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**Tephrocactus strobiliformis**  
Saujil, Catamarca, Argentina

Photo. - F. Vandebroek



# Lobivia pentlandii

Photos:- P. S. Down



Between Panduro and Eucalyptos



At Oruro





## FINDING LOBIVIA PENTLANDII From K.Preston-Mafham.

Setting off from La Paz, the bus climbed up the steep slope out of the valley in which the city is situated, and over the mountain ridge to follow a gentle slope on the short descent to the Altiplano. Getting off the bus at Viacha, I walked only a short way out of the town and along some paths between the fields to the nearest stony slopes. This was typical altiplano, with some scattered bunches of coarse grass and a few low shrubs growing among the rocks and stones. There were huge numbers of *Noewerdermannia* to be seen here - thousands of them in stony places among the fields - but they were almost level with the surface of the ground so they were only obvious when I was almost about to step on them. They appeared to be only about one inch across when fully grown and none of them were seen in flower.

The *Noewerdermannia* which I saw 15 years later in northern Argentina certainly stood up more out of the soil. Here in Bolivia there was some ripe seed to be found on these *Noewerdermannia* but it was very likely that they were from flowers which had been open in mid-winter. There were also some *Lobivia pentlandii* here, which were fairly abundant and much easier to see as they stood an inch or two above the surface of the ground. None of them was in flower but the fruit was much fresher on these *Lobivia* so they were probably in flower a month or so before I was there in the first week of December.

We were able to collect some seed from the *L.pentlandii* at Viacha which germinated and grew on well in cultivation. Even as two year old seedlings, the plants originating from Viacha were immediately distinguishable from those that came from Oruro. Now they are flowering size, with orange or deep yellow flowers, but no pink. The flowers on these *L.pentlandii* from Viacha are quite different to those from Oruro, being a different shape with a shorter tube.

Another excursion was made by bus from La Paz, travelling south over the altiplano to Oruro, with the low mountains not far from the road all the way, to our left. Again it was simply a matter of walking out of Oruro to the nearest slopes, which started immediately behind the last houses in the town. Now there were lots of *Trichocereus* to be seen scattered over the slopes, a few of them in bloom, with pale yellow flowers - and with fresh fruit. Here, too, there were *Lobivia ferox*, which had not been found near Viacha. Once again there were bunches of dry grass every foot or so and some scattered shrubs up to about 18 inches tall, between the rocks and stones. There were many *Lobivia pentlandii* to be seen here, fairly broad and flat, but they rose above the surface of the ground rather more than at Viacha, perhaps because they had already had one good shower of rain. Very probably they would project still further above the ground in two or three weeks' time, if by then they had had plenty of rain.

The real problem with *Lobivia pentlandii* is that in cultivation they do not grow like they are in habitat where they are mainly broad and flat, but become somewhat elongate, and also they are not as spiny, so it is difficult to study them in cultivation as they really present an atypical form of growth.

.....from P.Down

It was in December 1992 that I joined B.Bates and R.K.Hughes on a trip round south-west Bolivia. This visit started off from La Paz, where the first day was occupied in getting used to the altitude, then we set off south over the altiplano, towards Oruro. The road which we followed was quite level, over a wide expanse of plateau, with the mountains some distance away to our left. At Panduro, we turned off the main road, and headed towards Eucalyptus. This locality had been visited previously by B.Bates, so we knew that we would find some cacti in that area.

There was very little vegetation to be seen when going along this road - if you were travelling fast you might even think that there was none at all. But a few miles down this road we started to see some cacti. There were also some scattered dwarf bushes, of a height no greater than about 40cm (18 inches), as well as occasional small tufts of a reed-like grass. On stopping, we found that there were plenty of cacti in this area, but they were well spaced out, usually several yards between each plant. They were growing on flat and stony ground, at about 3,800m altitude.

We came across some *Rebutia pygmaea*, which barely projected above the surface of the ground - often we only spotted them because of their crimson coloured flowers. Some of these *Rebutia* had only one or two flowers, but I did photograph one bunch of half a dozen flowers standing side by side which completely hid the *Rebutia* they were growing from. Neither here nor elsewhere on our trip did we see any *Rebutia* growing into big clumps like those we grow here in this country. I do not recall seeing any more than ten offsets at the most on one plant. There were also clumps of *Tephrocactus* scattered around, but these plants were often as large as 30 to 50cm across - occasionally even larger, with hundreds of heads. Some of these *Tephrocactus* had lots of flowers, usually yellow, but we did see one plant with orange flowers and another with red flowers, although these colours may have been due to the age of the flowers.

There was also quite a lot of *Lobivia* to be seen, which we easily recognised as *Lobivia pentlandii*. Some of these *Lobivia* were growing close to the road, but we probably wandered about a quarter of a mile from the road, photographing the *Lobivias* that we found in flower. Although there were not a great many of these *Lobivia* in flower, there was a wide range of flower colours, ranging from pale pinkish white through all shades of pink, pale to deep orange, and eventually to pale red. Some of them were in beautiful shades which could hardly have been bettered by hybridisation. I did not see any of these *Lobivia* with plain white or plain yellow flowers. It being December, we were probably lucky to see as many of these *Lobivia* in flower as we did, but I would love to see this area at the optimum flowering time.

These *Lobivia* displayed a range of spine lengths, some plants having spines only about 4cm (1.5 inches) long, to others with spines 6-7cm (2.5 inches) long. Some plants had spines almost straight, pointing more or less upwards and away from the plant body, others had spines curving gently over the body, enwrapping the

plant. Where a *Lobivia* was growing in the scant shade of a dwarf shrub, or sheltered by one of the clumps of grass, they tended to grow with the areoles more widely spaced than those that were totally exposed to the sunlight. Looking now at some of my pictures which I took of these *Lobivia*, it is hardly possible to make a definite rib count, but I do get the impression that the rib count might vary between about 14 to almost 24. It also seems that plants with high rib counts often carried so many spines that it was not easy to see the body. But at the opposite extreme there were plants with a low rib count and areoles further apart which displayed an appearance similar to the early 19th century drawings of this species.

We then returned to the main road and continued our travel south over the altiplano. When we came near to Oruro, at about 3,750m altitude, we stopped because once again we could see some cacti. Here again there were *Lobivia pentlandii*, some of which were possibly even more densely spined than those we had seen at our first stop. Here we also saw *Rebutia orurensis*, *Trichocereus orurensis*, *Opuntia orurensis*, *Tephrocactus pentlandii* and what were probably *Neowerdermannia vorwerkii*. There were also a few *Platyopuntia*, which I did not notice when we were at this location, but only discovered that they were there when I came to look at my slides, at home. Here again the terrain was level stony ground with scarce vegetation.

On our way from the Altiplano, passing through the Cordillera en route to Potosi, we again met with *Lobivia pentlandii*, not far to the east of Cieneguillas. But south of that, *Lobivia ferox* and *L.versicolor* took over. Later on during this field trip, we had far more difficulty in identifying various plants - in some cases, even being unsure of the genus, such as a matter of *Weingartia* or *Lobivia*!

....from T.Marshall

When visiting Bolivia over December 1996 to January 1997, we were returning to La Paz from Challapata when a stop was made at Pazna, another near Machacamarca (before Oruro), then again at La Joya (off the Oruro to Panduro road). At each of these three places we came across *Lobivia pentlandii*. Then in December 1997, travelling south over the altiplano, we stopped near Panduro, near La Joya, at Caravi (near Oruro), and also just to the south of Challapata. Here again we found *L.pentlandii* at each of these places. These plants displayed a tremendous range of variation in their appearance, from a very open spination to those where the spines virtually obscured the body. The flowers ranged over the whole of the colours of the rainbow - red, orange, magenta, lilac, pink, and yellow.

....from J.Carr

On the road from Oruro to La Paz we came cross a mixed population of both *Lobivia pentlandii* and *L.ferox*. The *L.ferox* were solitary with long strong spines whilst the *L.pentlandii* were clumping with finer spines. But there were other plants looking like *L.pentlandii* but with larger bodies, whose spines were as long but finer than those of the *L.ferox*.

## **DID WE FIND LOBIVIA PENTLANDII? From J.R.Kirtley**

When I was in Bolivia in 1989 with B.Bates, travelling along the road going south from La Paz, we had an overnight stop in Challapata. One of the most interesting plants which I noted on the altiplano was a few km to the north of Challapata, not far along the road to Potosi, at site B/K 10. It was here that the hills started to rise from the more or less level ground we had followed from Oruro. We were just beyond where a large diameter corrugated metal drainage pipe crossed under the road. A stop was made when I saw through the binoculars a red flowering *Trichocereus tarijensis* at the base of a rocky outcrop, which would be about a quarter of a mile from the right hand side of the road. This was the first *Trichocereus* we had seen in Bolivia so we decided to investigate further, and walked over to the low hill.

After photographing the *Trichocereus*, we looked round at other plants growing on this rocky hillside, which had very little soil on the rock. There was solid rock in both vertical and horizontal bedding planes, together with broken rock and rubble as well as hollows in the rock filled with soil. There were scattered bushes no more than knee high as well as scattered tufts and clumps of grass. The grass looked as though it had been grazed by some sort of animal, of which we saw no sign. There were a great many flat padded *Opuntia* sp. with white spines, growing everywhere. There were so many that you could hardly walk around without treading on them. Also here were some yellowish-white flowering *Trichocereus bertramianus*, well spaced up the rising hillside, both tall and shorter plants. Growing in pockets of soil and humus in the rock crevasses were *Lobivias*, which I first thought to be an extreme form of *L.ferox*. These plants had many spines, both radial and central, probably 8 to 10 cm in length, brown to white in colour, pointing upwards and almost straight. The plants looked dry and shrunken (the rainy season had not yet started) the spines entirely covering the body, so that it was difficult to see the form of the plant.

None of these plants was in flower and I can only remember there being one single fruit, on the shoulder of a plant, which I knew to be immature when I collected it, so that I did not expect the germination to be good. From the hundred or so of these seeds sown in 1990, only 10 seeds germinated. The plants grew slowly as at that time I was growing them in pure grit. A few years ago, most of my plants were repotted into a loam/grit mix and, quite slowly, began growing, but they have turned out to be most unusual. The small plants show straight spines as well as others that are curved towards the end. This may only occur when the plants are at the juvenile stage, all of the spines becoming straight as the plants mature. Only time will tell. Several of these plants are now in other collections, and four of my remaining plants have spines hooked to varying degrees, the other two have straight spines. One of these plants, now 4 cm broad and high, produced a flower for the first time in 2000; the flower was 5 cm in length, coloured orange-yellow, and typical of *L.pentlandii* in form when compared with other *L.pentlandii* in my collection which were flowering at the same time.

The flowers come from very low down on the side of the plant, which is quite unlike *L.ferox*, but very

much like *L.pentlandii*. In addition, this flower was not at all similar to the flowers on the forms of *L.ferox* or its var.*longispina* which were also flowering for me at the same time; but the spination on this plant grown from seed collected at B/K 10 was typically *L.ferox* when compared with other plants of *L.ferox* in my collection.

These plants may possibly be an extreme form of *Lobivia pentlandii*. The plants of *L.pentlandii* that we found on the hillside above Oruro, some 109 km to the north of Challapata, have longer and more dense spination than those from other localities which we visited, as well as from both plants observed by others in habitat and those plants which I have seen in cultivation.

The first location where we saw *Lobivia ferox* on our journey south from La Paz was on the hills some way south of Oruro, these plants having the typical dirty white flower of this species. The last location where we observed *L.pentlandii* was to the south of Ventilla, which lies roughly half way between Challapata and Potosi. My own thoughts had been that because of the spination and flower, these plants at B/K10 might be natural hybrids between *L.pentlandii* and *L.ferox*.

.....from F.Vandenbreock

In the area between Oruro, Challapata and Potosi, the species *Lobivia pentlandii* occurs abundantly. The spination of this species is quite variable and may depend upon local circumstances such as the degree of moisture or sun that the plant receives. Sometimes the variation in the spination is quite surprising - on one of my slides there is a group of these plants which are almost devoid of spination, close to another group covered with a bunch of dense spines. The flowers of this species are fairly large and display a wide range of colours.

In the area between Oruro and Uyuni, I found only two species of *Lobivia* - *L.pentlandii* and *L.ferox*. They often grow together and when not in flower, it can be difficult at times to distinguish the one from the other. Normally a careful examination will permit an identification, but that is not so readily done from a picture.

.....from H.Middleditch

In Vol.3 of Britton & Rose, *The Cactaceae*, there is a first description of *Lobivia boliviensis* (= *pentlandii*), which was found by Rose in 1914 "on the low dry hills east of Oruro", where it was said to grow with *L.ferox*. The latter was stated to have fibrous roots, the *L.boliviensis* having "a thick fleshy root". Is this the only means of telling these two species apart from one another when they are not in flower?

.....from K.Preston-Mafham

No, *Lobivia pentlandii* and *L.ferox* can usually be distinguished from one another. There was no difficulty in distinguishing the *L.ferox* from the *L.pentlandii* where the two were growing not far from one another at Oruro. The *L.ferox* had much deeper and broader ribs, as well as having spines which are rather thicker, stronger, not quite as flexible, and not quite as numerous, as those on *L.pentlandii*.

.....from T.Marshall

The *Lobivia ferox* which we saw at both La Joya and Pocoata were roughly globular, wider than tall, with heavy grey-black spines. They were easily identifiable as a separate species from the *L.pentlandii*, although it is no simple matter to pin down the precise differences in specific features, it was more of an overall impression. The *L.ferox* had more acute ribs and somewhat thicker spines, the spines perhaps longer than those on *L.pentlandii*. The bodies on *L.ferox* were commonly a metallic greyish-green in colour, whilst on *L.pentlandii* the bodies were a more lime green colour. There was no real difference in the sizes of the two sorts.

.....from H.Middleditch

On the pictures of *L.pentlandii* taken by P.Down near Panduro and near Oruro, the spination varies to a surprising degree. Some plants have such an open spination that a first glance at the picture will see the body of the plant and barely notice the spines. There appear to be only one or two areoles per rib so that the ribs are far more obvious than the areoles. These plants are reminiscent of the drawings which accompanied the mid-19th century description of this species, which are reproduced in the Rausch *Lobivia* publications and elsewhere. Generally these plants tend to give the impression that they do not rise far above the ground.

By comparison, other plants in the pictures taken by P.Down seem to be wholly above ground, with the body so enwrapped by the upwardly curving spination that effectively it is only the spination that can be seen. However, there are also intermediates between these two extremes, so that it would seem to be most difficult to draw a hard and fast dividing line between those with an open spination and those with a body enwrapped in spines. In 1989 it was not really possible to propose a firm identification for the *Lobivia* found by J.R.Kirtley at B/K 10 near Challapata, but now it can be suggested that it falls within the wide compass of variation to be seen in *L.pentlandii*.

.....from R.Purslow

For reasons of space I have tended to follow a regime of hard cultivation with my plants, and on my *L.pentlandii* the spine length does vary from 11 cm long on a WR 201 with a 10cm wide body and 22 ribs, to 3cm long on a PM 143 which has 23 ribs. Various spine lengths between these extremes are to be seen on other plants with Lau, KK, or WR provenance. In general, spine length tends to increase with the age and size of a plant.

.....from M.Lowry

Looking at the field records for the B/K, BDH and BLMT trips to Bolivia, there are nearly a score of observations for *Lobivia pentlandii* between Achacachi in the north and Cieneguillas (NW of Potosi) in the south. Almost all these sites lie along the most direct route from La Paz to Potosi. In relation to the variation in spination between the northern and southern plants, I can confirm that there is a difference between the extremes with the southern plants having much longer spination than those in the north. However, I would not

say that this change was gradual, rather it appears that the separation lies at about the latitude of La Paz. For example, the plants at BLMT 1. at Calamarca (154 km north of Oruro), were virtually indistinguishable from those at BLMT 100, east of Challapata on the road to Potosi, some 150 km to the south of Oruro.

## FROM SUCRE TO ORURO From W.W.Christie

After travelling around parts of the basin of the Rio Grande and Rio Pilcomayo, as well as paying a visit to Culpina, the return journey from Sucre to La Paz took us via Ravelo and over the Cordillera to Oruro, on the Altiplano. After Ocuri, the land rose to 4300m and it was surprisingly green and damp among low hills where llamas were grazing.

Half way to Oruro, as we descended towards the town of Macha, where we intended to spend the night, the land was drier. This was one of several places where we descended to negotiate a deeply incised and steep-sided river valley. While still at altitude, we found isolated patches of cultivated fields. On the untouched stony ground all around, there were scattered clumps of stiff, upright bunches of grass as well as dwarf shrubs, all amongst bare patches of soil. Here we found a number of *Lobivia pentlandii*, with bodies barely visible through the enwrapping coat of long, more or less upright, slightly curved spines. Without a knowledge of the flora of the area, it would have been difficult to put a name to the plants, as none was in flower. They were also growing around the edges of cultivated fields, where stones had been piled together, in company with clumps of *Tephrocactus* (*Cumulopuntia*) *bolivianus*. The latter were in flower, although these were closing as the day neared its end.

Before reaching Uncia, we had to pass through a deep river gorge (down to 3500m) with sides of sheer rock, where a low-growing *Trichocereus* sp. which I have yet to identify, was the main cactus, together with *Trichocereus tarijensis* (or *orurensis*). Most of the *Trichocereus* were inaccessible on high cliffs, but we eventually found some within reach by crossing the river running through the valley. These plants growing in a shady area looked especially healthy - up to 1.5m tall and 7.5cm diameter with bright yellow spines. In full sun, these plants tended to be shorter and greener, and generally looked duller. Many of these *Trichocereus* were in flower (predominantly white), though getting close enough for a photograph was something of a challenge.

After Uncia and a few km beyond Llallagua (3750m) we again came across *Tephrocactus bolivianus* growing with *Lobivia pentlandii* and *Opuntia orurensis* on very bare stony ground on a gentle slope facing the sun. The *Lobivia* were in clumps of from 2 to 3 to 20 or more heads. The spines were not as prominent as at the previous site, but here most plants were in flower in shades of pink, magenta, and deep red.

We climbed eventually to 4600m, where large clumps of *T.bolivianus* with a particularly dense covering of brown spines and the typical yellow flowers, were growing at the highest point, before descending steeply to the plateau near Oruro. A few km from that town, the straight paved road passed alongside an arid and gently sloping area backed by a low but steep hill. The hill itself was covered in xerophytic shrubs from which *Trichocereus tarijensis* (or *orurensis*) up to 3m high, stood out. On the level ground at the base of the hill, there were large numbers of *Neowerdermannia vorwerkii*, flat with the ground, with an occasional *Rebutia orurensis*, *T.bolivianus* and *O.orurensis*. As the slope increased, the *Neowerdermannia* disappeared to be replaced by large numbers of *Lobivia pentlandii*, but this time not in large clumps but solitary or with 2 to 4 heads. Many were in flower, with the usual range of pinks and reds, although one was almost white, and on one plant a bud was obviously going to open next day with a yellow flower.

From here it was back to La Paz, stopping briefly on a side road that led to Eucalyptos, where there were many more plants of *Lobivia pentlandii*, growing with *Rebutia eucalyptana* and *T.bolivianus*. Here the flowers were only beginning to open in the morning sun, but appeared to be predominantly reddish. Finally, a few km before the La Paz conurbation began, we crossed a ploughed field to a low rocky ridge, at the foot of which were many *N.vorwerkii*, while higher up on the rock face there were *L.pentlandii* and *L.maximiliana*. The latter was covered with dense yellow spines and was just beginning to flower. In contrast, the *L.pentlandii* here had a much more open spination. As we recrossed the field to return to the car, we reached a low outcrop of rock where one plant of *L.pentlandii* had three bright yellow flowers open. There were also small plants of *T.bolivianus* with yellow or pink flowers growing side by side.

....T.Marshall

It was in December of 1997 that we set off over the altiplano, southwards from La Paz. We were aware from other field trips what could be found between Panduro and Eucalyptos, so we decided to strike off the main road at Panduro to head for La Joya. Coming close to La Joya, we saw a slope of heavily eroded granite on the east side of the road. Here we found plants of both *L.ferox* and *L.pentlandii*. It was near the end of this trip, in January, when we were returning to La Paz from Sucre via Ravelo to Uncia and Oruro. Being on a tight schedule, we made only one stop between Ravelo and Uncia, some km before reaching Pocoata. This road took us through a main range of the Cordillera, the road frequently running over very arid, exposed ground with moderate gradients, but here and there we came across a gully with a little more dwarf vegetation. Or we found ourselves looking down into a valley which provided shelter for a better vegetation cover. We were at a comparable altitude to our stop near La Joya, and here near Pocoata we again came across both *Lobivia pentlandii* and *L.ferox*.

Both near La Joya and near Pocoata, the *Lobivia pentlandii* gave me the impression of having an appearance intermediate between those to be seen on the pictures from P.Down which display a very open spination with exposed bodies, and those which were so well spined that the spination virtually obscures sight of the body. Of course there was the usual variation in spination to be seen i.e. some rather spiner than others,

but all the *L.pentlandii* which I saw at both these places had bodies clearly visible through the spination. The ground was very stony, the *Lobivias* fairly randomly disposed, without apparently favouring a spot under shrubs, or near rocks, or in gullies which might offer some water run-off in times of rainfall. My recollection is that we saw neither *L.pentlandii* nor *L.ferox* in flower either near La Joya or near Pocoata.

.....from J.Carr

Returning to La Paz from Sucre, we had decided to take the route straight over to Oruro. From Sucre, we gained altitude through Ravelo and beyond, eventually getting up to well over some 4000m altitude. After Ravelo we stopped to photograph some spectacular rock formations, then continued to climb, often through wooded slopes, until we rose above the tree line. We stopped on a couple of occasions but found no cacti. Finally, at what seemed the highest point at 3960m we found *Lobivia pentlandii*, with large heads up to five inches across, which formed clumps of up to 2 feet across. Also growing on this slope were *Tephrocactus bolivianus* and a *Sulcorebutia*. Here we were only a few km before reaching Ocuri.

After Ocuri the road dropped down into a wide plain of some 25 to 30km across, where we came to a small town. Just after the town we stopped and found *Rebutia steinmannii* and *R.pygmaea* on the same steep slope - at first glance the only difference was the flower colour. We then started to rise again, until we had reached to over 4200m where we found typical altiplano plants. The *Tephrocactus bolivianus* made large mounds up to 2 feet high and 3 feet across. We continued for some time until we came to a large, deep, valley that we had to cross. It was probably only a mile straight across from one brow to the other, but along the road it was about 25km of descent and ascent. In the bottom and on the sides of the valley there were *Cleistocactus*, *Echinopsis*, *Trichocereus*, and *Corryocactus*. The flowers on the *Corryocactus* were all pink, which was different from the red of all the other *Corryocactus* flowers which we had seen at various places between the vicinity of Lake Titicaca to south of Sucre.

