

# *THE CHILEANS 2004*

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*Cleistocactus crassicaulis*

West of Palos Blancos

Photo. - F. Vandebroek



*Eulychnia ritteri* near Chala

Photos: J. Arnold

## NOT FINDING EULYCHNIA RITTERI From F.Vandenbroeck

I am intrigued by the reported occurrence of *Eulychnia ritteri* near Chala, on the southern coast of Peru. Ritter states in Vol.4 of his work on the cacti of South America, that he only found a very small population of this species which he considers to be a relict of the genus, having become isolated from the remaining populations of *Eulychnia* which are to be found within the territory of Chile.

When we were in Chala we were on the lookout for these plants, but could not find a single trace of them. It would be interesting to know whether this species is still alive in nature in our days. They were found by Ritter in 1954 which is almost half a century ago. Much may have happened in the meantime. Unfortunately Ritter gives no details as to the locality of this population. As far as I know, no one else has ever made any mention of rediscovering these plants - or am I mistaken?

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

*Eulychnia ritteri*. Tree or bush of 2 to 4 m in height, branching from close to and not far above ground level. ... Flower appearing from anywhere between the middle of the stem to the crown, on all sides of the stem, opening by day and closing by night; petals pink. Type locality - Chala. Discovered July 1954.

.....from A.F.H.Buining. A trip with Ritter along the coastal zone of Peru. Succulenta 51.1.1972.

Travelling along the Pan-American highway from Atico, we were still just able to reach Chala this day, where we found some primitive accommodation. In this area along the coast it is still always extremely dry. But somewhat inland we found *Armatocereus ghiesbregtii*, which grew to 10m high, near to *Trichocereus chalaensis* which hung down the rocks, where to our surprise some plants of *Loxanthocereus gracilis* were also to be found. Unexpectedly Ritter quietly kept going forward on a completely bare and somewhat stony hill, where he started to search over it as if he had lost a needle there. My wife kept a very keen lookout and then discovered *Pygmaocereus familiaris*, of which Ritter knew that it occurred here. Quite small heads grew in company with one another in a fairly large group. They exist entirely hidden under quite fine gravel. We saw *Islaya paucispina* by the thousands on barren hills and mountains.

We searched in vain for an entire afternoon for *Eulychnia ritteri*, until we were well inland. The following morning we went over a different area of ground and then really came across this undoubtedly fine species of this genus. They had pink flowers, which we could admire.

.....from E.Markus

It was in July 1976 that we were in Chala, in company with E.Zecher who had visited Peru in 1969 when travelling with W.Rausch. In 1969 Rausch and Zecher did indeed find WR 432 *Eulychnia ritteri* near Chala. So it came about that in 1976 we left Chala and walked up into the hills in a more or less easterly direction. Eventually we came across this *Eulychnia* but I saw only five or six old stems in pretty bad condition. Unfortunately our car was broken into during a subsequent lunch stop in the main plaza in Arequipa and my diary was stolen so I am not able to say how far we were from Chala. I only know that the whole trip on foot out from Chala as far as the *Eulychnia* and then back again to Chala took us about 4 to 5 hours.

.....from J.Arnold

My own visit to Peru took place in October and early November in company with M.Lowry and I.Crook. The first half of our field trip was spent in the mountains, looking at *Lobivia* and *Oroya*. After visiting Puno and Lake Titicaca we travelled south to the coast via Moquegua. We then drove along the Pan-American Highway, northbound.

It was late afternoon when we stopped at some 4km before reaching Chala, at 178m altitude, to investigate some sandstone outcrops to the north of the road which appeared to have some hanging plants on them. These were a large form of *Haageocereus decumbens* - including some in flower, together with *Islaya islayensis*, some of which were 8 inches tall by 3 inches in diameter, many of them in flower. There was one seedling of *Neoraimondia arequipensis* which was about one foot tall, but no more of these plants were to be seen at that spot. Very cryptic and difficult to find were plants of *Pygmaocereus familiaris*. We spent some time in this location and, in the failing light, returned to the vehicle. However, in the distance a tall columnar plant could be seen, perhaps a quarter of a mile away to the north-east. It was too far to walk to it at that time of day and it was impossible to determine its identity from such a distance, but we believed it to be another *Neoraimondia* even though we knew this to be the general area where Ritter had discovered *Eulychnia ritteri*.

The following morning at breakfast we asked one young waiter whether he knew of any columnar cacti in the vicinity and he told us that there were some in the hills behind the town. We all set off from the hotel up a side street in the general direction we wanted and very soon found ourselves ascending low hills between low sandstone outcrops, with many *Islaya islayensis* both large and small, of which many were in flower. After about half a mile we reached the brow of the hill we had been making for, which afforded us a view of the area beyond. In front of us was a flat or slightly undulating plateau intersected by several deeply incised gullies, though at that time it was not possible to determine their depth. At a considerable distance away in the background, the outline of the mountains could be seen rising above the plateau. From this vantage point it was possible to see with binoculars columnar plants growing some considerable distance away. It appeared that they might be growing both on the flat tops and on the sides of the gullies. Again, at this distance it was not possible to identify them.

It was here that M.Lowry and I decided to walk to these plants whilst I.Crook decided to return downhill to Chala. We walked a considerable distance over flat and slightly undulating rocky, gritty, and dusty ground of a grey-brown colour with *Islaya* growing everywhere. They never carpeted the ground but there were large numbers of them, of every size up to about 6 inches tall.

We duly reached the first deep gully where we could see a way up the other side, but no obvious way

down our side. However, we made one attempt to follow a small gully down our side, which was very stony and treacherous, the stones underfoot running over each other like marbles. But we came to an almost sheer drop of about fifty feet down to the floor of the main gully. Since there was no means of negotiating this drop, we gave up and retraced our steps to the top, where we surveyed the scene again. We decided to follow the rim of the gully downhill, away from our goal and eventually made a shallow descent to the gully floor.

We then headed up the gully until we reached the point where we had already seen the path which would take us up the other side of the gully. This track up was at an angle of about 45° so was not too steep to climb. There continued to be *Islaya* about on the sides of the gully as well as at the top on the flat, when we reached it. The flat or slightly undulating plateau again lay in front of us and by this time we could now clearly see the columnar plants we were aiming for. They lay some considerable distance from us and on the other side of another gully. After a further walk of 20 minutes or so, we reached the edge of what turned out to be a very deep and wide ravine, with very steep sides. These were far too steep to contemplate climbing down. Although we could now see the plants clearly we could still not determine their true identity - were they *Eulychnia* or *Neoraimondia*?

We had no option but to continue "upstream" around the rim of the ravine and were eventually right opposite some of these plants, tantalisingly still a long way away on the other side! There were still *Islaya* everywhere but, apart from those, no other vegetation of any sort - not a tree, not a bush, nor a blade of grass. We continued to skirt the rim and it was apparent that the floor of the ravine was rising as we were approaching the head of the dry stream. With great excitement we saw a smallish plant in front of us on our side of the ravine. When we reached it, it was clearly what we had been looking for. This was a small *Eulychnia* about two feet high. It was in extremely good condition, showing signs of starting into growth with the areoles in the crown having longer and whiter wool. There appeared to be no other plants of *Eulychnia* on this south side of the ravine. Fairly soon after this we rounded a rocky outcrop on which there were a number of *Haageocereus australis* growing, plants with a number of fairly stout, up to two and a half feet long sprawling stems radiating in all directions, some of them in bud. Now we spotted a way down into the ravine! We simply slid down a sandy slope at about an angle of 70° for about a hundred feet, to the bottom.

Almost immediately opposite was a fairly gentle zig-zag path up to where we could see some larger specimens of *Eulychnia*, the majority of them branching. Ten minutes later we had reached the top of that path and we were standing on the flat ground just beyond the rim of the ravine, with some *Eulychnia* of about 6 to 8 feet tall, so that we were able to observe them at close quarters. We then walked some way "downstream" along the rim to where we were able to look down the steep sides which were covered with *Eulychnias* in large numbers. The larger plants were somewhat battered with branches dead and missing but the smaller *Eulychnias* were in excellent condition.

Now we went back along the rim to the same path, this time to descend to the dry floor of the gully and then walked "downstream". We had gone only a short distance when we could look up at the plants we had just seen from the rim above. We found it reasonably easy to scramble up this rocky slope which was covered with stones from pebble size to saucer size, most of them looking like broken slabs.

On these slopes we were now amongst *Eulychnias* of all sizes except very large ones. The biggest plants were about 8 feet tall and had about twenty branches which arose from the main stem anywhere from just above the base to well above the ground. The mature stems were around 4 inches in diameter, of a greyish blue green with woolly areoles bearing a few stout spines. Many of these *Eulychnia* grew only a few paces apart whilst others were further apart. They did give a slight impression of growing in groups. There were many small plants including some seedlings about six inches high.

The whole population was in very good condition, with good regeneration. They were only just starting into growth and we found only one plant bearing small, grey woolly buds. There were no flowers or fruit to be seen. I would estimate that they must flower at least two months later in January.

Being in a state of euphoria at having refound these plants after quite a lengthy passage of time, we were reluctant to leave the site. We followed the valley bottom "downstream" and the *Eulychnia* continued to be in evidence on the steep sides for a considerable distance. The sides of the ravine became higher and higher and the *Eulychnia* in consequence became further above us, until we could see them no longer. This would be a walk of about half a mile. I would estimate that there were around two hundred plants that we saw. We continued walking down into Chala. All in all, a very exciting morning, albeit a tiring one.

.....from H.Middleditch

At The Chileans 2003 Weekend we were treated to a slide of these *Eulychnia* growing on the side of a gully, among a mass of sharp-angled rocks which appeared almost to cover the ground. These rocks seemed to range from the size of a dining table, downwards.

.....from J.Arnold

Yes indeed, these rocks were all sorts of sizes and for practical purposes they covered the sides of the gully where the *Eulychnias* grew. It was far from easy scrambling around this very rocky slope.

.....from I.Crook

It was late in the evening as we drove towards Chala along the Pan-Am highway, from the south. We stopped just before the descent into the town. our attention having been caught by large specimens of *Haageocereus australis* growing on a rocky outcrop. We left the site at dusk, but not before our attention had been drawn by M.Lowry to a single columnar cactus about 800 metres away in the distance, which we initially thought was a *Neoraimondia*.

Chala sits on the coast at the southern end of a shallow bay about 10km wide. All along the bay the land rises relatively quickly from the coast, to about 150 metres altitude in a distance of 1.5 kilometres. It then continues to rise much more slowly, the next 150 metres rise in altitude occurring over a distance of about 6

kilometres. At the north and south ends of the bay, the mountains approach closer to the coast so that they present a rapid rise to above 1600 metres altitude. This gives the appearance, when viewed from out of town, of a 10km wide dry, dusty coastal plain extending from 1.5 to 6km inland, backed on three sides by high mountains, and descending quickly to the sea on the fourth side. Although this plain looks barren, it must see water at some time as its coastal third is cut by a series of dry, steep sided gullies, approximately 10 metres deep and of a similar width, extending down to the beach.

On the following morning we set off early after breakfast and walked from the hotel, across the road, through the market, and then continued inland for a kilometre. Having now climbed about 100 metres, we were able to see up to the top of the climb ahead of us, beyond which there would stretch the coastal plain. Through binoculars, we could see a columnar cactus in the distance, right at the top of the ascent. My companions decided to press on, but I turned back to the hotel and our vehicle. Firstly, the walk to this columnar plant required the more intrepid travellers to traverse the steep, sandy sided gullies that looked difficult to climb out of. Secondly, I was fairly sure that the columnar cactus seen through our binoculars was the same plant that we had seen the previous evening.

Driving back out of town for a few kilometres, the road rises sharply up to the edge of the coastal plain. Parking the vehicle, I walked inland, parallel to the coast and shortly arrived at the first gully. At the top edge of the gully there was a single 2 metre high specimen of *Eulychnia ritteri* which was growing some 10 metres away from a *Pygmaeocereus bylesianus* ssp. *familiaris*. The *E.ritteri* was the plant we had seen the previous evening and in the poor light had wrongly assumed it to be a *Neoraimondia*. The *Pygmaeocereus* grows as single or multiple headed plants, protruding only a couple of centimetres above the surface of the dusty plain, often near the protection of extruded rocks. Descending into the gully, there were to be seen several other specimens of *Eulychnias* of varying height, growing on the upper third of the steep sides of the gully, on the south-east facing slopes. About half the *Eulychnias* at this site were dead, but there were also some younger plants of about 30cm tall, indicating evidence of regeneration in the fairly recent past. The route into the gully and the lower sides and floor of the gully also contained large clumps of decumbent *Haageocereus*. Although I walked down the gully for a kilometre in the direction of the coast, I never met my travelling companions, so I can only assume that they found the *Eulychnia* in a different gully.

.....from H.Middleditch

Possibly yet another gully different to that where E.Markus found only half dozen or so *Eulychnia* in poor condition? Might this suggest that there could be other locations along this coast of southern Peru where similar gulleys hide *Eulychnia ritteri* from the gaze of travellers who may be following the low-lying ground next to the coast, or who are above the gulleys cut into what was presumably, in the geological past, the shore line before it was raised during an uplift of the Andes?

#### **EULYCHNIA RITTERI By W.Cullmann From K.u.a.S. 9 (8) 1958.**

(Full description given) This handsome plant has been known for some years in many collections under the name of *Eulychnia ritteri* n.n. In commerce and in collections the splendid white-haired seedlings attract attention. This species is the only Peruvian *Eulychnia*, its nearest neighbour from the genus grows some 400km further to the south in northern Chile. A comparison of both photographs which were taken by F.Ritter on the occasions when he was at the habitat locations immediately allows the great difference in the flowers to be recognised. The flowers of the Chilean *Eulychnia* appear to be set in a thick woolly ball of hair and are from two to three times larger than those of *Eulychnia ritteri*. Moreover the northernmost Chilean *Eulychnia* display a more or less distinctively pronounced pseudo-cephalium formation which is entirely absent in *Eulychnia ritteri*. The flower is 2cm long by 1.5cm wide.

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

*Eulychnis iquiquensis*. Flower 5.5 to 6.5 cm long, by 5 to 6 cm wide.

*Eulychnia aricensis*. Flower 4.5 to 5.2 cm long by 3.5 to 4 cm wide.

