed sown in 1991 obtained from K.Preston-Mafham PM 159 which was collected in 1990 from near Totora.

.....from H.Middleditch

The original Cardenas description of *E.calorubra* includes a picture of one of these plants, which has the tubercles arranged one above the other, so forming straight continuous ribs. My own plant of *E.calorubra* does have the tubercles arranged vertically one above the other, so forming straight ribs.

.....from M.Muse

On my PM 159 and HS 133 the tubercles are offset from those above and below, whereas my original plant from ex-Kohres seed, received as "aff. *E.calorubra*", has the areoles set deeply between hatchet shaped tubercles which are aligned in straight ribs.

.....from H.Middleditch

The original description of *E.obrepanda* by Salm-Dyck did not quote a flower colour. In the 1852 Curtis's Botanical Magazine there is illustrated an *Echinopsis cristata* as Plate 4687. The subtitle effectively placed this name in synonymy with *E.obrepanda* Salm-Dyck. The flower is described as having petals of a creamy white, "passing into the greenish-purple of the outer sepals" and also refers to "the purple flowered variety". In the drawing of the plant, the ribs are formed of tubercles arranged vertically above one another in a straight line. In view of the all the foregoing comments concerning flower colour and tubercle disposition on *E.obrepanda*, it would appear that it can encompass flowers of white or varying shades of pink to purple, as well as having tubercles disposed either vertically to form a rib, or offset from the next ones above and below.

.....from G.R.Allcock

In the New Cactus Lexicon, the description of *E.calorubra* states that it has "tubercles not offset" and "flowers orange-red above, pink tinged blue towards the base" whilst the description of *E.obrepanda* states that it has white flowers and to have tubercles offset. However, the illustrations of the species *E.obrepanda* in the NCL do include one having a coloured flower. Also in the works of W.Rausch in his *Lobivia* 1,2,3, there are also illustrations of *E.obrepanda* with white and with coloured flowers.

.....from F.Vandenbroeck

I have seen populations of *E.obrepanda* at many places in arid areas, like near Arani or Vallegrande, and I do not recollect seeing any of these plants in flower with both white and coloured flowers in the same population.

.....from T.Marshall

We have seen groups of *E.obrepanda* in flower and to the best of my recollection, where we saw these plants with coloured flowers, there were no with white flowers to be seen. On the way from Sucre to Yamparaez we stopped at two or three places where we could see groups of these plants with only white flowers.

THE STEINMANN, HOEK & BISTRAM EXPEDITION TO THE BOLIVIAN ANDES

By H.Hoek and G.Steinmann.

Translated by H.Middleditch from Petermanns Geographische Mittheilungen 1906 No.1

On 23 September 1903 we were ready to set off on our trip to Bolivia, from Jujuy, the last station on the northern Argentine railway. Our preparations were aided not the least by Moreno, the well-known Director of the La Plata Collection. In company with Moreno we rode via Humahuaca, Abra de Tres Cruces, and Cochinoaca, to Rinconada. Then at the Laguna de Pozuelos we parted company with Moreno as our route took us to Yavi. As we rode east we crossed the watershed between the Quebrada Humahuaca and the Rio San Juan. Yavi lies in a small valley some 112m below the level of the plateau. Up to here we were well served by the excellent Brackebusch map of the area but from now on it was to be quite different.

We reached the Bolivian frontier at Salitras, 3575 m. Away to the east lay the Victoria range whose highest point was the Cerro Cajas. Here the Victoria range divides into two arms, enclosing the extensive Pampa Tacsara of some 30km broad and 50km long, in the form of a shallow basin. In the northern part of this shallow basin lie three lakes without outlet, the salars of the Laguna Patancas, occupied by thousands of flamingoes, ducks, and geese. The southern part drains via the deeply entrenched Rio Honda to the Rio San Juan. North of Laguna Patanca our route crossed an insignificant pass into the Escayache valley.

At Salitras our ways parted for a few days. Steinmann rode northwards, descending into a red sandstone trough through which flows the Rio San Juan, as far as Tojo. In the warm climate at 2680m altitude where the Rio Honda joins the Rio San Juan there grew vines, olives, and figs. Steinmann then ascended to the plateau again near Yunchara. At the Patancas ranch the party was reunited.

On 12 October we stopped in Tarija leaving again on 20 October, crossing the eastern arm of the Victoria range at Cuesta Escayache. The single ridge descends gradually to a dissected mountainous area which in general appears to be an elevated plateau sloping to the north-east into which the rivers had entrenched themselves very deeply. At the height of the pass we once again came to the Puna which again bore the character of the area between Yavi and Patancas. Our route lay northwestwards over the plateau and in section gradually descending. After crossing the Quebrada Obispo we once more travelled through an arid greyblue landscape.

Once over an insignificant pass we reached the Chaupino valley, then for almost three hours followed it downhill. In its upper reaches it is a dry valley with abundant lush woodland of Acacia and cactus vegetation. The whole area between Escayache and the Rio San Juan is, in accordance with its height, a transition to the half-desert of the Puna. Even individual large trees occur, but always the vegetation bears the stamp of spiny and scanty.

No traveller could escape noticing that as he approaches the Rio San Juan, he comes to a geologically different sort of region; the extensive, red coloured sandstone cliffs of the mountains, the sandstone gorge of Chaupino, as well as the eyecatchingly inclined superimposed strata, in which the thick layers of sandstone outcrop abundantly. All these features stand in very obvious distinction to the grey and grey-blue paleozoic schist landscape through which we had ridden from Escayache. On 22 October we reached San Juan, standing besides the river of the same name, and then followed its course northward for a short while. It is a typical isoclinal valley in which it flows, and this valley continues farther after the river has left it by a breach through the valley wall to the east. The sandstone trough of the Rio San Juan is submerged under pampas alluvium somewhat south of Salitre and continues further to the north, beyond Tacaquira.

Our route lay directly northwards, over a small pass, always accompanied to the west by the red wall of the crown of strata, east of a slope inclined at about 45°, which represented the angle of the strata. At midday on 23 October we reached the Rio Grande de Cotagaita [=R.Tumusla - H.M.] which flows in the northern continuation of this long valley. Its course is in a southward direction from Cinti (Camargo); where we first came to it, near Vinapunta, it has also turned to the east, to join up immediately with the Rio San Juan to form the R.Camblaya.

From Vinapunta to Camargo, over a stretch of about 35km, the great isoclinal valley widens out slightly. This section also goes under the name of the Cinti valley. There on the broad valley floor a productive irrigation is possible, so here at the favourable altitude of about 2450m there flourishes the cultivation of fruit of the finest excellence. There are splendid houses which manifest evident prosperity which, together with the green of the gardens standing out twofold in the red surroundings, delight the eye. A principal product is wine, followed by figs. The valley is occasionally of great scenic beauty, the sandstone castles of Palca Grande especially exciting the interest. They lie roughly in the middle of the Cinti valley, where the Rio Grande de Cotagaita comes from the NW and joins the R.Camargo coming from the north to form the Rio Chico.

On 28 October we left the rich Cinti valley and riding northwards on a good track we arrived at a high plateau of paleozoic rock, similar to that between Escayache and the Rio San Juan, which again was dissected by numerous deep and steep sided ravines, which all drained to the R.Pilcomayo. Having left the isoclinal valley which we had followed from San Juan, a half day's ride brought us to Tacaquira, where the height at which the luxury of plant growths occurred was again left behind.

.....from P.Down

There is a large mass of red rock, of about the size of the Malvern Hills in Worcester, which is a very prominent feature to the west of San Pedro. We would be about half way between Cotagaita and the Cinti valley when we first saw the peak of this rock standing a little way above the rest of the mountains to the east. The peak has a very distinctive shape and colour. At the same time there were places along the road here where we could look down into the very deep and steep sided valley below, in which the river was flowing, in the same direction as we were travelling. The nearer we came to the Cinti valley, the less we were able to see into the river valley below; but the road continued to run more or less through the top of the mountains, so that for most of the time we could see the prominent red rock coming steadily closer. A little later we could see this very same lump of rock from the opposite side as we climbed up from San Pedro on the road to Culpina.

We had a little difficulty finding the start of the road over the mountains from San Pedro to Culpina, as there are no road signs. Hardly had the road got beyond the buildings of San Pedro than it started to climb sharply, with the first few zig-zag bends hidden behind the buildings. It then continued to climb up the steep mountainside in a series of zig-zags for a distance of 2 to 3kms. The surroundings were mostly grey rock and scree, with bushes and cacti scattered over the otherwise bare rocky ground. There were some *Jatropha* bushes to be seen and amongst these we saw what we at first thought were very tall *Weingartias*. But they turned out to be *Lobivia lateritia*, some 40 to 50cm tall, solitary plants with a slightly untidy spination. There were also *Weingartia cintiensis*, many of them clumping plants, and white-spined *Parodias* both solitary and in clumps. This is where Lau found his L.917. In every square meter there were a few cacti of one, two, or even three of these genera. So although the plants were scattered, there were plenty of them over the mountainside.

As the light was beginning to fail we decided that we would stop here on our return journey from Culpina in order to take some photographs. From the top of the climb we could look back and see the conspicuous red rocks near Palca Grande, where we had come from Cotagaita and left the valley of the Rio Tumusla and entered the Cinti valley.