Now on high-altitude altiplano type land once more, we again came across *Lobivia pentlandii*, growing on a large flat area with grass tussocks scattered a foot to a few paces from one another. Even at around 4000m altitude there were still fields which had been cleared of stones for grazing or for the cultivation of potatoes. From Bolivar we took the direct route to Oruro, passing many coloured rock formations. As we approached Oruro we came across many *Lobivia pentlandii* on altiplano type landscapes, as well as *Neowerdermannia*.

.....from M.Lowry

The road from Sucre to Oruro travels over some very high ground, but it also encounters a number of very deep gorges. Just to the west of Uncia we came across one of these gorges in which we found *Trichocereus bertramianus*. Beyond Uncia, but before Llallagua, on the rather higher ground, we came across some *Lobivia pentlandii*. These were described as *L.bustilloensis* by Ritter, but cannot really be regarded as a separate species. There were certainly no *Oreocereus* to be seen at this spot and no obvious *Parodia maassii*.

.....from R.Purslow

I have some plants of BLMT 173 from Lallagua in province Bustillo, a location which is quoted by Ritter for his *Lobivia rossii* var. *bustilloensis*. These do not appear to me to be distinguishable from the range of forms which we can now recognise for *L.pentlandii*. In addition, the Fig 581 and colour picture 18 in Volume II of Ritter's book, would not seem to be out of place for *L.pentlandii*.

## **NOT REALLY LOBIVIA BOLIVIENSIS - OR AURANTIACA? From H.Middleditch**

Accompanying the first description of *Lobivia boliviensis* in Britton & Rose is a picture of a cultivated plant, whose lower half carries a belt of long, slender spines which might even attain the 9cm length quoted in the description. The upper half of the plant is far less spiny - indeed from the photograph one might be excused for suspecting that the top half of the plant is spineless. If the spination on the lower half of the body is typical of that in habitat, then it would have almost completely enwrapped the body.

.....from J.R.Kirtley

Travelling south down the road from La Paz, over the altiplano, brought us to Oruro, from where we turned off the main road in order to explore a hill which lay behind the town. Here we found some *Lobivia* with numerous, long slender spines which almost obscured the body. The *Lobivia boliviensis* which is pictured in cultivation in the Britton & Rose book, could have looked the same at the time it was collected near Oruro as the plants we saw at this spot.

.....from E.Werdermann, *Blühende Kakteen*, 1938 Plate 149

*Lobivia boliviensis*. The plant in Plate 149, on its own roots, was collected by Steumer under his number 124 and sent to Berlin Dahlem Botanic Garden, where it has flowered each summer since 1935.

[ Full description given ] .... spination on the imported portion ca. 6-9, scarcely distinguishable between radials and centrals, standing outwards at an inclination, fairly entwined in a tangled confusion, twisted and flexible, not sharp, pale grey, mostly with brownish tip, variously edged and somewhat twisted, mostly smooth, on the aforementioned specimen up to 8cm long.

*Lobivia boliviensis* Br.& R. is pictured and described by the authors without flowers, nevertheless the spination seems to be quite characteristic and to correspond well with the specimen pictured here, both in respect of the number of spines as well as regarding their outward appearance.

Backeberg illustrates a plant as *L.boliviensis* in B.f.K 1938/1, which I consider to be a different species and have described as *L.hastifera*.

.....from H.Middleditch

The *Lobivia* in Werdermann's Plate 149 displays a lower half of the body encased with fairly close

packed, long spines, perhaps a little more curving than those in the Britton & Rose picture of this species, the upper half of the body apparently displaying only a few shorter, wispy spines - again, presumably the cultivated growth.

.....from F.Vandenbroeck

There is no doubt that the pictures of *Lobivia boliviana* in Britton & Rose Vol.III, and by Werdermann in *Blühende Kakteen*, represent examples of *Lobivia pentlandii*. The spineless or weakly spined tops of the plant bodies are typical for imported plants brought into cultivation.

.....from H.Middleditch

The *Lobivia boliviana* illustrated in Backeberg's B.f.K.1938/1 carries spines which are not quite as long as the flower, many directed half sideways rather than outward, most of them somewhat curved, so presenting an appearance roughly half way between the early 19th century illustrations of *L.pentlandii* where the body is not at all obscured by the spination, and the mass of outward and upwardly directed spines on the plants captured on film in habitat by P.Down and J.R.Kirtley.

.....from C.Backeberg, *Die Cactaceae Vol.III*

*Lobivia aurantiaca* - synonym *L.boliviana* sensu Werdermann. Werdermann writes "Habitat Bolivia, near Oruro" - at least that is based upon the species name, not on the Steumer location. Since the plants collected by me near Oruro have a different appearance and flowers, a new name has to be chosen for *L.boliviana* sensu Werdermann.

.....from H.Middleditch

First of all Werdermann decides to invent the name of *L.hastifera* for the plant of *L.boliviana* illustrated by Backeberg in B.f.K 1938/1. Then Backeberg decides to invent the name of *L.aurantiaca* for the *L.boliviana* illustrated in Werdermann's Plate 149. Taking into account the range of variation seen in the *Lobivia pentlandii* observed by J.R.Kirtley, P.Down, and T.Marshall on this stretch of the altiplano, it is hardly surprising that both authors considered the other's *L.boliviana* was not a precise match for the then standard form of this species. Hence both these names can be dispensed with.

.....from R.Mottram

The name *L.aurantiaca* is not validly published, because neither Werdermann nor Backeberg provided a Latin diagnosis. Backeberg indicated that the Type was based upon Steumer 124, but he never had a location for that specimen.

#### **NOT FINDING LOBIVIA PENTLANDII From R.Hillmann**

Leaving Uyuni, we took the road which goes in the direction of Potosi. For a short distance the road ran dead straight across the almost flat and level ground, coming to the foot of a mountainside whose slopes carried a scattering of rocks and stones, as well as some boulders, but very little in the way of other vegetation apart from scattered clumps of grass about 10cm high. The road gradually wound its way up this mountain ridge, from about 3700m at the foot to about 4000m at the pass over the ridge.

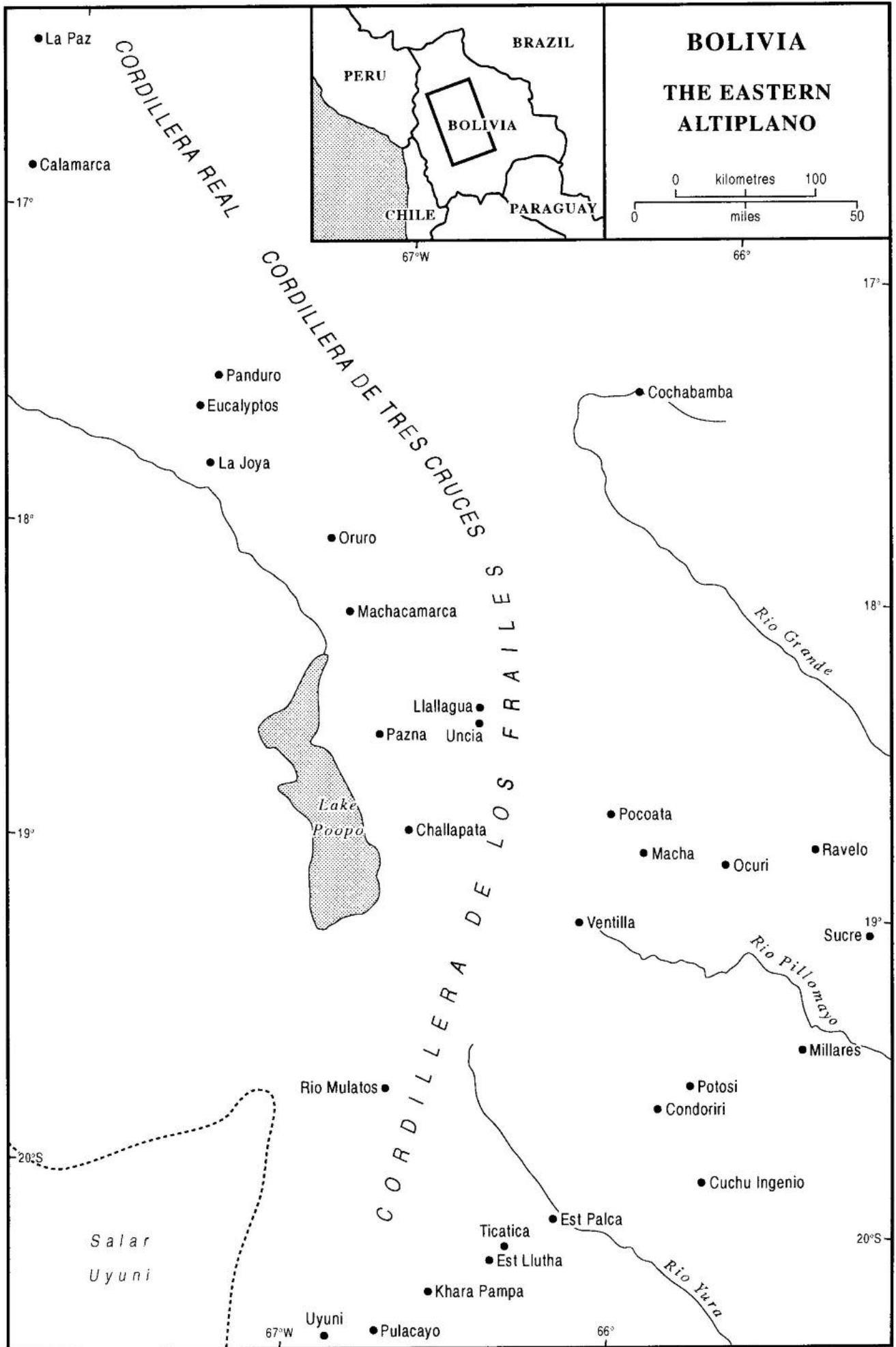
Beyond the pass, the road descended, bringing us to Pulacayo at 3900m, where we were down in a valley. This was a relatively sheltered place by comparison with the altiplano, and with some moisture, where scattered clumps of Ichu grass and other low-growing vegetation were to be seen - but still with a great deal of bare ground. We climbed up the opposite side of the valley, where we found *Lobivia ferox* quite common on the slopes, between the rocks, with smaller plants in the shade of the dwarf shrubs.

From Pulacayo the road descended gradually on to the Khara Pampa, a stretch of perhaps 30 or 40km across a bare, arid, desert like landscape at 3800m, virtually devoid of any vegetation. The road mostly ran across either level ground or with a gradient so slight as to be hardly evident. Only occasionally did we pass not far from a low, rounded hillock, whose slopes carried some clumps of Ichu grass and low growing bushes. About half way across the Khara Pampa, we stopped to check over one of these, which looked rather similar to habitats we had seen previously near the Argentine border with Bolivia. Once again we found some *Lobivia ferox* which were not present in great numbers, together with fairly small clumps of *Tunilla soehrensii* which were to be seen in greater abundance.

Continuing for a further 7 or 8 km, over the Khara Pampa, we came to a small dried-up lagoon, about 3 or 4 km before Estancia Llutha. Close by was a little gorge with quite steep, stony sides, where there were scattered clumps of Ichu grass, some dwarf herbs and a few very low growing shrubs. Once again we found some *Lobivia ferox*, but here we now discovered some different sorts of *Mediolobivia*, both *pygmaea* and a var. of *steinmannii*, which were growing in cracks and clefts in the rocks. There were also some *Neowerdermannia* to be found in the clefts in the rocks, but still with only a few mm of their body projecting above the surface of the ground. Easier to see were the clumps of *Tephrocactus bolivianus* - a few of these being a good 30cm or more across, as well as some *Tunilla soehrensii*. None of these plants was in bud, flower, or fruit.

Once beyond Est. Llutha we came into more mountainous terrain, so that the road was steep and winding in places. Then, after crossing a pass, we came down to 3650m to an expanse of sweeping slopes when we were only a few km before reaching Ticatica, a straggling village roughly half way between Uyuni and Potosi. Not only were the *Lobivia ferox* to be seen in rather greater numbers at Ticatica than at our previous stopping places since leaving Uyuni, where the *L.ferox* probably barely reached 20cm across and tall, now near Ticatica they were around football size, a good 25cm across, but again not elongate. The *Parodia maassii* were even more numerous, great fields of them. The road climbed up again shortly after Ticatica but even at 3800m there were still *Parodia maassii* to be seen in abundance, together with *Neowerdermannia* - which were not easy to spot as they were level with the surface of the ground.





Now the road climbed out of the valley of the R.Ticatica, and crossed a mountain ridge at about 4000m. Roughly half way between Ticatica and Est.Palca where it was more open and less moist than around Ticatica, so the *L.ferox* here would be no larger than about 20cm in diameter. The *Neowerdermannia* were very common here, growing level with the surface of the ground, either in clefts in the rock or besides the rocks.

Considerably further on, we were less than 50km from Potosi when we stopped at Comunidad Condoriri. It was here that, for the first time along this route, we came across *Trichocereus tarijensis*. They were growing in the river valley here and also into small side valleys, again in company with *Lobivia ferox*.

#### **NOT REALLY LOBIVIA FEROX? From F.Vandenbroeck**

The road we took from Potosi to Uyuni is a fairly good one and it offers marvellous landscapes and interesting cacti habitats. Leaving Potosi we found *Tephrocactus rossianus* with yellow flowers, and *Lobivia pentlandii*. Later on we met with *T.rossianus* with a wide variety of flower colours. At about 25km from Potosi, we came in view of tall specimens of *Trichocereus tarijensis* with red flowers. Climbing up to look at these plants we came across *Lobivia pygmaea*, *Tephrocactus bolivianus*, and *Lobivia pentlandii*. It was a beautiful habitat, with abundant small tortuous trees of *Polylepis* sp. with a red scaling papery bark. Further on, *Oreocereus trollii* and *O.celsianus* appear. Closer to Tica Tica we observed *Platyopuntia sulphurea* and large numbers of *Parodia maassii*. Beyond Tica Tica there are robust specimens of *Trichocereus werdermannianus*. Between Tica Tica and Pulacayo there is a high barren plateau where I saw only a form of *Lobivia* with small yellow flowers. The plants measure more or less 25 to 30cm across and are flat globose - is this var. *hardeniana*? Or these plants may be the "*Lobivia aurantiaca*". Nearer to Uyuni, the terrain gets sandier and more barren, with a monotonous vegetation of *Tola* shrubs. Suddenly, from the high plateau, the town of Uyuni becomes visible as a small white speck in an immense plain.

...from H.Middleditch

The picture received from F.Vandenbroeck of "*Lobivia aurantiaca*" is of a plant which is rather wider than it is high, the body almost completely enwrapped by outward and upwardly directed spines. The appearance of this plant is what might be expected of *Lobivia ferox*. So it is hardly surprising that we have a commentary from R.Hillmann on his trip from Uyuni to Potosi, where he quite clearly observed at various places en route, plants of *Lobivia* which he took to be *Lobivia ferox*. Yet from the picture taken by F.Vandenbroeck between Ticatica and Palucayo, one of these supposed *Lobivia ferox* flowered with what is to all appearances a yellow *L.pentlandii* flower.

.....from R.Hillmann

When we travelled from Uyuni to Potosi, none of the plants which we took to be *Lobivia ferox* were in flower. At various places where we looked at these *L.ferox*, there were both ripe fruit and new buds to be seen on these plants. We were there in the first half of December, so it is quite likely that fruit was from flowers that would have appeared after the first few showers at the start of the rainy season. A lot of the *Rebutia* we saw also carried both fruit and buds. I have heard various comments to the effect that these plants flower in this or that month, but it is quite possible that these plants do not have a particular month in which they flower. When they flower probably depends very largely upon what sort of rainy season there is in any year - some years the rains can arrive later, and some wet seasons have dry spells of two or three weeks.

.....from J.Pot

After meeting some difficulty in finding our way on to the right road, we left Potosi on our way to Uyuni. After travelling about 29km from Potosi, we stopped at JK 477 when we saw a large number of *Trichocereus* which were up to 2m high, growing in a rather sandy area. Walking round here, we came across a large globular plant with yellow flowers around the crown, which were about the same length as the innumerable long, slender, white spines. Back home we were told that these were *Lobivia aurantiaca*. These plants were certainly different from the *Lobivia longispina* which we saw at about 80km from Potosi on our way to Uyuni.

.....from C.C.Bouwman

The plants which we saw at JK 477, some 29km from Potosi towards Uyuni, are in my view a form of *L.pentlandii* - for me it is *L.pentlandii v.aurantiaca*. These were big plants, about 15cm broad and high. We were able to collect some seed off these plants and the resultant seedlings are now small plants, which have flowered, with a yellow flower.

.....from F.Vandenbroeck

It would be very difficult to accept this plant seen at JK 477, with yellow flowers and numerous fine spines, as *Lobivia pentlandii*, as the spination on this species is quite different from that on the picture of JK 477. Of course, it is extremely difficult to identify a plant from a single picture, that is without seeing it within its population where the general aspect and variability of the plants can be viewed. In the area between Oruro to Challapata and Potosi the species *Lobivia pentlandii* occurs abundantly. The spination on this species is fairly variable and may depend on local circumstances, Sometimes the variation in spination is quite remarkable: on one of my slides there is a group of these plants which is almost devoid of spination close to another group covered with a bunch of dense whitish spines.

.....from H.Middleditch

It is absolutely extraordinary to see the picture from C.C.Bouwman of the plant raised from the JK 477 seed - it looks just like the mid-19th century drawings of *L.pentlandii*, with the body clearly visible and not obscured by the spines. Only one or two areoles per rib are visible on camera, the six or seven radial spines are actually radiating from the areole but standing out somewhat from the body shape, together with one long, upright, dark central spine. The seedling and the parent plant give the impression of almost representing the two extreme ends of the range of appearance of the *L.pentlandii* seen and recorded by P.Down.





Challapata  
Photos:- J R Kirtley



Photo:- J Pot

S.E. of Potosi

Photo:- C Bouwman



Parent and Progeny



On Khara Pampa

Photo:- F Vandebroeck

Lobivia  
pentlandii



.....from J.R.Kirtley

Compared with the young plants grown from my own B/K 10 seed, the plant grown in Holland from JK477 seed has equally sharp ribs and what appears to be round spines but with round areoles whereas my plants have elongated areoles with spines more angular than round, but arranged the same way. On my B/K 10 the spines are either straight, or slightly curved.

.....from R.Purslow

Looking at the selection of pictures of *Lobivia* taken by J.Kirtley, one or two of those from north of La Paz, en route to Lake Titicaca, are of flowers which have their inner petals open only slightly wider than vertical, nothing like the wide open flowers on all the other pictures of *L.pentlandii*. Many of my own *Lobivia* have flowers which only open wide late in the morning - were these particular pictures taken early in the morning, when the flowers were probably not fully open? If they were taken later in the day, they may be of *L.maximiliana* and not *L.pentlandii*.

.....from J.R.Kirtley

Travelling north from La Paz, close to the end of our field trip, a stop was made near Chiripaca at B/K 69 at the south end of the lake. On the first low hill, two species of *Lobivia* were growing, *L.pentlandii* in flower and *L.maximiliana* without flowers. There was no doubt about the identification of these two species. After leaving Achacachi to return to La Paz, a walk was taken to the last hill on the left of the road, at B/K 70, and there we found *L.maximiliana* and an *Opuntia* sp. Here we photographed *L.maximiliana* in flower, when it would be about 1 p.m., which is the picture queried by R.Purslow. About mid-afternoon, a stop was made on undulating ground between Achacachi and Lake Titicaca, where *L.pentlandii* was found. Driving south alongside the lake, a stop was made some 1.4 km to the south of Copancara, where a flat-topped hill was climbed and there, once again, we found both *L.pentlandii* and *L.maximiliana*, neither in flower, but both instantly recognisable. Both drawn down into the earth, much more so than those plants seen at Chiripaca.

.....from H.Middleditch

The appearance of the spine-enwrapped *Lobivia* seen by J.R.Kirtley at B/K 10 is somewhat comparable to that pictured by F.Vandenbroeck en route from Potosi to Uyuni - both with yellowish flowers. The reports and photographs taken of the *Lobivia* found on the margin of the altiplano between Viacha and Challapata make it quite clear that spine-enwrapped plants of *L.pentlandii* are by no means uncommon. In addition flowers are displayed in a wide variety of colours. Consequently it appears that there is no real basis for separating out the name *L.pentlandii* v. *aurantiaca* although its use might well be a convenience.

Present-day information, especially observations from field trips undertaken in the last twenty years or so, has provided a wealth of data about the variation which may be seen displayed in habitat by one and the same species. Some of these differences may have a relatively simple explanation, such as *Echinopsis* in Rio Grande do Sul being more spiny when on open ground exposed to the sun, less spiny when growing under bushes. Other differences, such as the range of segment form in *Tephrocactus bolivianus*, lack an obvious explanation. But few other cacti display the range and diversity of spination to be seen on *Lobivia pentlandii*.

In their original description of *Lobivia "boliviensis"* (= *pentlandii*) Britton and Rose refer to the thickened rootstock. For such a rootstock to be effective in drawing the plant down almost to ground level for the dry season, it must have an adequate depth of sand or soil in which to operate effectively. Whatever means by which the seeds are dispersed, they can only land where they fall. But what happens to those seeds of *L.pentlandii* which germinate on ground with a depth of sand or soil less than that which a thick rootstock requires to perform its dry season function effectively? And what if it is only a thin layer of sand or soil? Such as the very rocky ground with a patchy, shallow soil cover at B/K 10 where *Lobivia* grew with the body enwrapped in spines?

Could those seeds which fortuitously land and germinate on an adequate depth of ground, generate a tap root, but no great armour of spination; whereas those which start life on a thin layer of ground and so cannot make use of a taproot to become semi-subterranean in the dry season, instead generate a heavy armament of spines? It appears that uprooting one or two of these plants in habitat might tell us if *L.pentlandii* produce different roots and different spination to survive in accordance with available depth of earth.

## **DISCOVERING TEPHROCACTUS STROBILIFORMIS      From A.V.Fric, Lovéc Kaktusy**

From Catamarca we took an autobus into the neighbouring little town, where I hired a car and we set off into the *Tephrocactus* habitats. There were two species, one from the relationship of *Tephrocactus papyracantha* v. *calva*, but with straight, dagger-like, 4-5cm long and 5mm wide spines at each areole. The second was a very interesting species, of which I had seen a specimen in Erfurt and which Dr.Roeder wished to describe as *Opuntia strobiliformis* (like a bread-roll). In this habitat no example appeared so roll-like as the dry, freshly arrived imports. I found joints which were 60cm [sic!] long and 10cm [sic!] thick. They were in full growth and so smooth that they resembled a grey-green sausage.

.....from H.Middleditch

When quoting extracts from Fric's biography on previous occasions it has been necessary to suggest that a degree of exaggeration would appear to creep into some of Fric's observations and dimensions. Might these segment sizes quoted by Fric be another example of the printed word being larger than life?