.....from H.Middleditch

The photograph of the top portion of a *Eulychnia ritteri* complete with flower which accompanies the original Cullmann description of this species, is rather small and not entirely suitable for reproduction. The camera is facing the flower opening which undoubtedly looks as if it is distinctly smaller than flowers which may be seen on pictures of Chilean *Eulychnia*. However, one may wonder if the flower was indeed fully open, or if it was taken out of a good or normal flowering season and was not really typical for this plant.

.....from R.Moreton

Compared with the picture taken by J.Arnold of *E.ritteri*, my only reasonably mature *Eulychnia* is *E.saint-pieana*, which has quite a lot more wool at the areoles which almost covers the plant. When we were out in northern Chile in 1994 we saw lots of *Eulychnias* but they were in such bad condition that I did not bother to photograph any of those towards Taltal. Those which we saw near to Santiago were in much better condition, and flowering.

.....from N.Rebmann

During the course of my field trips to Chile, I have seen *Eulychnia castanea*, *acida*, *breviflora*, *saint-pieana*, and *iquiquensis*. The plant of *E.ritteri* in the photograph taken by J.Arnold looks to me to be similar to *E.saint-pieana* and to *E.iquiquensis*, but with some differences.

.....from F.Vandenbroeck

It was very interesting to see the photograph of *E.ritteri* taken by J.Arnold in southern Peru. At first sight this particular specimen looks very green and rather openly spined, compared with the *Eulychnia* that I was able to observe in northern Chile. The *Eulychnia* spp. which I know from Chile are *E.acida*, *E.breviflora*, and

*E.castanea*. These plants can easily be recognised as separate species because each of them is of very distinctive appearance. None of them are similar to the *Eulychnia ritteri* in your picture. However, Ritter also describes a *Eulychnia saint-pieana* occurring northwards from Chanaral. I was able to observe these plants on several occasions. They are conspicuous on account of their closely set thick white woolly areoles and a heavy silvery greyish long spination - in many ways similar to the appearance of the *E.ritteri* in your picture. In addition, the flowers of *E.saint-pieana* are identical to those of *E.breviflora* i.e. a very short and broad flower tube. whereas the fruit on *E.saint-pieana* are large silvery hairy balls in contrast with the large golden hairy globes of *E.breviflora*. These fruits are a real marvel to observe.

I do possess pictures which I took north of Chanaral and near Barquito, of plants which display a very similar habit to that in your picture of *E.ritteri*. I cannot possibly see any distinctive aspects of Ritter's *E.barquitenis*, so I consider it to be merely a form of *E.saint-pieana*. However, these northerly occurring *E.saint-pieana* certainly do have a typical aspect of their own. Even more to the north, *Eulychnia iquiquensis* occurs up to close to the Peruvian border. But I scarcely know these plants as their habitats are difficult to reach. We often spotted them growing on high and steep cliffs, often enshrouded in the mists of the coastal fog zone, thus profiting from the most of the scarce moisture in these desert areas. Near Blanco Encalada we saw some specimens at close hand but I do not possess any close-up pictures of them. So in which way *E.ritteri* deviates from its Chilean relatives is not easy to tell - preferably one should see a whole population, with fruits and flowers.

.....from R.Zahra

It was in the 1960's that I bought seeds of *Eulychnia* from Winter and I still have examples of most of the plants they produced. It is just amazing how slow these particular cacti are to grow! Although most of them are now over 40 years old, they are still not more than 40cm tall. (Espostoas of the same age are now 3m tall and flowering!). Yes, I do have *Eulychnia ritteri* FR 276 from Chala, prov. Arequipa, and yes, it is identical with the picture taken by J.Arnold that you sent to me. Having said that, about 10% of these *E.ritteri* grown from Ritter's seeds had pale yellow spines, and although two of my remaining plants do have black spines, (like those in your picture), I also have one plant with yellow spines.

.....from H.Middleditch

The habitat colour picture of *E.ritteri* in Ritter's *Kakteen in Südamerika* includes one single flower. On the basis of a stem thickness of 6-8cm, the flower will be not quite 2cm across the upright petals. The black-and white habitat picture (taken by Ritter) which accompanies the original description of this species by Cullmann, is also of a single flower, whose petals are not even open upright. On the basis of a 6-8cm stem thickness, the flower will be barely 15mm across. This limited information would suggest that this small flower size, in comparison with the flower size on the *Eulychnia* which grow in Chile, could form a reasonable basis for separating *E.ritteri*.

#### **FINDING GYMNOCALYCIUM MONVILLEI From B.Schweitzer. Translated by H.Middleditch from *Gymnos* 10 (20) 1993**

Our visit to Argentina started off from Cordoba, from where we went north to Ongamara. Ongamara made quite an impression on us with its huge boulders; we climbed these rocks on both wooden steps and stone steps and had a very fine view from the top. Various *Gymnos* should grow in the surrounding grasslands and so we obviously searched there. In this way we came across *Notocactus submammulosus*, *Gymnocalycium monvillei*, and *G.capillaense*, growing in close proximity to one another.

After a round trip through Tucuman, Salta, Catamarca, and La Rioja, we returned towards Cordoba on a poor road around the north of the Sierra San Luis, to Villa Dolores and Altautina. The road then climbed to 900m altitude from where we went on to Tanninga.

Between Tanninga and Los Gigantes it was mostly open rocky and grassy slopes. The altitude gradually increased from 1100m and at several places we found more and more of the fine yellow spined *Gymnocalycium monvillei*. At one spot I wished only to take a fine picture of the landscape, of a field where the scattered boulders contrasted splendidly with the bunches of grass. As I was focusing the camera I discovered through the viewfinder that scattered amongst the bunches of grass there projected yellow spines and so in this way I found out that in nearly every bunch of grass there was a large specimen of *G.monvillei*.

Today there is a new tarmac highway between Mina Clavero and Cordoba. But we did not wish to use this all the way, but for some part to follow the trail of renowned cactus collectors. Unfortunately we had chosen a day which alternated between clouds, wind, and light showers of rain. At about 2200m near El Condor we searched for *Gymnocalycium andreae* in the icy cold, lying flat out, both to be less exposed to the wind and also because of the smallness of these plants. Several times my hand came up against a *G.monvillei*.

Then we followed the old road, arriving at Copina which consisted of only half a dozen houses. Here we were at 1458m altitude and right behind this spot the mountainside rose up, dotted here and there with small fields, up to a height of over 1600m. We searched there for a while, finding numerous plants of *Gymnocalycium monvillei* and *Lobivia aurea*. Hungry and cold, we found our way back to the main road.

On a quarry-like landscape shortly before Villa Carlos Paz, we could imagine we were at a cactus exhibition. On a flat patch of definitely no more than 10 square metres, we came across *Notocactus submammulosus*, *Gymnocalycium mostii*, *G.monvillei* and *G.calochlorum*. Then on the last day before our return home we made a round trip over the Sierra Chica.

[The place names quoted here by B. Schweitzer may be found on the Sierra Cordoba map, Chileans No.59 page 53]

.....from P.Harper

It will be some years ago that a friend of mine spent some time in Argentina where he had been sent to attend to his company's business there. Whilst he was in Argentina, he collected quite a number of plants for me and among these was a *Gymnocalycium monvillei* with a creamy coloured flower and a *G.multiflorum* with a pinkish flower. This *G.multiflorum* has since offset profusely and now it has about fifty offsets which are distributed over the main body from the base to well up the side. The main head will now be about 18cm across.

.....from H.Middleditch

My own two largish plants of *G.monvillei* are also about this body size. Perhaps they may continue to grow and become even larger, eventually?

.....from K.Preston-Mafham

Travelling west from Cordoba we came across *Gymnocalycium monvillei* at various places in the Sierra Grande, usually growing on fairly open ground. We saw lots of large single headed plants, up to about 30cm across and others of similar size, with only a few offsets. The *Gymnocalycium monvillei* here in our own collection, which are being grown in pans of about 20cm in diameter, start to produce offsets when at a much smaller size - they can have many offsets when only 8 or 9 cm in diameter.

.....from G.Rowley, Catalogue of Plants in Monville Collection 1846 (1998 Reprint)

This catalogue includes .... the giant *Echinocactus monvillei*, represented by two plants 35 cm in diameter. One of these was figured 4/5 life size by Lemaire in black and white in 1838, reproduced here at half size.

.....from H.Middleditch

In this 1998 reprint by Gordon Rowley of the 1838 Monville catalogue, there is a reproduction of the original illustration of *G.monvillei*. Measuring the plant as it appears on the page in 1998, it is 14 cm across the body. This 1998 picture is a half-size reproduction, so on the original 1838 Lemaire picture the plant would measure 28cm across the body. According to G.Rowley, the 1838 picture was 4/5 life size, hence the plant would have actually measured over 35cm in diameter, equivalent to over 14 inches in diameter or approaching four feet in circumference. This does not fit the 1838 Lemaire description of two feet in circumference, which is nearly 8 inches in diameter. It would seem that Gordon Rowley has mistakenly applied the dimensions quoted for the plant which was in the original 1846 Monville collection catalogue to the 1838 Lemaire illustration.

.....from G.Rowley

To correct my error; the final page of the introduction to the 1846 Monville catalogue includes "Echinocactus monvillii, of which the collection possesses two specimens 35 cm in diameter.....". Reading this, I must have made a hasty estimate from the Plate of the Lemaire plant, which is around 28 cm wide, of a 4/5 reduction. Sitting now with both Plates spread out in front of me, I can see that this is a nonsense.

.....from G.J.Swales

The original Lemaire Plate was published in 1838 but the Plate itself, according to the inscription, was drawn in 1836 and lithographed in 1837. The plant on this original 1838 Lemaire Plate is nearly 24 cm in diameter, somewhat more than the "two feet in circumference" (roughly 19 cm diameter) of the original Lemaire description. If indeed it grew from the 19cm diameter of the 1836 drawing to the 35cm diameter at the 1846 date of the sale catalogue, it must have been given the Victorian hot-house treatment! Unless they are two quite different plants.

.....from R.Mottram

The index to Lemaire's *Cact. Aliqu. Nov.* of 1838 states that the Plate of *Echinocactus monvillei* shows the plant at "natural size". The plant on the Plate measures almost 9 inches across the body.

.....from H.Middleditch

It may be advisable to draw a distinction between the plant in the Monville collection, apparently 24 cm in diameter in 1836, and the 19cm diameter of a plant which was in all probability in the Lemaire collection and used by Lemaire for his descriptive text. Both the Monville and the Lemaire plants may have come from Cels nursery; if you were a cactus nurseryman at that time, would you sell your biggest plant to the collector with the fattest purse? And perhaps let Lemaire have one not quite so large, and not so expensive? Thus Lemaire's plant 19 cm diameter (the 1838 text), Monville's plant (the 1838 Plate, drawn 1836) 28 cm diameter? Which could have grown to 35 cm across by 1846?

.....from G.J.Swales

Surely a diameter of 35 cm, very nearly 14 inches, is very out of character for this plant?

.....from H.Till, *Gymnocalycium* 3.(3). 1990 Fig.17

*Gymnocalycium monvillei* v.*grandiflorum*, solitary plant photographed in habitat at 900m altitude in the Sierra Grande, 36 cm in diameter.

.....from H.Middleditch

If this Fig.17 is of a plant 36 cm across, then the radial spines are up to 60 mm long, not 17-28 mm long, as stated in the accompanying text. Also the areoles are about 60 mm apart, not 30-32 mm apart as stated in the accompanying text. The wrong picture? A printing error? An enquiry on this point to the Austrian "*Gymnocalycium*" has elicited no response.

.....from G.J.Swales

The text accompanying this Fig.17 in *Gymnocalycium* 3.3.1990 quotes a spine length of 17-28mm; the spines in the picture ( Fig.17 ) measure some 6mm in length on the page, indicating a three or four to one reduction from natural size to the printed picture. The body of the plant on the printed picture measures 3 cm across which at a 3 or 4 to 1 reduction would indicate a natural size of 9 to 12 cm, thus bearing no relation to

the 36 cm body size given in the title to the illustration.

.....from H.Till

In regard to the size attained by these plants, much depends upon the surroundings and where the plants grow. Thus, on the high plateaux of the Sierras of San Luis, I have seen the largest examples of *G.monvillei* v. *gertrudae*, where the old plants have reached a diameter of about 40 cm. If one comes down to a lower altitude, then the plants decrease in size. By comparison, in Cordoba province there are large specimens to be found in the upper reaches of the mountains as well as at lower altitudes. In respect of the Type form of *G.monvillei* a predominant size of 20-25cm could be assumed.

.....from G.Rowley

Looking closely at the 1838 and 1847 Lemaire pictures of *G.monvillei*, it becomes apparent that the later one is a mirror image of the earlier, with added flowers. To prove this, I photocopied the earlier black-and-white engraving on transparent film and inverted this over the later colour Plate. The match is almost exact.

However, the saga continues; the 1847 Lemaire description of *Echinocactus monvillei* includes body 4 cm high and 5 cm diameter, the flower 10-11 cm diameter and more than 9 cm long. These dimensions match the flower on the accompanying Plate, but certainly not the body! How does this artistic chimaera come about?

.....from G.Charles

Yes, when the transparent photocopy of the 1838 Lemaire Plate from G.Rowley is reversed, it does fit the 1847 plate.

.....from G.J.Swales

The original 1836 engraving (published 1838) would probably be cut on the copper plate to depict the plant as it stood before the engraver. So that when it was printed, it would appear on the printed page as a reverse of the plant. It is very probable that this engraved copper plate would no longer exist in 1847 so another copper plate would then have to be engraved; if the second engraving was done using an 1838 print as a model, then this second plate would produce a print the reverse of that published in 1838. There are some slight differences to be seen in the spination, between the two Plates, but otherwise they are in excellent agreement with each other.

.....from G.Rowley

It would be my belief that Lemaire, desiring to continue his *Iconographie*, but without access to Monville's plants, resorted to the means of getting the block-maker to trace the original Plate (which did not include a flower) and add a fresh flower - which the engraver naturally did life size. This would explain the anomaly between plant size and flower size in the 1847 Plate and description.

.....from G.Charles

On the reproduction 1847 Lemaire Plate of *Echinocactus monvillei*, the height of the flower is between a quarter and a third of the body width; if the Plate is a full-size representation, then the plant body is about 23 cm across. This would make the flower between 6 and 8 cm tall.