.....from J.Kirtley

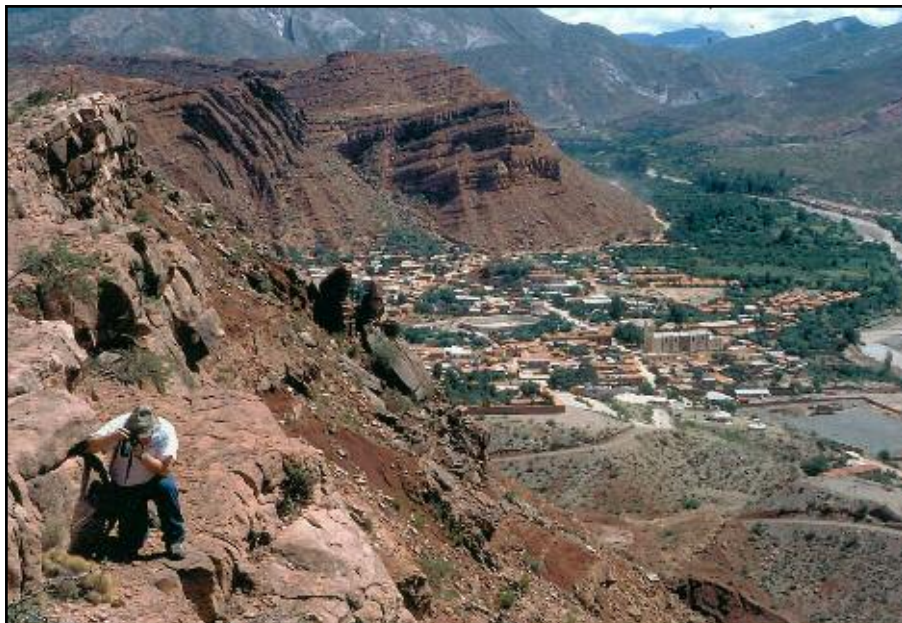
At San Pedro we crossed the river by a girder bridge and started to climb immediately. The flat area at the bottom of the valley is quite narrow and all this ground is given over to cultivation, mainly vineyards. Also on the valley floor grew quite a few trees which could have been 4 or 5 metres high; some of these looked like poplars - they could have been eucalyptus. The mountainside we were climbing was almost flat, like a tilted table top, the slope being too steep for the road to go straight up, so it wound from side to side. The ground we were crossing was mostly solid rock with little in the way of loose stones. The vegetation was mainly scattered bushes barely 1 meter high, together with a very occasional spindly tree about 2m tall. There was very little in the way of grasses. Stopping on this climb we found some *Lobivias* of *lateritia* affinity, *Parodia splendens*, and *Weingartia cintiensis*, together with a number of *Jatropha*. Looking across to the other side of the river, the



Near
El Puente

Photos:- F. Vandebroek

West of
San Pedro



Above
Camargo
Photo:- J. Fahr

Parodia camargensis

valley was bounded by an almost vertical mountain wall which could well have been over a thousand feet high with fans of scree at the base. A large depth of these cliffs was formed of a thick layer of red rock, crowned by bare pyramid-like peaks in brown strata. From where we stood, there was no vegetation at all to be seen on this rock wall. We climbed further up on the road to Culpina, still on the same flat slope. But then we had to turn back on our tracks because of repairs to the road. Wherever we turned to gaze, there were cliffs of red, blue, or grey, to be seen.

We stopped briefly for petrol in Camargo where the rock formations are quite unique - a patch of strongly folded strata, whereas all the rest of the way along the valley the strata gave the impression of being undisturbed by folds. There were still a number of trees 4 to 5m tall among the houses, but again the surrounding mountainside was very bare. We pushed on from here in the direction of our next overnight stop at Puna. Just outside Tacaquira we stopped near the football field. Next to a bush with broad green leaves we found two - and only two - *Parodias*, which may possibly have been of the *maassii* group. The spines were slightly curved but not twisted to any great extent; the spination did not obscure the very green body. One plant was about grapefruit size, the other was almost a meter high and leaning over at quite an angle giving the impression that it would not take much more growth for it to topple over completely. This plant bore orange flowers. Here we also saw a sprawling patch of *Platyopuntia* over a meter across, it carried less spines than the *platyopuntia* seen near Impora but was remarkable for the raised tubercles. It carried over a dozen flowers which were nearly white. On the slope rising on the far side of a dry gully, there were thickets of what appeared to be *Cleistocactus*, but thornbushes on the far bank of the gully prevented access. There were some cuttings of thornbush infilling any gaps as if it might have been intended to contain livestock. Here the mountains rose a great deal less above the valley than at San Pedro.

The altitude at Impora, Las Carreras, Villa Abecia, Palca Grande, and at San Pedro, is around 2500m. Travelling north to Muyuquiri, the altitude gradually increases to 3500m over a distance of about 28 km. From photographs taken at intervals between Camargo and Muyuquiri, there is not much in the way of vegetation bordering the river, or anywhere else, so that this paucity of vegetation may indicate a harsher climate than at Villa Abecia and around Impora.

A VISIT TO THE CINTI VALLEY From F.Ritter

From Carrizal I walked upstream towards Oroya, where one can cross the river in a basket guided on a wire rope; at this time of the rainy season crossing the river is a problem. From there I walked into a canyon in the high mountain. My most valuable find here was a new *Parodia* which I published as *P.commutans*. Towards evening I arrived at El Montes, where I had to stop overnight and where a native gave me shelter in a hut. Since it was pretty cold at night here in the mountain and I was inadequately prepared for it, I was thankful that the man offered me a blanket for the night. The next morning I climbed further up the mountain. My objective was Mal Paso where a road was under construction from Tupiza over the mountains to Carreras and thence to Tarija. By nightfall no habitation was in sight. Finally I saw some lights on a slope; it was quarters for the military troop engaged on road construction, where I stopped overnight. On the next day I went no further towards Mal Paso but returned to Carreras.

When near Villazon on 17 January 1957 I had the good luck to find a great many ripe cactus fruits. Two days later I washed out the seeds from them in a stream at Tupiza.

On April 27 I set off before sunrise from Hacienda Oroya near Carrizal on the track up a broad side valley northwards into the mountains. Then a steeper ascent began; late in the afternoon I arrived at El Molle, going on further in the direction of Torata. After nightfall I found no house for lodgings and eventually made myself a fire in the valley bottom, keeping it going through the night. In the morning I climbed further still, crossing a high ridge; about ten o'clock I came to the road to Torata. Here grew some interesting cacti, of which I made notes and collected samples. About eleven o'clock the omnibus running between Tarija and Tupiza appeared, which I took as far as Impora; then went on to Carreras.

.....from F.Vandenbroeck

We have made a number of visits to the quite long valley which is occupied by the Rio San Juan del Oro to the south of Villa Abecia and the Rio Tumusla to the north of Villa Abecia - the Cinti valley. The floor of this valley is almost flat and at many places it is given over to cultivation. But at other places, such as to the north of Villa Abecia, the whole of the valley remains barren. The relief structure of much of this valley, from Camargo in the north to Carrizal in the south, consists of deep beds of sloping strata which rise obliquely upwards to the east and end in a steep cliff face. Where the Cinti valley cuts through this strata, much of the length of the west side of the valley consists of steep slopes or even cliffs, where several layers of strata are exposed. To the east side of the valley the ground frequently slopes upward at a moderate gradient and in places the bands of strata can terminate in a series of steep cliffs, facing away from the valley.

The climate in this valley is quite different to that on the much higher ground at either side of the valley and in particular the temperature can be much higher in this valley than on the surrounding heights. Looking for *Parodia* in the vicinity of La Torre - close to Camargo at about 2,400m altitude - we found the heat to be almost unbearable. Nevertheless, after our first two visits to the Cinti valley, we decided that it was an area that we would like to go back to again, and we were indeed able to make a visit there later. In the surroundings of Camargo at the northern end of the valley, the whole area is characterised by obliquely sloping red sandstone terraces, which are also to be seen further south in the Cinti valley. On these terraces several interesting species of cacti may be found, such as *Parodia*, *Lobivia*, *Weingartia*, *Gymnocalycium*, *Trichocereus*, and *Echinopsis*.

These various cacti which can be found on the sloping sides of the valley, usually at the lower levels, do not occur on the more extensive areas of higher ground at either side of the Cinti valley. At altitudes of about 2300m there is a freely clustering, white spined, small bodied plant usually named as *Weingartia cintiensis*. These plants are numerous all over the Cinti valley where they often grow together with *Parodia*.

We first found *Gymnocalycium cardenasianum* close to Carrizal. My earlier visits to the Cinti valley led me to believe that this *Gymnocalycium* was rather scarce, but in the course of a later visit to this area, I hit upon many other populations. These plants are to be found close to the floor of the valley as well as on the rocky slopes at the sides of the valley - even occasionally up to the rim of the valley near Carrizal. On the higher slopes they are to be found in company with *Parodia ritteri*. As young plants, these *Gymnocalycium* keep well hidden in the soil, but the larger specimens grow into globular forms up to about 20cm across. They usually grow in stony soil, with a long deep tap root. These *Gymnocalycium* are frequently to be found on flat sandy pebblestone-strewn terrain where they often grow at the foot of small shrubs, although many fully exposed plants do occur.

The *Lobivia lateritia* seem to prefer the lower altitudes around the valley floor, where they can be seen with either red, yellow, or orange flowers. We never saw different flower colours intermingled in one and the same population. Between El Puente and Carrizal we only saw yellow flowers on these *Lobivia*, whilst northwards from El Puente they tended to flower orange or red. As is the case with *Parodia camargensis*, these flowers may be seen from November to January. The same applies to *Trichocereus camargensis*.

Around the town of Camargo there are vineyards to be found with *Parodia camargensis* growing close to them. This *Parodia* is abundant in the Cinti valley from Camargo to El Puente, where it can grow columnar up to as tall as 40 to 50cm., frequently forming clumps, and with a conspicuously golden yellow and variable divergent spination. It may also be seen in the lateral valley of the Rio Cotagaita off the central Cinti valley. Also quite abundant are several other species of *Parodia* which are to be found further away from Camargo, such as *Parodia fulvispina* - near Tojo, the tall *P.cintiensis* - near Impora, or the tall slender *Parodia* found along the Rio Camblayo which was described as *P.camargensis* v. *camblayana*. To the south of El Puente, to Carrizal, I did not see any *P.camargensis*, but here *P.ritteri* is to be found.