.....from F.Vandenbroeck

It was in 1991 that we were travelling down the road which runs from Andalgala to Mazan, along the eastern side of the Salar de Pipanaco. We had the flat ground surrounding the Salar on our right and to the left

were the low foothills beyond which rose the massive range of the Sierra Ambato. For most of the way, the surroundings were occupied by bushes of modest height on all sides. Reaching Saujil, we turned off along the road which leads to Poman taking us through the lowermost foothills towards the Sierra Ambato. There are several picturesque villages along this road whose inhabitants survive mainly by growing fruit trees. Making a stop not far from Saujil, we walked for quite some distance into the hills. These slopes continued to be covered with bushes, which were not very tall, about 1.5m high. They did not form really dense thickets, but were mostly sparsely spread. Here we came across *Gymnocalycium bodenbenderianum*, *G.schickendantzii*, and *G.saglione*.

We found lots of *Tephrocactus* there, many of which were in flower. There were a great many transient forms to be seen between those resembling *T.articulatus* and the somewhat singular form to be seen in the picture, which Ritter describes as *Tephrocactus strobiliformis*. There were many of these plants to be seen which had grown up to about 40cm tall, but there were occasional plants which must have been close to 50cm high. However, I consider *T.strobiliformis* to be merely a form (though somewhat conspicuous) of *T.articulatus*.

At the time of our more recent visit to this part of Argentina, we found a great change had taken place. Enormous areas of the natural vegetation had been cut down, square km after square km, for the purpose of planting olive trees.

.....from U.Eggl

We have found a quite extensive population of these so-called *Tephrocactus strobiliformis*, just to the SW of the city of Mendoza. The plants were not quite as large as 40cm high, but the vegetation at that place was quite open and scanty, whilst the *T.strobiliformis* grew on slightly inclined to almost level stony places. I do not recall seeing any of this form of *Tephrocactus* at any other places, but I would like to stress that of the *T.articulatus* which we saw, there are all sorts of intermediates between very densely and strongly spined populations to almost completely naked, and a similar variation is to be observed in segment size and shape.

.....from K.Gilmer

When we were travelling along the road which goes from Famatina to Patquia, we came across some scattered plants of *Tephrocactus strobiliformis* when we were south of Chilecito. This was a more or less flat area, the ground composed of sand and gravel, with some undulations where there were sand banks which could have been two or three metres high, all with sparsely scattered bushes of up to 1m in height, but no sign of grass. The *T.strobiliformis* were growing up to 40cm in height, with sausage shaped segments, completely spineless. Some of the segments were only 5cm long, many were some 10 to 15cm long, and not a few were 20cm long or longer.

#### **THE POINT OF GROWING TEPHROCACTUS STROBILIFORMIS? From H.Middleditch**

For many years I have been growing - or perhaps more accurately, trying to grow - a *Tephrocactus* which looks at first sight like one of the spineless sorts of *diadematus* or *articulatus*. All my other *Tephrocactus* plants of that sort have segments which mostly have a shape looking somewhat like a top, whether or not they have any spines. But this awkward specimen has segments which look more like short sausages.

The new segments on many of the other *diadematus* or *articulatus* sorts are fairly well covered in short woolly hairs when they first appear, so that it is not really possible to distinguish individual areoles or tubercles. Even with new offsets that are hairless, the individual areoles cannot be distinguished because they are packed so closely together. When new offsets are approaching walnut size, individual areoles can just about be distinguished over a large part of the offset. At roughly this sort of size, it does become possible to make an approximate count of the number of areoles on the new segment - approximate because at the apex it is still difficult to distinguish a few close-packed areoles. If this count is repeated near the end of the summer, when the new segment has attained a decidedly larger size, it will be found that no new areoles have been added to the original count. indeed, it is effectively possible to say that new offsets possess all the areoles that they are going to display when they reach full size. In fact, there is no growing point to these segments, as overall growth of a plant is solely by means of the production of new segments. An individual segment can become larger by increasing its volume, but it cannot grow any larger by putting on new growth, since it does not possess a growing point.

On the other hand, the *Tephrocactus* with the sausage shaped segments does seem to have a quite different mode of growth, for it apparently does possess a growing point. Over the course of a season, the growing point can produce new tubercles and new areoles and so extend the length of the segment, putting on new growth like almost all other cacti. This particular form of *Tephrocactus* comes to us under the name of *Tephrocactus strobiliformis*.

.....from F.Ritter, *Kakteen in Südamerika*.

*Tephrocactus*. [Diagnosis] ..... Low growing bush, rarely over 50cm tall, with numerous segments of determinate growth. A characteristic of all species is the terminal or subterminal offsetting, so that the segments stand in a series one above the other and in consequence the bush is of open growth, not closely packed.

.....from J.Essers

My own *Tephrocactus strobiliformis* is grown in a hanging basket which is hung up inside the greenhouse. It does produce quite long segments and I am sending one of these to you.

.....from H.Middleditch

The segment on receipt measured almost six inches in length, being not quite cylindrical but tapering

very slightly from base to top. It did root down and produced one fresh offset.

.....from R.K.Hughes

It will be a good ten years ago that I was first able to obtain a plant of *T.strobiliformis*. At the time I was under the impression that this plant was like *T.articulatus* and that the elongate joints were a result of poor cultivation. So I tended to be economical with the watering in order to avoid the growth of elongate joints. No wonder it did not grow very well! My present *T.strobiliformis* came from K.Gilmer as an unrooted cutting, which did get established. It put out a new segment which did eventually reach a length of some six inches.

.....from H.Sonnermo

It was in 1995 that I received an unrooted segment of *T.strobiliformis* from C.Holland, which rooted down and became established during that year. It now has three new branches. One of these was a new segment in 2001. This particular new segment was about two and a half cms long at the start of 2002. I took a felt pen and put a mark on each of the tubercles, counting them as I did so, There were about 20 tubercles, but it was not really possible to be precise because one cannot see the very lowermost areoles properly, and in addition it is very difficult to decide which is the last areole at the very top of the segment, where the tubercles become quite small. Over the course of the summer it was obvious that the segment was growing longer as new areoles and tubercles were appearing above those which I had marked with the felt pen. At the end of the summer I took a felt pen of a different colour and now I put a mark on each of the new tubercles which had been produced during the summer. Now there were about sixteen new areoles and the segment at about 5cm long is twice the length it was when it started to grow in Spring.

.....from K.Gilmer

We have come across plants of *T.strobiliformis* in collections which will grow their segments to their full length in one year. If cultivation conditions are really good, one year can be enough for plants to produce a segment of 22cm in length. But conditions are not the same every year so that sometimes these plants produce segments of this length only every second or third year. More often a segment may grow to, say, about 5-8cm long in its first year, then add a similar additional length the second year, with the areoles at the growing point standing very close together. In the third year, the segment may reach its full potential length, when the distance between the areoles at the top of the segment enlarges. Sometimes a segment will grow for one year only and not subsequently restart into growth, so there can be both long and short segments on a plant.

.....from F.Ritter, Kakteen in Südamerika.

### **Tephrocactus strobiliformis**

*Tephrocactus strobiliformis* is not a variety of *Tephrocactus articulatus* as commonly accepted, but a separate species, as Berger recognised earlier. Near Mendoza this species is to be found growing in huge numbers intermingled with *Tephrocactus articulatus*, where both retain their typical distinctive habit. Also near the city of Catamarca I saw both species growing close together. Near the city of La Rioja there grows together with *T.articulatus* a short-segmented form of *Tephrocactus strobiliformis* with an appearance closer to *Tephrocactus articulatus*. By Chilecito is to be found *T.strobiliformis* in its very typical habit, together with *T.articulatus*; these plants form upright shrubs of up to over half a metre in height, with the segments sitting in line one above the other - these are about 3cm thick and about 10 to over 20cm long, somewhat bluish grey-green. A particular distinction in comparison with *T.articulatus* is moreover the smaller and significantly more closely pitched areoles, which in the Type form are spineless. [Flower details] Somewhat less typical and rather closer to *T.articulatus*, without hybridising with it however, are the forms from Mendoza. Here the segments are 3-4cm thick and 6 to 11cm long and in occasional examples, with a parchment like spine above. Still somewhat closer to *T.articulatus* are the plants from Serrezuela (Prov. Cordoba) and close to the city of La Rioja; however, they already have a typical bush form, the segments being mostly spineless; however, there is often to be found at the upper end of the stem a very flat, 1-2cm long and 1-2mm broad parchment like spine, tapering up from the base to a pointed tip, directed upwards, grey. The glochids, as with the Type, are blackish-brown (with *T.articulatus* reddish brown). [Fruit and seed details]. Still closer to the typical *T.articulatus* is the un-named variety of the latter from the Province of San Luis.

Here we can follow up a form split off as a not very typical *T.articulatus*, the *T.strobiliformis* form with its elongate segments and shrub-like form which grows in the vicinity of the northwestern boundary of Prov. San Luis. From there towards the west, where the climate increases in aridity, and with that also the pressure of natural selection, evolution progresses yielding the typical forms not only of *T.articulatus* but also of *T.strobiliformis*. But even in the eastern area of origin, where they are growing together both forms are already sufficiently far evolved from one another that they no longer hybridise with each other to produce an intermediate form, so that they are to be regarded as separate species.

.....from H.Middleditch

Right from the time when cacti were being imported into Europe in the early 19th century, and for a great many years until relatively recently, it was common practice to select a plant whose appearance differed in certain respects from other plants known at the time - perhaps in rib count, spine count, body colour, etc. - and invent a fresh name for it. Nowadays we are becoming steadily more aware of the natural variation which can occur either within a population, or between adjacent populations. Today's problem is whether to have a myriad of micro-species to identify these variations, or to lump them all together so that a species name becomes almost meaningless, or to find a middle course where a name will convey a useful picture of a given species, or group of plants. Fortunately there are some plants which display clear and consistent differences in growth patterns, where nature has provided us with a natural method of separating species and we do not have to resort to an artificial man-made system of nomenclature. The distinction between the existence of a growing point on *T.strobiliformis* and the lack of a growing point in *T.articulatus*, may well be one of the best examples of natural species separation.



When Ritter says that he found examples of *T.strobiliformis* near Catamarca city, is this the only record of finding these plants in this area since they were first found growing there by Fric?

.....from D.Parker

Looking up the name *strobiliformis*, I find some confusion straight away, with the following four names:-  
*Opuntia diademata* v.*inermis* Spegazzini 1905  
*Opuntia strobiliformis* Berger. *Kakteen* 1929.  
*Tephrocactus articulatus* v.*inermis* (Speg) Backeberg 1953  
*Tephrocactus strobiliformis* (Berg) Backeberg.

Are they all the same thing?

.....from H.Middleditch

Unfortunately the answer to this question is far from simple. To be more precise, the quick answer is simple, but the ramifications are rather complex. Let us take first the names *articulatus* and *diadematus* which have been with us for many, many years and have been used in different senses by different authors. It would appear that Backeberg was the first to regard *articulatus* and *diadematus* as one and the same thing. The synonymy of *articulatus* and *diadematus* was also accepted by Kiesling (*Darwiniana* 1984) as well as by Gilmer & Thomas (*Schumannia* 2 1998), and by Iliff (*The Andean Opuntias* 2002). From the habitat slides of these plants shown at various Chileans' Weekends it became evident that it was virtually impossible to draw any dividing line between these two names on the basis of the presence or absence, size, or shape, of the spines. Consequently when consulting earlier literature, the names *articulatus* and *diadematus* need to be regarded as virtually interchangeable.

Of my own plants of this sort, most of them give the impression that they are not too happy with either their compost or their environment, or both. The last thing they could be described as is "thriving". At least there is one plant that produces segments getting on for a good 4 cm in length and spines of about 3 inches in length. But I do recollect going into a collection - and not a large collection - many year ago, being astonished to see a really thriving *T.articulatus* with joints that must have been all of four inches long. At the same time the segments were the same basically inverted top shape as those to be seen on my own plants, and on many others.

This brings us back to Spegazzini's *diadematus* v.*inermis*. The original 1905 description of this name included reference to "cylindrical segments 50 to 100mm long by 20 to 35mm thick." These sort of segments are well illustrated by the habitat picture Fig.10 of Gilmer & Thomas (*Ibid*), whilst Fig. 50 in the Leighton-Boyce & Iliff "*Tephrocactus*" illustrates well not only this sausage-shaped segment form but also the elongate elliptical shape adopted by segments of this plant in cultivation. So we have a clear distinction between the top-shaped segments of *T.articulatus* which lack a growing point, and the cylindrical sausage-shaped segments of *T.strobiliformis* which do possess a growing point. So that *Opuntia strobiliformis* Berger is the same thing as *Opuntia diademata* v.*inermis* of Spegazzini, and the same as *T.articulatus* v.*inermis* (Speg) Backeberg of 1953, as well as the same as the "*Tephrocactus strobiliformis* Berg = *T.articulatus* (Speg) Backeberg" of the *Kakteenlexikon*, since the latter two names both refer to the original cylindrical, up to 100mm long, segments of the 1905 Spegazzini description.

.....from D.Parker

There are approaching 400 plants of *Opuntia*, including *Tephrocactus*, in my own collection. From these, I have selected four plants which have the rather more elongated segments which seem to distinguish the "*strobiliformis*" form from the general run of varieties of *Tephrocactus articulatus*.

At the start of the growing season, early in March, one, two, or three segments were selected on each of these four plants, on which to make observations. On each of these particular segments, a mark was made with a felt pen under a number of areoles, especially near the top of each segment. As the tubercles more or less follow the contour of the stem and of course there are no spines, so it was quite easy to see these markings. In this way it would make it fairly obvious if any additional tubercles were produced by a growing point on any of these segments, as the season progressed.

At approximately monthly intervals up to June, careful observations were made on each of these segments to see if any new tubercles had been added at the crown, and also to check the length of each segment at the same time. The segments on two of the selected plants displayed virtually no increase in length over this period, but on the third plant two segments lengthened from 2.2cm to 4.4cm and from 4.5cm to 9.8cm respectively. On the fourth plant, a segment lengthened from 9.5cm in March to 14cm in June. But none of these segments displayed any new tubercles.

.....from H.Middleditch

Would these observations suggest that these particular segments did not have a growing point? That the increase in length was simply a reflection of water take-up as the growing season progressed?

.....from D.Parker

At that stage, that was my own conclusion. But over the same period, a number of new segments had appeared on these plants, in the form of tiny offsets, covered with close-packed short-woolly areoles, which were so close together that it was really impossible to count them. As these new offsets grew in size, the areoles on the lowest part of these new segments became separated from one another so that they could be seen as distinct individuals. At first, there were only a few of these separated areoles to be seen, but as the new segments grew longer, more and more areoles separated out from those still packed closely together at the crown of these segments. At the same time, the patch of closely packed areoles at the crown appeared to reduce in size, although their number could still not be counted.

.....from H.Middleditch

When the new segments of *T.articulatus* first appear, the areoles are so close together that it is not

possible to distinguish one individual areole from another. As the segment grows in size, the areoles gradually move apart from one another, so that effectively it is then possible to see every areole on a segment. And of course as the segment continues to enlarge over the season, the space between one areole and the next continues to increase. But evidently on *T.strobiliformis*, after the new segments attain approximately walnut size, the areoles on the lowermost tubercles have already moved apart from each other - moving a little further apart if the segment increases in diameter over the season. As the segment continues to grow in length, more areoles appear steadily from the growing point. The foregoing observations from members would suggest that the production of new areoles from the growing point may occupy one season, or more than one season. Plainly these segments do not continue to grow more or less indefinitely.

Put simply, the new segments on *T.articulatus* expand without having a growing point, whereas on *T.strobiliformis*, the segments extend their length by producing fresh areoles at the growing point - like a *Cleistocactus* or a *Trichocereus* - but not indefinitely. However, *T.strobiliformis* would also appear to be capable of producing new segments in cultivation which lack a growing point.

.....from J.Iliff, *The Andean Opuntias*, S.P.R. Vol.6. 2002

The morphological distinction between those plants in which the apical meristem of the shoot remains active and capable of resuming growth indefinitely (plants of indeterminate growth) and those in which such activity ceases after the shoot has formed a segment of the stem with a 'blind' apex - usually within one season (plants of determinate growth) is of wide application in the *Opuntioideae*.

.....from H.Middleditch

Presumably the expression indeterminate growth could be applied to the stems of *Austrocylindropuntia*? Whereas the segments on *T.strobiliformis* do indeed grow at their growing point but then produce a 'blind' apex, where the growing point ceases to grow. In this case would it be botanically incorrect to describe these segments as being of indeterminate growth? But then if the stems of *T.strobiliformis* are to be described as having determinate growth, what term to we apply to those *Tephrocactus* which produce segments which grow solely by expansion and not by means of a growing point?

## **NOT FLOWERING PTEROCACTUS? From W.Phillips**

My *Pterocactus* collection is small, but confusing. I have three clones of *P.kuntzei* from commercial "anonymous" sources, of which two flower well if I pollard them annually, providing two to three flowers on each small plant. In addition, I do have a big plant which is in a 6 inch pot because of the huge tuber, but it will not flower. I have cut back the stems un-mercifully, and all it does is to throw up even more stems. Other years, I have left it alone. But still no flowers. It has been stood outside all year, protected from rain during the winter - still no flowers. When I came to ease it out of its pot in order to put it into a 7 inch pot, with my porous compost, I found that it had produced flower buds which had aborted. It has never done that before. It used to be in a more prominent position on the shelving, but last year in desperation it was put into a well-lit but out-of-the-way corner, so that I never noticed the attempt at flowering. Previously it had stood on the hottest, sunniest places in the greenhouse and even with the doors and vents open it got regularly "baked", as the temperature regularly reaches 40°C. In winter, the heater in my greenhouse is set so as to avoid the temperature falling below freezing point. Watering never starts before Easter, sometimes even later, when the weather is warm enough.

The two plants that do flower have reddish-purple stigma lobes. Backeberg says that *kuntzei* has green stigma lobes whilst *decipiens* has a reddish-purple stigma. Despite this, I am inclined to accept Kiesling placing these two names into synonymy. I also have two plants which were vegetatively propagated from habitat collected material from San Rafael, Mendoza, labelled *Pterocactus* sp. aff. *decipiens*? Now these plants flower profusely from the end of almost all of the stems. The flowers are smaller than on my *P.kuntzei* and are of what I would call a cafe-au-lait colour, as compared to the dirty chrome yellow colour of my *kuntzei* - but again with purple-red stigma lobes.

.....from W.Clarke

Usually I do not have much success with getting *Pterocactus* to flower. But this year my *P.tuberosus* did produce two flowers, the petals a very pale cream colour, the upper parts tinged with a pinkish brown to a varying extent.

.....from K.Gilmer

I am in agreement with R.Kiesling that *P.decipiens* and *P.tuberosus* are both synonymous with *P.kuntzei*. The most frequent colour of the flowers on this species is of course yellow - yellow in different shades that stretch from a pale lemon to a dirty yellow, the latter including a brownish tinge. Indeed I did see a specimen with light brown flowers in the field in Argentina; but on account of the vegetative features of the plants at that location, they were unambiguously *P.kuntzei*. Of course one would not normally expect to see such a flower colour on *P.kuntzei*, but I now think that it lies within the range of variation of flower colour for this species.

.....from A.Johnston

Although it seems to be a commonly held view that *Pterocactus tuberosus*, *kuntzei*, and *decipiens*, are one and the same, there does seem to me to be differences between them.

.....from A.de Barmon

How can flowering be induced on *Pterocactus tuberosus*? Quite a few different treatments have been tried, but up to now none of them has been successful, even though all the plants concerned had a mature tap root. They are grown in pots which are twice as high as standard pots, so the tuber is fully immersed in the

compost. They have been pruned in winter, by simply detaching gently the youngest segments of the branches. They have been given generous waterings during the growing season, and lighter but regular ones over winter. And they have been put in a hot location in the greenhouse. Flower buds seem to appear but shortly stop growing and are replaced by new vegetative buds around the apex of the branches. The latest idea is to provide some extra feed during the growing season.

## ENCOURAGING PTEROCACTUS TO FLOWER From J.Arnold

My Pterocactus are grown in the unheated section of my greenhouse, separated by a glazed partition from the heated part of the greenhouse. It is an Alton greenhouse, being up against a fairly substantial party wall which is quite thick, longer and taller than the greenhouse, so that it may be a useful heat reservoir. The outer door of the greenhouse opens into the unheated section and it is left wide open during the summer and also frequently open even over the winter months. The Pterocactus are on the bench quite close to the door. On odd occasions when the overnight temperature has been down below zero, I suspect that they could have actually frozen solid!

It will be two or three years ago now that I decided to put my Pterocactus into more generous size pots in order to give the tuber plenty of growing room, particularly in depth of pot. They are in my usual compost, about half and half J.I. No.2 and inert material which is a mixture of perlite, largish grit, grit for alpines, and sharp sand. This does drain quite well and it seems that Pterocactus do like good draining compost. They are watered quite liberally from about the end of January so that by about mid-February they are fat and growing well, putting out new stems from the tubers and new branches from existing stems. After two or three months, the buds start to appear on the new growth so that a number of them will be in flower by Easter.

It will be a few years ago that some seed of Pterocactus tuberosus became available from F.Vandenbroeck, which germinated quite well for me and four of these plants have been retained. Of all my Pterocactus, these probably produce the best crop of flowers, because the top growth is more vigorous and so it flowers better once the tubers have reached a reasonable size. The flowers are predominantly yellow or brownish-yellow; when yellow, they are an ochre-yellow rather than canary yellow. They also probably have the largest tubers of all my Pterocactus, about 4 inches across. But the flowers are not all the same colour on the various species of Pterocactus.

This year, Pterocactus skottsbergii has flowered for the first time, with quite large flowers of a bronze-orange colour. But the flowers on P.megliolii are even larger, about two inches across, white, again flowering for the first time this year. The flowers on P.valentinii are quite small and of a reddish orange colour. In addition, two plants of P.australis, and P. araucanus have also flowered. It does seem to me that most of these have flowered only when subsidiary shoots have been produced from the primary stems. This is certainly so with P.megliolii and P. araucanus.

.....from M.Muse

All my Pterocactus are kept in an unheated greenhouse over winter and are then put out in the open air for the summer. They are being grown in what I would call run-of-the mill pots which are a little deeper than they are wide. My P.skottsbergii and JL 103 P.valentinii have not flowered, but at present they are seriously in need of repotting and when that is done I may be able to look forward to better growth as well as a better chance of seeing flowers. My black-spined P.australis has flowered, even though it is in only a 2 inch pot, but the P.australis from the "Straits of Magellan" which has straw coloured spines, does not flower.

.....from J.Gamesby

It will be quite a few years ago that I paid a visit to the collection of A.W.Craig when he pointed out to me that he had repotted all his plants of Pterocactus into much more generous sized pots. They certainly gave the impression that they were growing well, so I decided to do the same with my own Pterocactus. The first problem was to get hold of some suitable pots, but I soon found that most nurseries used a suitably deep pot for their clematis and roses - usually described as a rose pot. These are about 4 inches diameter and some 8 inches deep. Having acquired some of these pots, I transferred all my Pterocactus into them and they are now growing much better. However, they still only flower some years and not other years.