.....from H.Middleditch

Which leaves us with the question, have flowers of this size ever been observed on *Gymnocalycium monvillei* (=multiflorum).

.....from P.Bint

I purchased a plant of *G.monvillei* DJF 368 from W.Greenaway which has produced some very large flowers, almost 3 inches across. The flower petals have a wide pink midstripe and are similar in colour to those on *G.horridispinum*. This flower size is rather larger than I would expect to see on *G.monvillei*.

.....from M.Muse.

Having abstracted entries from various catalogues of DJF numbers and locations, I see that DJF 368 originates from near El Condor, in province Cordoba.

.....from G.Hole.

We were travelling eastwards along the new stretch of tarmac road which goes across the Pampa Achala, heading towards El Condor. The surroundings were mostly grass covered hillocks and flatter areas, with outcrops of rock which could be up to some six feet high and wide. We stopped where we caught sight of some magenta flowers in the grass, in order to take a walk round. Only 15 yards off the road, we came across some *G.monvillei* which formed clumps, with a main head perhaps some four inches across, together with a ring of pups. A couple of these offsets were taken with us. These have now flowered, one with white flowers that have a quarter-inch wide magenta stripe down the petals, the other with pure magenta flowers, the flower size being typical for *G.monvillei*.

Before taking this stretch of road, we had driven a mile or two down the old road, where we saw a few *G.andreae*, which were growing in cracks in the rocky outcrops. Subsequently, after returning home, I found out that if we had gone a mile or two further along the old road, we would have come to a spot not far off Los Gigantes where there were large numbers of *G.andreae* and also a population of *G.monvillei* which produced much larger flowers. When paying a visit to Austria on a later occasion I was fortunately able to obtain a sample of these plants which had been raised from ZJ collected seed. These plants have now flowered and they produce a white flower which is amazingly broad when wide open, something like 4 inches across, and about 3.5 inches tall.

.....from H.Middleditch

The Austrian "*Gymnocalycium*" 3 (3) 1990 quotes a flower size of " up to 50-70mm long by up to 80mm in diameter" for *G.monvillei*. It also renames the Backeberg *G.grandiflorum* as *G.monvillei* v. *grandiflorum*, without quoting a flower size. The flower of about 10cm across noted by G.Hole suggests that the 1847 flower size of 10-11cm wide for the flowers of *G.monvillei*, as unearthed by G.Rowley, may not be a figment of the imagination, after all.



**BLOSSFELDIA Werdermann By F.Ritter**  
**Translated by H.Middleditch from Kakteen in Südamerika Vol.2 1980**

When this genus was discovered by Marsoner and Blossfeld in Jujuy in 1936, it caused quite a sensation on account of its uniqueness. Blossfeld, who had sent a specimen to Werdermann in Berlin, wrote about it: "The plant appears to be exceptionally rare and it is questionable whether it will ever be found again". Understandably then, that Werdermann treated the specimen that he had received as a valuable gem. Today it has been established by me that Blossfeldia belongs to the most abundant cacti of Bolivia. But also in Jujuy, where it was discovered, it is by no means rare. On account of their preferred growing location, their insignificance, and unobtrusiveness, they do not catch the eye very readily. Thus it happened with me, when I was searching for cacti in Tarija for the first time in 1931. There I went over a ridge near the place called Angosto where at the time I discovered *Rebutia kupperiana* amongst other sorts. Twenty eight years later, in 1959 I went along the same ridge; but now I knew how the habitat locations for Blossfeldia revealed themselves and so I learnt by looking for them at a small spot there. In 1931 I was going past them perhaps three steps away, not expecting that this place could harbour any other cacti, without suspecting a sensationally exciting new genus grew there. Five years later they were found for the first time by Marsoner and Blossfeld in Jujuy, that is to say, they were brought to them by the indians.

In 1952 I had gone to South America without any cactus literature and without adequate preparations, after twenty years when I had not troubled myself about cacti and new discoveries during that interval. and so had even received no knowledge of Blossfeldia. I was scarcely three days in Bolivia when I found on a vertical rock wall tiny flat pieces which, for want of ribs, tubercles, and spines, excited my greatest astonishment. I sent it to Germany and was advised that it had already been discovered a fairly long time previously, the Blossfeldia *liliputana*. It is remarkable that in Bolivia even in areas where it is abundant, Blossfeldia is generally unknown to the natives. Thus on one occasion in Perez, prov. Campero, I pointed out to a peasant the Blossfeldia which I had found at a spot where it was growing on the road barely 100 metres from his house; he declared that he had never seen such a plant. The Blossfeldia is generally known only to the youngsters who shepherd the goats in the mountains. Goats indeed often scramble up steep rocky places where the Blossfeldia are often to be found. If they can reach them, they gnaw them off; however these plants are often protected against browsing by animals only on account of their growing places being unreachable.

Cardenas, who throughout a quarter of a century investigated Bolivian cacti, and had cacti brought from many of his previous scholars in the whole country, received a Blossfeldia from Bolivia in 1961 and writes about it in "Cactus" 1964 No.2 - "That is the first Blossfeldia which was found outside Argentina". But I had already found it years before in four species, in 17 Bolivian provinces and in hundreds of thousands of examples at numerous locations. It is one of the most abundant cacti in Bolivia. Their development centre no doubt lies in Chuquisaca province where all known species are to be found.

The genus Blossfeldia is a miniature cactus, to which belongs the smallest known cactus species, Blossfeldia *minima*. Obviously there is a relationship with *Frailea*, but Blossfeldia is in a still much higher grade in specialising in its exceptional growing conditions. Among all the genera of cacti, the shortening of the axis is to be found in its extreme here and indeed to the most noticeable extent with the species Blossfeldia *liliputana*. If the ground is moderately soft and yielding, then the body grows in the ground, so that the thickened root and the body axis which shrink in the dry season largely retain their contraction even when taking up water after the rains, so that the plant bodies remain withdrawn below the surface of the ground. The resulting additional growth in the crown is barely upwards but essentially sideways, in consequence of which the cup or crater shape develops. Or if the ground is not yielding, flat like at the surface of the ground. With resistance from hard ground the plant bodies can even become up to 2cm tall and project out of the ground and above the thickened rootstock.

A peculiarity is the thickened rootstock and the mode of offsetting. The roots are usually divided side by side and mostly pink coloured and soft or barely hard. They have the peculiarity that where they lie above the surface of the ground, they generate offsets internally which break out through the epidermis as they grow. In a similar fashion new offsets can break through the top of the head of the plant from within.

.....from W.Rausch, My 4th expedition to South America, G.O.K. Journal January 1971

From Peru we went via Lake Titicaca to La Paz, where there is scarcely a level street. However, at least we had arrived in Bolivia and it was back into the Field. On some excursions in company with Vasquez, the unheard of luxury of a Jeep was enjoyed. The genus Blossfeldia is no easy proposition for the collector. The tiny dwarfs are found only with difficulty, still more difficult perhaps to photograph, since in most cases they grow in shaded locations, squeezed into rock crevices, on steep river banks. The genus has a wide distribution area, 15 locations being known between the Rio Caine in central Bolivia to Catamarca in Argentina.

.....from M.Lowry

In the course of our 1996 visit to Bolivia in company with B.Bates we made a trip from Tarija along the road going towards Entre Rios, as far as Narvaez. On our return journey we rejoined the main road not far from Tarija and at that junction we turned south in order to visit La Angostura. This is the spot where the Rio Tarija passes out of the plain of Tarija by cutting through a high ridge of rock, producing a canyon with almost vertical sides. There is a picture of this magnificent feature in Willy Kenyon's book of photographs of Bolivian landscapes, a picture which gives a far better impression of this feature than can be conveyed in words. Here, at BLMT 82, we saw *Cleistocactus strausii*, *Echinopsis mamillosa*, and *Lobivia tiegeliana* v. *flaviflora*.

It was quite some time later when back at home, I came across the entry under FR 89a Blossfeldia *liliputana* in Englera 16 for 1995, which gave a location for this plant at "Angosto - first break-through of the

Tarija river". Surely this must be the very spot which we had visited ourselves? So plans were laid to make a return visit to this location on our 1997/1998 trip to Bolivia. And indeed we did go back there, to BLMT 82. This time we made for the rock wall at the entrance to the canyon and almost immediately found Blossfeldia growing in the cracks of the bedding planes on the vertical rock faces. They were to be seen growing on this rock from about knee height, past eye level, to about four metres up the rock face. With the close proximity of the river, these plants probably had the advantage of a somewhat humid atmosphere from the moisture rising up from the river waters.

In the Willy Kenning picture, the muddied waters of the river are running in full spate and there are some clouds to be seen in the blue sky, both very suggestive of this photograph having been taken in high summer. This location is north of the Tropic so the sun will be to the south of Angostura in high summer, hence the north-facing canyon wall on the Willy Kenning picture is in shadow. It was on this north-facing side of the river where we found the Blossfeldia. It is quite probable that they could extend down the length of the canyon which is perhaps half a mile long.

Our next stop after leaving Angostura was just beyond Padcaya. Here we saw a south facing cliff on the north side of the road so we decided to look and see if there were any Blossfeldias growing there. Once again we were fortunate in finding these plants. There was some obvious water seepage at the base of the rock face and there might have been some trace of water in the bedding planes where the Blossfeldia were growing.

.....from L.v.d.Hoeven, At The Chileans 1989 Weekend.

We were travelling south from Aiquile, getting nearer to Punte Acre on the Rio Grande, which is down at 1800m, finding Parodia and Weingartia. In a little canyon away from the river, at 1900m., we found a Blossfeldia growing on near-vertical rock. The largest heads were only about half an inch in diameter. They are shaded for most of the day because of overhanging trees.

.....from J.D.Donald (Ibid)

These Blossfeldia are often found lying at the base of the rocks because they have been washed out of the rock. Mostly they are shaded because the rock surface on which they grow faces towards the south. They produce offsets from the roots.

.....from T.Marshall.

At most of the places where we found Blossfeldia growing on steep rock faces, the band of strata in which they were growing was not made up of layers of hard rock but more of a shaley sort of material. These layers were usually not only fairly thin, but also quite friable - they gave the distinct impression that the exposed face in which the Blossfeldia grew could gradually erode away. We did see some Blossfeldia with a length of root exposed to view, between the rock face and the plant body, and this was put down to the shaley strata which originally covered the root up to the underside of the plant body, having eroded away over a period of time.

.....from M.Nilsson

From Humahuaca we had planned to go over to Iruya, but first we made a short stop in Tilcara. Late in the afternoon we took a walk east of the village and found the small Blossfeldia liliputana. They grew very close to each other, in clay in the narrow cracks in almost vertical rock, probably only a metre above the level ground. The habitat was very dry. I have never seen Blossfeldia flower in habitat.

.....from P.Down

The only spot where we found Blossfeldias on our visit to Bolivia was when we in the village of Millares. We were looking for Gymnocalycium at the time and were most surprised to come across these Blossfeldias. They grew in the horizontal cracks of a fairly steep cliff and they were very dried up - the rainy season was barely under way at the time. I can not really remember exactly which way the cliff was facing, but the rock face obviously had sunshine for several hours of the day. This rock face was possibly 60 to 70 feet high and some 75 to 80 yards in length, at the side of a valley with the village in the bottom. There was not much other vegetation about, perhaps a few Acacia trees and Jatropha bushes.

.....from M.Lowry

It is probably at this spot where the new road has been cut out of the cliff and this particular habitat location has now been destroyed.

.....from G.Charles

Blossfeldias that I have seen have always been in the same sort of locality, mud-filled cracks in rock strata, often vertical strata. The face of the rock is usually nearly vertical and orientated away from prolonged sunshine. We found some Blossfeldias growing in this manner about 100m above the river at Cacheuta in province Mendoza, roughly half way between Mendoza city and Uspallata. I have never seen fruits on Blossfeldia in habitat, only early buds on plants which looked dehydrated, perhaps before the first rains.

.....from H.Middleditch

This location at Cacheuta appears to be the most southerly habitat location reported for Blossfeldia.

.....from B.Bates.

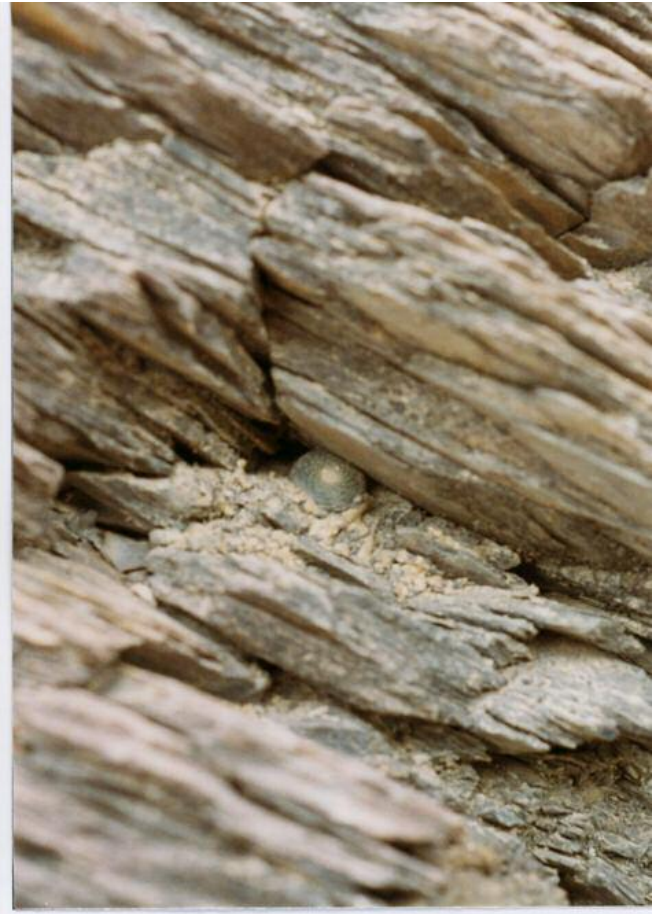
Blossfeldias almost always grow on vertical rock faces where the rock is split by numerous bedding planes so that the roots have to find their way down into those crevices. Each location where these plants are to be found occupies a comparatively small extent, but there are a great many individual locations.