It was in late January of 1997 when we made an excursion from Las Carreras - where we had our lodgings for several days - to La Torre, where we found lots of interesting species. The months of January and February are somewhat the high point of the rainy season in this part of Bolivia, so it was quite normal that in the afternoon we had to confront heavy rain showers. Yet, coming back near El Puente, we wanted to make another excursion up a high hill slope, as far as the ridge of the crest, in order to find other plants. We waited for the rain to calm down and off we went. We found numerous specimens of *Lobivia lateritia*, *Parodia camargensis*, *Trichocereus camargensis*, *Opuntia sulphurea*, and a few *Cleistocactus tupizensis*. In the meantime it started pouring with rain again and from the ridge of the crest, the valley of the Rio San Juan del Oro looked very grey and misty.

The hill slope was moderately steep. The plants of *Parodia camargensis* were fairly numerous and the specimens were growing rather closely together. These *Parodia* readily form clusters, even producing so many heads that they form a kind of spiny cluster. In this case the individual heads of the plant remain much shorter and flatter than solitary plants. Ritter described them as *P.camargensis* v. *prolifera*. In the accompanying picture taken near El Puente, the *Trichocereus camargensis* here were up to about 1.5m tall, mostly growing in a somewhat semi-decumbent way. The bushes and trees were 4 to 5m tall and it is not exceptional to find such trees on the valley slopes. It could be said that *P.camargensis* can be found in a variety of circumstances, on shallow or steep slopes, on rocky ledges. or even on flat ground.

These *Parodia* are growing on extremely steep - often unreachably steep - slopes in the valleys of the Rio Cotagaita and the Rio Tumusla to the west of San Pedro, but that is because these valleys are deep and narrow. Here the *Parodia* do not cluster, possibly because of the extremely arid habitat. The accompanying picture gives a closer look at these plants, where there is seemingly no other vegetation to be seen. However, this picture was taken in the month of August 1988, which is the dry period. The speckless blue skies do not promise a single spot of rain. In the rainy season, all kinds of smaller herbs and grasses may spring up amongst the stones. Also near Tojo the Cinti valley is very narrow and deep.

Between Las Carreras and Villa Abecia the river runs through a broad valley with sloping sides, where it took us about half an hour or more to walk from the road, across the barren valley floor, to the foot of the rocky slopes. In 1985 we did find a form of *Parodia* which formed large clusters with as many as 20 to 30 heads and, strangely, the different heads of the clusters tend to remain globular. I found these plants either on the bottom of the valley or close to it, mainly between Villa Abecia and El Puente. They did puzzle me at the time. It may be a form of *P.camargensis* v. *prolifera*, although the spination is different from the forms of clumping *P.camargensis* that we found near El Puente, where it is fairly frequent.

.....from J.Fahr

From the petrol station in Camargo we found a narrow track which took us through the mountains and up to the high plateau. Walking about 100m from this track we reached the spot in the accompanying photograph from where we could look down over the valley and also see the town of Camargo, below. It was on these rocky ledges that we saw some plants of *Parodia camargensis*.

.....from F.Vandenbroeck

Certainly we did find *Parodia camargensis* growing on such ledges, just at the rim of the valley. The highest altitudes where I found these plants was east of Santiago de Cotagaita, well above the canyon of the Rio Tumusla. Here they grow in company with *Trichocereus*, *Lobivia*, *Weingartia*, and *Cleistocactus*. To the west of San Pedro I did manage to reach the *Parodia camargensis* which were growing on steep, bare rocky slopes. This was the only location where all the plants remained single headed, obviously because the habitat

is too exposed and barren.
.....from H.Middleditch

On the front cover of Chileans No.58 there is a photograph of a *Parodia ritteri* seen near Impora, which lies to the west of the Cinti valley. Looking at this picture, and at other pictures which I have of this *Parodia*, I find that the body is virtually hidden from sight by the spination, which is fairly dense. By comparison, in similarly close-up pictures of *P.camargensis*, the body can be glimpsed between the spination. Could this be because there are less ribs on plants (of similar size) of *P.camargensis* compared with *P.ritteri*? So that there is a wider gap between adjacent ribs, allowing sight of the body?

.....from P.Down

I have been growing plants of both these *Parodia* for over twenty years now, under a variety of names that are usually grouped under one or other of these two species. Some of them are from our BDH trip in 1992. They all get cylindrical with age and sometimes take nearly ten years before they will flower. My *P.ritteri*, four of them with Lau, ZT, or BLMT provenance, and three others, have 13, 14, or 15 ribs. My *P.camargensis*, two with RBC and Lau provenance, and seven others, have 12, 13, or 14 ribs. The reason that the body can be seen on *P.camargensis* is that the areoles are further apart, allowing the body to be seen through the spines. On *P.ritteri* the areoles are closer together along the ribs so causing the spines to hide the body.

.....from H.Middleditch

Several of the place names which are mentioned above may be found on the Chileans Cinti Valley map.

THE GYMNOCALCIUM URUGUAYENSE COMPLEX. By A.Hofacker and K.Herm. From *Gymnocalcium* 7(4) 1994

The distribution of *G.uruguayense* is in no way confined to Uruguay. This species is also still to be found about 30km away from the border, in Brazil. Its main distribution area, however, is in Uruguay.

Uruguay is a small country for South America. To the north it borders the Brazilian state of Rio Grande do Sul, in the south to the Rio de la Plata. In the west, the border to adjacent Argentina is the Rio del Uruguay and to the east, the Atlantic Ocean. Almost the whole expanse of Uruguay is covered with typical hilly pampa, which in only a few places becomes interrupted by gallery forest along the larger rivers. In the west, it adjoins the level pampa. Impressive in the northern parts are the table mountains. The infrastructure is little developed, there are only a few main roads, which are moreover to be found in poor condition.

Uruguay belongs climatically to a moderately warm zone with rainfall in all seasons. On average, about 1,000mm of rain falls over a period of 90 days in the year. Between the periods of rainfall, the landscape takes on a steppe-like character. The ground is porous, with a pH between 5.5 and 6.2.

Cacti are to be found throughout the country. Almost no cacti are to be found in a marshy area around the Rio Negro in Central Uruguay. Notocacti are the most widely distributed, followed by *Frailea*, *Gymnocalcium*, and *Echinopsis*. The genus *Gymnocalcium* is represented by some described taxa. However, we regard these plants as close to one another, so with the exception of *G. schroederianum* v. *Osten* we recognise no important distinctions. The flowers on these plants are mainly yellow, in various shades. But very often either the stamens or the stigma are stunted, so that it is possible to distinguish male and female flowers. In this way, one speaks of incomplete dioecious forms. The seeds of the Uruguayan *Gymnocalcium*, with the exception of *G.schroederianum*, are fairly large and belong to the subgenus *Macrosemineum*.

Under the name of *G.uruguayense* (Arech) Br.& R., our finds will be presented here, which in the widest sense are associated with this species. They are the plants which have been described under the names of *G.netrelianum*, *leanum*, *guerkeanum*, *hyptiacanthum*, and *artigas*. In the opinion of the authors, it is hardly possible to make a division into these different species. The range of forms around *G.uruguayense* is so great that it is very difficult to find clear distinctions. Most of the plants in an individual population are fully homogeneous, but even a few kms away a completely different habit can be displayed. One therefore needs to include these groups in the concept of one species and regard the individual populations as specific habitat forms comprising one very variable species which is still in the process of developing. In addition, if in this case the name *uruguayense* is hardly allowed to continue on taxonomic grounds, it should continue to be still employed, because up to the present time it is the most widely distributed one that has been found.

The plants in this complex can be readily divided into two groups. The well spined plants which only occur in the north of the country, and the less well spined plants. The first group would be represented by *G.uruguayense* and its var. *roseiflorum*. The second group is to be found in central and southern Uruguay. The plants from there commonly have 7 to 11 radial spines. Even by eye these plants can usually be distinguished from *G.uruguayense*. Their spines are thinner than those on *G.uruguayense*, and they lie against the body of the plant or curve round it. These plants tend to fit the description of *G.hyptiacanthum*, which unfortunately lacks any indication of flower colour, or that of *G.leanum*. In the past, *G.hyptiacanthum* would frequently be confused with *G.leanum*. Backeberg even considered *G.leanum* to be a hybrid, later regarding it as identical with *G.netrelianum*. Critical inspection indicates that both these descriptions are not valid, therefore these plants, too, could be included in the *G.uruguayense* complex.

Echinocactus uruguayense was validly described by Arechavaleta, albeit with white flowers. This was either a mistake or there were actual plants which had white flowers. The Type location was stated to be Paso de Los Toros, where today there is a huge dam and in place of what was then a small hamlet there is now a large town. The white flowers appear in the literature from time to time due to long-gone mistakes. Fric, who brought the first plants to Europe, maintained that the flowers were yellow, whilst Britton & Rose said that they were pink. Herter, who found the *G.artigas* and described it, referred to the first description of

Arechavaleta and contended that his Gartigas with yellow flowers must be something new since the foregoing reference to *G. uruguayense* had white flowers. This did not hinder him at all from printing a photograph of *G. uruguayense* with his first description and titling it as *G. artigas*.

Our AH 145 (=HU 1331) was found about 20km to the north of Santa de Livramento. This species grows here together with *Notocactus minimus* Fric & Kreuzinger variety *tenuicylindricus* (Ritter) Havelicek and *Notocactus mammulosus* (Lem) Bckbg in rough ground. The habitat is covered with relatively dense dwarf herbs

Gymnocalycium H10 (HU 1202) and H12 (HU 1206). Both habitat locations lie in the so-called border area between Brazil and Uruguay. Here the green border develops. The habitat location lies within the grassland area, which is especially obvious on account of the many accompanying grazable plants. They grow here in small groups, drawn down deeply into the stony ground. In close proximity there are *Notocactus mammulosus* and *Frailea* sp. to be found.

.....from G.O.K. Monthly Vienna meeting minutes.