.....from K.Gilmer

The winters can be very cold indeed in this part of Germany so all my Pterocactus are kept in a greenhouse with the heating controlled to come on at 0°C, but then it cuts out at about 3 or 4 degrees higher. Most of my Pterocactus are left in the greenhouse over the summer months, but even with the ventilators fully open, the temperature inside the greenhouse can rise to even 45°C on cloudless, sunny summer days. My plants of P.australis and P.fischeri do not seem to like these conditions so during the warm summer months they are brought outside, where some clones flower and other clones do not. Inside the greenhouse, P.reticulatus, P.gonjianii, and P.megliolii will flower. The various clones of P.tuberosus all flower readily, but if I leave perhaps twenty or thirty branches on any of these plants, most branches can produce a flower but some of the buds abort. This does not happen with my plants of P.tuberosus which have only a few branches, where every bud opens into a flower. But it is almost impossible to obtain flowers on P.araucanus.

.....from G.Hole

There must be well over a hundred plants of Pterocactus in my own collection, all of them being kept over winter in an unheated greenhouse which can go down as far as - 8°C. All these Pterocactus are grown in deep ("long tom") pots, with a very gritty compost as the tubers do not seem to like being in a peaty compost. Many of them have been grown from stem cuttings and when they have a tuber this needs to be up to 2 inches across before they are likely to flower. If the tuber grows nearly as wide as the pot, then it is put into the next



size pot up, or else the plant becomes reluctant to flower.

My *P.tuberosus* will flower pretty well every year on the annual growth. Before the growing season starts, all the previous year's stems are removed and then the tuber will produce a fresh crop of stems - almost all these new stems will be carrying flowers by the summer time. Originally I had no flowers on my *P.hickenii*, so I rooted down a cutting and when that was well established, with its own tuber, I put the parent plant out in the frost and the cold rain during January and February - which evidently triggered it to decide to flower. When the buds began to show, it was put back into the greenhouse and then the buds developed into flowers. Without having to repeat the spell outdoors in winter, it will now flower about every other year. It grows a new head each year and this new head will flower in the following year - a new head does not seem to flower the same year in which it grows. My *P.skottsbergii*, which looks to me like a *P.hickenii* with longer spines, will also only flower on a new head in the year after the new head is added to the plant.

My *P.fischeri* was also given the harsh winter treatment, like *P.hickenii*, and it subsequently flowered the once, but never again. Whilst *P.araucanus* simply does not want to flower at all.

.....from A.Johnston

My own *Pterocactus* are in two and a half inch pots, which do not allow the plants to grow a large tuber, but still they do flower well almost every year. The flowers do not seem to have any preference for growing on the branches, many of them appear on the main stems. In particular on *P.kuntzei*, which produces a bunch of new stems from the top of the tuber every year - by the end of the season they are so untidy that they are usually all cut off.

All my *Pterocactus* are kept in my unheated greenhouse. There are some occasions when I have gone into this greenhouse on a winter's day and on carefully getting hold of the body of, for example, *Pterocactus reticulatus*, found it is solid, just like stone - presumably frozen solid. But that does not prevent growing or flowering in the summer. The first watering of the year will be some time in February - usually on a warm sunny day. During the summer the door and the vents will be left wide open all the time and if it is a hot sunny day the air circulation fan will be set away in order to ensure that the air is kept on the move to avoid the inside of the greenhouse getting too hot.

.....from H.Sonnermo

Some years I put my *Pterocactus* outside for the summer, but this year I left them in the greenhouse - I think they grow very well in there, where they have plenty of ventilation (windy!) and warmth. None of my *Pterocactus* is grown in a deep pot. I have found that little spare root room and not too much nutrition can force the plants to flower. I have tried to set fruit on them using pollen from other genera, but with no luck.

.....from H.Middleditch

In the account by Carl Skottsberg of the Botanical Results from the 1907-1909 Swedish Expedition to Patagonia (published 1916) there are fourteen tables of minimum, maximum, and mean temperatures for each month of the year for fourteen locations in Patagonia. The table for Bariloche, situated on the shore of Lake Nahuel Huapi (Chileans Patagonia and Lake District maps), records a minimum temperature of -12.2°C in August, the other stations having a minimum ranging between -6°C and -33°C. The indigenous flora, including the *Pterocactus*, will need to survive being subjected to this temperature during the winter, which at least two of our members have been able to prove to their satisfaction.

Patagonia is renowned for the strength of the winds so that a well-ventilated greenhouse in summer would seem to compare reasonably well with the natural environment for *Pterocactus*, and again that appears to help to encourage flowering in cultivation. At one of our Chileans' Weekend meetings, it was observed by A.de Barmon that his greenhouse did get stiflingly hot on fine sunny day - could this be a contributory factor in discouraging onward growth of buds into flowers?.

.....from A.de Barmon

The idea that a "hot" location in the greenhouse might be detrimental to flowering of *Pterocactus*, seems to be an excellent idea. So next season I will find a sunny but cooler spot in the greenhouse for these plants.

## **PTEROCACTUS STIGMAS - A CLOSED SUBJECT?      From H.Middleditch**

It will be many years ago since I first had sight of a picture of a *Pterocactus* flower. At odd (and usually lengthy) intervals I was able to look at photographs of other *Pterocactus* flowers. In this way I began to take it for granted that the stigma lobes on *Pterocactus* flowers usually remained upright, parallel to each other, not closely clasped together but barely apart from one another and never spreading. Eventually this neat perception was rudely disturbed when one of our members produced a photograph of a *Pterocactus* flower with the stigma lobes opened about half-way, that is, they stood at about 45° to the vertical. My own plant of *Pt. kunzei* opened four flowers last year and at no time did I see the stigma lobes open; yet I am convinced that the previous year I saw wide open stigma lobes on a flowering cutting of the same species. Perhaps the stigma lobes only adopt this attitude for a short period towards the end of the life of the flower and perhaps it is only when they are in this disposition that they can be successfully pollinated? Do efforts to achieve pollination fail to achieve success for most of the time the flower is open, because the stigma lobes are closed? Have the stigma lobes been closed or open when successful pollinations have been achieved?

.....from A.Hill

Last year I had two plants of *P. tuberosus* in bud; the stem carrying one of the buds was almost detached from the plant and unfortunately it did fall off before the flower opened. However the other flower did mature and I found it open at about 11 a.m. in full sun, facing south. The four stigma lobes were joined at the tip but were separated further down. I checked the plant every hour or less whilst the flower was open but the lobes did not separate.

.....from M.Lowry

My own *Pterocactus meglilii* has produced a flower and I did attempt to persuade it to set fruit. But I am quite sure that the stigma lobes never opened out away from each other.

...from J.Lambert

Of the *Pterocacti* of which I was able to bring cuttings back with me from Argentina, several have not only established and grown on but have also flowered. I have never observed the stigma lobes to spread open, either in nature or in cultivation. However, if they do so only for a short while under certain conditions, I may of course have missed it. It is quite possible that the stigma lobes of *Pterocactus* behave exactly like most other cacti i.e. they may be more or less clasped together at the opening of the flower, but then rapidly open up. Anyway, it seems sufficient to apply the pollen gently on to the closed stigmas to obtain pollination; I cross pollinated *P.kuntzei* and *P.gonjianii* and obtained a fruit on the latter.

What I have observed on the flowers is the sensitivity of the stamens; as soon as you touch the anthers (for example, to collect pollen) the filaments fold back towards the style, closing up like the tentacles of a sea anemone. This is a most curious feature, whose purpose I do not very well understand. I have observed sensitive stamens on all the flowers that I have examined so far for this feature. Kiesling does mention it as a generic character.

.....from A.Johnston

From my own recollection the stigma lobes on *Pterocactus* flowers are mostly closed. Looking at my photographs of flowers on my *P.kuntzei*, *australis*, and *valentini*, the stigma lobes are almost closed. However I do remember that the stigma lobes on my *P.kuntzei* were partially open when I pollinated them. But I do not recall them being very wide open.

....(later) On all the *Pterocactus* flowers which opened this year - *australis*, *gonjianii*, *kuntzei* and *reticulatus* - the stigma lobes were open before the flower faded. In addition I can report that the stamens were sensitive on all these flowers. Is this characteristic designed to envelope some small insect to make sure it gets well covered with pollen, or is it to prevent something else taking the pollen?

.....from K.Gilmer

Normally on the first day the flower opens the stigma lobes are closed, which may be a device to prevent self-pollination. The stigma lobes will normally open in the course of the second day, by which time the pollen will have been removed from the flower by visiting insects.

.....from A.Johnston

The flowers on my *Pterocactus* in cultivation still had plenty of pollen on the anthers even when the stigma lobes had opened.

.....from H.Middleditch

Perhaps as a result of not many insects visiting these particular flowers?

.....from K.Gilmer

In regard to the stigma colour on *Pterocactus* flowers, I can confirm that most of the *Pterocactus* species have a red or reddish stigma. With the exception of *P. kuntzei* which sometimes has a green, pale green, or even yellow stigma. But I think that the colour of the stigma is not really a good feature for distinguishing between different distinct forms or variations, because the colour can be affected by growing conditions in cultivation. One of my cultivated plants of *P.kuntzei* normally displays a red stigma, but sometimes a flower may have a reddish-green, or even a clear green, stigma.

However, it is preferably not to say that this particular feature can only be found on flowers of *P.kuntzei*, as I have just had two flowers open on *P.valentini*, one with a pinkish red stigma, the other with a pale yellow stigma!

## **FINDING WHICH SORT OF HAAGEOCEREUS? From M.Williams**

The route for our field trip to Peru took us southwards to the shores of Lake Titicaca, from where we drove over the Western Cordillera to Moquegua. After an overnight stop, we travelled south along the Pan-American Highway to Tacna, which lies in the southernmost part of Peru, at no great distance from the border with Chile. From Tacna, we travelled inland along the road leading to Tarata, which gradually climbs above the valley of the Rio Caplina. Eventually we came to the pass which takes the road out of the valley of the Rio Caplina and over into the valley of the Rio Sama. A few km beyond the pass, we stopped to look around at the *Tephrocactus sphaerica*, the *Corryocactus*, the *Oreocereus*, and the *Arequipa*, which we had already seen here and there on our ascent to the pass.

At this point we turned round and retraced our steps back towards Tacna, stopping on the descent at 3150m altitude and seeing the same selection of cacti as on our ascent. Continuing on our descent, we made another stop, shortly after the *Browningia candelaris* had put in an appearance, at 13km from the pass and at 2670m altitude, near Quilla. We had come into a gully which was fairly narrow, with fairly steep sides which were not so steep as to make it difficult to walk straight uphill. It could have been all of sixty or eighty feet climb from the road to the top edge of the gully. The sides were made up of a mixture of rocks of various sizes, together with fairly compact sand.

At both sides of the road, at the foot of each slope, we found some plants of *Haageocereus*, which were growing between the lumps of rock, the rocks being all sorts of sizes up to as big as paving slabs. These *Haageocereus* were not to be found on the more steeply sloping sides of the gully, where there was an occasional *Browningia candelaris*, mostly growing no closer than a stone's throw from one another. As we climbed up the hillside, past the *Haageocereus*, we came across some *Arequipa*, then a yard or so further up

there was a *Corryocactus*, and then a yard or so further up again a *Tephrocactus sphaericus*, almost in a line up the hillside. There were not a great many of these plants and there were also a few leafless, dwarf shrubs and other odd bits of vegetation here and there, all looking very lifeless.

The new stems on this *Haageocereus* started off growing upright until they were perhaps round about one foot high, when they started to adopt a curved shape. The tallest stems would have reached almost a yard in height, by which time their lower parts were lying close to the ground, the stems adopting a curved or banana-like shape with the growing point facing upwards. A great many of the central spines were really surprisingly long, as long as the thickness of the stem itself. What was particularly surprising about these *Haageocereus* was the stoutness of the stems, as they were about 7cm in diameter, which I can still confirm from the small cutting which I have established. The rib count would be about 16, again confirmed from my own cutting. The central spines, of much greater length than the radial spines, ranged up to 4cm in length, those on the habitat portion of my own small cutting being up to about this same length.

In the 1999 Chileans' Field Number Compendium, the entry for FR 318a is given as *Haageocereus platinospinus* with a location of Quilla, which I take to be the place of the same name which was close to where we found these *Haageocereus*, at 13km to the south of the pass. It was quite some time later when I found in Englera 16 the location for FR 318a *Haageocereus platispinosus* given as "Peru, on the road from Tacna to Charana". Perhaps the name *platispinosus* might be used for the plants which we saw here on the Tacna to Tarata road? Near Yura, which is not far from the city of Arequipa, we found plants of *Haageocereus platinospinus* at 2560m altitude. These plants displayed a more upright mode of growth, many of them having most of their stems adopting a nearly vertical attitude. They had a much less stout form of stem, being only about 4cm thick, again with 16 ribs. But here the spines were ranging up to about the same length as the diameter of the body. .

There was a suggestion that the *Haageocereus* which we saw on the Tacna to Tarata road was only a form of *H.australis*, but I understand that *H.australis* grows only in the coastal zone, and according to the description of that species it grows in a virtually horizontal manner.

.....from H.Middleditch

The Ritter field numbers published in the 1999 Chileans' Field Number Compendium were compiled by extracting all available entries from the 4-Volume *Kakteen in Südamerika* published by Ritter. Added to this were details obtained from various sources, and it is quite possible that the "Quilla" location for FR 318a may have originated from correspondence in (or before) the 1970's with some collectors in New Zealand who obtained Ritter seed from Frau Winter, grew on the plants, then supplied Frau Winter with stocks of seed for the seed sale catalogue.

.....from K.Gilmer

During our visit to Peru we also followed the road from Tacna to Tarata, from where we continued over the Cordillera as far as Lake Titicaca. On the way to Tarata we made a stop at 2446m altitude, before reaching the pass, where we came across both *Browningia* and *Haageocereus*, but by the time we had ascended to 3250m altitude, neither of these sorts was to be seen, although we did see *Arequipa*, *Corryocactus*, *Oreocereus* and also some *Erdisia* there. Beyond the pass, and even beyond Tarata, at 3750m altitude, there were still *Arequipa*, *Corryocactus*, and *Oreocereus* to be seen, but no *Erdisia*.

We also made an excursion from Tacna along the road which heads inland towards the border with Chile. It goes up the valley of the Rio Caplina as far as Pachia, from where the road takes a side valley to the right towards Palca. Along this route we first came across *Haageocereus* at a spot 10km north-east of Tacna, at 960m altitude. We again found *Haageocereus* at three more stopping places between 1565m and 2365m altitude, at each of which it was accompanied by *Browningia*, but only at the 2365m spot did we also find *Corryocactus* and *Arequipa* accompanying the *Haageocereus*. Higher up still at 3240m, there were no longer any *Haageocereus*, but the *Corryocactus* and *Arequipa* were now joined by *Oreocereus*. By 3700m, quite close to the border with Chile, we had seen the last of the *Corryocactus* but the *Arequipa* and *Oreocereus* were still there. And finally at the pass, at the border with Chile, we saw only *Tephrocactus ignescens*.

.....from H.Middleditch.

It is noted by M.Williams that in Englera 16 the Ritter FR318a *Haageocereus platinospinus* originated from "Tacna to Charana". Charana lies in Bolivia, close to the border with both Chile and Peru. The most obvious route to reach Charana from Tacna is that taken by K.Gilmer through Pachia and Palca, then crossing over into Chile. This same route out of Tacna, via Pachia and Palca, to what is now the border between Peru and Chile, had been followed shortly before 1830 by Meyen, and again shortly after 1830 by D'Orbigny.

## **REISE UM DIE ERDE. By F.J.F.Meyen, 1834**

**Abstract translated by H.Middleditch**

Our expedition set off from Tacna on 31st. March, the road out of Tacna taking us along the valley of the Rio de Tacna which is remarkably wide, often half a league or more. There are some trees and bushlike vegetation but all around is dead with nothing but sand and bare rock. Passing Caleo, we came to Patchi. Four leagues further on, we arrived at a single house where the strata are in almost horizontal layers, with a red rock forming the upper layer. We now come to the region of the cactus, with *Cereus candelaris*, *Cactus fascicularis*, and *Cactus aureus*. We then made an overnight stop at Palca, which lies on the side of a very deep quebrada, that carries a very fine vegetation. It was here that we saw some obelisks about 20 feet high and 8 feet wide.

From Palca our road continued steadily along the slope of this fertile quebrada, which is exceptionally



pleasant. The abundant vegetation continued. The Cactus peruvianus with its large white flowers is really at home here and the bushes are thickly overgrown with the fine Mutisia hirsuta. Some more obelisks were to be seen on the rim of the quebrada. But when no more of these obelisks were to be seen, there was no longer any water. The rich vegetation gave way to much lower growing forms. The tall Cereus and even Cactus peruvianus ceased to occur and lower growing forms appeared, which were covered externally with white shiny hair. The ascent of the mountainside became extraordinarily steep. Well after the last hairy Cerei had disappeared, the vegetation became very low growing indeed, a plant barely a foot high having a stem of 5 to 6 inches thick, branching repeatedly.

[Having gone over the Guatillas pass into what is now Chile, the party subsequently crossed the Rio Azufre and continued on their way towards Charana, with the Nevada Tacora to their left.]

.....from H.Middleditch

From the altitude at which it was seen, it might be reasonable to presume that the cactus described by Meyen as having "white shiny hairs" were most likely Oreocereus. The Cereus aureus of Meyen was renamed Erdisia meyenii by Britton & Rose.

### **VOYAGE DANS L'AMERIQUE MERIDIONALE. By Alcide D'Orbigny** **Abstract translated by H.Middleditch**

All my preparations completed, I waited until May 19th 1830 for my muleteers. I loaded up my personal belongings and set out [from Tacna] before them. I went in the direction of Pachia, where we were to lodge overnight. At a league from Tacna I came into the hamlet of Pocolualle. Much further on are the hamlets of Casa Blanca and of Calama, situated in the midst of flourishing vegetation, although artificial, where there are fine willow trees. Beyond Calama, the valley divides into two arms, of which the one to the right is uninhabited, whilst the other to the left is cultivated as far as the eye can see. The hills, quite low at first, rise more and more, in proportion to our progress, and finally appear as veritable mountains. But they are sandy, dry, and support only some creeping cacti. The slope to the right is called Cuesta de la Hiesera, from the sculptures which are said to have been found there.

After two hours' travel, I arrive at Pachia, a fine village situated close to the river. (In the translation of the voyage of Mr.Meyen, "Nouvelles Annales des Voyages" 1836, either it has been badly translated or the place names were so badly written that they are hardly recognisable; thus Calama is written Caleo; Pachia as Patchi; etc.) It is made up of a huge church and a large number of houses, scattered among the cultivated fields. Down below, to the north, I could see the narrow mouth of the ravine of Calientes, from which emerged the waters which fertilised the valley and where is to be found a thermal spring. To the right, the entrance to the ravine of Palca, which I would have to tackle in order to reach the summit of the Cordillera.

The following day I eventually set off on the route. I left behind the cultivated fields to cross two leagues of a plain without a trace of vegetation, as I made for the mouth of the ravine of Palca. My mule train entered the ravine, following the dry bed of the stream, with at best the breadth of a mule between two enormously high walls. Or else, when the bottom of the ravine was impassable, one climbed by narrow paths, over little shifting stones, making a thousand detours, passing from one side to the other according to immediate practicalities. At three leagues from the entrance to the quebrada, I noticed at the edge of the trail, many blocks of granite, on which the natives had sculptured enormous figures. At the beginning of the ravine an utter barrenness was to be seen. A few cacti, of a peculiar appearance, like a candelabra, arose to represent the vegetation all on their own.

Before arriving at Palca, one climbs up a slope to the right of the ravine, and then looks down on the village and its fields. The mountains here are not as arid as before. More species of cacti occur here, as well as some other plants. The bottom of the ravine, a hundred to a hundred and fifty metres in width to each side, receives irrigation water and is sown with lucerne, with maize, and also with potatoes. I went down into Palca, which is a stopping place for the mule trains which ascend or descend to the shore of Peru from the highland towns of the country, and of Bolivia.

On the following day, I set off on my way. For two or three leagues I followed the very picturesque margins of the quebrada, the bottom bedecked with leafy bushes and various flowers (Cactus peruvianus, Mutisia hirsuta, according to Meyen). Here and there, small huts in the cultivated parts. I arrived at the junction of the Palca ravine with another, waterless, ravine. There, I left behind the the hygrophyllic vegetation and turned into a quebrada bare of greenery, displaying nothing more than some cacti, one large, the other very small, covered with white wool. The remainder of the vegetation changed two or three times as I climbed to a steadily greater height, being quite different to that of the Palca ravine.

The track became steeper and steeper, making hairpins among the rocks, whilst my dog had to stop every twenty or thirty metres to catch his breath. Finally we came to the Gualillas pass.

.....from H-A Weddell, Voyage dans le Nord de la Bolivie. 1853

On April 23rd we set off from Tacna and quite shortly found ourselves beyond the cultivated area which lies close to Tacna. Two leagues on our way, we passed through the little village of Calama. Then shortly after passing through the hamlet of Pachia, we entered a very deep ravine, a tributary of the Rio Tacna. The slopes of the Quebrada displayed a slightly less stunted vegetation, which included Schinus molle. A little further up we saw an appreciable number of large cactus. Maize was being cultivated at a number of suitable places in the ravine. The vegetation then became more abundant and whilst there were no trees, large bushes were not absent.

Reaching Palca, we were at an altitude of 2900m, where we stopped overnight. On the following morning, we continued to ascend the ravine, by a track which became steeper and steeper. Eventually we came out on a sort of plateau, where grew the same bushes that we had seen earlier, together with a vegetation again composed of a fairly large number of species. But the further we climbed, these were fewer and fewer until there were only half a dozen species.

Finally we arrived at the Paso de Gualillos, which according to my barometer was about the height of 4500m quoted by Mr. Pentland.

.....from H.Middleditch

It will probably be over thirty years ago that an aged but excellent map of Bolivia was received from F.H.Brandt. The coverage of this map extended to south-eastern Peru and northernmost Chile, so taking in the Tacna to Tarata area. It also names the pass which lies on the present Chile-Peru border, to the southwest of Vulcan Tacora, as Paso Gaulillas. To retain historical accuracy, in the foregoing abstracts the name of this pass has been quoted with exactly the same spelling as it appeared in the original documents.

.....from K.Gilmer

From the road we travelled between Pachia and the Gualillas pass, we did not see anything in the nature of large sculptured rocks, or obelisks.

.....from H.Middleditch

The description for *Cereus fascicularis* provided by Meyen (Chileans No.37 p.13) includes a height of four feet, with stems "subarticulatis" i.e. giving the appearance of being somewhat segmented without being actually divided into segments. Taking this feature in isolation, the illustrations of *Armatocereus* in both Rauh's book on the Cacti of Peru and in Backeberg's *Die Cactaceae* display precisely this feature as if it was a regular characteristic of *Armatocereus*. Even though the flowers on *Armatocereus* are white and of about 3.5 inches in length, it may be rather unexpected to find flowers on an *Armatocereus* of only four feet in height. In addition, *Armatocereus* does not appear to occur in this very southernmost part of Paeru.