.....from H.Middleditch

In the habitat photographs of Blossfeldia, taken by B.Bates, the rock appears to be composed of numerous layers of a fairly thin, slate-like material, each layer evidently separated by a likewise thin layer of some sort of soil, or of friable shale, in which the Blossfeldia roots can gain a hold. Not only Blossfeldia roots, evidently, to judge by the fairly substantial branches on the shrub which has managed to gain a foothold in these self-same circumstances. So in the picture taken by J.Lambert near Purmamarca, it is perhaps a little



At Millares

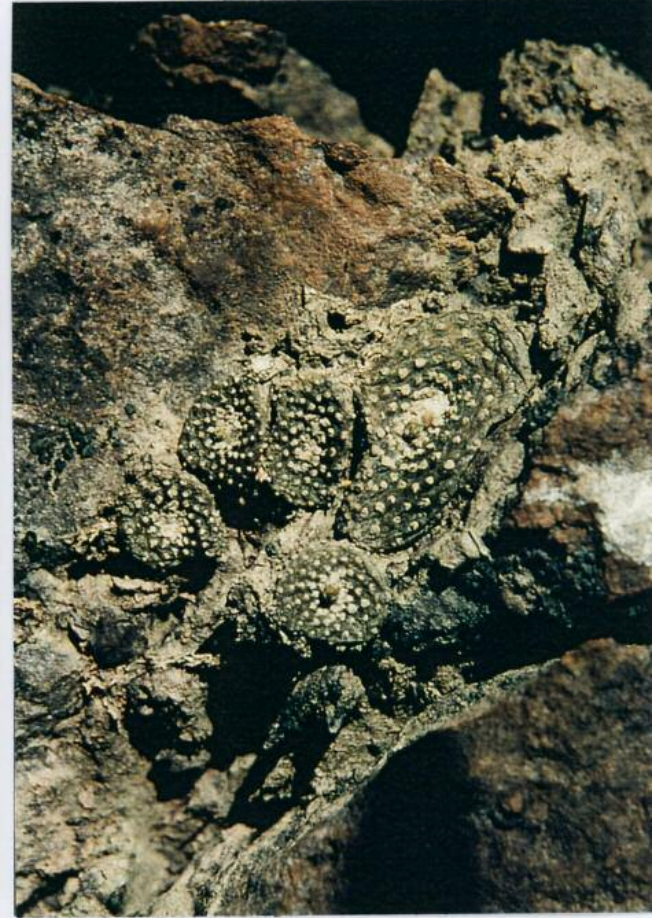


Photos: B. Bates



At Purmamarca

Photo: J. Lambert



At Titiconte, Iruya

Photo: M. Winberg

**Blossfeldia**

surprising to see the Blossfeldia growing in what could possibly be quite slim cracks or crevices between what seem to be fairly large and solid rock looking like blocks of granite or sandstone.

.....from J.Lambert

If my picture gives the impression of granite blocks, it is merely due to the fact that the layers of rock at this particular spot were not as thin as usual. Indeed, my field notes record that this was a schistose material, with some shale in the crevices, into which the Blossfeldias developed their quite long roots. So the rocks here may simply have been somewhat "younger" and less degraded than at other places where Blossfeldia grows. And I have not seen flowers on these plants in habitat, either.

.....from R.Hillmann

Blossfeldia usually grow in vertical rock faces which receive the morning sun. Loam is essential for these plants, for there is loam in the cracks and crevices of the rocks and it is here where the Blossfeldia grow. Going down into the gorges of the Rio Turuchipa and the Rio Pilcomayo you will find millions of these plants, the older ones even forming small cushions.

Near Tojo, in the Rio San Juan del Oro valley, Bolivia, there were some Blossfeldia which were in bud. But the only Blossfeldia seen in flower were those found near Purmamarca, Quebrada Humahuaca, Argentina.

.....from T.Marshall

All the Blossfeldias which I have seen in habitat have been growing in vertical rock faces, in the shade from the sun, usually near water or where there is water seepage from the rock, or at least a damp habitat - never in an arid situation. They form a thick turnip-shaped root, which will be flattened if it has grown in a narrow crack in a rock. But because these plants usually grow in a clay-like soil, they can be pulled out of the ground with no great difficulty. At several places where we found Blossfeldia, as at Angostura for example, I have uprooted what looked like a clump of heads, always to find that they were a bunch of individual plants.

I am pretty sure that the picture of Blossfeldia in habitat taken by M.Winberg, will have been taken before the onset of the wet season, when the plants are shrunken to more or less level with the ground; they could very well be in bud, as we have seen many of these plants in bud towards the end of the dry season. I have even seen seed pods on Blossfeldia in December. Although these plants will become more turgid during the wet season, any upward expansion of the body is likely to be some 5mm at the most.

.....from H.Middleditch

It would seem that the Blossfeldia which have been found in habitat are all reported to be growing under almost identical conditions, irrespective of in which part of Argentina or Bolivia they have been seen. In these circumstances it would hardly occasion much surprise to find that they display very little, if any, material variation in their outward appearance from one place to another within their distribution area..

.....from M.Winberg,

I think that there is only one species of Blossfeldia. It is very widespread from mid Argentina up to Bolivia.

.....from R.Zahra

I find that the body of all these "different" Blossfeldia species is very similar. The same thing could be said about the flowers, but there is one exception which is Blossfeldia grandiflora (or Blossfeldia boliviensis v.grandiflora) because this is the one which has flowers that are slightly larger. One of the most conspicuous differences we have observed is that 99% of these plants are self-fertile, but two of them would not produce seeds unless the flowers were pollinated from a different plant. These two are B.atroviridis and B.cyathiformis. So it seems to me that there are perhaps only two species, one which is self-fertile and another which is self-sterile and hence I do not understand on what grounds the other 6 to 9 different names have been created.

.....from H.Middleditch

And how many sorts of Blossfeldia would have been involved in making that comparison?

.....from R.Zahra

I have visited my two friends who also grow Blossfeldias and together we have discussed and compared our material. All together we have fourteen different species names, together with Blossfeldia R477, R488, R717, as well as Blossfeldia sp. from Padcaya, Rio Chico, Villazon, and Zudanea. Putting all these Blossfeldia together it was simply not possible to distinguish one from another.

...from A.de Barmon

My own plants of Blossfeldia all display an epidermis with a coating of tiny white dots or patches. Some plants have so many of these minute silvery white dots that they almost cover the whole of the plant body, whilst others have barely a sprinkling so that apart from the white areoles, the body does look quite green. Most of my plants display a greater or lesser degree of this coating, so that all together there is every transition between the two extremes. Several of my Blossfeldia have much of the body almost obscured by this white coating, but around the crown the body is much more green looking. So this feature does not seem to have any relationship with this or that species name.

Blossfeldia seem to me to fall into two groups. The first group consists of:-

B.fechseri P244. B.grandiflora B.liliputana  
B.minima KK 1803 B.subterranea KK1505 B.sucrensis KK 1704  
B.tarabucoensis B.tominense B.zashizena,

also KK1525, as well as Blossfeldia sp. Millares, Rio Chico, Villazon, and Zudanez. The Blossfeldias in this group grow fast enough for me to produce flowers at 2 to 3 years old from seed. Their fruits contain round about 100 seeds.

The second group consists of:-

B.atroviridis, cythiformis, flocculosa, formosa, WR 717 (La Rioja) and WR 488 (Camargo). The Blossfeldias in this group are much slower growing from seed, producing flowers at about 4 to 5 years old

from seed. The fruits are smaller and contain only about 20 to 50 seeds, the seed being roughly half the size of those in Group 1.

.....from H.Middleditch

Is it possible that the smaller seed and fewer seed per fruit is the result of less effective pollination, also reflected in the slower growing rate of the smaller seed?

## **BLOSSFELDIA**      **By M.Fechser**

**Translated by H.Middleditch from Cactus (France) 20,84:1965**

I remember having collected the first Blossfeldia in Jujuy; it is the species which Castellanos described as Blossfeldia liliputana and which I have since found again in La Rioja, in Catamarca, and finally in Salta, where I have heard it said that it grows in Bolivia as well. At the present time I have four species of Blossfeldia. At the moment I am trying to obtain some grafted specimens which, although they do grow most vigorously, allow their real differences to be distinguished more readily.

In regard to the flower, I cannot see any differences between the four species. That described by Castellanos under the name B.liliputana is the same as that which Backeberg described under the name of B.campaniflora. The flowers sketched by Castellanos & Lelong in "Opuntiales vel Cactales" do not display the flower as it really is. I have seen how these sketches have been made; the flowers are opened artificially to display the interior parts which thus gives a false idea of their correct form. I have informed C.Backeberg but he has not replied to me on this matter.

I am sure that the Blossfeldias of La Rioja, of Catamarca, Salta, and Jujuy exhibit some differences which above all lie in their dimensions. The two species exhibiting the most characteristic differences are those of Jujuy and Catamarca, this latter described by Backeberg under the name of B.fechseri. The Blossfeldia from Jujuy is a greeny-grey colour, that of Catamarca has more woolly areoles, is a little less grey and of a brighter green colour. As for that from La Rioja it is a smaller size than the species from Catamarca from which it differs only in size. Indeed, I can confirm that the Blossfeldias from Catamarca and from La Rioja grow well if they are cultivated on their own roots. The dichotomous splitting of the head is very frequent in this genus.

It is worth noting that Blossfeldias cultivated on their own roots should never be sprayed during warm humid weather because that softens them and then they risk catching an infection which ends up by killing them off. As long as the plant seems to be in good condition and full of sap, it is not necessary to water until it starts to wrinkle. It is best to keep it dry, so long as it is not too dry. When it does start to wrinkle it will be as well to spray it. During the cold season, Blossfeldias like to be moistened, that is to say dampened, by an atomised spraying if the air is dry. I have the impression that these little plants can absorb humidity via the epidermis and the areoles.

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

Blossfeldia thrives best in cultivation on its own roots; it is undemanding and often produces its small blooms which only open wide in full sun around midday. Their natural habitat is on more or less perpendicular rock faces of the sort which are just sufficiently loose to make it possible for the roots to penetrate it. The tiny seeds are able to cling to steep faces by means of their fine external bristles, and as their large spongy strophiole reduces the weight of the seeds, even a current of wind can waft the seeds against a rock face.

Climatically the boundaries of Blossfeldia are widely spaced; they grow from lower levels up to an altitude of 3400 m and geographically they have an extraordinary extent of distribution. They are known from the mountains west of Mendoza (33° latitude) up to the Rio Mizque in Bolivia (18° latitude) which is a distance of over 1700 km. How little their willingness to flower and fruit is hindered by unfavourable circumstances can be illustrated by the specimens of Blossfeldia atroviridis which I wrapped in paper in Province Valle Grande in Bolivia and took with me. After two months when I unpacked these plants in Chile they bore ripe fruit with seeds. I have never experienced this same thing with any other cacti. Nor can I confirm the opinion of Buxbaum that some blooms are preponderantly male, others preponderantly female. I only saw flowers with equally well developed stamens and stigmas.

Remarkable with Blossfeldia is the very marked reduction of the flower. In that way the tube (or receptacle) has almost vanished, and its height usually amounts to only a fraction of a mm. roughly a third or a half a mm. The bottom of the flower around the base of the style thus forms only a small portion with a somewhat elevated margin, so that one cannot speak of it as a tube in the normal sense. The marginal elevation is so low above the bottom that usually only one row of stamens can be inserted there, at best there are two rows. Even Buxbaum says in his description of the genus that there are only two rows of stamens in the most extreme cases observed up till then. Nevertheless he provides two sketches of flower cross sections of Blossfeldia liliputana, in which 4 or 5 rows of stamens stand one above the other in a tube which is shown three to five times as long as any I have observed on numerous flowers. That is only to be explained if Buxbaum did not make the sketches himself but had them prepared and the artist, in expectation of a longer tube drew it more from his imagination than it actually displayed. Hence what reliance can then be placed on the numerous sketches which Buxbaum includes in his publication? especially if his drawings could often be based upon erroneous interpretations.

.....from H.Middleditch

Accompanying the text of Opuntiales vel Cactales by A.Castellanos and H.V.Lelong are a score or more of drawings of flower sections from a wide range of genera. Each one of these flower sections has been drawn so that it includes all the stamens which can be seen when a flower is cut in half, vertically, together with the tube and petals forming the back of the half flower. This may well be artistically correct, but it is perhaps not

the best way of depicting botanical detail. For this reason, it is difficult to make out the disposition of the stamens and their mode of insertion on the Blossfeldia flower section provided by Castellanos & Lelong. This particular sketch may well depict a flower with a single row of stamens but that is certainly not clear on the drawing.

.....from Schweizer Garten, 10.1945

In 1941 the Zurich City Succulent Collection came into possession of the smallest species of cactus, [Blossfeldia] which were a difficult struggle to keep. At about that time they were about the only examples still existing on the continent, consisting only of two small bodies. Today we are in the happy situation to report that these tiny plants (still in the same small pots) have produced not only very good growth and further offsets, but in the meantime have already flowered several times and moreover have produced fruit and seeds. Indeed further grafting trials will continue, as the separation of individual offsets has up to now achieved no success. Naturally all hopes now hang on the germination of the seed.

.....from H.Middleditch

Which evidently can also be quite a problem.

## **FINDING TEPHROCACTUS LAGOPUS IN BOLIVIA From J.Carr**

A return visit was made to Bolivia in November of 2003, when we had decided to travel round the northern side of Lake Titicaca. From La Paz, our route took us via Achacachi to Escoma, from where we turned away from Lake Titicaca, in order to head north for Charazani, a place named as Jose Perez on older maps. The Rio Suches lay out of sight to our left as we travelled over an area of high pampa, with very low growing vegetation. grass being the tallest - other than the cacti. At this altitude the grass is usually well cropped by llamas so 4" is tall, other plants being alpines or mosses. As we approached much closer to Charazani, however, there were steep hills and slopes as well as mountains with snow covering to be seen to the east. The drop into Charazani is over 1000m and Inca terracing is to be seen on the hillsides all the way on the descent.

After an overnight stop in Charazani, we retraced our route back up to the high pampa and took the road which turned off towards Ulla Ulla. This road also ran through an area of high pampa with slopes and small hills, with snow on the mountainsides both forward and to our right. Our road ran perhaps half a dozen miles or so away from the Rio Suches, which now formed the boundary between Bolivia and Peru. After travelling some miles we started to catch sight of white patches of hairy Tephrocactus scattered over the hillsides to our left. They were not continuous, but there were some plants to be seen at one place, then there was a gap, then a few more appeared further on, and so on. We stopped at two or three spots to walk perhaps as far as a mile along the hillside to take a look at these Tephrocactus. This was a real task at this altitude of 4450m. We also felt the intensity of the cold quite keenly. There was a biting wind, as well as occasional showers of hail, and also evidence of overnight frost.