(A slide show from W.Rausch) In 1968 W.Rausch undertook a trip through Uruguay in company with D.J.van Vliet. Uruguay is a hilly, relatively low lying country - the highest mountain is 501m high - whose wide grassy plains are grazed by millions of sheep - they are the greatest enemy of the cacti. The cacti often grow amongst the grass, although their preferred habitats are stony places in the countryside. Striking with the Uruguayan cacti is that they flower towards the end of the rainy season, when their bodies are plump and succulent. In contrast to this, the cacti in the high Andes bring forth their flowers at the first signs of life at the end of the dry season. The first cactus flower appeared out of the grass - a *Gymnocalycium uruguayense*. Outside the flowering season these plants are hidden in the grass and are not to be found. This species is distributed throughout the whole of Uruguay, their flowers are paler or darker yellow, externally brownish, their bodies are closely or sparsely spined, the spines finer or stronger. All forms are met with, intermingling at all habitat locations.

.....from K.H.Prestle, *Succulenta* 1991

The *Gymnocalycium uruguayense* growing in the north-west part of their distribution area are very interesting, as they exhibit a great variation in their appearance. Those growing on the Brazilian side of the border have round ribs and smaller bodies. They grow in grassland or meadow and are very difficult to find.

The pink flowered form of *G. uruguayense* has been known for a long time but it has always been regarded with much scepticism, because some people cannot understand that pink flowering plants can exist within this yellow-flowering group. For example, Frank, in Krainz, *Die Kakteen*, knew nothing about the population where these plants came from. He did not know if they had a range of varieties or only one form. Other specialists thought that it was a hybrid. Where the origin of this flower colour is, remains a problem that will never be solved.

.....from L.Bercht

Across the whole of Uruguay and also in some places on the north side of the border, in Rio Grande do Sul, one can find a group of *Gymnocalycium* which in the past have been given several names like *uruguayense*, *netrelianum*, *guerkeanum*, *leanum*, and *artigas*. These are commonly grouped together under the name of *G. uruguayense*. Kiesling has also included *G. hyptiacanthum* in this group, but that is open to question.

I have visited this area on three different occasions and found these *Gymnocalycium* at around 200 different habitat locations. In the north you will find plants with 3 - 5 strong spines, whilst in the east there are forms with many appressed spines, and in the south these plants have spines with a dark base. But in any one population there is little variation in spination, although all the plants in any one population will not be absolutely identical. The male plants have a stronger tendency to make offsets than female plants whilst male and female plants do tend to display some difference in spination, from my own observations.

During my visits to this habitat area I have been able to collect seed off these *Gymnocalycium* and I now have several hundred seedlings of these plants in my collection, which are now of flowering size. The flowers are either white, pink, or yellow. None of the populations that I came across display flowers of more than one colour. Those from Arroyo Tres Cruces, south of Artigas and also from some 50 km. to the south near Campamento, have pink flowers (LB 651, 655 and 658). Somewhat to the west near Javier de Vana and Cuaro (LB 642, 644) flowers are nearly white. All the others have (greenish) yellow flowers. The nearly white flowers are probably more closely related to the pink flowering ones than to the yellow flowering plants.

.....from P.Moor

I have a number of plants of *G. uruguayense* which I grew from L.Bercht seed, including LB 306, 326, 651, and 656. Also a plant of *G. netrelianum* HU 93 which was obtained from a commercial source. None of these plants have central spines. The LB 651 and 656 are recorded as var. *roseiflorum* and both of them do have pink flowers.

.....from C.Dean

I have plants of *G. uruguayense* Schlosser 102 and 149 which have pale yellow flowers, as well as a plant of *G. netrelianum* HU 93 which has a clear pink flower. The Schlosser plants show new spine growth outwards from the body but I interpret these as being radial spines, since as they mature they form spines that are radial, almost flat to the plant body and curving back towards the body.

.....from W.Phillips

I have two plants of the pink flowering *G. uruguayense* HO 25 which are stated to have originated from Massoler in district Riviera, Uruguay. Also a pink flowering FS 542, an ex-habitat plant from Salto.

.....from H.Middleditch

The HO 25 originates from the area which is noted by L.Bercht as the home of the pink flowering

Guruguayense. But the habitat of "Salto", close to the Rio Uruguay, does not appear to be recorded elsewhere as an area where pink flowering plants may be found.

.....from R.Zahra

All my plants of Guruguayense have no central spines with the exception of my LB 2693, which does have central spines.

.....from L.Bercht

I have looked at all my plants of Guruguayense and only on my LB 2693 from Ruta 56 could I see a central spine.

.....from R.Crook

I do have a plant of *Gymnocalycium* Schlosser 103 which does display a protruding central spine on some of the areoles.

.....from P.Harper

I am growing a number of *Gymnocalycium* of the Uruguayense group and they are all somewhat similar in having radial spines which tend to bend back somewhat, following the basic contour of the body. However, it will be almost thirty years ago that I acquired four plants from Whitestones nursery with Schlosser field numbers, In the intervening years they have grown and produced offsets, several of which are now as large as the original heads and all four are in 10 inch pans. The largest heads are about 4 inches across, many of them a little wider than tall. They have 14 to 16 ribs with 7 to 9 radial spines per areole. The Sch.126 from Cerro Pieda de Afilar and the Sch.138 from Punta Balena have no central spines, but the Sch.136 from Colonia has a few central spines and the Sch.109 from Laguna del Sauce has an occasional central spine.

.....from R.Mottram

A batch of *Gymnocalycium* which had been collected in Uruguay were sent to me by H.Schlosser in 1979. I still have plants of Sch. 101, 102, 107, 109, 125, and 149, which have been grown from offsets taken off the original collected plants. These are now mostly about 6 to 7cm diameter. Only the Sch.107 has one areole with a central spine of 1cm long, the others have no central spines.

.....from H.Middleditch

In the above article by Hofacker and Herm, there is a reference to five species names, in addition to uruguayense, to be found within what they describe as the uruguayense complex. The oldest of these names is *G.hyptiacanthum*, first described by Lemaire in 1839. It was stated to have radial spines, there being no reference to central spines which, by default, would evidently have been absent. The flowers, fruit, and origin of the plant concerned were stated to be unknown. The Forster-Rumpler 1882 Handbuch der Cacteenkunde has no *hyptiacanthum* in the contents index but it is included in the text. It attributes "weissgelb" i.e pale yellow flowers to this species and also states that central spines were absent, the radial spines being "appressed to the body", all features present in most Guruguayense.

The 1898 Schumann 'Gesamtbeschreibung der Kakteen' states that flowers are pale yellow and also "central spines 0 - 1". The accompanying drawing is of a plant with radial spines appressed to the body but without any central spines. Britton & Rose say that central spines are solitary or wanting. In their publication of *G.schatzlianum* in K.u.a.S. 36.12.1985, Strigl and Till provide a table comparing selected features of *hyptiacanthum* and this spec. nov., in which it is stated that *hyptiacanthum* has "central spines mostly absent, one in age".

.....from K.H.Prestle, 2009

In the past thirty years I have paid frequent visits to Uruguay and to Rio Grande do Sul, and as a result I have a comprehensive collection of plants which display that in these lands far more cacti occur than have as yet been accepted. As far as the species such as uruguayense, *netrelianum*, *hyptiacanthum*, and *melanocarpum* are concerned, I am less of a specialist since I possess a comprehensive collection of *Notocactus*, *Echinopsis*, and *Frailea*, but one could also say that I am a so-called habitat specialist. Unfortunately the so-called species of *Gymnocalycium* are much more variable than have been accepted so that whatever is written in the literature is often quite incorrect.

Some years ago I documented some of the forms of *G.denudatum* from Rio Grande do Sul in the Austrian Cactus Journal "Gymnocalycium" and I have also written a further contribution to show that almost only half of this species is known.

Regarding the other *Gymnocalycium* noted above, I have written a lengthy article (of some twenty pages) some time ago for the same publication which unfortunately has still not been published, since the Editors work somewhat slowly and in addition are translating and revising the scientific part in the Vienna University.

But I can give you some quite new observations, as in the meantime I have found some white flowering populations in the south and in the north of Uruguay, which show that in accordance with today's ideas, the work of Arechavaleta has covered only a part of the species, which must be completely re-defined.

Also the species *netrelianum* and *hyptiacanthum* which up to now have been almost completely neglected are still present in these lands, if also somewhat very concealed in populations of Guruguayense forms. I regret the very long time since new plants worthy of new descriptions have been brought into cultivation. It appears that the *G.netrelianum* is not only to be found in the SW of Uruguay but this species is at home in central Uruguay. *Gymnocalycium netrelianum* very often has a central spine but this occurs only in age and hence is not often seen.

The *G.hyptiacanthum* were found by me in Rio Grande do Sul hidden between plants of Guruguayense, although this species is almost exterminated. According to the prevailing conception, *G. hyptiacanthum* has a flattened globular habit, a distinctive spination, and also a distinctive flower. Up till now, a central spine similar to *G.netrelianum* can not be confirmed. Both species are very probably closely related to one another, whilst up till now *G.hyptiacanthum* has only been seen in Rio Grande do Sul.

.....from H.Middleditch

The writer of these last observations clearly holds his own views regarding naming and identification of the Uruguayense group of *Gymnocalycium*, which would not appear to quite match the general consensus. Nevertheless, the observations regarding the occurrence of central spines on habitat plants of age, does match other comments on this aspect, and also fits Schumann's 1898 statement of "central spines 0-1". The suggestion that white flowering plants can be found in the south of Uruguay is rather unexpected.

.....from R.Zahra

My two plants of *G.hyptiacanthum* were grown from ex-Kohres seed, without any provenance. They are now five years old, being about 50mm in diameter and about 40mm high. Both of them have two central spines at virtually all the areoles.