To some extent, a subarticulate stem is not entirely absent from some illustrations of *Corryocactus* that appear in the literature; however, the *Corryocactus* from southern Peru and northern Chile have a yellow or orange flower, not the "white flower 3.5 inches long" of Meyen's *C.fascicularis*. Taken on its own, this description of the flower would suggest the possibility of a *Haageocereus*. But there do not appear to be any references in the literature, or field comments from recent travellers to southern Peru, of *Haageocereus* which display a subarticulate stem, nor do the species of *Haageocereus* described from the area of the Chile-Peru border have only "8-9 radiating spines". How does the Meyen description for *C.fascicularis* fit in with the *Haageocereus* seen by K.Gilmer on the inland side of Pachia?

What name should be applied to this *Haageocereus* found along the road going from Tacna, via Palca, to the border with Chile? On the basis of the Ritter 318a location of Tacna to Charana for an occurrence of *H.platinospinus*, do we use this name? Or might it be described as *Haageocereus fascicularis*?

### **HAAGEOCEREUS FASCICULARIS (Meyen) Ritt., comb. nov.**

**Translated by H.Middleditch from *Kakteen in Südamerika* Vol.3**

Syn: *Cereus fascicularis* Meyen 1833, *Allgemeine Gartenzeitung*.

non K.Schumann 1898

non *Trichocereus fascicularis* Br. & R. 1920

non *Weberbauerocereus fascicularis* Backbg 1942

syn. *Haageocereus chilensis* Ritt. n.n

Body grey-green, growing decumbent downwind, freely offsetting from the base and from procumbent stems. Stems 40-50cm tall or up to 1m long when lying on the ground, 4-7cm thick, 11-18 ribs, ..... Spines brown, becoming grey. Radial spines 7-10, pointing sideways, ... 1-4cm long, central spines usually 1, pointing straight outwards, occasionally bent downwards from the base, 4-15cm long. Flower ... white 70-85cm long, Fruit .... etc.

Type location, west of Chapiquina, at an altitude of between 2000 and 3000m, in Dept. Arica, Chile. Distributed as far southwards as Mamina. It does not extend north beyond the border with Peru. Found by me in 1953, FR 601 and FR 125.

The original description of this species by Meyen is indeed very brief, but on account of the information about the location of the discovery in the Cordillera Tacna, it plainly relates to this species described above, since none of the cacti there match the data provided by Meyen. In the Cordillera of Tacna there grows *Haageocereus platinospinus*, whose distribution spreads down from the north but ceases however to the south at the Chilean border. I found *Haageocereus fascicularis* only across the border in Chile, as well as not far to the south of Tacna, and from there further southwards. Nevertheless if the data from Meyen does quote Tacna, it is to be noted that at that time the northernmost Chilean province of Tarapaca belonged to Peru, Tacna lying on the border with Tarapaca.

It is out of the question for the spine count from Meyen of "spines 8 or 9, radiating" to apply to the related *Haageocereus platinospinus*, whereas it fits exactly with the species described above.

.....from H.Middleditch

There is little doubt that Ritter is likely to have had in his possession various works of reference relating to cacti. However, it seems to be fairly certain that Ritter did not have access to the 1833 travelogue written by Meyen, as Ritter was clearly unaware that Meyen's *Cereus fascicularis* was found along the road from

"Tacna to Charana", the selfsame route where Ritter found his *Haageocereus platinospinus* FR 318a. Which is north of the present border between Chile and Peru, whereas Ritter states categorically (above) that *Haageocereus fascicularis* is only to be found south of that border and it is *H.platinospinus* which grows north of that border e.g. at the Meyen Type location for *Cereus fascicularis*. It is also noted by Ritter that no cacti matching the Meyen description for *Cereus fascicularis* can be found in the Cordillera Tacna and "therefore" this name must apply to the *Haageocereus* from Chile. However, there are no reports whatsoever suggesting that the *Haageocereus* in northern Chile grow with "subarticulate stems up to four feet high" in accordance with Meyen's description for his *Cereus fascicularis*.

It is *Haageocereus australis* (or *decumbens*) which is to be found growing in the coastal zone of southernmost Peru and northernmost Chile, where they are supported by the mist which rolls in landward from the Pacific Ocean. Mostly these *Haageocereus* are to be found growing in a procumbent or decumbent manner, The *Haageocereus platinospinus* and *H.fascicularis* grow further inland, in the rainfall zone whose waters originate from the Atlantic Ocean. Ritter tells us that *H.fascicularis* has 7-10 radial spines and that *H.platinospinus* has 10-13 radial spines (but not under the entry for the latter name). Various observations and photographs have been received of the *Haageocereus* to be seen growing in this rainfall zone, but no actual radial spine count. Perhaps the cutting from GC 340, near Qilla, now being cultivated by M.Williams, could fit one or other of these names if we had a radial spine count?

.....from M.Williams

On my cutting from GC 340 there are one or two stout centrals up to 3cm long, the longer of these two spines becoming downwards pointing and grey with age. The new spines at the apex are amber at the base shading through to matt black at the point. There are 14 to 16 radial spines.

.....from H.Middleditch

So does this fit into *H.platinospinus*, just as Ritter insists? Whereas a close scrutiny of the pictures from F.Vandenbroeck suggests up to 10 radial spines, which does fit with *H.fascicularis*. What we do not have is a radial spine count for the *Haageocereus* seen by K.Gilmer on the road "from Tacna to Charana". Could these be Meyen's *fascicularis*, with 7-9 radial spines?

.....from K.Gilmer

Regarding the *Haageocereus* which we found round Tacna, I was able to count the number of radial spines by looking carefully at the slides which I had taken of these plants. The plant photographed a few km to the NE of Pachia at 1565m altitude, en route to the Gualillas pass, growing in company with *Browningia* (TG134) has 11-12 radial spines. On the picture taken at 2440m altitude at km48 from Tacna to Tarata (TG140), there are about 10-12 radial spines at each areole.

My travelling companion for my field trip to this part of Peru, R.Reith, was able to collect some seed from the *Haageocereus* at TG140 which germinated in his collection and I now enclose photographs of two of those plants.

.....from H.Middleditch

In the close-up view of the youngish plants grown by R.Reith, the half sideways pointing central spines make an accurate radial spine count rather difficult, but the figure appears to be 10-12, which would appear to put them into *H.platinospinus*.

.....from J.Arnold.

Travelling inland from Tacna in the direction of Tarata, we made a stop between Quilla and Estique Pampas, at 2716m, at Km48 from Tacna - only 6km from where M.Williams made a stop along this same road three years previously. We were in a very arid quebrada with ground composed of sand and gravel (ACL 508). There were *Browningia* and *Corryocactus* growing here, as well as short and fat plants of Arequipa. There were some semi-decumbent plants which we logged as *Loxanthocereus sextonianus*. We saw them frequently along this road.

.....from H.Middleditch

It would be rather surprising if this semi-decumbent plant was indeed a *Loxanthocereus*, as available records for the distribution area of this genus would not appear to extend to the east of Arequipa or to the east of Ilo on the coast. However, perhaps the radial spine count from M.Williams might provide a guide to the identification of that plant. What does Ritter have to say about *Loxanthocereus sextonianus* in this respect?

.....from F.Ritter, *Kakteen in Südamerika*.

*Loxanthocereus sextonianus*. Half-procumbent species from the south of Dept. Arequipa, west of the desert zone, which in growth and spination is so very similar to *Haageocereus decumbens* growing in the same places, that with both lacking flowers and without having them close together to compare, they can easily be taken to be one and the same. However, *Loxanthocereus sextonianus* is, in general, thinner - usually 2-3 cm thick, with fewer ribs - usually 13-15 .... spines are in colour, size and number just the same, but the number of radial spines is somewhat less and the central spines more.

.....from H.Middleditch

This does not provide a radial spine count, but in his *Kakteenlexikon*, Backeberg quotes a radial spine count of "up to 30 or more" for *H.decumbens*. and "up to 30 for *Loxanthocereus sextonianus*".

.....from W.Rauh, *Peruvian Cactus Vegetation*.

*Loxanthocereus sextonianus*. The original Backeberg plant (nr. 3428) in the Jardin Exotique, Monaco, has ...more or less 13 ribs, with 20-30 very slender, radiating, 5mm long radial spines. Type location, above Mollendo, near the coast.

.....from H.Middleditch

The radial spine count of 14-16 on the ex-Km 54 Tacna to Tarata plant being grown by M.Williams, seems to be on the high side for *Haageocereus platinospinus*, and on the low side for *Loxanthocereus*

sextonianus.

.....from W.W.Christie.

Among the plants in my collection is a *Loxanthocereus sextonianus* which was originally in the collection of the late J.Forrest. It has no provenance, but I understood that he had acquired it during the course of a visit to a continental nursery - possibly De Herdt. It has flowered for me with a typical *Loxanthocereus* flower. The stems, of about 20mm thickness, are rather peculiar as they are divided up into segments of about 30mm or so in length. There is one central spine, fairly robust, and about 10 radial spines.

.....from H.Middleditch

There is no reference under *Loxanthocereus sextonianus* in Ritter's *Kakteen in Südamerika*, to the stems of this species being divided up into segments. But in Backeberg's 1959 *Die Cactaceae Vol.2.*, the stems are described as "leicht abbrechend" which could be translated as sub-articulate. It was Backeberg who wrote the second half of the 1958 Rauh "Peruvian Cactus" book where *Loxanthocereus sextonianus* is described as having "gegliedert" stems, which is more positively segmented. This feature does not appear to be associated with any other descriptions of *Loxanthocereus*. Which raises the rather intriguing question, did Meyen see growing at the same spot, a *Loxanthocereus* with an articulated stem (which would hardly be in flower in March) and a *Haageocereus* sporting a bunch of white flowers, and took them to be one and the same?

.....from W.W Christie

Other than the stem segmentation, it is quite possible that the external appearance of the plants seen by Meyen were indeed similar. There are plenty of examples in the field of botany of locations where plants of different genera adopt a very similar mode of growth as a defence against the common environmental hardships, giving them a comparable external appearance .

.....from R.Mottram

There was a stock of this *L.sextonianus* with segmented stems already at Whitestone when I arrived here in early 1974. The source of that particular material was, I believe, Holly Gate. At that time, the segmented stem form, said to have been distributed by Backeberg, was regarded as typical for this plant. The earliest known photo of this sort, which appeared in the Rauh 1958 publication, curiously shows an unarticulated stem.

.....from G.D.Rowley, Ashingtonia 1.11.1975

This unusual miniature *Cereus* seems to be uncommon, as yet, in English collections, although I saw it often in Dutch and Belgian glasshouses. It was apparently distributed by Mr.Jansen who had it direct from Backeberg.

.....from C.Backeberg, My 1933 expedition. Cactus Journal of G.B. 2.1.1933.

I began collecting in northern Peru, then came the work in central Peru ... I was keen to collect a lot of *Cereus* material here. ... I had found *Cereus pacalaensis*, *C.pseudomelanostele v.laradensis* and *C.faustianus*. I was also able to collect again plants of the rare *Cereus eriotrichus* and *C.cephalomacrostibus*. And then I spotted a most peculiar novelty, *Cereus* (*Erdisia*?) *sextonianus*. Two years earlier I had wandered over the same site but had not seen it, and nearly missed it again.

.....from H.Middleditch

In Backeberg's *Die Cactaceae* we find that *C.pacalaensis* was found in Dept. La Libertad, some 580 km north of Lima; *C.pseudomelanostele v.laradensis* was from Laredo, N.Peru, whilst *C.faustianus* and *C.eriotrichus* came from the valley of the Rio Rimac, which flows through Lima. The *C.cephalomacrostibus* and *Cereus* (now *Loxanthocereus*) *sextonianus* originated from the vicinity of Mollendo. Like this swath of *Cereus* names from various widely spaced parts of Peru, it is not unusual to find that Backeberg's travellogues can tend to be rather expansive in places. Even the map of his various expeditions which appears on the inside cover of his "Stachlige Wildnis" plots his 1933 trip from Lima down the high Cordillera via Lake Titicaca to Bolivia, well away from Mollendo on the coast. Alongside are mini sketches of a balsa boat, a saloon car, and a horse rider, to indicate his diverse modes of travelling. But what do we find in the text?

.....from C.Backeberg, Stachlige Wildnis.

[Following visits to Yauli, Chosica, and Oroya in the Rimac valley] I travelled to Mollendo, the last large harbour before the Chilean border. This place lies where the cliffs fall steeply down to the sea. From there, a railway runs via Arequipa to Lake Titicaca. Just outside the town I came across *Islaya mollendinensis*. Nearby there was *Haageocereus decumbens*, whose snake-like body crept over the arid ground. In the vicinity grows the *Corryocactus brachypetalus*, forming dense bushes up to 2m high, with their green apple-sized fruits. [From there, by rail to Arequipa]

....from R.Mottram

The first description of *Erdisia sextonianus* appeared in *Kaktus ABC* for February 1936, which makes no reference to the origin of the Type. But in Rauh's *Peruvian Kakteen vegetation*, Backeberg notes that the plant which he originally collected at Mollendo was then in the *Jardin Exotique*, Monaco.

.....from H.Middleditch

This first description refers to "stems up to 15cm long" but makes no mention of the stems being sub-articulate, although this evidently was a feature of the Type plant. Apparently it has never been re-collected. Was it just a sport, a one-off clone? Did Meyen see a similar sport, a subarticulate *Haageocereus*, which took his eye as being unusual? A trek up the valley from Pachia towards the Gualillos pass - not along the present road - might unravel the mystery. Meanwhile, perhaps a ball and chain might not be inappropriate for the plant being grown by M.Williams, whilst awaiting a flower.

.....from R.Mottram

Fruit has been set on my plant of *Loxanthocereus sextonianus* which has the typical segmented form of stem growth and a typical *Loxanthocereus* flower. But not a typical *Loxanthocereus* fruit. On other *Loxanthocereus* which have set fruit for me, there are scales and hairs on the fruit just as on the pericarpel of



the flower, but certainly no spines. However, on the ca. 3 cm diameter fruit of *L.sextonianus* there are neither scales or hairs, just some small areoles each with a bunch of very short, spreading spines. In appearance it is quite similar to fruit which has set on plants of *Erdisia* (or *Corryocactus*) here, but on *Erdisia* fruit the spiny areoles easily become detached when the fruit is ripe. On *L.sextonianus* the spiny areoles remain firmly attached to the ripe fruit.

.....from H.Middleditch

In his "Stachlige Wildnis" Backeberg tells us that he found *Corryocactus* in the vicinity of Mollendo - are there any other field records for this occurrence?

The genus *Binghamia* was established by Britton & Rose. Subsequently, between the wars, various names were placed under this genus. Several plants which were evidently *Espostoa* x *Haageocereus* found their home in this group and the name has now been discarded. Following a field report from K.Gilmer, the Ritter *Oreocereus tacnaensis* was shown to be an *Oreocereus* x *Weberbauerocereus*, despite the absence of any plants of the latter genus in the vicinity. The *Loxanthocereus sextonianus* with a segmented stem and an *Erdisia*-like fruit appears to have been found at one place, only by Backeberg, where *Erdisia* is present and other *Loxanthocereus* are absent. But it would now appear that this plant is simply an *Erdisia* x *Loxanthocereus* hybrid, another hybrid to add to the catalogue of natural hybrids to be found in Peru. And was the *Cereus fascicularis* Meyen, with its sub-articulate stems, yet another of these hybrids?

## FINDING GYMNOCALYCIUM PFLANZII From F.Vandenbroeck

*Gymnocalycium pflanzii* is indeed, as Ritter puts it, the most numerous and widely spread *Gymnocalycium* species in nature - considering with it the forms near Comarapa, Millares, and Puente Acre. Ritter considers many species names as referring to mere forms or varieties of *G.pflanzii*. However, I feel somewhat uneasy about *G.pflanzii*, as the difference in appearance and habit of some of these "forms" may be enormous. There is an appreciable difference between the *G.pflanzii* of the Paraguayan Chaco and the *G.zegarrae* from near Comarapa and at first sight they have little in common. Even the forms occurring in the Bolivian Chaco may differ strongly from those of the Paraguayan Chaco.

We found the first plants of *G.pflanzii* about 25 km south of Fortin Teniente Agrippino Encisco (Fortin Garrapatal), a military post situated on the main Chaco route. This may be the southern limit of the growing area of this species in Paraguay. Around this post there is a natural reserve in which the species abounds, together with typical forms of *G.friedrichii* and Chaco species such as *Eriocereus*, *Stetsonia*, *Piptanthocereus*, *Cleistocactus*, and *Platyopuntia*. Here the *G.pflanzii* occur in very dense thornbush with lots of spiny terrestrial bromeliads and must be pretty much in the shadow in the rainy season. The body of these plants is mostly a fresh velvety green. Although clusters of up to five or six heads on fully grown plants are not rare, solitary plants are smaller in size and more openly spined than the Bolivian Chaco plants. It is a great pity that these parts of the Chaco are being more and more destroyed for extensive cattle rearing and large monocultures.

That part of the Bolivian Chaco through which we travelled rather amazed me because it differed considerably from the Paraguayan Chaco. The type of vegetation is very similar but the landscape is different; you never really get into flat country, the last low Andean offshoots keep rolling into the plain and strongly feature the landscape. In Paraguay the Chaco is as flat as a pancake. We saw lots of bottle trees between Camiri and Boyuibe. They were very nice to see because they were leafless and most of their big globular fruits had burst open and showed huge conspicuous white woolly balls. Picking these cotton-wool balls from the tree you find the black seeds interspersed in the woolly hair. Between Camiri and Cuevo the area is Chaco-like, rather dry and sandy with lots of bushes, smaller trees, *Eriocereus*, *Platyopuntia*, *Castellanosia*, and bottle trees. *Gymnocalycium pflanzii* is numerous in this area. The biggest specimens of *G.pflanzii* we came across were also in this area, to the east of Cuevo, where we saw plants of a formidable size up to 40 or even 50 cm tall and 30cm wide. They grow in a rather columnar fashion which reminds one of older specimens of *G.saglione*.

Between Villamontes and somewhat past Palos Blancos, *G.pflanzii* is very numerous and displays little variability. Here again we saw clustering plants of this species. In fact the area around Palos Blancos is very remarkable as to its climate and vegetation. Leaving Villamontes, ascending through the canyon of the Rio Pilcomayo (Angusto de Villamontes) one travels through a country with lush green vegetation, when, approaching Palos Blancos, the vegetation gets sparser and thorny and takes on a Chaco-like character. So one could say that Palos Blancos is an island of drought in green and lush surroundings. It is not clear to me why this is so. Between Palos Blancos and Entre Rios the landscape is mountainous country covered with interminable lush forest. Some trees and bushes are deciduous, others not. This type of habitat is nothing like the dry Chaco-like vegetation of Palos Blancos. But we still found *G.pflanzii*, growing on a steep narrow crest of limestone in company with *Parodia formosa*.

The forms we met with near Lagunillas remained rather small and weakly spined. There they grow on steeply sloping hills among bushes and smaller trees which are interspersed with *Eriocereus* sp., but on sandy patches which were more exposed to the sun. They grew together with an *Echinopsis* which we only saw as small plants, which may be a form of Ritter's *E.boyuibensis*. This area could be considered a transitional zone between the flat, dryer, Chaco region and the humid forest that occurs at higher altitudes.

These plants of *Gymnocalycium* may vary considerably in size and this probably depends upon the specific habitat. In most areas they only reach a width of about 10cm.

(For place name locations see the map of Bolivian Andes S.E. Ranges in the Map Compendium).

.....from L.v.d.Hoeven

My 1992 expedition started from Buenos Aires and went through Paraguay into the Bolivian Chaco. From Asuncion we started off along the Trans-Chaco highway. It would be about 20 km to the west of La Patria when we first came across *G.pflanzii*. We always found these plants growing in complete shade amongst shrubs and trees, some of the trees being over ten feet high. I even found one or two plants actually growing on tree trunks!

.....from W.W.Christie

Our visit to Bolivia started off from Santa Cruz de la Sierra, which lies on the edge of the Chaco lowlands, not far from the eastern foothills of the Cordillera. From Santa Cruz, we set off on the road to the west through rich farmland and woody plantations, which were dripping wet from recent heavy rainfalls. For much of the way to Samaipata, the road climbed through a steep gorge, thickly clothed with trees, with many epiphytic plants to be seen, including Tillandsias, Bromeliads, and *Acanthorhopsalis*. Tall, straggly cereoid plants, including *Samaipaticereus corroanus* and an unidentified *Cereus* sp. were occasionally seen among the shrubbery. *Cleistocactus candelilla*, with bicoloured red and yellow flowers, and *C.samaipatanus* with red flowers were occasionally spotted.

As we climbed higher after Samaipata, the trees lost their fresh green look and were more widely spaced. We passed the only known site for *Cleistocactus winteri*, with most plants inaccessible on the high cliffs.

Near Mataral, at 1200m. (3.4km from the village of Agua Clara) *Cleistocactus candelilla* and a *Cereus* sp. were to be seen. Nearby, we first encountered *G.pflanzii v.zegarrae*, which were growing partly buried in a pocket of humus-rich soil on a sloping rock, in partial shade on a bank right besides the road. These *Gymnocalycium* were only 10-12cm in diameter and there was no sign of flowering. The spination was very weak. On our return journey along this same road two weeks later, we saw more of these *Gymnocalycium* in the same general area, first at about 5km. east of Mataral at 1525m altitude. These plants were up to 15cm in diameter with longer spines and they had unopened buds. They were growing in a stony soil (not half-buried) on the side of a hill in the shade of trees, together with *Cleistocactus*, *Weingartia*, and *Neoraimondia*. Later in the day, a little further on near Los Negros at 1350m, we came across similar *Gymnocalycium* with open flowers, white with a red throat, growing under the same conditions among trees.

On the edge of Comarapa we came across *G.pflanzii v.comarapense* which was growing in stony soil on an open hillside. These plants were up to 20cm in diameter and were flowering profusely, some with uniform pink flowers and others with white flowers with a red throat. growing side by side. There were no trees here but a few low dessicated shrubs. *Echinopsis comarapana* was probably the most abundant cactus here, growing with *Cleistocactus candelilla*, and on the top of the hill *Roseocereus tetracantha*. This may well be the most northerly site for *Gymnocalycium*.

Further south in Millares (at 2350m) the *G.pflanzii v.millaresii* were growing in small pockets of soil on the steep exposed side of a hill that seemed to be superficially at least entirely of slate. The hillside was right in the centre of the village and was reached through a gap between the houses. These *Gymnocalycium* were also up to 20cm in diameter. Flowering seemed to be past and many of the plants carried mature fruits. Here we found *Weingartia*, *Echinopsis*, and *Blossfeldia*. This may well be the greatest altitude at which any plants of this group of *Gymnocalycium* are to be found.