We found both mats of T.floccosus and hummocks of T.lagopus. The whole hillside was covered with mats of alpines and mosses but there were no trees or shrubs at this altitude, all vegetation other than the cacti being below two inches in height, on account of the grazing by llamas and vicunas. The T.lagopus were to be found at around 4400 to 4500m altitude whilst the T.floccosus were generally seen below 4400m. Only occasionally did we come across both species growing together. At one point we saw a whole hillside which had a white coating of hail, which was jocularly noted as a great population of T.floccosus.

From our first sighting of these Tephrocacti we would have gone a further 15 or 20 miles along the road towards Ulla Ulla before the need to replenish our stock of fuel obliged us to turn about and head back towards Charazani. Once again we passed the hillside which shortly before had been carpeted with a white coat of hail, but the hail had now melted away to reveal the scattered plants of T.floccosus which had not long before been obscured from view. Some of these T.floccosus had white hair whilst others had yellow hair.

.....from M.Cardenas, US C.&S.J Vol XXXVIII No.2 1966

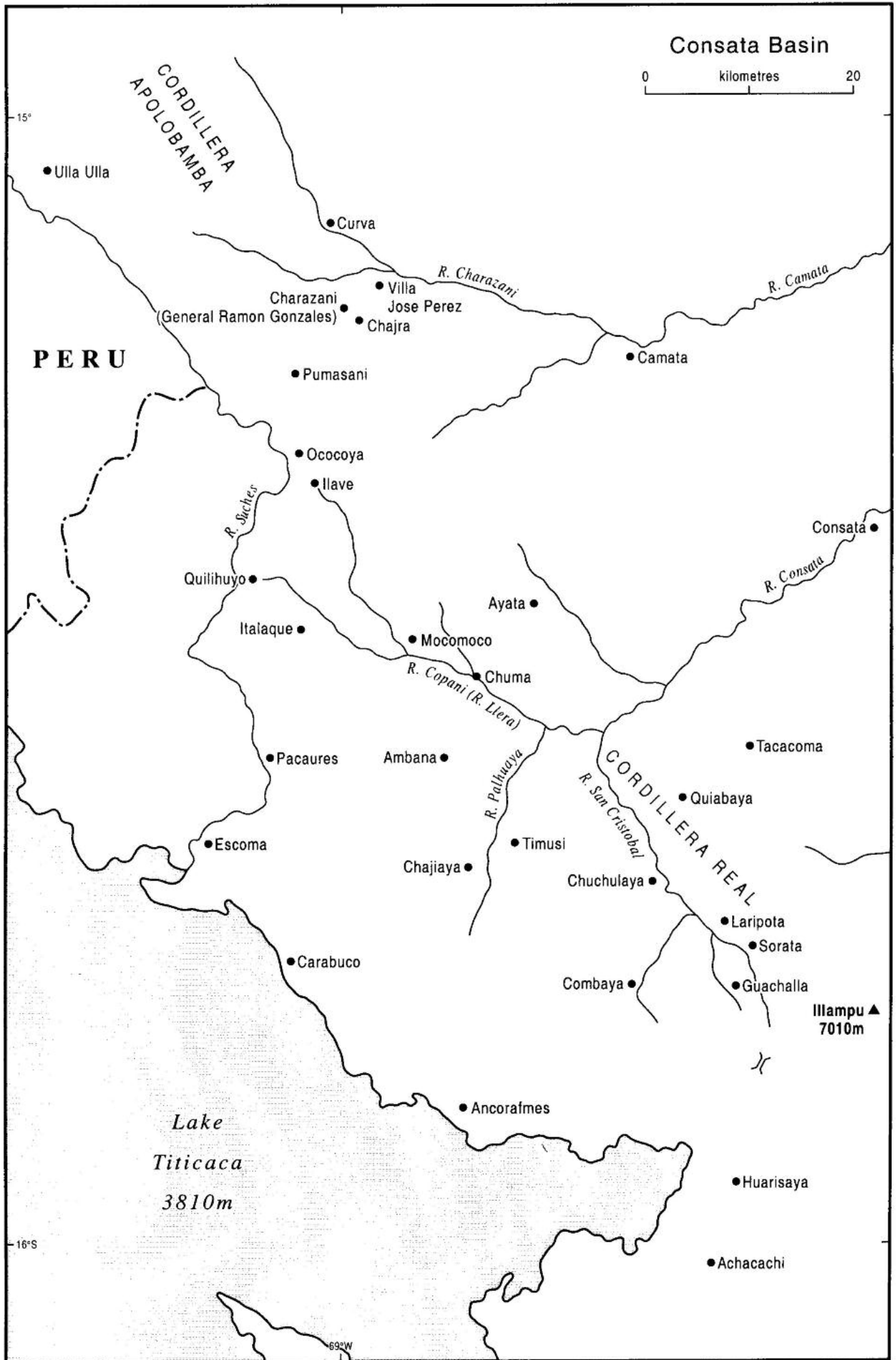
[On a visit to Charazani] ....between Lake Titicaca and the Peruvian border we have seen these spectacular great mounds formed by T.lagopus (Sch) Bckbg. at 4200m.

.....from H.Middleditch

Perhaps these were seen in the course of the visit to Charazani made by M.Cardenas, as reported in Chileans No.49. Current altimeter records could well be of improved accuracy compared with the figure quoted by Cardenas. Sightings of T.lagopus in this same general area were also made independently by Rausch and by Ritter, as noted in Chileans No.61.

The Cordillera Apolobamba and the Cordillera Real represent one section of the high ridge which bounds the eastern side of the Andes, facing the low-lying Amazonia. The gap between these two Cordillera would originally have been occupied by a similar barrier ridge, but the headwaters of the tributaries to the Rio Consata, with the advantage of the steep drop down to the Amazon basin, have cut that portion of the Cordillera into numerous isolated blocks. These valleys are so deep in relation to their surrounding heights that the only practical means of access to them is to strike north from Escoma and follow the high pampa towards Charazani, turning into the head of the required valley. Even then, access to the lower part of the valley can involve "a thousand metres descent of numerous hairpins", as Ritter found when visiting Ayata [Chileans No.49 p.10]. Not too surprising, then, that when Rausch tried a short cut, he was defeated by the depth and precipitous nature of the valley sides. [Chileans No.61 p.26].

The location for T.lagopus found by J.Carr on the slopes of Cordillera Apolobamba are clearly a continuation of the populations in the adjoining part of Peru. However, the observations by Cardenas, Ritter,



and Rausch, would suggest that *T.lagopus* extends from there, even further to the south-east, probably in isolated populations on the higher parts of the dissected ridge of the Cordillera which lies to the south-east of the Cordillera Apolobamba.

## WE FIND WHICH SORT OF CLEISTOCACTUS From F.Vandenbroeck

Our visit to Bolivia started from Santa Cruz de la Sierra, from where we travelled southwards along the eastern margin of the Chaco plain as far as the Argentine border. Along the way we passed some of the outlying foothills of the Andes. Arriving at Villa Montes we then turned westwards, into the Andes, in the general direction of Tarija. At first we followed the valley of the Rio Pilcomayo for some distance. The road then turned abruptly southwards from the Rio Pilcomayo, winding its way through the hills and valleys until it arrived at Palos Blancos. To the west of Palos Blancos, in the direction of Entre Rios, we came across a green-flowered *Cleistocactus* which was growing in a very lush Chaco-like habitat. It was the rainy season and the landscape was an undulating green expanse of bushes and low trees, interspersed with cacti such as *Trichocereus terscheckii*, *Cleistocactus chacoensis*, *Cereus comarapanus*, *Eriocereus tortuosus*, *Gymnocalycium pflanzii*, *G. hamatum*, *Pereskia*, and *Neoraimondia herzogiana*. As lower growing plants there were lots of spiny bromeliads, grasses, and an attractive *Arum* sp. I tend to assume that this *Cleistocactus* could be Ritter's *C. micropetalus*. The flowers were all uniformly green, rather small, all of them closed, even though it was noontide when we found them, and densely covered with white hairs. Also the description of "golden yellow spines" for *micropetalus* seems to fit those we saw. Moreover Ritter cites as the habitat the "province of Avilez" which corresponds with the area where I found the plants. I remember seeing them only at one particular spot of which I did not keep an exact record.

.....from H.Middleditch

At The Chileans 1998 Weekend we were shown a slide of this plant in flower, by F.Vandenbroeck. The flowers appeared to grow horizontally, at a slight angle to the leaning stem, suggesting that they would grow straight outwards from a vertically upright stem.

.....from M.Lowry

On our 1996 trip to Bolivia we were returning to Tarija from the Condor pass when we made a diversion to see where the River Tarija enters the gorge at Angostura. The walls of the gorge are literally vertical and the river occupies the full width of the gorge. At this point we were at the west end of the defile cut by the river and from there we returned to Tarija. Where the river occupies this gorge it is cutting through a quite narrow mountain ridge of no great north-south extent. On our 1997/98 trip to Bolivia we left Tarija and followed the main road going southwards in the direction of Bermejo, as far as Padcaya. When we were coming back towards Tarija, as we were approaching - but still some way off - Angostura we took the road going to Comunidad Angostura. In this way we were able to follow the east side of this same ridge which the R. Tarija enters by an impassable gorge so that now we came to where the River Tarija issues from that gorge. It was here that we came across *Cleistocactus micropetalus* and at the same location we also found *Cleistocactus hyalacanthus* (*tarijensis*) as well as *Cleistocactus strausii*. Some of the specimens of *C. micropetalus* here really were enormous, up to as tall as eight feet high.

.....from H.Middleditch

Over an area of the lower-lying part of the Andes to the west of Villa Montes there are a group of *Cleistocactus* names which are characterised by fairly short, basically green, flowers. Not far from Villa Montes at only 460m altitude is the habitat location for *C. crassicaulis* Cardenas and also for *C. clavicaulis* Cardenas, whilst *C. viridialabastri* originates from the road between Villa Montes and Palos Blancos at 600m. Then *C. crassicaulis* v. *paucispinus* Ritter is from near Cajas which lies no great distance to the north of where the Villa Montes-Tarija road crosses the Abra Condor. Then finally we have *C. micropetalus* which is found some distance to the south-east of Tarija.

The Cardenas description of *C. crassicaulis* includes a "flower 35 mm long, constricted at the tip, tube purplish pink with light green scales and dense white hairs". A little further in the same text we find Cardenas describing the flowers as greenish - is it the green scales which completely cover and obscure sight of the purplish-pink tube so making the flower appear green to an observer? In addition, on the photograph which accompanies Cardenas' description, the flower length is close to two-thirds the stem thickness, which on the basis of a 35mm long flower would make the stem roughly 47 mm thick, not 60-70 mm thick as quoted by Cardenas (as also noted by Ritter). This 35mm stem thickness would be closer to the apparent stem thickness on the Vandenbroeck plant, likewise estimated from flower length.

In his treatment of *C. crassicaulis* in his *Kakteen in Südamerika*, Ritter observes that he found this plant in March 1958 and gave it the name *C. ipotanus* in the Winter seed catalogue, Since Ritter did not publish a description for his *C. ipotanus*, he accepts that the name *ipotanus* had to be relegated to synonymy under *C. crassicaulis* which was validly described by Cardenas in 1961. The 1958 Winter catalogue includes a note against *C. ipotanus* that "Flower - green", which does match the appearance of the flower on the Vandenbroeck picture.

Then we have *C. viridialabastri* Cardenas with "Flowers 40 mm long, light green at opening; at anthesis scarcely opening, light green at the base, pink at the middle length, emerald green at the tip." Here we do have an indication of the change in the colour of the flower as it ages. The flower sketch which accompanies Cardenas' description of *C. viridialabastri* is of a flower which is very constricted at the opening, a feature which matches the flower on the Vandenbroeck picture.



For his *C.clavicaulis*, Cardenas gives "Flowers 35 mm long, pericarpel green, tube pink turning to red, yellow scales, with a very small quantity of white hairs; petals magenta-red, green at the tip". The sketch of the flower, done in the typically rough Cardenas fashion, again shows the tube having a somewhat reduced diameter towards the opening, as on *C.crassicaulis* and *C.viridialabastri*. However, in the small photograph which accompanies Cardenas' description of *C.clavicaulis*, it is just possible to discern on two of the flowers that the petals are half-reflexed open at the mouth of the flower, in contradiction to his adjoined sketch. However, a possible explanation for this apparent contradiction may be sought in the description of the flower on *C. micropetalus*, as given by Ritter: "The flower is only open for one night, opening in the evening and closing in the early morning hours". In my own collection there are night-opening flowers on various other plants which will stay open during the following morning if the weather is dull and cool and the possibility could be accepted that, given the appropriate conditions, the flowers on Ritter's *C.micropetalus* may likewise stay open for some part of the daylight hours; similarly Cardenas' *C.clavicaulis* flowers. Has Cardenas taken his photograph by flash, when the petals at the tip were half reflexed at night, and sketched it in daylight, when the petals at the tip had closed back again?

We also have a *C.crassicaulis* v.*paucispinus* Ritter which would appear, from the description, to differ merely in detail of body habit. In his *Kakteen in Südamerika*, Ritter regards the Cardenas' *C. crassicaulis* and *C.clavicaulis* as synonymous, despite Cardenas noting the flower on one having a "dense white hairs" and "a very small number of hairs" on the other. One might, should one wish to do so, infer from this that Ritter saw both very hairy and almost hairless flowers in the same population when collecting his *C.ipotanus*.