.....from H.Middleditch

It seems to be very likely that these are not plants of the Uruguayense complex, but are probably of either *gibbosum* or *reductum* affinity if they flower white, or *schatzlianum* if they flower yellow. But it is possible that there may be other plants of this complex in cultivation originating from commercial sources which are not correctly named, which may help to explain the confusion that has surrounded this group of names.

.....from R.Zahra

We should not give too much weight to the fact that we have plants with field numbers. Most of the seeds that we buy from dealers come from plants they have themselves, or their friends have, in their greenhouses. These might, or might not, have been grown from seed collected in the wild. Furthermore in greenhouse conditions cross pollination between plants of different species could not be ruled out.

.....from H.Middleditch

It would appear to be most probable that *G.hyptiacanthum* is the earliest described name within the "uruguayense complex".

.....from R.Mottram

It seems to be pretty much agreed these days that *G.hyptiacanthum* is the first name to be described for the Uruguayense group of *Gymnocalycium* and so has priority. The drawing in the 1914 *Blühende Kakteen* plate 164, entitled *Echinocactus hyptiacanthum*, which has a white flower and also several projecting spines per areole, would appear to be a misapplication of this name.

.....from H.Middleditch

Gymnocalycium netrelianum was first described as an *Echinocactus* in 1853 by Labouret in 'Monographie de la Famille Des Cactées'. with radiating spines and yellow flowers. *Gymnocalycium guerkeanum* was first described by Heese in the German Cactus Journal M.f.K. for 1911 where it was stated to have a pale yellow flower, no central spines, and appressed radial spines. *Gymnocalycium artigas* was first published by Herter in 1951.

.....from L.Bercht

It appears that the name *hyptiacanthum* is now being accepted for all the *Gymnocalycium* of the uruguayense group.

.....from H.Middleditch.

G. uruguayense was first described by Arechavaleta in 1905 in *Flora Uruguay*, with an accompanying photograph of a plant without central spines, the radial spines curving back towards the body. The flowers were stated to be white, which is rather odd since the habitat location of Paso de los Toros is well outside the area from which white flowering forms of *G. uruguayense* have been recorded more recently.

.....from L.Bercht

I have searched the area around Paso de los Toros but I was not able to find any specimens of *G. uruguayense* there - it appears that they have become rather sparse in that area. When we were there the ground was rather wet and also we were there in the latter part of the afternoon, so that it was far from easy to search for these cacti. But I have received one or two plants from M.Meregalli which do originate from the vicinity of Paso de los Toros and they do have yellow flowers.

WHAT IS GYMNOCALYCIUM LEEANUM? By D.Metzing. From *Gymnos* 8 (1991) 65

(Conclusion) Summarising, it is thus established that *Echinocactus leeanum* i.e *Gymnocalycium leeanum*, has been misinterpreted at the latest since 1922. *Gymnocalycium leeanum* Hook is a species from the south east of the province of Buenos Aires. It belongs in the relationship with *G.gibbosum* (Haw) Mittler, and *G.schatzlianum*, consequently in the *Gymnocalycium* series *baldianum* Buxbaum. For *G.leeanum* sensu Br. & R., another name must be sought, but that will not be considered here. For the time being these plants from Uruguay should be described as *G.leeanum* non Hooker.

.....from G.Charles, *Gymnocalycium in Habitat and Culture*".

(page 112) Metzing 1991 came to the conclusion that *G.leeanum* was in fact a plant related to *G.reductum* and *G.schatzlianum* from Buenos Ares province.

(References, page 272) Metzing 1991 Was ist *Gymnocalycium leeanum*? *Gymnos* 8(16) pages 63-65.

.....from R.Mottram

Looking at my copy of the German *Gymnos* publication, there is the article in *Gymnos* 8(16)1991 pages 63-65 by D.Metzing where he suggests that *G.leeanum* is related to *G.gibbosum*.

.....from H.Middleditch

With my copy of *Gymnos* 8 for 1991, pages 63-65, open in front of me, I see that it is suggested by D.Metzing that the name *leeanum* should be placed under *G.gibbosum*. But is there any record of *G.gibbosum*

displaying either a spination or a yellow flower colour to match the 1845 drawing of *G.leanum*?

.....from P.Harper

I do have various *G.gibbosum*, none of which look the least like my *G.leanum* and all of them flower white.

.....from R.Zahra

Gymnocalycium gibbosum is to be found in a huge area covering part of the Departments of La Pampa, Buenos Aires, Rio Negro, and Chubut. From my own plants I find it to be very variable. Neither this species, nor the synonyms from the G.Charles book on *Gymnos*, have yellow flowers and I have never seen any plant having a name associated with *Gibbosum* which has yellow flowers. In the G.Charles book, *G.leanum* was treated as *G.reductum* subsp.*leanum* (Hooker) Papsch, but then G.Charles is an arch-lumper.

.....from H.Middleditch.

Looking at the 1846 drawing of *Echinocactus reductum*, which accompanied the article by Pfeiffer and Otto in *Abb. und Besch. Blühende Cacteen*, it gives the impression of several spines at each areole standing well away from the body, quite unlike the 1845 drawing of *G.leanum*. In the first description of *G.schatzlianus* by Strigl & Till in *K.u.a.S* 36.12.1.85 it is stated that this species has a yellowish-white flower and (1) 4-7 central spines, without indicating whether some plants have one central spine, or if some areoles on these plants have one central spine. If it is one central spine per each areole, then this plant would be close to *G.leanum* Hooker. As this latter is the earlier publication then it becomes necessary to say *G.leanum* Hooker synonym *G.schatzlianus*.

.....from Curtis's Botanical Magazine 1845 Plate 4184.

Echinocactus leeanus. ...tubercles not arranged in distinct lines or series so as to form ridges with their corresponding furrows, but placed with a good deal of irregularityareoles producing about eleven rather slender spines of which one, the central one, stands forward and is quite straight. The other ten are slightly recurved and spread horizontally, most of them nearly equal in size and about half an inch long.

.....from H.Middleditch

This description would suggest that each areole carries a central spine and this is also displayed in the accompanying drawing, which includes two apparently full size areoles and spines, one of which does clearly include a central spine whilst the central spine is far less clear on the second one.

.....from R.Purves

I have a plant of *G.leanum* which was acquired when the A.W.Craig collection was sold up. It is now 5cm wide and 3.5cm high. with 10 ribs and with a very dense spine cover. The radial spines from each areole intermingle closely with those of its neighbour. Some of the areoles also have a central spine which stands straight out, just like the spine cluster on the 1845 drawing, but most areoles lack a central spine..

.....from F.Berger

On the older plants of *G.leanum* in my collection there is an isolated central spine.

.....from H.Middleditch

These last two observations fit in with the 1898 comment from Schumann for "0-1 central spines" on *G.hyptiacanthum*, but do not match the characters for *G.leanum*. Also in view of the observation from L.Bercht that he has one plant of "*G.uruguayense*" raised from ex-habitat seed which does display some central spines, would this suggest that these particular plants labelled *G.leanum* may well belong in the *Uruguayense* complex?

.....from G.Charles

In my book I accepted Papsch's opinion that the plants from the Sierra Tandil in southern Prov. Buenos Aires, Argentina, are the original *Echinocactus leeanum* (Hooker). I think my cultivated plant of Papsch 89 5-7 from the Sierra Tandil illustrated in Fig.224 on page 112 is a reasonable match for Hooker's original plate 4184 from Curtis's Botanical Magazine (1845). They both exhibit a single central spine, a feature which my habitat observations suggest is not consistent in the population.

.....from A.de Barmon

My *G.leanum* was grown from Koehres seed listed as as GK 610/91 in his 1991 catalogue. Comparing it with the 1845 Curtis drawing of *leanum*, the one difference is the complete absence of any central spines on my plants in cultivation.

.....from H.Middleditch

Would this last observation suggest that this plant could hardly be *G.leanum* and may well be *G.uruguayense/hyptiacanthum*? It is possible that there could be other plants in cultivation which originated from commercial sources which are likewise not correctly named. This would help to explain how confused has become the identification of plants in cultivation of the *Uruguayense* group.

.....from R.Coward

I have grown some *G.uruguayense* from ex-Mesa Garden seed with bodies which give me the impression of looking rather like *G.denudatum*.

.....from H.Middleditch

Do both *G.uruguayense* and *G.denudatum* grow together anywhere in habitat? Anywhere near Artigas, for example? Does *G.artigas* have a body which bears resemblance to *G.denudatum*?

.....from N.Gerloff

In the course of my travels in Uruguay and Rio Grande do Sul, I have come across some *G.denudatum* near Aguas Claras which display flowers that are pale yellow to almost white. These will be *G.denudatum* v.*neocopinum*.

.....from N.Riedel

My pink-flowering plants of *G.uruguayense* v.*flora rosa* Fric were originally received in the 1970's from

Dr. Schutz at Brno, and from S.Fleischer. From the firm Haage in Erfurt I have *G.hyptiacanthum* v. *citriflorum*, which greatly resembles the 1898 Schumann drawing of this species. and on only one of these plants there are occasional central spines. My *G.artigas* have yellow flowers but only 6-8 ribs whereas my *G.uruguayense* usually have 12-14 ribs. It appears to be misguided to regard this *G.artigas* as part of the *Uruguayense* complex.

.....from G.Slack

I have looked at my *G. netrelanium* and *uruguayense* of which I have 4 or 5 plants of each name. The *uruguayense* tend to have 6 to 11 ribs and the *netrelanium* have 11 to 16 ribs.

.....from G.J.Swales

The original description of *G.artigas* by G.Herter gives the rib count "at first 6-8, later up to 10" This feature would not appear to separate *G.artigas* from the *uruguayense* complex. Herter does not appear to have published a photograph of the plant with his original description. But he refers to a habitat photograph entitled *G.uruguayense* from Paso Valegas which appeared in an article by Muller-Melchers in a 1947 issue of *Sukkulantenkunde* which, according to Herter, was his new *G.artigas*.

.....from R.Mottram

There are four plants in that habitat picture which each appear to display only eight ribs.