The next *Gymnocalycium* we came across was *G.pflanzii v.riograndense* near Tomina and then again between Tomina and Zudanez, at Quebrada Waran Huaniyoj, at 1950m. They were growing in a flat shrubby area in sandy soil with a wide variety of other cactus species, both globular and cereoid, interspersed among trees. These *Gymnocalycium* were 20cm or more in diameter and had a heavier spination than the other varieties we had seen. A few had partly open buds, but none were in full flower. They looked as if they would open to typical white with red throats. We found the same species again as we descended into the valley of the Rio Grande at 1200m, growing among the *Espositoa guentheri* and *Pereskia* in light shade. These *Gymnocalycium* were in flower - white with a red throat. They had glossy green bodies compared with the bluish-green bodies of most other forms we had seen. Some of them were enormous - 30cm wide and high in some specimens. Some of these plants had been dug up by farmers or by cattle. They had a strange funnel-shaped taproot with a long narrow section that was at least 30cm long. This was also by far the warmest place we visited on this trip - estimated in the high 30's centigrade.

All these plants had very different habitats, differing flowering times, and looked different morphologically. Some are quite disjunct populations. Recent authors have lumped them all together as a single species, even without sub-species. With my limited observations I cannot seriously dissent from this view, but I suspect that they are in the process of evolving into distinct sub-species.

.....from F.Vandenbroeck

The slide originating from J.Donald that was taken between Comarapa and Saipina which shows *G.zegarrae* (=comarapense) growing side by side with *Weingartia* was a familiar sight to me because I saw these two species growing together in great numbers near San Isidro. We found quite large specimens of *G.zegarrae* - some 25cm wide and tall - growing near San Isidro, between Mataral and Comarapa. Near Mataral and Mairana we found similar but smaller specimens of this same (?) *Weingartia* and also smaller specimens of *G.zegarrae*(?). It is possible that these specimens are at the limit of their distribution area and consequently do not grow quite so well.

.....from T.Marshall

On the last day of our stay in Zudañez, we drove as far as Mojocoya. This place lies on a sort of plateau above the bottom of the valley, but well below the surrounding mountain tops. As we were approaching Mojocoya, we were below 2000m altitude and here we came across a *Gymnocalycium* of *pflanzii* affinity. All

solitary, some of them were about 9 or ten inches across. We saw none of these plants either in bud or in flower. Also in this valley (as in many places round Zudañez) the ubiquitous *Opuntia sulphurea* was to be found almost anywhere. There may well have been *Neocardenasia herzogiana* also growing here, but as we saw these plants here and there at so many places in this area it is difficult to say for certain that they also grew in the Mojocoya valley.

.....from L.Hoeven

During my trip to Bolivia, we travelled from Pasorapa in a generally north-west direction to Pena Colorada. [ See Chileans Upper Rio Grande map ] From here it was a fairly short distance to the Rio Mizque valley, where we came across *Quiabentia pereziana*. We were very fortunate to be able to find a place where we could drive across the Rio Mizque. Here were more *Quiabentia*, together with *Neocardenasia herzogiana*, bottle trees and also *Gymnocalycium zegarrae*.

.....from J.R.Kirtley

About 20km north of Aiquile, as we were approaching the valley of the R.Mizque, we caught sight of some parrots on the hillside to our right so we decided to stop for a look round. Not far up the hillside there was a dry gulley with very steep sides that had probably been carved out in the rainy season, exposing earth and rubble but no solid rock. Right on the rim of the gulley was a *Gymnocalycium* with the body enwrapped in spines. I scrambled the twenty feet or so down into the gulley to find more *Gymnocalycium* growing on the the near-vertical sides, but now all without the dense armament of spines. Only one plant carried two buds and one or two dead flowers, none of the other plants carried any buds. The smaller plants were more flat than globular, possibly with it being near the end of the dry season - there was no green at all on the bushes or trees, not a leaf to be seen anywhere. The ribs on the *Gymnocalycium* were very obvious, or more accurately the shallow grooves between the ribs were very obvious, as the ribs were hardly raised at all. But the larger plants, some 4" or 5" across, really looked just like a collection of tubercles without any definite ribs at all. The projecting tubercles were separated by such narrow, deep, grooves that the sides of the tubercles almost touched each other. This raises the question whether the smaller, ribbed, plants were the young form and the larger, tuberculate, plants were the adult form.

.....from F.Vandenbroeck

The different forms of *Gymnocalycium* which were found and photographed by J.Kirtley between the Rio Mizque and Totorá remind me of plants showing little variability which I found in the valley of the Rio Mizque and which I consider to be transitional forms of *G.zegarrae* (found in the region of Comarapa) and *G.riograndense*. The latter has a distinctively depressed globular appearance with a brownish body colour, broad plain ribs and an open, long flexible spination, such as those we found near Puente Acre. On the other hand *G.zegarrae* has a specifically globular shape, grows rather large, and has many ribs and a denser spination.

Near Otuyo I remember finding very impressive specimens of *Gymnocalycium* of more or less 25 cm across. The flower colour varied from white to pink. Between Otuyo and Millares and at San Isidro these plants probably occur at their maximum altitude. It was between Otuyo and Millares that we came across large plants with numerous ribs which were probably *G.millaresii*. We found some sparsely flowering specimens on steep bushy slopes in a sandy pebbly soil. We did not see so many specimens of this species. They were a somewhat flattish shape, but we certainly did see some that would be 20 cm across. Further on, near Millares, we found some more specimens but they looked in a poorer condition, probably because of the drought or the nature of the soil. As my knowledge of Geology is insignificant (much to my regret) it would be difficult to say what sort of rock it was there, but I do remember that in this locality the soil was rather poor, brittle, and loose.

.....from H.Middleditch

So we now have two observations from habitat of different flower colours having been seen in one and the same population of this group of *Gymnocalycium*.

.....from L.Bercht

In my own collection I will be growing about fifty plants of various sorts from this group around *Gymnocalycium pflanzii*, which produce a good show of flowers each year. On the first day of opening, many of these flowers (particularly on the *G.pflanzii* and *G.zegarrae*) start off on the first day of opening with petals that are a flesh, or salmon colour. But by the second day on which they are open, the petals will now be more of a pinkish-white colour. This characteristic of a change in the colour of the flower petals from day one onwards, is not peculiar to this group of *Gymnocalycium*. It may also be observed in various *Gymnocalycium* which are to be found in province San Luis, Argentina, as well as in various other cactus genera.

Starting my visit to Bolivia by crossing the Paraguayan Chaco from Asuncion, passing through Izozog on the way to Palos Blancos, we found *G.pflanzii* at just over a dozen places between Filadelfia and west of Palos Blancos. Travelling further west brought us in due course to Millares, from where we went via Puente Acre, Villa Granado, Perez, and Pulquina, to Mataral and along this section of our route I recorded *Gymnocalycium* at eleven locations, as *G.zegarrae*. It is certainly difficult to put into words the difference between these two species, as I see them. Generally the *G.zegarrae* are only solitary but specimens with large bodies can often be seen. On the other hand, the *G.pflanzii* do tend to form clumps and also they display thinner spines.

.....from H.Middleditch

The original descriptions by Cardenas for the various species which fall within the *G.pflanzii* group, do include salmon coloured flower petals for *G.izozogii*, and pinkish-salmon for *G.millaresii*. It now appears that it may not be possible to regard these particular flower colours as a fixed characteristic for these two names, as Cardenas may have fortuitously looked at flowers on their first day of opening. It is rather surprising that Ritter, who is far from slow to criticise the writings of others, does not appear to have taken the opportunity to

use this anomaly in order to criticise the Cardenas descriptions.

In The Chileans No.21 for 1972 there was an article about *G.pflanzii*, which included my own comments about what was very probably an ex-habitat collected plant, as follows:

My own plant of *G.pflanzii* was obtained from W.Wessner at Muggersturm on our 1971 Cactus Tour, a plant about 3" in diameter and some 5" in height. All but the topmost inch or so of the plant is the colour of pale brown earth - possibly because it has been immersed that deep in pale brown earth in habitat. Perhaps the summer storms in the Chaco swept increments of earth over the plant each season, which it then grew through, or perhaps the plant pulled the growing crown down into the earth during the long winter drought. It is rather like a whodunit - was it buried or did it shrink?

My plant of *G.pflanzii* produced a bud in midsummer from close to the growing point. The flower had the typical form for this group, with very pale peachy-pink petals. The slide which I took of the fully opened flower shows only a pale pink tinge to the petals, which suggests that the colour had faded slightly by then.

.....from J.Piltz

No, we did not concern ourselves with scraping the earth away from around any of these *Gymnocalycium* which we saw, in order to find out if any portion of the body was below the ground level.

.....from L.Bercht

But many of my own mature *Gymnocalycium pflanzii* display this brown colouration over the lower part of the body. It may well be a form of defence, a tougher outer skin in place of a green epidermis - or simply a reflection of the age of the plant!

.....from A.B.Lau, Cactus Log, U.S. C. & S.Jnl. Vol54 1982

Now we are nearing Comarapa, with *Parodia comarapana* (Lau 951) growing in abundance to the north of the road. The whole area is strewn with large specimens of *Gymnocalycium comarapense*, which strongly resembles *G.zegarrae* - in fact I cannot accept the two as separate taxa and would rather call them forms. *Gymnocalycium comarapense* (Lau 950) at times had no lines dividing the areole sections, which *G.zegarrae* (Lau 948) according to the description, always has. I have tried in habitat to separate the two forms on that basis, which was extremely difficult. Flowers are identical, only the spination in *G.comarapense* seems to be a little softer.

On our way to La Higuera we arrived at Pucara, from where we would go on foot. Then, early in the morning, we were off to find *Vatricania guentheri*. The trail went down, down, down, zigzagging and hot. At 1400m we saw the first examples of *Gymnocalycium riograndense* (Lau 343). All were infected with a disease which seemed to be a fungus. Only small specimens were in a more or less good condition. There is not a great difference from the *zegarrae* and *comarapense* forms. The body is not dull, but with a certain sheen. We found this species all the way down to 900m.

.....from K.Preston-Mafham

After a night of rain at Sucre we left next morning for Potosi. Near Millares we travelled for some miles through an area where there were no cacti at all, then came into a different sort of vegetation. We came over some hills and ran into quite an abundant band of cacti, growing on what I think could be a mica schist, or mica; it was like slate but brittle and black. Here grew *Gymnocalycium millaresii*, some plants being almost the size of a football. The pulp in the fruit was a different colour to that in *G.zegarrae*.

## **GYMNOCALYCIUM PFLANZII (Vpl) Werd. By F.Ritter.**

**Translated by H.Middleditch from Kakteen in Südamerika.**

The Type location for *Gymnocalycium pflanzii* (Vpl) Werd lies near Palo Macardo, east of Villa Montes, in the lower-lying land of SE Bolivia. This species is certainly not rare, as Krainz declares in his work "Die Kakteen", but is possibly the most abundant *Gymnocalycium* that there is. In addition, it has a particularly extensive area of distribution - I know it from Lumbreras in Province Salta in Argentina, to Comarapa in Province Valle Grande in Bolivia, which covers an extent of 7 degrees of latitude. The statement of "up to 50cm plant diameter" is based on a very large over-estimate. I measured the maximum thickness at numerous habitat localities and found it up to 25cm.

Krainz gives an incorrect description of the seed, based upon seed from Blossfeld. In this instance there must have been an incorrect identification owing to a seed mix-up, or malformed seed, since the overall differences, down to the minutest detail, in the same sort of seed, is quite different. Perhaps it is the smallest *Gymnocalycium* seed that there is, ca. 0.6mm long by 0.4mm broad and thick, bug-shaped, midbrown, shiny, smooth or very fine almost flattened tubercles with a short strophiole, hilum basal, not oblique, whitish, oval, without a visible micropilar aperture. FR 29.

In general, this species displays only insignificant regional varietal differences, so that a separation into regional varieties does not appear to be feasible, with but one exception. Whilst the fruit-flesh of the Type species is always blood-red, the plants from the most northerly area always have white fruit-flesh. The watershed between the Rio Grande and the Rio Pilcomayo form the boundary; in all parts north of that, the fruit-flesh is white and southwards from that it is red. On the basis of my field notes I cannot justify any other typical varietal features of these plants, at least not with confidence, since the breadth of variation in both varieties is of far-reaching extent. Only a comparison between a large amount of collected material would perhaps allow of identification even without knowledge of the characteristic defining varieties of the fruit. In the absence of such research, I base the diagnosis on the colour of the fruit flesh alone.

I have put seven names which Cardenas published as supposedly new species, as synonyms of *G.pflanzii*



and its var. *albipulpa*. I was by chance at four of the Type locations designated by Cardenas (of *marquezii*, *millaresii*, *chiquisacanum*, and *zegarrae*), and certainly put the identification of these names with *G. pflanzii*, whose breadth of variation lay within the scope of the same *G. pflanzii* at other places. The illustrations which Cardenas provided of them are also correspondingly typical for the species *pflanzii*. What Cardenas presented as characteristic, had to do with one or perhaps particular examples, and lies secondly also within the extent of the breadth of variation of *G. pflanzii* elsewhere. If we seek an answer to the question, how is it possible that a new species was seen on seven occasions, when they had not been proposed earlier, it is obviously due to the fact that the descriptions by Cardenas are usually based upon only an individual specimen, whilst the breadth of variation would scarcely be considered, or even not at all. The latter, however, is most significant for species taxonomy since with the limitation of descriptions to a single specimen, the way is opened to each subsequent production of pseudo-species in which the description gaps become filled with non-existent "New discoveries". Unfortunately, the Regulations for Botanical Nomenclature encourage the foregoing process, since the description of a Type specimen is enough for the acceptance of the legality of the diagnosis.

The following are to be placed as synonyms to the variety of the Type species of *Gymnocalycium pflanzii*: *G. lagunillasense*, *G. marquezii*, *G. millaresii*, *G. izozogzii*, and *G. chiquisacanum*

***Gymnocalycium pflanzii* (Werd) v. *albipulpa* Ritt.**

Synonyms: *G. zegarrae* Card., *G. griograndense* Card.

Neither of the quoted synonyms are representative of this variety, since they represent only one form from two different locations, without any note of their breadth of variation; the colour of the fruit is also unrecorded. FR 397.

In the Winter catalogues since 1956 this FR 397 appeared with the designation *Gymnocalycium bolivianum*. Later, on account of my better information, I recognised this as a variety of *G. pflanzii*, so in the 1960 Winter catalogue it became *G. pflanzii* v. *albipulpa*.

.....from F. Fuschillo

The species and varieties around *G. pflanzii* were originally in the heterogeneous Microsemineae group but were separated out by Buxbaum into his *Pflanziana* group, together with a further section for the *Saglioniis* group. Later, both *pflanzii* and *saglioniis* were put into a single group by Schutz. The *pflanzii* group were again separated, this time as *Piriseimineum*, by Till and Hesse, in 1985. On one occasion I looked at about 1500 seeds of the *G. pflanzii* group and found them all to be pretty much identical, although quite recently I have come across some seed of a variety of *G. pflanzii* which is somewhat different from the other forms. However I can quite understand why Ritter puts under one species name all the various forms of *pflanzii* which have been published as species and varieties - it is not possible to separate them when looking at the seed. Ritter's idea about the two different colours of the fruit flesh in *G. pflanzii* is interesting; I had already taken a slide of a fruit with the bright red fruit flesh, but now I want to find out as much as I can about the fruit on plants which are in cultivation under names such as *millaresii*, *lagunillasense*, *zegarrae*, *marquezii*, and so on, in order to establish what is the colour of their fruit flesh.

.....from H. Middleditch

Subsequently, slides were received from F. Fuschillo where the fruit had been cut in half to expose the nature of the interior. Both KK 736 *G. griograndense* and KK 524 *G. zegarrae* displayed fruit with the interior filled with a white pulp. This does match the classification put forward by Ritter.

.....from H. Till

The best distinguishing characteristic between the forms of *G. pflanzii* and those of *G. zegarrae* is the fruit. In all *pflanzii* forms the fruit is globular, red when fully ripe and it opens by an annular split in the upper third of the fruit below the base of the flower remains. In all the *zegarrae* forms the fruit is the shape of an acorn, usually blue or violet when fully ripe and opens in a vertical split down the side. On the other hand *G. millaresii* stands between these two, giving the impression of a relict form. It is a large, disc-shaped plant with a dark epidermis and almost straight spines. The flowers are small, pale pink; the fruit is small, globular, red, and opens at the side with a vertical split.

.....from H. Middleditch

In reading much of Cardenas' autobiography, it becomes evident that many of his later field trips were undertaken in the company of people who had earlier been his students when he was lecturer, and later head of the Agriculture department at the University of Cochabamba. From the general drift of the text, one tends to get the impression that Cardenas would sit in the vehicle whilst his ex-alumni followed his instructions and looked around for plants of interest. The daily journeys on the mostly unsurfaced roads of the period would hardly allow of an hour or two for searching round at each stop. In addition, unlike Blossfeld and Marsoner, who sawed the top off their truck in order to stack it up higher with boxes, one tends to get the impression that Cardenas would not be inclined to arrive at his pre-booked destination looking like the local scrap man on his rounds. Bearing this in mind, and since Cardenas only needed one Type plant for a new description, it may be reasonable to surmise that he did not concern himself with more than one or two plants from any one collecting point.

There have been a goodly number of field reports of these *pflanzii* sorts of *Gymnocalycium* being found in southern Bolivia and adjacent Paraguay, but I have to admit that the suggestion by Ritter that they extended into northern Argentina, as far as Lumbra, did occasion me some surprise.

.....from J.C. Hughes

It was in January of 2001 that I set off for an 8-week holiday in Argentina, travelling first to Bariloche on the edge of Lake Nahuel Huapi, where I looked for alpine plants in the surrounding mountains. From there I went north to San Martin de los Andes, with the same mission. Then I headed into Chile, going north as far as

Antofagasta on the edge of the Atacama desert. from where I travelled to Salta province in the north of Argentina. The preferred time to visit northern Argentina appears to be in December as this is just before the main rainy season when the roads are usually passable and many of the cacti are in flower. I had been advised against going in February, as it would be difficult to get around! However, this was the very time when I arrived! Staying a few days in Salta, I was able to visit the beautiful Quebrada del Toro. Now there were twelve days remaining before my return flight.

Whilst making some enquiries in my hotel in Salta about possible transport to Cafayate, I made the acquaintance of one of the guests, who was about to take a week's holiday and offered to take me on an excursion to the Bolivian border. But first, we made a visit to an eccentric nurseryman friend of his, who later guided us to several plants at Cabeza de Buey. This spot lies some 45km due east of Salta, where the foothills of the Andes meets the Chaco plain. It was February, the start of the main wet season, and at either side of this road there was lush, green vegetation, grass, climbers, and shrubs. We ended up on quite a wide dirt track and although I was told that the cacti "grew along this road", it did not look at all promising when we reached the spot. The overall impression was of the English countryside at the end of May or early June. Apparently in the dry season all this greenery would have dried away and then it would have been easy to spot the cacti. But we did manage to locate a few before darkness brought an end to the day's expedition .

We returned the next day to where my acquaintance knew where the globular cacti grew. And what did we find? There was a large sparingly branched cereioid plant, whose stems were almost 20ft. high and some 4 inches thick - it was somewhat similar to the *Trichocereus terscheckii* which I had seen in the Quebrada del Toro. On a bank by the road was a *Cleistocactus* about 90cm tall with red flowers 6cm long, which I tentatively identified as *Cl.baumanii*. This plant was green bodied and had many fluffy white buds above the one flower which was out on the occasion of my visit. There were no seed pods. A seedling *Cereus* (? *forbesii*) was found amongst pebbles. This was 40cm tall and appeared to have been damaged and hence now had two arms. The bodies were grey-green with the new spines yellow. I tentatively identified as the same *Cereus*, a large plant rising above a group of bushes, branching both from the main stem and from the branches, of some 15ft. in height and some 4 inch stem thickness. The stems seemed to have many growth stops, giving it an almost *Armatocereus*-like appearance. One plant that I was almost certain of its identification was *Opuntia salmiana*, which I had grown when I had a much smaller collection and valued its free flowering habit, if not the segments which were easily shed and attached themselves to clothing, etc. This plant was growing in grass and was up to some 40cm tall.

Only after lifting up the grass and other vegetation on the banks lining the road, were we able to see the *Gymnocalycium pflanzii* growing beneath, when we found two clumps of these *Gymnocalycium*. Certainly I would never have thought of doing this to find any cacti if my host had not insisted that he had seen them in this area. The largest head measured 13cm and I remember seeing another clump of some 13 heads on the previous night, but so thick was the vegetation that we could not relocate this the next day. There was some leaf litter on the ground round these plants which was slightly dusty, suggesting that the grasses may have acted as a partial umbrella during the rainy season. I have also noticed that there was some corkiness at the base of the plants, having inspected the slides which I took at the time. I also brought back one offset from one of the clumps in order to get an unequivocal identification. This was less than the size of my thumb nail, but has since grown on to occupy a 3 inch pot.

There was a boundary fence running either side of the road and we made various sorties into the vegetation and close to the fence at one spot we found what I identified as a *Harrisia* in bud with knobbly seed pods some 6cm across. These resembled those of the unripe seed pods of *Harrisia ascendens* which I later saw in Brazil. They were shiny and dark green but I expect they would have changed colour when ripe. A branch with flower buds was picked and these opened at about 9 p.m. that night, to form flowers measured at 22cm across. Going on to the shoulders of a hillock, where our altitude was 1000m. we found a couple of *Parodias* some 6cm across in the dense shrubby vegetation. Their spination was perhaps rather more open than might have been the case in another season, as these plants were also shaded by vegetation, sufficiently so that we had been unable to find them the previous evening. One of these *Parodia* was in bud but there were no seed pods on either plant. I was fortunate to find a small clump of seedlings which appeared to be these same *Parodias* and chanced removing one of these, no more than the size of my finger nail and wrapped it in a piece of tissue. Amazingly this plant has survived and flowered about two years later, with yellow flowers. I have labelled it tentatively as *P. mutabilis*.

Certainly this would be an interesting locality to visit in another season in order to re-examine the populations at this location.

.....from J.Lambert

My first trip to Argentina in 1981 took me past Lumbreras and it was here where I came across *G.pflanzii*, which is not far to the south of Cabeza del Buey. I would be inclined to agree with the identification of the two cereioid plants seen there. Indeed, to my knowledge, these are, together with *Stetsonia coryne*, the only cereioid forms to be encountered in this region. Another fairly large-sized plant there is *Opuntia quimilo*.

(Cabeza de Buey and Lumbreras may be found on The Chileans map of Central Salta).

.....from J.Piltz

Travelling north from Lumbreras towards Cabeza del Buey, we arrived at the crossing of the Rio Juramento (P.154) where we stopped to fill up with fuel. Some 250m from the river bank we had a look at an area of dense Chaco vegetation, mostly bushes. We could see some tall *Trichocereus terscheckii* with the upper part of their stems standing above the bushes, but no other columnar cacti were visible. Here, we also found some *Gymnocalycium pflanzii* which were forming clumps, together with two different types of *Parodia microsperma*.

Travelling further north, into Jujuy province, we were approaching San Pedro on the Rio Grande, where the level ground was given over to growing sugar cane. But the adjacent slopes were covered with dense Chaco vegetation, again with the tall columns of *T.terscheckii* to be seen standing up out of the bushes. Here at P.240, we again found *Gymnocalycium pflanzii*, ranging from single heads, to one large head with a few small offsets, to broad low growing clumps which might have even been as wide as 50cm across. Once again, accompanied by two sorts of *Parodia microsperma*.