The Type location for *C.micropetalus* is given by Ritter (*Englera* 16) as Angostura, Valle Concepcion. This is evidently the spot described by M.Lowry (above) where the R.Tarija cuts through a mountain ridge.  
.....from R.Mottram

The descriptions of Cardenas are seldom adequate, and often misleading. The description of *C.clavicaulis* is full of inaccuracies. In spite of the description referring to the stem saying "10cm thick above", he illustrates a plant that is only 6.5 cm at its broadest, as measured by his inset 4 cm scale. The ribs are only 5 mm high in the Latin, yet 10.5 mm high in the French. Stem height is 40-60 cm high in the Latin and just 40 cm in the French. The name itself suggests a clavate stem, yet the photo hardly qualifies for that description.  
.....from H.Middleditch

From the inset 4 cm scale to which R.Mottram refers, the flower length on Cardenas' picture of *C.clavicaulis* would be 35mm, which does at least match his description.  
.....from G.Charles

When visiting the Donkelaar collection in the early 1970's I recollect seeing a plant of *Cleistocactus crassicaulis*. This had quite a thick stem, somewhat comparable to *C.micropetalus*. In my own collection I have a *C.viridialabastri* which was acquired from Donkelaar. This plant has stems which are thinner than those on Donkelaar's *C.crassicaulis*. But it produces hundreds of flowers which start off green but then turn red before they wither. My *C.mendozae* R 287 is one metre high with a stem which is thinner and finer spined than my *C.micropetalus*. It also has two-coloured flowers, pink and green, of similar appearance to *C.micropetalus* but the flowers are slightly upwards pointing.  
.....from I.le Page

My *Cleistocactus mendozae* has been in my collection for a considerable number of years - it is now in an 18cm (7 inch) pot. It is about 1.5 m high with 18 ribs; the stem is about 50 mm thick for a large proportion of its length and has the appearance of being stouter than many of the other *Cleistocactus* in my collection. It is of flowering size and the flowers are a very good match to those on the habitat pictures of *C.tominensis* taken by J.Carr and W.Christie.

## **FINDING CLEISTOCACTUS TOMINENSIS from W.Christie.**

Turning off the main road from Zudanez to Tomina, taking a side road going to Hacienda Tomina Chico, we came to the Quebrada Waran Huaniyoj where, at 1950m altitude, we came across some *Cleistocactus*, which were growing in company with *Gymnocalycium pflanzii*, *Echinopsis huottii*, a *Cereus* sp., *Neoraimondia herzogiana*, and *Harrisia tetraacantha*, in a flat area between low hills, among shrubs and low trees. Not far away we found *Quiabentia verticillata* and *Opuntia sulphurea*. These *Cleistocactus* usually had only a few stems (3 or 4), rising to about 1.5m tall, which carried lots of flowers on the top 30cm or so of the stem up to the growing point. Most flowers were 2 to 3 cm long and green, but on the same stem some of the flowers were bright red near the tip. It is not clear whether this represented a different stage in the development or decline of the flower. In the appearance of the stem I see a superficial resemblance to my *C.tominensis*, of which I have a small plant of PM 167. Also I have a *C.crassicaulis* which was grown from Kohres' seed more than 20 years ago. The main stem is about 90 cm high, but it has never flowered.  
.....from H.Middleditch

One of the photographs of the *Cleistocactus tominensis* seen by W.Christie at BB 408 is a close-up of flowers arising from fairly well down the stem, one of which is a bud possibly within a day or two of opening, the second a mature flower, and the third a withering flower. In this way the life cycle of the flower is caught on the one picture. The not-yet-open flower is entirely green in colour, the mature flower has a green pericarpel together with a red tube and green petal tips, the dying flower has a green pericarpel and a shrinking reddish-brown flower tube.

At both the locations where the pictures were taken by F.Vandenbroeck and by W.Christie, there were also *Gymnocalycium pflanzii* and *Neoraimondia* to be seen - possibly indicating areas of a comparable

phytogeography. This would suggest that *C.clavicaulis* may have to be regarded as a synonym of *C.tominensis*. But the *C.micropetalus* seen at the exit from Angostura by the BLMT party appears to be growing in a different phytogeographic association.

The second picture taken by W.Christie is of the top of a stem with flowers arising from as far up as the shoulder of the crown of the stem. The very topmost flowers are pointing more upwards than outwards, possibly due to their standing just above the shoulder of the crown.

.....from R.Mottram

If an identification is to be suggested for this *Cleistocactus* which was seen by F.Vandenbroeck near Palos Blancos, there are a number of names which need to be considered, all of which may be conveniently grouped under the umbrella of *C.tominensis*. This species can vary quite considerably in its habit of growth, and may be quite massive. The more sprawling habit of the Vandenbroeck plant is a bit unusual, but the flower is very diagnostic, varying relatively little in morphology. It is related to *C.micropetalus*, but the flower and fruit of that is much more heavily scaly. In both species the receptacle tube turns pink on the day of anthesis, although I am uncertain if this is always so. The flower on the Vandenbroeck plant is also more heavily clothed with hair than I have seen in this species before.

.....from H.Middleditch

Within the group of names of *Cleistocactus* suggested by R.Mottram as a possible identification for the plant seen by F.Vandenbroeck, all share a common character in having a relatively short and not quite horizontal flower, green in colour before it starts to fade. The *Cleistocactus* with this type of flower are distributed over quite an extensive area. The habitat location given for *C.tominensis* is given as the Tomina valley, which lies to the east of Zudanez. Between Tomina and Padilla, not far from the Rio Tomina which flows north into the Rio Grande, is the habitat location for another member of this group of green-flowering *Cleistocactus*, *C.mendozae* Cardenas. It may be open to question whether Cardenas was aware of the Type location for *C.tominensis* when he wrote his description for his *C.mendozae*.

At an appreciable distance south of this area and very approximately half way to Villa Montes, is found Ritter's *C.capadalensis*, near Capadala "above the Rio Pilcomayo". Then further south still there are the various names for the *Cleistocacti* with the short green flowers which occur between Tarija and Villa Montes.

.....from R.Mottram

My own plant of *Cleistocactus tominensis* was raised from FR seed purchased from Winter around 1960 time. I have now had a chance to take another look at the flowers on this plant. It shares a great deal in common with *C.micropetalus*, but the essential diagnostic differences can be summarised as:- Flowers on *C.micropetalus* much shorter overall, with larger, more prominent tube scales, and anthers exceptionally large.

During development of the flower on *C.tominensis* the tube is more or less straight and angled upwards from the stem at about 60° to the axis of a vertical stem. At anthesis the tube bends downwards above the nectar chamber until the perianth is horizontally orientated, at ca. 30° to the axis of the ovary. Throughout its development the flower has a pale green pericarpel and tube, and grass green perianth. Following anthesis the tube turns reddish pink in colour, probably as a signal to the pollinating birds that nectar is no longer available. At anthesis the stigma is exerted by about 4.8mm., after which the receptacle tube continues to grow and enclose the stigma again.

.....from H.Middleditch

It had been my impression that the flowers on my *C. micropetalus* stood out more or less horizontally from the stem. However, the foregoing observations from R.Mottram caused me to look at the flowers more closely. This was fortunately when my plant was carrying quite a few flowers of different ages, which made it fairly simple to look for any changes in flower shape. It was quite a surprise to find that the flower did not start off by growing out horizontally from the stem, but had a quite positive - but not prominent - upward inclination. Up to about half their mature length there was no change in this attitude of the flower. But by then the slightly longer (older) flower had adopted a bend more or less where the tube and pericarpel met, of such a degree that the flower tube then did point more or less horizontally outwards.

Following this observation, a couple of buds were marked with a felt tipped pen and observed more than once per day in order to check whether the first deductions were indeed correct. This confirmed the change part way through the life of the flower, with the tube changing from straight to slightly bent.

.....from R.Mottram,

Having received the foregoing observation a close watch was kept on the flowers on my own *C.micropetalus* and I can now confirm that there is indeed a bend in the flower tube at perhaps one third length, the outer part of the flower being more or less horizontal.

.....from H.Middleditch

On the habitat picture of flowers on *Cleistocactus tominensis*, taken by W.Christie, it is just possible to see on two flowers that there is a slight bend in the tube above the pericarpel, with the tube adopting a very slight upward inclination. This flower form is replicated in the Vandenbroeck picture and on the flowers on my own *C.micropetalus* and *C.ipotanus* in cultivation.

.....from T.Lavender

I do have plants that follow the description of the flower that you have seen in your own plant, and one which certainly follows the description by Cardenas of *C.crassicaulis*. I was given a plant, without a name, which also has the same sort of flower as *C.crassicaulis*, but is a more robust grower. The stem of the latter plant is approximately three inches in diameter; when it outgrew its allotted height spot in the greenhouse, I cut off about two feet six inches. The spines are quite different to the ones on the Vandenbroeck picture, but I suppose that this could be put down to the difference between habitat and cultivated plants.

The plant I have of *C.viridialabastri* also follows the description by Cardenas; the stem is very similar to



Cleistocactus crassicaulis

Photo: T. Lavender



At Queb. Waran Huaniyoj

Photo: W. Christie



At Omereque

Photos: J. Carr

Cleistocactus tominensis



the picture in the original description and the flower goes through the same life cycle as the description also. It remains green for the period up to anthesis and then becomes rosy pink in the middle.

I did take a picture of *C.tominensis* in the Huntington Botanical Gardens in California and unfortunately not in flower but with fruits. I compared that picture with the stem of the plant given to me by R.Ginns and they were very much alike. The plant from R.Ginns flowered once and was neither the same nor near to the picture taken by F.Vandenbroeck which you sent to me. There was *C.mendozae* to be seen in the Exotic Gardens at Monaco and the picture I have of that again bears no resemblance to the Vandenbroeck plant. I have not seen, nor do I have a picture, of either *C.clavicaulis*, *C.capadalensis*, or *C.ipotanus*.

At this moment I have both *C.crassicaulis* and *C.viridialabastris* coming into flower. The *C.crassicaulis* is definitely the nearest in flower form and colour to the Vandenbroeck picture. As I recall, the flower remained green throughout the flowering cycle except when it is withering and turning the usual fawny brown colour. I do not recall the petals being reflexed.

.....from H.Middleditch

The picture of the *Cleistocactus crassicaulis* on the front cover displays the very distinctive difference that can be found in the overall appearance of the stem; in this instance, possibly brought about by the old stem dying back and subsequently restarting into new growth. It is this sort of difference which does pose difficulties in trying to identify a species of *Cleistocactus* by stem habit alone, even in habitat, not just in comparison with cultivated specimens, as observed by T.Lavender.

.....from W.Withers

I have an old *Cleistocactus* plant which came from Ron Ginns many years ago now - so many, that I cannot even remember when. The plant has about 18 to 20 ribs and this is the first time that it has flowered. The flowers are tubular but are just slightly larger in diameter at about one third of their length and then they have a slight taper from there towards the tip. At the very tip the outermost flower petals are very slightly open and there are several rows of petals which can be seen when looking right into the flower opening, the outer petals green, the inner petals purplish in colour.

.....from H.Middleditch

The Cardenas description of his *C.mendozae* specifically notes "Flowers .... outer perianth segments acute lanceolate green, inner segments light magenta." The Cardenas description of his *C.clavicaulis* refers (in the Latin) to the exterior flower petals being "pink below and greenish above", the interior petals as "dull magenta below, becoming greenish above". The flower in the close-up picture from W.Withers appears to match the latter description. The Cardenas description for his *C.viridialabastris* refers to both inner and outer flower petals as emerald green, and for *C.crassicaulis*, "outer segments green, inner segments white, greenish above". It may be open to question whether these observations represent a change in colour during the life of the flower, like the change in colour displayed by the exterior of the flower.

.....from R.Mottram

It would be very interesting if one of these flowers can be sectioned to find out the nature of the inner flower colouration.

.....from H.Middleditch

It will be almost fifty years ago that I purchased a *Cleistocactus ipotanus* - from the cactus nursery which was then in operation near Matlock, if memory serves me correctly. To my pleasant surprise, it has now finally decided to flower, although it has only produced two blooms, which stood straight out sideways at right angles to the vertical stem. They were a green colour with a copious covering of white hair, the tube being not quite cylindrical, but slightly thicker at about one third flower length. The petals did open very slightly but not as far as tubular form. When the flower seemed to be fully "open" but without any signs of starting to wither, the middle third (or thereabouts) of the tube turned from a green to a reddish colour. One flower was snapped clean off the areole, measured and sectioned. From base to petal tips (excluding the projecting style and stigma) it measured 46mm in length; maximum thickness was 10 to 11mm.

Consulting the descriptions of *crassicaulis*, *clavicaulis*, and *viridialabastris*, flower length is quoted as 35mm, 35mm, and 40mm respectively, which does not really reach the flower length on my own *C.ipotanus*. However, the overall appearance of the flower is certainly a good match for that on the *Cleistocactus* photographed by F.Vandenbroeck near Palos Blancos. In particular, the very obvious hairy coating, (as noted above by R.Mottram) and on the *C.crassicaulis* in the collection of T.Lavender.

.....later. A year later, an unopened and wholly green flower (with the usual white hairs) was found on my *Cleistocactus ipotamus*. It measured 47cm, in length, excluding the projecting style and stigma. The following morning, the petals were slightly reflexed, although not so far as to form an extension of the tube, whilst the central third of the flower had turned pink in colour.

## **CEREUS TOMINENSIS By W.Weingart.**

**Translated by H.Middleditch from Monats. der Deutschen Kakteen Gesellschaft, 1931.**

Prof. Karl Troll travelled as a geographer of Bolivia in the years 1926-1928 and sent seed of a *Cereus* to Prof. T.Herzog in Jena, from which Garden Inspector A.Peitscher of Jena raised seedlings designated as No.174. Prof. Troll provided a copy of his description drawn up on the spot at the habitat, which Prof. Herzog procured. A picture and plants were given by A.Peitscher.

The *Cereus* seedling received from R.Torenzer of Erfurt is the same as that which has been brought into commerce as *Pilocereus spec.1* from Bolivia.

Description according to data from Dr.K.Troll:- The *Cereus* grows upright, columnar, up to 2m high, 5cm

thick, branching moderately. It has 18 - 22 ribs which are very low and display a distinct cross-groove between the areoles. The areoles are 5 to 7.5mm apart, small, circular or somewhat elongate, roughly 3mm in diameter. Areole wool compact, blackish in the lower half, golden yellow above. Eight to nine spines, sharp, not strong, only one is 2cm long, the others shorter than 1cm, On new growth the spines are dense, but white and yellowish, so that the top of the stem has a shiny golden yellow appearance.