.....from H.Middleditch

Which would hardly appear to justify their separation from *G.uruguayense*

.....from G.R.Allcock

My own plant labelled *G.artigas* produces yellow flowers, which is in accordance with the original description by Herter.

.....from H.Middleditch

That Herter original description is reproduced in the *G.Charles Gymnocalycium* book, including reference to the yellow flowers.

.....from G.J.Swales.

The Type specimen of *G.artigas* was collected by Herter at Blanquillo, which lies almost in the centre of Uruguay, and was named after General Artigas, the founder of Uruguay. This name has no geographical connections.

.....from H.Middleditch

In his article on the *Gymocalcium* of Uruguay, which appeared in the *Dutch Succulenta*, K.H.Prestle records a PR 52a *G.artigas* (misprinted as PR 53a in the Czech version) from the place named Artigas which lies on the border of Uruguay and Rio grande do Sul. It may be that this name was used without knowledge of the Type location quoted by Herter.

There would appear to be still confusion surrounding the names which fall within the *Uruguayense* complex, whilst the original *G.leanum* with central spines at most areoles would appear to be a better match for the current *G.schatzlianum*.

SOME DISAPPEARING SULCOREBUTIA?. From W.Gertel

Most of our visits to the habitats of *Sulcorebutia* in Bolivia have been made some time during the month of October. There is usually little rain in that area in October and it can sometimes rain more in one place than in another, but it is not really the start of the rainy season. A great many *Sulcorebutia* seem to withdraw into the ground for the dry season, when they probably receive no water for many months. But in October many of them may still be buried so that it can be very difficult to find them, even if we are sure that we are looking in the right place. They can produce flowers in October, which we did see when we were looking for these plants, but the flowers very often project up out of the ground without the actual plant being visible. With the onset of the real rainy season, this is when the *Sulcorebutia* show themselves above the ground. When a visit was made by J.de Vries to a *Sulcorebutia* location in October of 2005, he wrote to tell me that there were very few plants of *Sulcorebutia* to be seen at that place, but when I visited that same place in the following December, we found hundreds of them, if not thousands. None of them in flower, but many in fruit.

The mountainous area in which many *Sulcorebutia* are to be found in Bolivia is separated from the Amazon lowlands by a range of high mountains. The air coming from the tropical lowlands is driven over this dividing range and it is a fantastic sight to see the clouds coming over that ridge every afternoon, as well as during the night, the cloud and mist coming well downhill. One morning in October, when we had spent the night in our tents at a place about 15km to the east of Epizana, we could hardly see our hands in front of our faces because of the fog. The tents were soaking wet and water was dripping from the trees and bushes. On the next day, to the west of Epizana, we were unable to drive to the side valley lying near Monte Punco, where I had earlier found *Sulcorebutia tiraquensis* in 1985 because a hail storm drove the heavy clouds and fog through the valley. All the fog dissolved in the sun before it reached the main road.

This mist zone extends from about km90 to the east of Cochabamba, all the way to about km180 in the same direction towards Santa Cruz, or even further. Depending on the height of the mountains and the existence or absence of valleys which cross the mountain chain, this area is more or less damp. Almost anywhere in this area there are rocks to be found which are covered with moss. These are usually good places for finding *Sulcorebutia*. Over the 20km or so between Epizana and Cochabamba, there are no *Sulcorebutia* to be found because the mountains and the mist zone are too far from the road itself. which over this stretch is well above 3000m altitude, which is too high for *S.tiraquensis*.

We were at the location of *S.totorensis* in 1989 when we found many of these plants in flower but with no sign of the plant bodies. Because of the bad weather, we were not able to take photographs. Three days later, in beautiful weather, we made a detour in order to be able to visit the same place again, to take pictures, but we found hardly any flowers at all on the *Sulcorebutia*. At several of the places where we found *S.totorensis* in 1989, the habitats looked like a flowering meadow, and so when we were on a field trip two years later I wanted to show my friends this magnificent display. But there was not a single flower to be seen and we hardly found any plants, even though *S.totorensis* is not really tiny.

Near Estancia de Bombeo, we visited the location of *S.verticillicantha* in 1986 at the beginning of October and found many plants in flower. We went back to the same spot two weeks later with four of us searching for plants, but we did not find a single one as they were still buried underground. The place "Sayari" which Ritter mentions in his first description of this species is only a few km distant.

Even in cultivation, each plant of a specific field number will flower all together over a period which may be only two or three days. Before that time, or later, the odd flower or two may appear, but if all plants at one location do flower at the same time, this will ensure that many flowers do get cross-pollinated.

The surroundings in which *Sulcorebutia* are to be found differ from site to site, but there are some features which are to be seen at many of their locations. Most *Sulcorebutia* grow on hills, more or less on the crown, whilst others, like *S.frankii*, grow on the lower hill slopes. But I have never seen a site where *Sulcorebutia* grow without a lot of rocks. Many *Sulcorebutia* grow in the cracks of rocks where nothing else would be able to survive. So an essential feature of a *Sulcorebutia* site seems to be hills with loose rocks of all sizes.

Take, for example, the place where *S.tiraquensis* grows. From the road one has to cross a gradually ascending area covered with bushes and small trees, The branches of the bushes and trees are covered with moss. Then a few metres ahead we see the hillside starts to ascend more steeply and the trees and bushes abruptly cease to grow there. Only grasses remain, with some herbs and very low shrubs. Now we come across *S.tiraquensis* growing well above the surface of the ground, and looking very much like the *Sulcorebutia* as they grow in our greenhouses. There is a lot of moss between the grass as well as the *Sulcorebutia*. By comparison, *S.steinbachii* grows level with the surface of the ground, in much less drier areas, also without trees and bushes close by, but again in the company of hardy grasses.

Then we found *S.pampagrandensis* growing in very sparse surroundings, in company with hardly any other sort of vegetation except for some dwarf grasses and also what may be lichen. On a mountain close to Sucre, covered almost top to bottom with eucalyptus trees, only the uppermost part of the summit is partly free of these trees and only here is *S.canigueralii* to be found, at spots where there is little soil and some moss. In the dry period, these *Sulcorebutia* are covered with sand and leaves from the trees. At another summit, where the magenta coloured flowering *S.canigueralii* grow, there are no trees at all - this is one of the barest places at which I found *Sulcorebutia* growing - usually in cracks in the rocks.

On top of the pass near Sucre, *S.vasqueziana* is to be found growing between small rocks in company with nothing else but some sparse low growing grass and some lichens. Sometimes it is difficult to distinguish between the *Sulcorebutia* with its long yellow spines from the small plants and the grass. Of course I do not know how many of these sorts of surroundings may change during the rainy season.

I have found *S.loosenickyana* on the Cerro Chataquilla and it is also to be found along the road from Punilla to Ocuri. But here, there is an almost unbelievable mix of forms with no distinctive differences to be noted at any particular spot. In cultivation their appearance changes considerably but it is still a complete mixture with not a single plant from one spot looking like another from elsewhere.

Recently *Sulcorebutia* has been found more or less 15km from Santa Elena and further on the way to Camargo.

SEEKING SULCOREBUTIA By W.Christie.

In mid October of 2001 I was taken by B.Bates on a tour of cactus habitats in central Bolivia, in the course of which we visited various habitats where *Sulcorebutia* could be found. Some of the places along our route had received recent rains, but others had not and here the *Sulcorebutia* were still pulled down well into the soil. We rarely had to walk more than some 10 to 20m away from the road in order to be able to see any *Sulcorebutia*, so that I was not able to see how widely any of these populations might extend, nor whether there was any variation in the appearance of these plants throughout any one population. The whole area over which we travelled was a fairly high plateau so that all the *Sulcorebutia* which we saw grew at relatively high altitudes. Individual plants varied greatly in the size of their heads as between one stopping place and another.

The immediate surroundings where we found *Sulcorebutia* did vary from place to place. At 2775m, not far from Totora, on the road to Omereque, we found *S.oenantha* pulled down into the clayey soil, plants of only 1cm across, growing on a flat rocky area together with a few dwarf xerophytes. A few km further along this road, at 2750m, on a similar flat area but rather more stony, we found *S.tiraquensis* v. *totorensis* with single headed plants of 4 to 5cm across, standing out from the stony soil. They displayed variable spine colours. Also growing here was *Echinopsis obrepanda*.

Between Epizana and Monte Punco, near Chulchungani, at 3050m, we found shallow rooted plants of *S.tiraquensis* f. *bicolorispina*, growing on a hillside in shallow pockets of soil among, or on, large sandstone rocks. Many of these plants were in flower, some flowers bright red, others with a purplish (magenta) tinge to the petals. These plants were found immediately next to a field of potatoes which had new green shoots some 30cm or more high, so there must already have been some rain here.

A km or two further along the road we spotted a spectacular *Trichocereus conaconensis* in full flower on the side of a steep gorge, which dropped some 20m or more from near the road down to the valley floor. Also growing here on top of the cliff were large plants of *Echinopsis calorubra*. On the opposite side of the gorge, we found *S.tiraquensis f.bicolorispina* again, in flower, together with yellow spined plants that may be the form *electracantha*, some in flower, growing among thick grass. A short way to the west of Lopez Mendoza there were large plants of *S.tiraquensis*, about 5cm in diameter, growing on a gentle rocky slope among low growing xerophytes.

At 3180m near Rancho Zapata, there were *S.tiraquensis v.longiseta* growing on an inselberg in small pockets of soil or moss on the sheer rock face, which was perhaps 100m long and up to 10m high. Some of these plants were growing in the shade of Puyas and they were greener and much less spiny than the typical form.

At 1km to the east of Kairani at 2525m, on a stretch of flat rocky land, some 30m wide between the road and a tree lined river gorge, we found *S.steinbachii v.polymorpha* on the rockier areas, with heads up to 6cm across. Where the soil was thicker, there were *Echinopsis calorubra* and *Lobivia maximilliana v.caespitosa*. On a flat sandy patch near the edge of the river gorge there was yet another micro-habitat where *Tephrocactus rossianus* was growing.