At neither of these two locations did we see any of these *Gymnocalycium* in flower, but collected plants have flowered in cultivation, always with white flowers.

.....from G.Charles

After an overnight stop in Salta, we headed off to the area around Lake Cabra Corral. There is no road marked on any maps which goes directly eastwards from Cabra Corral towards Metan, but one does exist, which we followed, gradually losing altitude as we came nearer to the margin of the Chaco lowland. Before we reached the main road, we made a stop (at GC 448) where we were travelling through pretty thick woodland, so dense that we had considerable difficulty finding a way to get into it. There were some places where we could just walk upright between the bushes, but a lot of crawling on hands and knees was required. There were many sorts of cacti growing here - tall *Trichocereus terscheckii* and sprawling *T.thelegonus*, an unidentified tall *Cereus*, slender stems of *Cleistocactus baumanii*, *C.smaragdiflorus*, and a species of *Monvillea*, pads of an *Opuntia* sp. and stems of *O.salmiana*, globular *Echinopsis albispinosa* and smaller *Parodia cabracorralensis*, together with *Gymnocalycium delaetii*, *G.pflanzii* and *G.saglione*. What was quite remarkable was how many of these plants were to be seen actually growing on the branches of the trees - *Cleistocactus*, *Echinopsis*, and *Gymnocalycium*, presumably as a result of the birds cleaning their beaks on the branches and leaving seeds there. Equally remarkable was the size of the clumps of *G.pflanzii* some of which must have consisted of several dozens of heads and could have been almost a metre across. Before we reached the main road to Metan we saw both *Stetsonia* and tall plants of *Opuntia quimilo*.

.....from H.Middleditch

Is this the only field record of finding both *G.pflanzii* and *G.saglione* at one and the same place?

.....from H.Till & W.Till, K.u.a.S 39.12.1988

*Gymnocalycium pflanzii* v. *argentinense*. [Full description provided]. Type plant from K.H.Uhlig (collector unknown) from Gonzales on the Rio Juramento. Two other locations were discovered by G.Neuhuber in the spring of 1988 in Salta province, near El Totoral in dense brushwood and by La Troja on gentle hills at 700-800m altitude

.....from H.Middleditch

The "Gonzales" in question may well be the Joaquin V.Gonzales which lies roughly 100km further down the Rio Juramento from Lumberas. La Troja lies roughly half-way between Lumberas and Salta city, a few km NW of the GPS location for GC 448 in the Rio Juramento valley. The foregoing data confirms Ritter's southern distribution point for *G.pflanzii*.

However, somewhat puzzling is the picture in the above issue of K.u.a.S which compares cultivated plants of *G.pflanzii* v. *argentinense* and *G.pflanzii* v. *pflanzii* side by side. The *G.pflanzii* v. *pflanzii* has less stout tubercles and a shallower cross-groove between tubercles than the v. *argentinense*. Yet the plant (then quite small) collected at Cabeza de Buey by J.Hughes, recently photographed after making good growth, is nothing like the Till & Till plant of v. *argentinense*, but (outside the steep sided tubercles in the crown) is a good match for the v. *pflanzii* in the K.u.a.S. picture!

.....from L.Bercht

Among the *Gymnocalycium pflanzii* in my own collection there are plants which were obtained during my visit to Bolivia as well as other ex-habitat plants such as those which came from the collection of the late travelling companion of J.Piltz at the time of his visit to the P.240 and P.154 locations. Standing in my greenhouse with the issue of K.u.a.S. open in front of me at the *G.pflanzii* pictures, and looking at my plants of *G.pflanzii*, there are examples from the Bolivian Chaco which look like the v. *pflanzii* in that picture, and other specimens which look like the v. *argentinense* in that picture, So the validity of the variety *argentinense* would appear to be open to question.

.....from U.Eggli

In my field notes my only record for finding *G.pflanzii* v. *argentinense* in Salta province, is at a small hamlet called Salamanca, at about 1300m altitude, in the Quebrada Cafayate, a few km to the south of Alemania.

.....from H.Middleditch.

It is quite extraordinary that *G.pflanzii* should be found here, much further to the southwest and much further inland than all the various foregoing field records. Surely this must be almost at (or even just beyond?) the limit to which the modest rainfall and associated vegetation extends up the valley of the Rio de las Conchas?

## **SOME SMALL PIECES OF TEPHROCACTUS      From G.Hole**

Travelling in western Argentina in company with Rausch and Kuhas, a visit was paid to Arrequentin and then our route took us north to Tinogasta and on to Fiambala. Going west from Fiambala, the road follows a river valley, in which water is always flowing as it is melt water from the Andes. Shortly after leaving Fiambala, we passed some *Soehrensia formosa* which were taller than wide, roughly a foot in diameter and 18 inches high. They were nothing like the huge specimens we had seen a day or two earlier in the Quebrada del

Toro, not far from Mendoza city. Growing together with the *Soehrensia* were large clumps of *Tephrocactus* which gave the impression of being similar to those we had seen at Arrequentin.

When we were perhaps 10 to 15 km to the west of Fiambala, the valley had taken on a characteristic appearance which continued with little change for most of the rest of the way to Chaschuil. The valley floor would be possibly a couple of hundred yards wide, snaking here and there as we gradually gained altitude. To our right, on the north side, the foot of the mountains came to within a hundred yards or so of the river. But the south side of the river was quite different, with the mountains perhaps half a mile to a mile away. Only on this south side of the river, there was a steep bank which varied from perhaps 30 to 60 feet in height. It was not easy to scramble up this steep bank, not just on account of the steepness, but also because it was made up of fairly loose grit of between one eighth and half an inch in size. Immediately above these steep sides the top became abruptly flattened, as if by a bulldozer. This flat ground ran away from the valley at a slight slope, apparently as far as the mountains in the distance. At frequent intervals, this flat ground was trenched by equally steep sided gulleys running into the river valley, leaving these long, low, flat-topped terraces like moraines, anything between a tennis court and a couple of football pitches in width. There was not a sign of any bushes, shrubs, herbs, or grass to be seen on the top of these moraines, but relatively plenty on the valley floor near the river.

Roughly 25km out of Fiambala, we came to a signboard by the roadside which indicated that we had come to Loro Huasi. A little further on, there was a similar signboard facing in the opposite direction. But between these two signs, there was nothing to be seen of any human activity, and certainly no dwelling of any sort. It was here that we stopped to climb up the steep bank side in order to search for *Puna bonniae* and *Lobivia famatinensis* on the flat tops. We did succeed in finding the *Lobivia*, but not the *Puna*. The *Lobivia* was growing not on the flat top, but on the sloping sides. We then turned our attention to searching the flat top.

At first we thought that we were not going to find anything there, as there was no obvious sign of any cacti. But after searching the surface of the ground for quite some time, we spotted a small clump of *Tephrocactus* whose heads were level with the surface of the ground. The segments were roughly the same size as the smaller pieces of grit which made up the surface, and also not very different in colour, so that these plants were far from easy to see. But after we had found the first one, then we began to see others. Most of these clumps would be about one to 1.5 inches across; we did see a few which were larger, up to 3 or 4 inches across, but on investigating one of these it turned out to be 3 or 4 separate heads growing up from the one underground tuber. We did occasionally find a couple of these flat clumps a little more than a pace apart, but others that we could see were perhaps 10m apart.

Although the surface of the ground was simply loose grit, it was well compacted below the surface. We dug down around one of these *Tephrocactus* clumps, to find a buried stem of up to 6 inches in length, below which was the top of a stout taproot about 4 inches thick. But even after half an hour of digging out the compacted ground, by which time we were down to about twelve or sixteen inches below the surface, we had still not reached the bottom of the post root. From the thickness and taper of the thick rootstock we estimated that it could have even exceeded two feet in length!

There might have been segments on some of these plants which were as big as a quarter of an inch across, but many of them had segments which were no bigger than a match head - so that some thirty five of them would barely span one to 1.5 inches across. As far as one could see on segments of this size, there did not seem to be any tuberculations - and if there were any spines, they were so short that they could not really be seen.

A few bits and pieces were taken off several of these plants, which have now rooted down and grown in cultivation. One of these pieces consisted of a short length of tuberous root, from the top of which grew what initially appeared to be two less substantial lengths of root, very knobbly and mis-shapen, each about 4 inches long, each carrying as few miniature segments at what had been the surface of the ground. But on a close inspection, at the top of the root tuber where it had been four inches below ground level when we excavated it, there was a grubby segment of about 8mm in diameter, complete with two or three fine spines each about 20 mm long, spreading sideways. The two, 4 inch long knobbly "roots" rising up from the root tuber were now seen not to be roots at all, but a series of segments of various shapes and sizes, one above the other.

The grit in which this plant had been growing was almost rock-solid, which had to be hewed away, not just scraped away. There was no fine loose sand on top of the moraines, so the original plant, now a pair of buried stems, could not have been covered by wind-blown sand. So that how a root tuber could have shrunk that far down into that semi-solid ground during a dry spell, remained a mystery. Any surface water would flow down the gulleys into the river, or sink into the gravel-like ground, so that it hardly seems possible for a flash flood to have deposited a bed of gravel on top of the moraines and cover up these plants to a depth of a few inches. Nevertheless, there was previous segment growth to be clearly seen, four inches below the present ground level.

The new segments which have grown in cultivation on this plant, were green about 6 to 7mm thick and about 26-28mm long, carrying a comparatively large number of fairly tiny white woolly areoles, which are but 2 or 3mm apart, with a few tiny hair-like spines. One of these new segments grew from the top of the root tuber, another from about half way up the length of the buried stem formed by the mis-shapen segments, and the third one from close to what had originally been ground level.

Another piece of *Tephrocactus* from this very same patch of ground, comprised a length of tuberous rootstock, with a few tiny aerial segments, all ostensibly not basically any different from the foregoing specimen. But the new growth on this plant consists of segments some 20mm long by 10mm thick, nearly bullet-shaped, etuberculate, slightly bluish-green in colour, with sunken areoles about 6 or 7mm apart, the areole pit perhaps one mm across, with areole wool that hardly reaches to the top of the areole pit, spineless.



These segments would easily pass for *Tephrocactus mandragorus*, apart from the colour of the epidermis.

The third piece now in cultivation consisted of a rootstock of 4 or 5 inches in length and about half an inch thick, pretty well straight and cylindrical, again with a few small aerial segments. The new segments which have grown in cultivation at the top of this rootstock, are roughly pear shaped, hemispherical below and tapering above on a slightly outward curve, about 10mm thick and 12mm tall, with a few insignificant areoles and a few hair-like spines barely 3 or 4mm in length. The epidermis is a grey colour, with a pinkish-purple tinge, a colour that I have never seen before on any segments of *Tephrocactus* of this size and shape.

It is quite extraordinary that these three pieces, picked up at random from a small patch of ground, could produce such remarkably different new growth forms. We then decided to continue further along the same road, and in doing so we passed through a much narrower section of the valley, which was perhaps only 50 yards wide between the steep cliffs of black rock on either side. When we were possibly 35 km or so to the west of Fiambala, we decided to make another stop, as the terrain was again the same as before, in order to climb up the steep sided bank on to the flat top. With the experience of our previous stop fresh in our minds, we were able to find more specimens of the subterranean *Tephrocactus*. At both locations, these plants were recorded as *T. archiconoideus*.

Continuing our journey onwards up the river valley towards Chaschuil, we stopped at the two primitive dwellings which is all that makes up the place of this name. On the slope behind these dwellings we saw fairly large numbers of mounds of a *Tephrocactus*, roughly twenty inches wide and a foot high, which could have been *T. bolivianus*. Near one of these plants there was a small bunch of segments lying on the ground, which could have been knocked off one of these plants by some animal or other. This had two fat segments about 30mm thick and 40mm tall, which were probably partially dried up and consequently shrunken and misshapen to some extent. The spines were fairly slender, about 25 to 30mm long, bent sideways shortly after emerging from the areole, but on the growing plants it appeared that the spines were basically straight, standing out half-upwards from the segments. These plants were similar to others we had seen near Arrequentin.

Also on this same patch of hillside there were some distinctly smaller and lower growing hummocks of *Tephrocactus*, about 8 to 10 inches across and some 2 to 3 inches high, with slim spindle-shaped segments, roughly half an inch in diameter by three quarters of an inch long. The new segments growing in cultivation from a cutting off one of these plants, are also slender spindle shaped, tapering to a point at the top, of a similar size to the habitat growth, with slim whitish semi-transparent spines about half an inch long, standing slightly nearer to the horizontal than half-upwards. They are rather similar to the plants we saw shortly after crossing from Chile into Argentina at Paso de Jama, on the road from San Pedro de Atacama to Susques.

Continuing our travels along the road going northwards out of Chaschuil, we came on to what I would describe as a desert of white sand, with short grasses and scattered shrubs growing up to about one foot in height. The surroundings continued to display this appearance over quite a considerable distance. Eventually we reached the Sao Francisco pass, where we crossed the border from Argentina into Chile.  
.....from K. Gilmer

On the occasion of our visit to western Argentina, we also travelled along the road from Fiambala to Chaschuil. I do recollect the place where the valley was much narrower, with quite steep sides; there was a signboard saying "Quebrada las Angosturas" at the start and at the end of this section of the valley.

When we were near to Chaschuil itself, we were at the foot of the mountain slopes. Here on these slopes covered with grit, stones and rocks we could see *Denmoza rhodacantha*, an *Opuntia* from the Airampo group, as well as large clumps of *T. bolivianus* with magnificent yellow - or sometimes white - spination. There were also more compact clumps of a *Tephrocactus* which may have been *T. minutus*; these plants displayed an enormous variability between one another. There was variation in the size and shape of the segments, as well as in the colour of the segments, and also in the spination. Some plants grew in the form of low hummocks, some more like mats, rising barely two segments above the surface of the ground.

Most of these *T. ?minutus* had segments which were nearly globular or shortly ovoid and quite thick. Some plants had greenish segments almost entirely lacking in spines but with a thick tuft of glochids at each areole, yet one or two segments on the same plant had a few good spines, which might vary between 1 and 6 cm long on one and the same segment. Other plants had greenish segments totally lacking in glochids, but with slender spines of a fairly consistent length more or less equal to the segment height, all pointing slightly downwards. Taking one of these plants in isolation, it could easily be suggested that it was a *T. mandragorus* growing in the Quebrada del Toro near Tastil. Yet other plants had reddish brown coloured segments, with 1-3 short, wispy, downward pointing, appressed spines at most areoles, yet other segments on the same plant displayed long, robust, sword-shaped spines, one per areole from the upper 3 to 9 areoles, pointing sideways like a traditional hypogaea. And even on some individual reddish-brown segments, all variations in spination between those two extremes. There was very little other vegetation on these more or less steep mountain slopes, just a few scattered dwarf bushes and the occasional bunch of grass.

From Chaschuil we drove north, coming into a more flattish or undulating area, framed by the 4 to 5000m high mountains. Mostly this was covered with grey sand and grit, but in some places there were extensive patches of white sand, as if from a beach. Here again the *Tephrocactus* were to be found on the slopes, both *T. bolivianus* and *T. ?minutus*. Here the segments of the *T. ?minutus* could hardly be seen for the dense coating of long spines of 6 cm or more in length, broader or narrower sword-shaped, pointing either upwards or outwards.

This was the most northerly point of our travels along this route, which continues over the border into Chile. From here we retraced our steps, stopping once again at a few places along the return route to Fiambala.  
.....from G. Charles

Travelling north from Tinogasta we were following a broad and flat bottomed valley in the direction of Fiambala. Just before reaching Fiambala we turned westwards into a side valley on the road which leads to Chile. This side valley starts with very gently sloping sides leading up to the surrounding hills, but it gradually becomes narrower as you climb. We were perhaps 30 km to the west of Fiambala when we decided to stop and look for *Lobivia famatinensis* at the place which K.Gilmer had suggested. At this spot the floor of the valley was not very wide and on the south side we were close to a number of very steep, but fairly short slopes of gravelly appearance. These formed the sides of a number of spurs which ran out from the higher hills behind. On the floor of the valley there were a few scattered bushes, where we were able to find one or two plants of *Echinopsis leucantha*; there were also a few trees here and there which could have been twenty feet tall. At the foot of the steep slope there were *Tephrocactus geometricus* in quite surprisingly large numbers, not growing as tall as I had expected but making small clumps of stems, only two joints high at the most. Apart from an occasional specimen, these *Tephrocactus* did not grow either on the valley floor or on the slope, but were concentrated on the few yards where the foot of the slope merged into the floor of the valley. The segments were very pink in colour and looked dehydrated. Most of these plants were in flower.

It was remarkable that the steep sided spurs on the left of the road continued for several kms and so afforded a similar habitat for these plants. Between the spurs, the sides of the gulleys running into the river valley also lay at a similar steep angle. There was nothing in the way of a handhold to help in climbing up this steep slope, which appeared to be composed of rocks and gravel over sand. But it was very compact and cohesive, quite different from a sand dune, so that it barely yielded as you walked up to the flat tops of the spurs.

After scrambling up to the top of the slope, we found the ground changed abruptly to a gently sloping surface, which lay at a similar level to the left and to the right, on successive spurs, over a considerable distance. The surface was made up of coarse grit with rocks, but below this surface the ground was composed of a mixture of grit and fine sand. Evidently the fine sand had been scoured off the top of the spurs by the wind, leaving only the larger pieces exposed. However, apart from an occasional small clump of *T.geometricus*, there at first seemed to be nothing at all growing on this flat ground. We had been told that *Puna bonniae* (then known as *Puna rugosa*) grew on these tops, but we failed to find it, perhaps because it was shrunken underground after a long dry winter.

However, we were able to find a few plants of *Lobivia famatinensis*; these were growing either on the flat top but close to the edge, or just over the edge and a few feet down the steep side. There were a few dead flowers to be seen on these plants, situated near the shoulder, as well as a few seed pods. The seed has since proved to be viable. I saw no sign of these plants on the rest of the relatively large flat area on the top of these spurs, and none either on the valley floor, or with the many *Tephrocactus geometricus* at the base of the steep slope.

In scrambling up one of the slopes we saw a small cylindrical stem which had a tuberous root and was evidently a *Pterocactus*. A search over a length of the steep slope revealed some more of these plants, but we only located a small number.

As far as we could tell there had been no recent rain but there were a lot of flies about, so there could have been some snow melt seeping down the valley. As far as I can recollect there were no obvious signs of any other pollinating insects. Apart from the *Tephrocactus geometricus*, none of the other cacti were in bud or flower.

.....from C.Pugh

In the course of climbing up the steep sides of these spurs of ground, we found an occasional slight indentation in the slope and it was here that we found the *Lobivia famatinensis*. One of them evidently had had the body kicked off the root and there were certainly a lot of animal tracks to be seen around the place. They could have been wild donkeys. There were quite a lot of *Pterocactus* on the flat top of the spur of ground, and a lot of digging had been taking place - possibly done by Guanacos unearthing a rootstock for something to eat.

.....from J.Iliff

As an identification for these plants seen between Fiambala and Chaschuil, might one perhaps consider *T.archiconoideus*? Can we accept that Ritter did not just happen to light upon an extraordinary, abnormal specimen, and that his description does give a representative picture of a recognisable type. If so, then one can infer it has certain characters (that for me anyway, even though I have never seen it!) combine to give a very distinct memorable habit: plant perhaps absolutely small, certainly with small dense-packed segments; relatively very numerous, small, very crowded areoles; abundant, relatively long and very densely bushy glochids; short but relatively broad flat spines; and a large proliferous fruit, broader than the segments. And of course the huge, thick root.

.....from H.Middleditch

Not just a huge thick root; looking at Ritter's photograph of his archiconoideus we see a plant with the aerial part of the body joined to the swollen root by a thinner - but still a good finger thick? length of cylindrical root - or buried stem? Thus adopting the very same basic form as noted by G.Hole for the plants found between Fiambala and Chaschuil. In which case, would *T.archiconoideus* be a suitable identification for these latter plants? If it were not for some of them looking like *T.mandragorus*, some like RMF 14 and others quite different still?

Leaving the bustling tourist resort of San Pedro de Atacama, we headed out on the road leading north towards the El Tatio Geyser which lay some 50 miles away at over 4000m altitude, from where the snow-capped peaks of the Cordillera were to be seen. The road out of San Pedro followed the irrigated river valley for some way and then started to climb gradually, up the side of the valley. A number of stops were made to look at the cacti which were very obvious from the road, not just the tall *Trichocereus atacamensis*, but also the hundreds of *Tephrocactus* clumps.

After about four or five such stops, it looked as if we were getting to the upper limit of the *Trichocereus*. So at the next stop we walked over a fairly flat patch of ground, in order to look down into the valley where we anticipated that we might see some *Trichocereus*, and also in the hope of finding some *Oreocereus*. There was a sprinkling of the fair sized hummocks of *Tephrocactus tortispinus*, but far less numerous here than they had been on the climb behind us. There were also odd bits of dwarf vegetation, but much of the ground was quite bare. In walking across this fairly level ground, our eye caught some rather unusual little humps sticking hardly a cm above the surface of the ground. On getting down on our hands and knees we found that these were tiny segments of a *Tephrocactus*, a very great deal smaller in size than the segments on the large hummocks of *Tephrocactus* dotted over this patch of ground.

There were several places where we could see perhaps a dozen of these tiny segments projecting half way out of the ground, perhaps a cm or two away from each other. They may have been individual seedlings, or the tops of a single plant. Actual clumps would be 3 or 4 inches across at the most, the very small joints few in number, adopting a mat-like form rather than a hummock. The segments were roughly ovate in shape, about 12 mm long and some 8-10mm thick, lacking obvious glochids but with less insignificant spines. These plants were growing in a sandy-gritty ground so we decided to scrape this away from around one of these plants, finding that the bunch of segments were carried on a root of about one inch thick and a couple of inches long. Excavating further down we exposed a substantial tuberous root which was some 4 inches in diameter, and made up about half the total 14 inch length of this plant.

After photographing this plant still standing in its excavation, we pushed back the sand to rebury the root, then walked back to the vehicle, when we discovered that we had parked over the top of another one of these same plants.

It was at a later date, when travelling with G.Charles et al. when we were on the road going to Toconce. Reaching the junction where we joined the road coming from Caspana to El Tatio, we turned towards Caspana, travelling over the high ground until we came to the Cuesta Chita. Here we stopped when we came across scattered plants of *Soehrensia uebelmanniana* but again with very little other dwarf vegetation and a great deal of bare ground. Walking round we were now able to see some mats of up to a foot across which were made up of small segments similar in size and appearance to those we had seen on the Cuesta Diablo. Again, growing in gritty sand. In cultivation, this RMF 14 produces segments which are larger and elongate by comparison with those to be seen in habitat.

.....from H.Middleditch

On my own specimen of RMF 14 most of the segments are roughly 15 mm in length, of a shape between ovate and conical; on the newer growth there was one segment which exceeds 30 mm in length, but still 8 to 10 mm thick like all the others. To try and encourage it to grow more habitat-like segments, it was put up near the ridge of the greenhouse, but this merely resulted in the new segments now growing up to 50mm long - still with numerous white-woolly areoles - so it is now back down on the bench. There are a very large number of areoles for the size of the segment, irrespective of segment size. The spination can only be described as insignificant. Since RMF 14 is reported to be found near Banos de Puritama it might be acceptable to consider identifying it as *T.conoideus*.