The flowers are scattered irregularly over the whole of the stem. They are small, only 26mm long, forming a tube. The pericarpel is roundish tapering to the base, stoutest at about 9mm from the base of the flower up to half its length. It is smooth, with small pointed triangular scales disposed not very close together, bare, only the scales with a quite feeble margin of white hairs. The crown of the flower is thus about 13mm long, the outer flower petals are very acute, narrowly triangular, the inner petals narrow spear shaped, with a short taper. There is no evidence of a tube when viewing the flower externally, from the base of the flower, hence the end of the pericarpel, the crown of the flower was of 9mm in diameter, gradually becoming narrower in the shape of a bow, the opening of the flower being only 5-6mm in diameter, the style with the stigma lobes projecting. (Above data according to a sketch from K.Troll).

The flowers appear in all gradations of colour from pale red to green, mostly pale red with a distinctive green base, but also occasionally completely green.

Habitat location: Dry vegetation (Schinopsis brushwood) in the Tomina valley, east of Sucre at 1800 to 2000m.

[There follows a description of the 11cm tall seedling of *C.tominensis*, together with a lengthy dissertation on the epidermis of the spines and body of a number of Cactaceae].

### **DID WE FIND CLEISTOCACTUS MICROPETALUS? From R.Hillmann**

Starting off from Zudanez, we drove along the road which would take us to Mojocoya. We went past El Rodeo and then, some distance before Tomina Chico, we turned off in a northerly direction, heading for the valley of the R.Mojocoya. Near Quilla Quilla, not far from Estancia Churicana, we crossed a river which ran down into the Rio Tomina. On the steep slopes at either side of this river, there were scattered various low-growing shrubs, like Fuchsias and Solanum, together with an abundance of Bromeliads, all growing among the numerous rocks. There were *Cleistocactus candelilla* growing here - which were in flower - together with an *Echinopsis* species, as well as *Aylostera vallegrandensis*.

At this spot we came across a different sort of *Cleistocactus*, growing up to about 2m in height. There were not a great many of these plants to be seen - mostly they grew a good stone's throw apart from each other, only occasionally a few metres apart. Most of these *Cleistocacti* had only a few stems. We walked up the slope at one side of the river (the only side where these *Cleistocacti* seemed to grow) in order to look at them more closely and we did not find any of them carrying flowers. However, we were fairly sure that they were *Cleistocactus micropetalus*. But we did find some which had fruit that was about 20cm in diameter, yellowish in colour, often with several fruits on one stem.

Continuing northwards, after a minor pass, we came into the Mojocoya valley, where the R.Mojocoya flows north and eventually joins the Rio Grande. Our road ran well away from the river itself, as it more or less followed the rim of the valley. Occasionally we would meet with groups of fairly tall bushes, or even trees, but the terrain was mostly occupied by lower growing bushes and other low vegetation. This road brought us into the pampa around Mojocoya itself. From here, the Rio Mojocoya runs north for quite some distance, through a deep quebrada, to join the Rio Grande. To the east of Mojocoya itself, the valley is enclosed by a mountain ridge which is called Cerro Chaco Grande. At the northern end of this ridge, the ground falls away sharply to a much lower altitude, down to the Rio Grande. We drove east out of Mojocoya, winding up a steep slope on the ascent of this ridge, passing through a dense vegetation of trees, bromeliads, and so on, until we reached the top, which was rather like a long table mountain. We could see, well below us, the taller vegetation growing down in the valley, along the line of the R.Mojocoya.

Leaving the vehicle, we started to walk northwards along the flat top of this ridge. Here there were neither trees nor bushes, but a great many bromeliads, which often lined the edges of the rocks. There were again *Cleistocactus candelilla* and *Aylostera vallegrandensis* to be seen, but we also came across *Blosfeldia liliputana*, a *Trichocereus* species and a *Sulcorebutia* species. It was not difficult to pick a way forward between the shrubs and the patches of Bromeliads, particularly over the open places, avoiding the big rocks.

It was along the top of this table mountain that we came across more *Cleistocactus* of a similar appearance to those which we had seen near Quilla Quilla. Some of these *Cleistocacti* were again almost 2m high so that they could be seen here and there, standing above the other vegetation. The further we walked in the direction of the deep valley of the Rio Grande, the more grasses and herbs there were to be seen. Eventually we came to where wreaths of misty cloud were coming up from the valley below, where the Rio Grande ran, occasionally enveloping us in a dense fog. There continued to be more of the *Cleistocactus micropetalus* growing here. Some of these *Cleistocacti* which we saw during this walk were in fruit, the fruit being yellowish to red, and covered with short hairs. Others were in flower, whilst some of them carried both flowers and fruit. These plants must have a long flowering season, because many of them had buds, flowers, and ripe fruit, on the same plant. Some plants had only a few flowers and fruit, others had more, but there were a few with as many flowers and fruit as in Ritter's Abb.825 picture. The flowers were quite short, green in colour, and nearly covered with a coat of white hair. Very few of these flowers had the tips of the petals open, but many of them had the stigma projecting beyond the end of the petals.

It was on the occasion of a later visit to Bolivia that we set off from Tarija on an excursion northwards

towards the valley of the Rio Camblaya-Pilaya. We passed through San Lorenzo and Leon Cancha, then shortly beyond Camaron we found ourselves with a magnificent view over the valley of the R.Camblaya-Pilaya. As we were driving down the slope into this valley, we passed through surroundings which were green with grasses, herbs, bushes, and trees - such as *Chorisia speciosa* - as well as an occasional *Neocardenasia herzogiana* and *Cereus colloseus*.

Shortly before we came close to the river, we saw some multi-stemmed plants of a *Cleistocactus*, so we stopped to take a closer look. They grew up to about 1.5m in height and had about 16 to 18 ribs. Fortunately there were a number of them carrying both flowers and fruit. Again, the flowers were short, straight, green, and hairy, similar to those which we had seen on the previous field trip, both near Mojocoya and en route to Sopachuy. These *Cleistocacti* grew in the company of a *Parodia* species, *Gymnocalycium pflanzii*, and *Echinopsis hammerschmidtii*.

During earlier visits to Bolivia we had already seen a great many *Cleistocacti* at many different places. Sometimes we found *Cleistocacti* growing in the company of much taller bushes - even trees - whilst at other places there was much lower accompanying vegetation. Most of these *Cleistocacti* displayed quite a degree of variation in their appearance, in both stem and spination - not only from place to place, but often between one *Cleistocactus* and another of the same sort at the same location. Occasionally this sort of variation could be seen in one and the same plant.

.....from H.Middleditch

The altitude at which these green-flowering *Cleistocacti* were found by R.Hillmann ranges from 1650m near Estancia Carapari which lies to the north of Tarija, to 2500m on Cerro Chaco Grande near Mojocoya. However, in these areas both *Neoraimondia herzogiana* and *Gymnocalycium pflanzii* were also observed - by R.Hillmann near Carapari and by W.Christie from east of Zudanez. This would suggest that these three different cacti might occupy a common phytogeographical zone.

.....from T.Marshall

When we were staying in Zudanez we made an excursion to the Cerro Calle Calle which lies not far to the east of Zudanez. We had driven barely three km along the road when we came to the track that was to take us on the ascent of Cerro Calle Calle. There was a band of dry woodland alongside the road, following the foot of this mountain, and I am sure that we saw some of these green-flowering cacti in that semi-open woodland. Some of these plants were growing upright, but there were also many large patches of these plants growing in a sprawling fashion.

.....from J.Carr

It was in late September of 1998 that we set off from Zudanez to travel via Sopachuy to Nuevo Mundo, from where we planned to cross the Rio Grande. Before approaching Nuevo Mundo we were travelling through the mountains at something over 2000 metres altitude. We had lost some altitude by the time we reached Nuevo Mundo and when we were some ten miles or so north of Nuevo Mundo we were down to about 1500 metres altitude. By this time we were passing through dry semi-forest and we were watching out for any *Vatricania guentheri* amongst the trees. Once we caught sight of these plants, we stopped to look round.

There was no problem in walking away from the road, picking a way between the bushes and trees, over mostly stony ground. There was flat ground, there were slopes, and there were some low hillocks from which we were able to see our surroundings a little better. Here we saw at least two species of *Jatropha*, two species of *Pereskia*, and the *Chorisia* with the swollen flask-shaped trunk. There was also *Neoraimondia herzogiana*, *Castellanosia caineana*, *Gymnocalycium pflanzii* and a tall species of *Cereus*. As well as a green-flowering *Cleistocactus*.

We made another stop about a mile further on, now down to 1220m altitude, where once again we saw this same *Cleistocactus* with basically the same accompanying vegetation. Travelling further on, we came to the steep descent down to the bottom of the Rio Grande valley.

.....from H.Middleditch

The account by Alcide D'Orbigny (*Chileans* No.57 p.146) of his visit to Bolivia includes the crossing of the Rio Grande at virtually the same spot between Valle Grande and Villa Serano, as described by J.Carr. But in the opposite direction. On the descent from Pucara, on the north-east side of the river, D'Orbigny effectively records seeing *Vatricania*, as well as other sorts of cacti which "rise up like candles for one or two metres". Could these include the green flowering *Cleistocactus*? This spot may well be at about 1300m, the altitude at which these same plants were seen by J.Carr on the descent on the southwest side of the Rio Grande.

.....from T.Marshall

On our trip to Bolivia we came across *Neocardenasia* at both sides of the crossing of the Rio Grande between Villa Nova and La Higuera.

.....from J.Carr.

Later on, in early October, we set off from Totora at nearly 3000m altitude, heading along the road going towards Omereque. We made several stops, the last at 2400m, each time finding some *Sulcorebutia totorensis*. As we approached the Rio Mizque, we had a fairly steep descent into the valley, until we were down to below 2000m altitude. On this descent the vegetation changed completely. We would be some 15km or so NW of Omereque when we came into the dry forest which again included *Neoraimondia herzogiana*, *Castellanosia caineana*, and *Gymnocalycium pflanzii*, as well as some *Cleistocactus* which we presumed were *C.parviflorus*.

On a later trip to Bolivia, we once again passed through Omereque, going south. Just after leaving Omereque we came across some more *Cleistocactus* with both green and red flowers on the same plant. But here the plants were of both upright and sprawling growth, growing under the *Neocardenasia* and under the trees, again in company with *Gymnocalycium pflanzii* which were up to 8 inches across.

.....from T.Marshall

When we passed through Omereque in 1998 it was early in the season and I cannot recollect seeing any flowers on the *Cleistocactus* which we saw some 15 km NW of Omereque. The name of *C.parviflorus* was suggested at the time because it appeared to be similar to those *Cleistocactus* which we had seen further to the west. However, it became quite clear later that it was *C.tominensis*.

.....from J.Carr

A couple of weeks later we were heading east from Tarija in the direction of Villa Montes. After leaving Entre Rios and prior to reaching Palos Blancos, we came across some thin stemmed *Cleistocactus micropetalus* which were displaying the usual green and red bi-coloured flowers.

It was beyond Palos Blancos when we saw some similar looking *Cleistocactus*, this time about 2.5 to 3 metres tall that had 15 or 16 ribs, but with flowers that pointed upwards and displayed no bend part-way along the tube. There were *Neocardenasia* growing here and we also found plants of *Gymnocalycium pflanzii* that measured twelve inches in diameter. The daytime temperature was around the 40 degrees centigrade mark and there were even palm trees to be seen.

.....from F.Vandenbroeck

We travelled three times (1988, 1992, and 1997) in the area of Palos Blancos, and examining my notes of these travels in respect of this area, I find that in each instance there appears the name *Neocardenasia herzogiana*. For my 1992 trip I noted "Neocardenasia numerous". According to my notes, this species occurs to the east and to the west of Palos Blancos. The area around Palos Blancos carries a dense vegetation of shrubs and low trees interspersed with tall columnar cacti, such as *Neocardenasia herzogiana*, *Cereus comarapana*, *Stetsonia coryne*, and *Trichocereus terscheckii*. Penetrating into the dense shrubbery one may find *Pereskia*, *Gymnocalycium pflanzii* (at times very numerous), *Gymnocalycium megatae* (*hamatum*), *Cleistocactus*, *Harrisia*, *Arum*, and lots of spiny bromeliads. In 1988 we crossed this area in the dry season. Then the cacti are easily to be seen, whereas during the wet season they are mostly hidden by the foliage of the accompanying plants. I do remember the climate as almost unbearably hot. In one of his books, Ritter states that the area around Palos Blancos and Villamontes is one of the hottest in Bolivia. I believe he is right.

.....from T.Marshall

During our 2002 visit to Bolivia we were travelling from Tarija to Villa Montes and at Palos Blancos we must have taken a wrong turning at Entre Rios, as it eventually became evident that we were travelling south in the direction of the border with Argentina. For much of the way, this road passed through a dry forest, though by no means a uniform vegetation - there were tall trees, bushes, dense in places, more open elsewhere. Here and there along this road we saw *Cleistocactus* growing and occasionally we did see a few flowers, which told us that they were the green flowered type. We got as far as Carapari before we decided to turn round, retrace our steps, and find the right road to Villa Montes. My recollection is of the same green flowered *Cleistocacti* not far from Carapari.

.....from H.Middleditch

From the foregoing accounts it appears that the location near Omereque is the most north-easterly point at which these green-flowering cacti have been reported, whilst the route from Palos Blancos to Carapari is the most south-easterly location. But in both areas, as in the great majority of other reported locations, these *Cleistocacti* were accompanied by *Neoraimondia*, *Gymnocalycium pflanzii*, and possibly by *Castellanosia*.

.....from J.Carr

There were certainly *Neocardenasia* (*Neoraimondia*) to be seen in the Mojocoya valley.

.....from R.Kiesling.

There is a dense forest of *Neocardenasia* near Carapari which lies not far north of the border with Argentina. There are also three herbarium specimens on record of *Neocardenasia* from near Mizque.

.....from J.Carr

From the point where the road from Totora to Omereque drops into the Mizque valley, there is no road going upstream along the Mizque valley. So really there is no practical means of determining how far this *Cleistocactus* might extend in that direction.

.....from W.Christie.