A few km further on, at 3650m, near Toralapa, among gently rolling hills, we followed a ridge and found some *Sulcorebutia*, all single heads rarely more than 1cm across, pulled right down into the deep soil. There were two forms of this *Sulcorebutia* here, which we could not identify at the time, but later they were named *S.steinbachii*.

At our first stop between Arani and Mizque there were *S.taratensis* together with another unidentified *Sulcorebutia* species, growing on a rocky knoll some 20m high. The solitary plants were 2cm in diameter, with large tap roots, that grew in deep pockets of soil among the rocks. In similar looking rocky surroundings, at 3180m among rocks by the side of the road, we found large numbers of *S.steinbachii v.australis*, usually solitary, with heads up to 8cm across, but also with occasional clumps, many with bright red flowers, growing amongst mosses. Similar plants were to be found everywhere we stopped along a 20km stretch of road, even though we gradually dropped down to 1000m altitude. But near Mizque at 2190m, we again found *S.steinbachii v.australis*, after climbing a gentle slope to a rocky outcrop. But here, each plant looked different, ranging from pectinate spines to long yellow centrals.

We drove from Mizque to find *S.purpurea* at its type locality, at 10km from Chaguarani, at 2960m. Here they were growing on a very exposed hillside among rocks and rough grass, in stony ground right at the top of the pass. These plants were mainly single heads of up to about 8cm in diameter.

Back at Chaguarani, at 2638m, among rocks by sandstone cliffs, we found *S.cylindrica v.crucensis* with pink flowers growing in shallow pockets of soil among bare rocks. The plants were globular and about 5cm in diameter, and were occasionally double headed.

At 5km from Chaguarani at 2500m, there grew the usual yellow flowered form of *S.cylindrica* on a rocky sandstone area on a gentle slope backing on to steep cliffs a few hundred metres away. The plants were white-spined, elongated up to 10-12cm long and up to 4cm in diameter, growing in shallow pockets of soil and hanging over the red sandstone, all solitary, many in flower.

At 12km before Aiquile, near Kairani, at 2625m, we found *S.albissima* growing amongst white stones and shale on a gentle slope. Many of these plants grew together in clumps but I had the impression that they were all single plants - unless the branches started well below ground level. *Echinopsis huotii* also grew at this site, among tufts of rough grass and shrubs which were also around the *Sulcorebutias*. On similar terrain near Kairani grew *S.mentosa v.santiaguensis*, all solitary plants up to 4cm in diameter. On the way back to Aiquile, 10km before there, at 2450m, there were *S.swobodae* growing by the hundreds among mosses, along a flat rocky outcrop on top of a low ridge. These were yellow spined plants whilst brown spined plants grew on another ridge at the other side of the road, with individual heads of up to 4cm across, barely projecting above ground level.

Stopping at the southern edge of Aiquile at 2350m, we found *S.mentosa*, many in clumps, growing in deep shade among rocks and leaf litter on a gently sloping hillside. Close to the school at Quiquijuna, at 2813m, there were *S.pulchra* growing with *Parodia prestoensis* on a steep exposed hillside of crumbling shale, near the top of the pass where not much else grew.

Not far from Sucre, at 11km from Alamos at 2980m, there were *S.caniguerallii* growing in pockets of soil among the rocks, in company with *Austrocylindropuntia teres* and also growing nearby were *Cleistocactus buchtienii* and *Lobivia cinnabarina*. At the Barrancas pass, at 3090m, we found a few single headed plants of *S.vazqueziana*, 2cm across, on a long, low, rocky outcrop just above the road, growing in shallow pockets of soil on the rocks.

Some 21km from Alamos, there were *S.alba* growing on a flat rocky area at one side of the road, while *S.frankiana* was growing in a grassier area at the other side of the road, about 10m apart from one another. Both were found as single heads of up to 3cm across or in small clumps.

At Hacienda Uahka, at 3175m, which lies 23km beyond Yamparaez, there were large clumps of *S.tarabucoensis v.aurieflora* growing on a low flat rocky ridge, in company with *Lobivia cinnabarina*, *Echinopsis calorubra*, and *Parodia yamparaezii*, but little else apart from moss and lichens, and a few sparse clumps of coarse grass. Beyond Tarabuco, at Lambayo, we took the road leading towards Presto. After difficult travelling over rough terrain we reached a spot some 30km from Presto at 2550m, where we came across plants of a new and un-named *Sulcorebutia*, later named as *S.tarabucoensis v.patriciaeae*, which were hard to find as they grew in cracks between rocks and leaf litter on a hillside which was covered in shrubs of about 1 to 1.5m tall. This was quite atypical surroundings for *Sulcorebutia*.

Having driven for 5km on our return along the same road, we found what was possibly *S.gemmae*, growing on top of a rocky outcrop at 2750m at the summit of a hill. These plants peeped out from cracks in the rock where there appeared to be very little soil, with heads of only 1cm in diameter. This was an archetypical *Sulcorebutia* site.

After spending the night at Valle Grande we headed east and at 7.5km out of town, at 1900m, we had a long trek through an area of grass and shrubs where cattle were grazing, then a good climb to the very top of a hill where there were hundreds of *S.langeri* growing in what seemed to be pure sand and grit, most of them being about 1cm in diameter.

.....from W.Gertel

I think I know the place where the "first stop between Arani and Mizque" was made, as I have also stopped there at my G99. It is *S.steinbachii* which grows there, not *S.taratensis*. And my G85 is probably the unidentified *Sulcorebutia* seen "near Toralapa at 3650 m" which should be the magenta flowering form of *S.steinmannii* v.*hoffmannii*.

.....from H.Middleditch

Would it be correct to presume that the shallow-rooted plants found in pockets of soil in depressions in rock, did not have a tap root, since there would hardly be adequate depth of soil to accommodate such mode of growth?

.....from J.R.Kirtley

To the south of Totora we came across plants of *S.pampagrandensis* growing on a rocky outcrop which had tap roots wedged down between cracks in the bedrock, whilst near Lopez Mendoza the *S.tiraquensis* had fibrous roots clinging to only a few centimetres of topsoil over bedrock.

.....from T.Marshall

There is quite an area of farmland around Mojocoya, which we drove through for perhaps a couple of miles as we headed for Cerro Nunauco, which rises to the NW of Mojocoya. The plateau below the mountains is mainly land cultivated for agricultural crops, with the town of Mojocoya in the centre of the plateau. After the initial steep ascent of the Cerro Nunauco, we came to what is a more or less flat topped mountain which gradually rose in altitude the further we went along it. Here the ground is quite shaley - the rock crumbles and breaks up very easily. There are sporadic shrubs growing throughout this area but the cover is by no means heavy. The area seems to be fairly well grazed by goats.

At roughly 2700-2800m altitude, we found some *Sulcorebutia* growing in clefts in the rocky ground, which look very much akin to *S.mizquensis* or *S.crispata* - smallish spined bodies with delightful pink flowers. These were recorded by J.de Vries under the name of *S.mojocoyensis* n.n. The body form of these plants is quite variable - in the manner of varying spination - so that visually these plants looked like *S.crispata*, *S.augustinii*, or *S.langeri*. The *Sulcorebutia* seem to be very altitude sensitive, as they do not seem to grow on the lower hill slopes, even if the habitat matches that of where they grow higher up on the hill

.....from J.Cooke

Spine colour does seem to be variable on a number of species of *Sulcorebutia*. I have several clones of *S.rauschii* which display spines varying from yellowish to brownish, as between one plant and another. Also I have several plants of *S.vizcarrae* grown from seed sown in 1986 with spine colour varying from plant to plant, from a deep brown spines, to reddish centrals and white radials, to uniformly yellow spines.

.....from J.R.Kirtley

Even at one location in habitat we could find plants which differed in spine thickness, length, and colour, in the number of spines present and the colour of the body, to name a few features. Flowers may also be variable in colour in the same locality. In my own collection I have over a dozen plants of *S.krahnii* which have a similar rib count and spines of similar length, attitude, and density, but their colour varies from nearly white, through cream, pale brown, reddish brown, to almost orange. In addition I also have over a dozen plants of *S.cylindrica* which vary in rib count from about 12 to about 20, and with spination varying between 1cm to nearly 2cm in length, and from white to brown in colour.

.....from H.Middleditch

The photograph of *S.cylindrica* taken by W.Christie in habitat, is of a plant which is decidedly long and thin, which is not growing upright, but lying more or less horizontal on the ground. Is this just a peculiar oddity, or does this species really grow normally in this manner?

.....from J.Cooke

I have in my collection a plant of *S.cylindrica* which I obtained about twenty years ago from Windyridge Nursery, as a cutting off an imported plant of Lau 335. It does grow in an elongated fashion with a stem of not much over an inch in thickness, but when it gets to about 6 to 8 inches tall it falls over, so I cut it off and reroot it. It has lemon yellow flowers which appear from up to the shoulder of the plant and probably come from areoles that are about two years old.

I do have several other *Sulcorebutia* which are taller than broad, such as a *S.menesesii* FR 775 which will be a good twenty years old, that is about 7cm in diameter and 15cm tall. But it is not impossible that this elongation may be a reflection of my cultivation. In the summer, my greenhouse enjoys direct sunshine for about five hours before the shadow of the house falls over it, and in the growing season - about April to September - I water my plants liberally once a week with a hose pipe.

.....from W.Gertel

Sulcorebutia cylindrica is normally the only *Sulcorebutia* which grows to a cylindrical shape when getting older, although there are others which do this under certain circumstances. To be precise, it is only the yellow flowering type-form which does this, not the magenta flowering var.*crucensis*. This, of course, is in habitat. In culture also var.*crucensis* tends to grow cylindrical when it gets old, but it stays compact for much



Sulcorebutia
cylindrica
HS 46

Photos & Collection:-
J.R.Kirtley



Sulcorebutia
krahni



Sulcorebutia cylindrica near Chaguarani



Sulcorebutia cylindrica VZ 153

Photos:- W. Christie

longer than the yellow-flowering ones. It clearly depends upon the amount of light it gets. In my own collection, none of my *S.cylindrica* have ever fallen over to lie horizontal. It was at a site near Chaguarani that we came across plants of *S.cylindrica* in flower, with yellow flowers at one site and with pink flowers at another site.