.....from K.Gilmer

I also have a specimen of RMF 14, which grows relatively slowly on its own roots, the segments remain relatively small and the spination is, as you say, insignificant. On a graft, however, the plant presents a rather different appearance. The segments become distinctly larger and also the spination increases, with spines up to 12mm long, one per areole, sometimes with 1-2 additional much shorter and often bristle-like spines. On older segments the areoles carry a dense tuft of quite long glochids. The grafted plant has a decided similarity to the *T.coloreus* which I received from K.Preston-Mafham which he had raised from seed that he collected himself at the Type location. Only *T.coloreus* definitely has somewhat larger segments and more spines.

.....from R.Ferryman

On my own plant of RMF 14, the upper areoles on the new segments carry some fairly robust spines of about half an inch long, one per areole, pointing nearly upwards, of orange-brown colour. But on "last year's" segments these spines have become grey, and have turned to face half-downwards.

.....from G.Hole

Travelling north out of the busy tourist centre of San Pedro de Atacama, we were on the road which would take us to the geysers at El Tatio. Roughly 20km after leaving San Pedro, the road comes to the Rio Purifica, which at this time of year (December) was a shallow stream about three feet wide. This ford was surrounded by quite undulating terrain and once across the river we again saw the scattered hummocks of *Tephrocactus atacamensis*, which were not as large as those seen nearer to San Pedro.

But, in addition, there were some quite different *Tephrocactus* also to be seen here, growing absolutely flat like mats, standing barely a segment or two above the surface of the ground, growing among the rocks. They were quite numerous - you could stop at the roadside, open the car door, and touch them - if you could see them! These clumps were up to 5 to 6 inches across at the most with perhaps as many as 500 heads, the





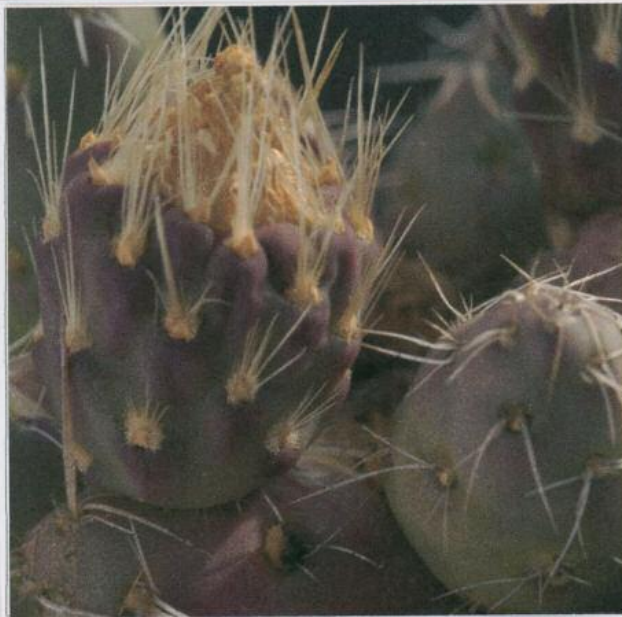
Photo:- W Rausch – Banos de Puritama



Photo:- K Gilmer



Cuesta de Diablo      Photos:- R Ferryman  
**Tephrocactus conoideus**



Photos:- R Ferryman

**Tephrocactus sp.**  
from Chaschuil



majority of the clumps being of rather less size than this. The heads were very small, only about 3 to 4mm in diameter, most of them spineless. We did get the impression that we were looking at mostly young and immature heads, so we wondered if there had been some animal previously eating the top off these plants.

On trying to expose the root system, it proved a difficult task. After half an hour's digging, one of the 5 or 6 inch broad clumps turned out to have several underground stems, possibly two inches thick and almost twenty inches long, all rising up from a huge underground tuber which was at least 6 to 8 inches thick. It was quite impossible to dig far enough down to find out how long this tuber might be.

The small piece which we brought back home with us has now produced segments which are about 18mm long and some 10mm in diameter.

### **TEPHROCACTUS CONOIDEUS By C. Backeberg Die Cactaceae Vol.I 1958**

[From the latin] Small, branching; segments small, olive-green, almost conical, up to ca. 2.5 cm long by 11 mm in diameter or smaller; areoles with pale yellow felt; spines at first up to ca.7, minute, appressed downwards, reddening at first becoming grey and deciduous, later 1 (-2 shorter) thicker spines, only one porrect (others adpressed, more or less curved), greyish-white, somewhat flattened. Flower unknown.

Habitat Chile, Banos de Puritama. Probably identical with Ritter FR 256 (Winter catalogue 1957).

.....from F.Ritter, Kakteen in Südamerika, 1980

I give my own description [of *T. conoideus*] from my notes of 1956: hummocks of 10-20cm diameter and up to 10 cm high, with very deep trunk-like root. Segments close-packed, 1.5-2 cm long, 1-1.5 cm thick, somewhat grey-green, somewhat tapering upwards, almost etuberculate. Areoles white woolly, 1-2 mm diameter, 2-5mm apart. Central spine usually one, bluish grey-brown with paler foot, barely flattened, slender, 15-25mm long

.....from A.W.Craig

As we were travelling south from San Pedro de Atacama we decided to take the road leading to Socaire. When we were about 2 to 3 km to the south of Socaire we made a brief stop where we walked some way from the road. Here there were a surprising number of herbs and dwarf bushes growing up to roughly knee height, seldom more than half a dozen paces over bare ground between one and another. We also found some clumps of *Tephrocactus* here, mostly about 6 or 8 inches across with a few clumps up to possibly as broad as a foot across. But all these plants displayed a small mushroom shaped hummock, not one of them rising more than a few inches above ground level. The segments were fairly small, about 25mm long and barely 10mm thick, rounded at the base and tapering upwards to a conical shape, with a smooth exterior lacking in tubercles, with one significant spine per areole roughly 15 mm long standing out sideways from the segment. There were Lupins in flower here as well as a large yellow daisy-like flower.

.....from K.Gilmer

Another plant from this same general area is one collected by Kas which he found at 3900m on a volcano not far from San Pedro de Atacama, but with no further information. The size and general habit of the segments is similar to those of RMF 14. These carry mostly one spine per areole, up to about 10 mm long, almost porrect or directed slightly upwards or slightly downwards, sometimes together with with 1-2 additional but much shorter and often bristle-like spines. On older segments the areoles carry a dense tuft of quite long golden-coloured glochids.

.....from C.Holland

The type of glochid formation on the older areoles of the ex-Kas plant which is described by K.Gilmer, is quite typical of the *Maihueiopsis* group generally and both my RMF 14 and RMF 356 display this character to varying degrees. But again the older segments may represent immature growth, which is also often beset with glochids rather than with spines. The RMF 14 when grown on its own roots will eventually produce the sort of habit that is displayed in the picture of the grafted K.Gilmer plant, but it first spends a long time producing tiny and unremarkable growth.

.....from H.Middleditch

An elementary sketch from Kas in Vienna, indicating where his small-segmented *Tephrocactus* was found, was forwarded by K.Gilmer. Apparently Kas travelled south from San Pedro de Atacama, following the shore line of the Salar de Atacama, until he came to a village with a church with a tall steeple. There he took the turning which goes off to the east, following the same road until he came to a volcanic peak which was where he found the plant concerned..

...from A.W.Craig

Looking at this sketch, there is only one single village at the east side of the Salar Atacama which has a tall church steeple, and that is Toconao. Just beyond Toconao there is a turning on to a road going eastwards past Talabre.

.....from H.Middleditch

On the large scale map of this area which came from C.Sherrah, this road going past Talabre comes to a dead end at the foot of Vulcan Lascar, possibly 20km east of Talabre.

.....from K.Gilmer

Having put your deductions to Kas in Vienna, he tells me that you have correctly located where he found his small-segmented *Tephrocactus*.

.....from H.Middleditch

Being now in possession of a rooted segment of the ex-Kas plant, I have very little hesitation in regarding it as the equivalent of RMF 14. From the Kas location, it is no great distance at all to where another small segmented Tephrocactus was found by A.W.Craig a few km to the west of Socaire (above). Equally similar in appearance to my RMF 14 is the small specimen originating from Caspana, which lies to the west of El Tatio.  
.....from K.Gilmer

I have a plant of PM 241 T.archiconoideus originating from Rio Transito, which bears comparison with my plant of RMF 14.

### **TEPHROCACTUS ARCHICONOIDEUS By F.Ritter**

Dense clumps of 5-20cm in diameter, remaining very low growing, offsetting from the base. The plant grows well down into the ground, whereby the old globular original segments superimposed one above the other in a line form a long neck up to about 12cm long, under which is to be found the long, hard, scabby swollen rootstock; this 10-15cm long, several cm thick, with very few hairlike roots. Segments broadly conical, in old age almost globular, about 17mm long and 15mm thick below, pale greyish-green, often burnt reddish-brown by the sun, without tubercles. Areoles 2mm diam. below, barely 1 mm diam. above, somewhat sunken, filled with greyish felt, 2-4mm apart; new segments without glochids, in older ones aftergrowths of distinctive bunches of 5mm long pale yellow glochids, mostly absent or few and short on the upper segments. The spines often remain slender 3-5, commonly directed downwards, 3-5mm long. Usually there is one stronger central spine, 10-15mm long, 1-1.5mm wide at the base, flattened, white from the base towards the tip, brown towards the end, straight, directed somewhat downwards, together with 3-4 slender almost appressed radial spines several mm long, lying downwards or somewhat sideways, white, slightly flattened. Flowers unknown. Fruit about 2cm in diameter, usually larger than the segments, pale yellow, with large floral scar, white areoles with glochids but without spines. Fruit filling watery-slimy, not sticky, sparse. Type location Transito, east of Vallenar, between 1200 and 2800m altitude, rare. Distributed downstream from the mountains.

.....from H.Middleditch

There is both a latin and a vernacular description for T.archiconoideus provided in Ritter's Kakteen in Sudamerika, but fortunately conflation between the two is absent. This Ritter description might almost be applied to the very fine specimen of Tephrocactus brought back from Cachi Pampa, on the road from Quebrada Escoipe to Cachi, by H.Vertongen. This particular plant is now cultivated in a suitable deep pot to accommodate the long semi-cylindrical taproot and kept on a shelf some two feet below the roof of the greenhouse. The cultivated growth is quite different from the habitat growth, whilst the original ex-habitat segments are now producing very obvious, dense tufts of yellowish glochids.

.....from C.Holland

When it comes to older segments producing great thick tufts of glochids, my RMF 356 (T.archiconoideus from Conay) on its own roots is an even more extreme example with only 5 mm size segments and ginger glochids. On a graft, it still produces relatively small segments, but then with spines and even longer glochids so presenting an appearance more akin to the pictures of T.archiconoidea in Ritter's Kakteen in Südamerika.

.....from R.Ferryman

Travelling through Chile in company with K.Preston-Mafham, we decided to make an excursion inland from Vallenar along the valley of the Rio Huasco. This took us past El Transito and so we were able to come across Neochilena transitensis growing up on the hillsides. At a rather higher altitude we found Eriosyce, a different sort to those we had seen near Copiapo. Reaching Conoy, we climbed due east up a small valley and on to a flat, arid, windswept area where, to our surprise found some Tephrocactus growing in cracks and crevices in the surface of almost solid rock. They were very compact mat-like plants with very small segments. The roots were firmly wedged down in the cracks in the rock so that it was quite impossible to get them out. This location appeared to fall within the distribution area of "Transito 1200-2800m" given by Ritter for his T.archiconoideus and we felt that this name was appropriate here.

The segments were certainly less than half an inch in diameter ( definitely smaller than those found much earlier on T.conoideus ) with a spination that must have been pretty insignificant as I do not recollect it having any impression on me. On the other hand, as I found to my cost when removing one or two segments, the prolific ginger glochids at each areole certainly did make an impression on me - and a lasting one at that.

.....from K.Preston-Mafham

Travelling from Huasco up the valley of the Rio Huasco, we passed through El Transito, on the look out for Eriosyce. Going further along the road, we came to a spot where there was a slope falling away to our right with grass and scattered bushes as well as some golden spined plants which were obviously Eriosyce. Stopping here, we were looking round at the Eriosyce when we found some small Tephrocactus were also growing at this same place. The plants were almost flat, with segments that were very small, I should imagine barely 10mm in diameter, virtually globular, closely packed together, looking just like a mat of beads. These were taken to be Tephrocactus archiconoideus and we were probably at the Ritter FR 256 habitat location. However, as there were no plants in flower no photograph was taken of them, although on reflection a picture would have been very useful.

.....from R.M.Ferryman

Looking at my plants of T.conoideus which are now displaying several flowers, I see that these flowers are a funnel-form shape with only the tips of the petals curving slightly outwards. These plants are in full sun

in the greenhouse so this flower shape can hardly be due to inadequate daylight.

.....from K.Preston-Mafham

My own plants of *T.archiconoideus* have also flowered, but on these plants the petals open fully, just like all other *Tephrocactus*. In cultivation, the segments are more pointed than they are in habitat.

.....from J.Iliff.

Would you like to look at Figure 3266 in Backeberg's *Die Cactaceae Band VI*? This does not appear to me to bear the slightest resemblance to *Tephrocactus camachoi*, as it is titled. Do you have any ideas as to its possible identification?

.....from H.Middleditch

The text which accompanies this picture states that the plant was raised from Ritter-seed. There is no indication of segment size, but it may not be entirely irrelevant that this so-called *T.camachoi* follows immediately after *T.conoideus*. One might be excused for suspecting that the segment size is on the smaller side. We now know that *T.camachoi* is to be found not just north and east of Salar de Atacama, but also quite some way further to the south on the road which runs from Copiapoia via Puquio to Salar Maricunga. When Ritter collected the seed from which the Backeberg Fig 3266 plant was raised, it is not impossible that it was found between the northern and southern locations for *T.camachoi*, in the upper reaches of some of the river valleys running out of the Andes to the Pacific shore. Was it found by Ritter somewhere in that extensive stretch, when he was not sure at the time of its identity? Did Backeberg get an inkling of its finding place and so suspect that it might be *T.camachoi*? This volume of *Die Cactaceae* was published in 1962 and it was not until 1980 that the first description for *T.archiconoideus* appeared in Ritter's *Kakteen in Südamerika Vol.3*, which originates part way between the two areas from where *T.camachoi* occurs. Hence it is quite possible that Backeberg's Fig.3266 is of *T.archiconoideus*. Particularly if it is compared with Figs 729 and 731 in *Kakteen in Südamerika* - in Backeberg's picture, segment length to diameter is comparable to Fig 731 and strength of spination is about half way between the two Ritter pictures.

.....from J.Iliff.

That falls into place. Your idea that Backeberg's picture may be *archiconoideus* seems to me very possibly right.

.....from K.Preston-Mafham.

My own plant of *T.archiconoideus* PM 241 grew with tiny rounded joints in habitat. In cultivation my seed-raised plant has produced rather more elongate segments, but not as proportionately long as on the Backeberg picture in question. Also the spination on my plant is rather finer.

.....from K.Gilmer

My own plant of PM 241, which came from K.Preston-Mafham, grows very slowly and over eleven years has made a clump of just over a dozen segments. The segments are roughly three to four times longer than thick. New segments produce very short, weak spination whilst all the older segments carry long, dense tufts of golden glochids at each areole. Quite unlike the plant in the Backeberg picture.

.....from W.Greenaway

What size pot do you think is holding the plant in the Backeberg picture? If it is a four inch pot, then I cannot see that plant being *T.archiconoideus*. But if it is in, say a two inch pot, then it is possible. However, my own plants of this species have less elongate segments and the central spines are certainly somewhat more robust. The real problem here is that some *Tephrocactus* display a quite different appearance in cultivation compared to what they look like in habitat - not only that, it is quite surprising how much a cultivated plant can differ between one collection and another. As an example, my own *Austrocylindropuntia verschaffeltii* grows with quite stumpy stems and puts out fairly substantial spines. Cuttings sent to three different growers produced the cylindrical sort of stems with little or no spination, of the form that is commonly seen in collections in this country. So it would be very difficult to identify the Backeberg picture as *archiconoideus* with any degree of certainty.

.....from H.Middleditch

As one of those who grow *A.verschaffeltii* in the long, spineless manner, I would readily accept that an appreciable difference between habitat and cultivated form is often met with in various *Tephrocactus*. As an example, the RMF 14 grown by R.Ferryman seems to display less deviation from its habitat appearance than my own plant.

There are locations for RMF 14 equivalents at Caspana, Puritama, a short way to the east of Talabre, and at Socaire (see Chileans' Antofagasta map). From there, it is quite a fair distance to the finds at Transito and Conoy. Then there are the finds from near Chaschuil, which include some plants looking rather like *T.mandragorus* and others which tend to give the impression that they do not really differ greatly from the RMF 14 *T.conoideus*. All these finds appear to display etuberculate segments.

At this moment, there seems to be no seed available from any one of these various small segmented *Tephrocactus* plants, so we lack that guide as to whether we may at least be considering one coherent seed group.

## **A NOTOCACTUS CD. From P.Moor**

This CD came from the InterNoto group and offers a comprehensive overview of the genus *Notocactus*. The first page has a contents list which you can use to access the various features of the CD, starting with an overview of the CD and a discussion of its contents. The next section, "All about Cacti", is a page with lots of links that allow you to look at things like Flower structure, Fruits, Seed, Taxonomy, a comparison of

Notocactus and Parodia, Field numbers, and hybrids. Then there is a page on InterNoto.

There follows an appreciation of the genus and the sub-genera, then a series of sections discussing each sub-genus in more detail. Next there is a page entitled "Listen" which allows an alphabetical search for a particular species. Each individual page carries the description and usually a photograph. Then follows a list of names of Field Collectors - clicking on a name brings up their individual listings. The next section which is entitled "Standorte and Karten" has some maps, but appears to be incomplete. Next to last there is a bibliography, and finally a list of internet links.

This is all in German and provided I have a decent dictionary handy, it provides a lot of information, as well as plenty of photos. Not all the pages have a key labelled "Zuruck" which will take you back to the previous page.

## **A SULCOREBUTIA REVIEW From J.Cooke**

The Sulcorebutia CD in the Chileans Library contains a huge amount of data although it can be rather complicated in places to access the information it contains. There are hundreds - perhaps I can even say thousands - of images of plants, flowers and flower sections, as well as sketches of flowers and seeds (but no SEM pictures of seed, as far as I can see). It is possible to bring up pictures of four plants at once on to the screen. There are about twenty or so maps which cover most of Bolivia. Each map will identify the location for the plant that is being viewed and you can zoom in on the location.

It is possible to search for any parameter that you might care to mention - flower colour, the colour of the style or stigma, number of spines, spine colour or field number - almost anything except location. There is a huge list of field numbers from over a score of collectors such as EH, RH, KK, HS, etc. - thousands of numbers.

.....from W.Gertel

Together with a fellow cactus enthusiast I have been publishing the "Kompendium der Feldnummern der Gattung Sulcorebutia" since the year 2000. This year we came out with the fourth edition which runs to 95 pages. Compared with the third edition, we have added several new lists of field numbers, added to other lists, and some mistakes have been corrected. There are also 13 colour prints, as well as some SEM pictures of seeds of Sulcorebutias and drawings by the late N.Brederoo.

.....from J.Brickwood.

There are means of obtaining a great many field number references by making use of the internet, starting by logging on to [www.cactus-mall.com](http://www.cactus-mall.com) and then making use of the Field Number search form provided by R.Martin. By entering a field collection number, the data on that plant will be provided, if available. Alternatively, by entering a species name, the field number or numbers corresponding to that species will be provided. There are some 145 different field lists, not all of them complete, many highly incomplete, but nevertheless a fairly comprehensive data bank.

.....from H.Middleditch

I wonder if W.Gertel is familiar with this facility?

## **The Chileans - Subscriptions - Volume 18**

A subscription renewal form will be enclosed with this issue of The Chileans. After going to press with the first issue of the current Volume, the Post Office announced an increase in postal rates, subsequently followed by a further increase, so that the subscription for the current volume did not reflect these increases. The Post Office have now indicated that there will shortly be a further increase in postal rates.

It is a pleasure to be able to acknowledge the many and various contributions which are utilised in compiling each issue of the Chileans, both the observations, comments, and photographs which come by mail as well as those which arrive in the form of numerous pictures on CD. In addition, practical assistance such as providing copies of documents, sending samples of seed for examination or test sowings, formatting text from disk, looking after finances, and so on, are of invaluable help in preparing each issue of The Chileans. Without such support it would be quite impossible to continue with the publication of The Chileans.

It is now some twenty years since a computer was purchased for use in the preparation of The Chileans, at a cost well in excess of better equipment which is available today. This PC has been used virtually exclusively for the preparation of the text for The Chileans and in due course it will be necessary for it to be a charge on the accounts.

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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	
\$ Copiapoa	B.Burke, 23 Jessica Way, Leigh WN7 4QG	brendanburke@blueyonder.co.uk
Echinopsis	M.Muse, 32 Fielding Road, Birstall, Leicester LE4 3AJ	
\$ Frailea	R.Gillman, Oddyns Farm, High Cross Lane, Little Canfield CM6 1TF	
\$ <i>Gymnocalycium</i>	S.G.Slack, 50 Sunnyside, Edenthorpe DN3 2PH	grahamandirene@slack2830.freemove.co.uk
<i>Haageocereus</i>	J.Arnold, Suffolk House, 2 Oak Hill, Washingbrough LN4 1BA	john_joan.arnold@2oakhill.freemove.co.uk
\$ <i>Islaya</i>	M.Williams, 40, Long Lane, Harrishead, Stoke on Trent, ST7 4LQ	mowhizz@tesco.net
<i>Lobivia</i>	J.R.Kirtley, 11 Fire Station Houses, Alnwick NE66 2PB	jim@kirtley7.fsnet.co.uk
\$ <i>Matucana</i>	P.Hoxey, 34 Stonehill Road, Great Shelford CB2 5JL	paul@hoxey.com
Neoporteriae	R.Moreton, 91 Umberslade Road, Selly Oak, Birmingham B29 7SB	
\$ <i>Notocactus</i>	P.Moor, 60 Milton Hall Road, Gravesend DA12 1QW	philip.moor@blueyonder.co.uk
<i>Opuntia</i>	R.Crook, 35 Cardinal Close, Worcester Park, KT4 7EH	
\$ <i>Parodia</i>	J.Brickwood, 48 Haselworth Drive, Gosport PO12 2UH	john@jbrickwood.freemove.co.uk
\$ <i>Sulcorebutia</i>	J.Cooke, Orchard End, Chipperfield Road, Bovingdon HP3 0JR	julian@cactusorchard.freemove.co.uk
<i>Tephrocactus</i>	R.K.Hughes, 16 Ashbourne Avenue, Bootle L30 3SF	
\$ <i>Weingartia</i>	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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