.....from J.Pot

Sulcorebutia cylindrica is rather strange. It looks as though it falls over, but you cannot bend a horizontal stem back upright, if it is lying down - it is quite stiff. One pink flowering HS 44 has grown rather long, but it still does not "lie down".

.....from P.S.Deane

Some of my *S.cylindrica* are about 30mm in circumference and 25cm long. One plant of this length has started to fork in two; it would have flopped over if I had not supported it. My W.Kr 679, supposedly *S.cylindrica* v.*crucensis*, from the road between Chaguarani and Tin Tin, is covered in white wool, with blackish spination. It is about 25mm in diameter and 18cm long, has flopped over and there are now seven offshoots, about 25mm long, from the horizontal portion. My W.Kr 671 v.*crucensis* is only 15cm tall and flowers magenta. Another of my *S.cylindrica* is a Lau 337, a columnar plant with a yellow flower.

.....from J.R.Kirtley

In my experience, plants of *S.cylindrica* become elongate as they age, to the point of being snake-like and creeping along the ground. My two imported plants of *S.krahnii* obtained from Uhlig in 1993 were growing in this way when I acquired them and have continued to do so. They had to be held down into the pot by fencing wire and supported along the body by another pot until they rooted, as otherwise the weight of the stem overhanging the pot would have tipped itself out of the pot.

The roots of *S.cylindrica* are fleshy and fusiform, as on my Lau 335, but not tap rooted. The flower on this species are mostly pinkish magenta, but there are some yellow flowered forms such as Lau 335, and HS 65, whilst those with white flowers are quite common, such as HS 44a.

.....from H.Middleditch

There are several references made by W.Christie to seeing *Sulcorebutia* with heads of barely 1cm across, growing in crevices in the rock, and others evidently growing in soil with more root room with heads of 6 or even 8cm across. Do the small headed plants grow into much larger heads when given adequate root room and watering in cultivation?

.....from J.R.Kirtley

From my own recollections of seeing *Sulcorebutia* growing in habitat, the sizes of individual heads do vary, but I also found that no two plants of the same species were exactly alike. The variation from one locality to another can be quite marked, but the plants within each of those localities can be quite similar, but never all the same. For example, on a rocky outcrop at Sacaba on the road from Cochabamba to Colomi, where all the individual plants of the species seen there were single headed and nearly the same size, about 1cm in diameter, but each was an individual. I feel sure that these are the plants that J.Donald discovered, JD 134, a red flowered variety of *S.krugerae*, which as far as I know have not been recollected. Growing among them were other plants of various sizes of a different *Sulcorebutia* species with long, strong spines.

In many cases the differences between individual plants in one population are minute, so that even when looking at 50 or 60 plants growing within a few square feet, they may all look the same, but on really close examination, differences can be found. Differences in size could result from many causes, age being one, availability of moisture and nutrients another, and even plants growing within inches of one another may not receive the same amount and so be a different size, even though they are the same age.

.....from W.Christie

Most of the small headed *Sulcorebutia* which I have grown from ex-habitat cuttings do grow rather larger in cultivation. But certainly not all of them. The *Sulcorebutia langeri*, for example, still keeps its small heads which will be only about half an inch in diameter, but it produces numerous offsets in the course of time which form into a clump.

.....from W.Gertel

Of course most *Sulcorebutias* will grow larger in cultivation than in habitat, some doing it more - like *S.canigeralii*, *S.pulchra*, etc., - some doing it less, like *S.langeri*. But even *S.langeri* can become quite big in cultivation due to better feeding.

A BED OF THORNS?.....from F.Wakefield

For quite some time I have had problems with seed raising on account of the growth of moss on the top of the pots. This year I attempted to tackle this particular problem. First of all, I sterilised the compost (half peat, half grit, plus a small amount of lime and Q4) by raising the temperature to about 180°F and keeping it there for about twenty minutes. Thereafter the compost was kept under a closed cover as far as it was possible to do so. The seeds were sown on to the compost and watered with a solution of Filex in boiled rainwater. The pots were placed in a gravel tray and placed on a propagator under the staging with a pane of glass overall. Enough of the Filex solution wound up in the gravel tray to ensure that the compost remained moist.

Thereafter, the glass cover was never removed until some five months had elapsed, when most of the pots were removed and the plants pricked out. There was no sign of any moss on any of the pots and about half of them had a light film of blue-green algae on the surface of the compost, which had remained thoroughly moist over the whole period without any replenishment.

From this it seems to me that the way forward is to take a little more care in handling the compost so that it is exposed to the air (and airborne spores) for the absolute minimum of time. Finally, none of this treatment seems to have affected either germination or growth.

....from J.Brickwood

From time to time I experiment with different compost mixes for my seed raising. I have had a love/hate relationship with perlite. Formerly I stopped using it because of its tendency to migrate upwards in the pot and because the pots seemed to dry out very quickly in warm weather. But I have now started using it again quite simply because it seems to do the job better than grit or coarse sand and plants seem to develop better root systems in it. Incidentally, I have found that the Cal-val sand is pretty useless for this purpose. I now stick basically to a mixture of John Innes/Arthur Bowers/Perlite for virtually all of my cacti. More loamy or more peaty mixtures are used depending upon the genus. The key to long-term success, I believe, is a high content of mineral constituents, be it perlite or grit, or whatever. Nowadays I tend to use 50% or more in my compost and now rarely lose plants due to overwatering. I was tempted to stray last year by experimenting with Baby Bio houseplant compost, because a large sack of it seemed to be so light and airy. This was a mistake, because I found that it actually retains more moisture than the 'heavier' composts. But, worst of all, horrible white lumps of a creamy mouldy type of deposit form near the surface after a few waterings, which proved disastrous in my trials using it as a seed compost. But there again, I know others who swear by it!

I have had algal growths on my seed pots using both JI and peat-based composts, so I do not think that the JI is to blame. It is not really a major problem if it forms after germination - the seedlings grow on quite happily regardless. In the past I have used cling-film to cover a whole tray full of 2" seed pots and these do indeed remain moist until the film is removed. This method has been used with great success with such as Lobivia and Gymnocalycium. The only reason that I now prefer to seal the pots individually is partly through lack of space, but also to minimise the the risk of algal or any other attacks affecting a whole lot of seed pots, rather than the odd one or two. Individually sealed pots do dry out quicker, but providing they are tightly sealed, they do not require too many rewaterings.

ORANGE SEEDLINGS? From C.Holland

It is many years ago that I was able to obtain some viable seed of Austrocactus. At that time I used to use copper fungicide to treat the seeds, by applying it to the newly sown seeds on a sterile media, and subsequently for several dosings after germination. Since that time my procedure has changed little except that I now use Chinosol at one gram per litre, or half as strong again. Even then some seedlings still went orange at the base or were completely orange and deformed on escaping the seedcoat. I have heard of people treating some types of seed with a solution of 5% bleach to help reduce infection, but not with Austrocactus.

GYMNOCALYCIUM - The Slide Library from G. Slack

Within the next few months I may well be able to complete the scanning of the slides in the Slide Library and putting them onto a CD.

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Slide and CD Library Holders and Particular Interests

Austrocactus	A. Johnston, 11 Malvern Road, Scunthorpe DN17 1EL	
Cereanae	G.J. Charles, Briars Bank, Fosters Bridge, Ketton, Stamford PE9 3UU	graham.charles@btinternet.com
\$ Cleistocactus	T. Lavender, Kalanchoe, Market Place, Tetney DN36 5NN	
Echinopsis	M. Muse, 32 Fielding Road, Birstall, Leicester LE4 3AJ	
\$ Frailea	R. Gillman, Oddyns Farm, High Cross Lane, Little Canfield CM6 1TF	rickgillman@btinternet.com
\$ Gymnocalycium	S.G. Slack, 50 Sunnyside, Edenthorpe DN3 2PH	sgrahamslack@talktalk.net
Haageocereus	J. Arnold, Suffolk House, 2 Oak Hill, Washingbrough LN4 1BA	john_joan.arnold@2oakhill.freemove.co.uk
\$ Islaya	M. Williams, 40, Long Lane, Harrishead, Stoke on Trent, ST7 4LQ	maurice.williams@talktalk.net
Lobivia	R. Purslow, 75 Littlehampton Road, Selsdon CR2 7SJ	
\$ Matucana	P. Hoxey, 34 Stonehill Road, Great Shelford CB2 5JL	paul@hoxey.com
Neoporteriae	R. Moreton, 91 Umberslade Road, Selly Oak, Birmingham B29 7SB	
\$ Notocactus	P. Moor, 60 Milton Hall Road, Gravesend DA12 1QW	philip.moor@blueyonder.co.uk
\$ Parodia	P. Down 24 Brackley way, Totton, SO40 3HN	
\$ Sulcorebutia	J.R. Kirtley, 11 Fire Station Houses, Alwick NE66 2PB	jim@kirtley7.fsnet.co.uk
Tephrocactus	R.K. Hughes, 16 Ashbourne Avenue, Bootle L30 3SF	
\$ Weingartia	A. Glen, 5 Hall Grove, Macclesfield SK10 2HQ	aglen@tinyworld.co.uk

\$ indicates that a list of slides of that genus is available on request by s.a.e. or E-mail. Numbers of slides per genus vary from a few to a considerable number. Slide quality and species coverage are also very variable. Also available are CD's for Notocactus, Parodia, Sulcorebutia, and Weingartia. Any additions to this library in the form of slides or a CD will always be very welcome.

The Chileans

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