On my first visit to Bolivia, made in company with B.Bates, we had left the main Totora to Aiquile road in order to travel round some of the local side roads. After an overnight stop in Mizque, we took the road out towards Molla Punca, but after only about three miles it became blocked, so we were obliged to return to Mizque. Along this road we saw hundreds of *Cleistocactus*, with only a few of them in flower. I went off on my own to photograph a few of these plants and their flowers. They were identified by B.Bates as *Cleistocactus parviflorus* v. *aquilensis*, but in retrospect I now think that they look like *C.micropetalus*. They were very robust plants, up to 2m high or more and freely branching, quite unlike the *C. micropetalus* that we saw near Zudanez, which were no more than 1.5m tall, often with a single stem or, at the most, two. When I visited Bolivia again in November 2003, we had another overnight stop in Mizque. On this occasion we took the road out of Mizque running directly to Aiquile, where once again dozens of *Cleistocactus* were to be seen, only a few of which were flowering. Again these seemed to be *C.micropetalus* as the unopened flowers were green, turning red later as the flower matures. On neither occasion did we see any other sorts of *Cleistocactus* out in flower either to the north or to the south of Mizque. I have no record of seeing any *Neoraimondia* near Mizque.

Also on our 2003 trip, as we were travelling westwards from Saimapata, we passed through Mairanana. Then near Mataral I first noticed the *Neocardenasia* (or *Neoraimondia*) *herzogiana*, although later I realised that they grew all the way from near Mairanana to Comarapa, sometimes singly among trees and shrubs, but at other times with hundreds of these plants together. It was near Mataral that we also saw some more plants of

*C. tominensis*. I did photograph a young plant of *Neocardenasia* with a spiny main stem but the branches growing out from this stem tended to be spineless.

.....from H.Middleditch

So we now have the distribution area for *Cleistocactus tominensis* extended north-east as far as Mataral, and also further upstream along the valley of the Rio Mizque from Omereque, to Mizque. But most often in a comparable phytogeographical environment.

.....from M.Cardenas, Autobiography

[Travelling from Tarija via Entre Rios, heading for Villa Montes] ... We left Palos Blancos and came into a zone of abundant cacti. Of course I was surprised by the presence of two spp. which are to be met with in the Departments of Cochabamba and Chuquisaca, at altitudes much greater than that of down to 800m between Palos Blancos and Villa Montes. The first, *Neocardenasia herzogiana* or "carapari" appears along the road from Cochabamba to Santa Cruz, at altitudes between 1800 and 2000m.; then in the Province of Tomina, at Rio Chico and at Millares, between Potosi and Sucre, at more than 2000m. The other species, *Castellanosia caneana*, is to be seen near Rio Caine at 2000m and at Saipina at 1600m and at Caipipendi at 1100m.

From the phytogeographic point of view, Mizque is a xerophytic region with varying elements which are more commonly at home in the Chaco of S.E. Bolivia

.....from H.Middleditch

Could this "Rio Chico" be the river of that name running north to join the Rio Grande near Puente Arce? The main road from Sucre follows the Rio Chico valley for quite some way as far as Puente Arce.

.....from T.Marshall

We did see *Neocardenasia herzogiana* when travelling along the road from Puente Arce to Sucre, at 1990m at about 5 km to the north of Chuqui-Chuqui.

.....from W.Christie

But to the south of Aiquile, we saw large numbers of *Neoraimondia*, indeed a forest of them, mainly in the valley of the Rio Grande, where most of them were on the west side of the river on the other side to the road.

## IN THE WILDS OF SOUTH AMERICA By L.E.Miller 1918

[ Starting from Cochabamba ] We left Tarata with our mule train ... the first ride ending at Uaiculi. The soil in this region is so arid that even cacti grow in limited numbers only. There are no streams, so water is obtained from deep wells. After leaving Uaiculi, the slopes of the highest peaks were littered with fields of broken rocks that resembled a quarry dump. Where there were no rocks, thick clumps of grass stood. When we reached the elevation of 13,450 ft. we found a very peculiar plant belonging to the bromeliaceae, a *Puya*. The next night was spent on the banks of a narrow creek called Usiamayo. It was less than half a day's ride from Usiamayo to Mizque.

The cactus forest belt of Bolivia has its beginning in this region, although it does not reach its maximum development until some distance further south. The fauna of the Mizque region is typical of the arid highlands, but many spp. of birds belonging to a different zone were met with for the first time in Bolivia. I immediately recognised the white anis that were so common near Asuncion and a little finch of a deep red colour. Near Mizque lies a narrow valley enclosed on both sides by a ridge of mountains. In addition to the birds we found at Mizque, there were many species unknown to us; a gorgeous Amazon parrot, and a kind of Macaw that we saw in this region only. Most members of the parrot family were feeding on cactus fruits that were ripening in great abundance.

Our next station was the large indian town of Totora. The country is rough and the trail runs up and down over numerous mountain tops, varying between 7,100 and 10,000ft. in height. There are a number of ravines filled with low, dry, woods - they form the connecting links with the lowland forest and it is up these avenues that the new fauna we were constantly observing finds an easy means of invading the uplands. Before reaching Totora, we had seen guans, and jays of a dark blue colour.

At Chilon we entered the heart of the giant cactus forest. The country, as far as the eye could see, is covered with the thorny plants. Some of the giant club-cacti rear their fluted columns to a height of 60 to 75 feet and are of majestic appearance. We put up at Chilon and walked along the banks of the R.Chilon which is a tributary of the R. Mizque. The stream is rapid and shallow and flows over a rock-strewn bed. The majority of birds inhabiting the thorny jungle that grows on both sides of the water-course were still of the arid upland type; but there was a further encroachment of a foreign fauna; the brown-shouldered orioles, coral-billed tinnamon, and red-tailed parakeets. They were the advance ranks of a stream of birdlife flowing up the valley of the R.Grande and its tributaries where conditions are at least somewhat similar to those obtaining in the Chaco country to the east, which is their normal habitat.

.....from A.F.H.Buining, Bolivian Cactus Country, Succulenta 54.9.1975

After a trip of about 250km [from Cochabamba] we came to Comarapa at 1870m where we stopped overnight. At 6.00 a.m. the following morning, a south wind brought a misty drizzle, in place of the usual dry wind. However, the sun quickly chased away the clouds and we enjoyed the landscape. The surroundings of Comarapa are renowned for the many sorts of cacti which grow there. We found *Cleistocactus fusiflorus* and *Cereus comarapanus*. Near San Isidro, at 1600m, we saw the first giant columns of *Neocardenasia herzogiana*. The stems are up to 60cm in diameter at the base, before the side branches arise.



.....from F.Vandenbroeck

As far as I know, the largest numbers of *Neocardenasia* are to be found to the south of Comarapa (San Isidro) where the large dense stands almost give the impression of a forest. At least that was in 1988. When we passed there in 1997 the population seemed to have diminished drastically. Man is encroaching more and more on these barren habitats. The most impressive specimens we got to see were in the Rio Mizque valley, where they grew up to 10m tall. These plants bear much resemblance to the Peruvian *Neoraimondia*, although they grow in totally different habitats.

**BOLIVIAN CACTUS FORMATIONS By M.Cardenas**  
**U.S. Cactus & Succulent Journal Vol.XLI 3.1969**

The spectacular open cactus forest of central South America has attracted the attention of botanical explorers since the first decade of our century. The first botanist to picture it was the well-known German scientist Theodor Herzog on the occasion of his visit to the region in 1909. Later on, in 1918, American ornithologist L.E.Miller from the American Museum of Natural History mentions this open forest in his book "In the wilds of South America". This formation extends from about Comarapa at 2,000m to Samaipata at 1,500m in the Department of Santa Cruz and from Mizque at 2,000m in the Department of Cochabamba to the Rio Chico and Tomina, at an average altitude of 2,200m, in the Department of Chuquisaca.

The main component of this open forest is the tall columnar candelabra-branched *Neocardenasia herzogiana* Bckbg., which at first glance is reminiscent of the Peruvian *Neoraimondia macrostibus* (K.Sch) Br & R. in its gigantic forms. Though photographed in 1909, the Bolivian *Neocardenasia* was not described until 1949. In 1948, we made the first description of it from various specimens in their natural habitat and sent it together with a detailed picture of its flowers and fruits to C.Backeberg, who published our diagnosis under his authorship in *Blätter für Sukkulentenkunde* in 1949. This extraordinary cactus differs from *Neoraimondia* by its flowers with bristle-like short tufts of spines on the ovary, its spination, and the direction of the branches. The fruits of this cactus, called vernacularly "carapari" or "kalapari" are the most delicious we know among all wild and cultivated cactaceae, with a combined taste of pineapple and strawberry.

*Neocardenasia herzogiana* occurs also as scattered individuals beyond the open forest area mentioned above. We saw one at Millares, Department of Potosi at over 2500m and yet another one in the chaco formation at Izozog at only 500m.

If one admits that *Neocardenasia* is related to *Neoraimondia* from Peru, it would be interesting to explain the absence of this curious cactus between Arequipa, Peru, and Comarapa, Bolivia. The greatest concentration of *Neocardenasia herzogiana* is located on the way from Pulquina to Saipina, Department of Santa Cruz, at about 1600m. The tallest specimen we know measured 15 m. These cacti are ordinarily orophile, growing on gentle mountainous slopes though one may see some of them as pediophiles on the level ground at the base of the mountains.

Two other columnar cacti appear in this open cactus forest. They are *Eriocereus tephacanthus* Riccobono or "ulala" and *Cereus comarapanus* Card., both bearing edible fruits. These are pediophile only.

The ground around these xerophytic shrubs and the columnar cacti is practically carpeted by one of the richest cactus flora known in Bolivia. By the middle of Spring, the edges of the highway display hundreds of *Echinopsis comarapanus* Card., with large white flowers, open in the early morning before sunrise. Here and there, appear large groups of *Gymnocalycium zegarrae* Card., with round stems from 10 to 40 cm in diameter with flowers open by day. [Various other individual spp. of cacti as well as of other vegetation are noted]. Throughout the entire area of this formation appears amazingly dense clumps of *Cleistocactus*, located mainly along the edges of the highway and in open spaces among the bush. The typical species are *C.candelilla* Card., *C.pojensis* Card., and *C.vallegrandensis* Card. .... *Castellanosia caineana* Card. described by us originally from Rio Caine in the Department of Cochabamba at 2000 m is seen near Saipina at 1600m. This curious tall columnar cactus seems to follow the course of the Rio Caine to places ranging as far as Villa Montes in the Bolivian Chaco to the southwest at only 500m. Dr. Buxbaum in Austria has made interesting morphological studies of the flowers of *Castellanosia*.

.....from B.Bates

It was mid-December when we were travelling from Padilla towards Las Higueras. We made a couple of stops before Nuevo Mundo and then the landscape changed from rocks to more or less tropical forest as the altitude dropped to less than 1500m. We stopped north of Nuevo Mundo when I saw *Harrisia* sprawling near the side of the road. There was also *Harrisia tetraacantha*, various *Cerei*, *Pereskia sacharosa* and *P.diaz-romeroana*, a *Cleistocactus* sp., and a couple of *Opuntia*. We also found *Gymnocalycium pflanzii* - these are taller than the *G.millaresii* and the tubercles are larger. These *Gymnocalycium* here are not so large in diameter, being only about 15cm across. The habitat is fairly heavily shaded by the trees and tall cacti, but the sun managed to penetrate the covering. The soil is very rich in humus. At our next stop further north, the altitude drops even further below 1300m. Here the *Gymnocalycium* are quite common, as is *Vatricania guentheri*.

.....from K.Troll, Zeitschrift Gesellschaft Erdkunde für Berlin 1928.

[In regard to the drainage basins of the Rio Grande and Rio Pilcomayo] ....In all the deep valleys the dry valley formation exists between the higher altitude vegetation. The valleys drop steadily lower with the fall of the rivers, to ever increasing dryness and warmth. On the deep valley floors of the Pilcomayo and Pilaya, probably also the Rio Grande, there develops a dry forest from about 2000m downwards.

.....from H.Middleditch

Another series of articles from K.Troll, again covering his exploratory trip through this same part of Bolivia, appeared in the 1927-1928 Petermann's Geogr. Mitteilungen. In 1929 this Journal carried a map of the southeast Bolivian Andes on which K.Troll plots the areas occupied by half a dozen basic types of vegetation. One of these areas of vegetation is defined as the "Dry vallies and basins... with large cerei". On his map, this dry valley type of vegetation with the "large cerei" occupies the valley of the Rio Grande from below the confluence with the Rio Mizque to as far upstream as a considerable distance above Puente Arce, together with most of the Rio Mizque valley; this dry valley type of vegetation also occupies the valley of the Rio Pilcomayo from its junction with the Rio Pilaya upstream as far as the Sucre-Potosi road, together with the valley of the Rio Pilaya nearly to Villa Abecia. [ See accompanying map ] As Neocardenasia is well-known from various locations within this distribution area, it might be that this particular "large Cereus" could be found throughout much, if not most, of this particular vegetation zone as defined by K.Troll. In turn this might suggest a comparable distribution for *Cleistocactus tominensis*. For example, along much of the length of the Rio Pilcomayo valley. But the greater part of this river valley is difficult of access, lacking well-used trails, and seemingly rarely visited by travellers.

.....from R.Hillmann

Neocardenasia is a plant which is restricted to the hot and dry valleys of the big river systems in Bolivia. The biggest specimens of Neocardenasia which I saw were growing near the Rio Mizque close to Pena Colorado, east of Aiquile. But I also saw these plants along the Rio Pilcomayo and Rio Turuchipa. A friend of mine travelled on foot all the way from Azurday to Culpina, fording across the Rio Pilcomayo. He saw Neocardenasia all the way along the bottom of the canyons. He has also seen another, smaller, form along the Rio Pilaya in Department Tarija.

.....from H.Middleditch

These locations along the Rio Pilcomayo and Rio Turuchipa, together with the location for Ritter's *C.capadalensis*, do indeed fall within the vegetation zone designated by K.Troll as the "dry vallies ... with large cereus".

.....from T.Marshall

We did reach Turuchipa in the course of our 1998 trip to Bolivia but we did not see any Neocardenasia in the vicinity of that place.

.....from H.Middleditch

And what sort of altitude were you at when you were near Turuchipa?

.....from T.Marshall

From Padcoya to Turuchipa we made a few stops at altitudes varying between about 3200 and 3800m.

.....from H.Middleditch

Which would suggest that Neocardenasia would be found further downstream along the Rio Turuchipa at lower altitudes, closer to the confluence of that river with the Rio Pilcomayo. It also begs the question whether *C.tominensis* might also occur at places along the R.Pilcomayo upstream from Est. Carapari, other than at Capadala.

.....from R.Hillmann

When travelling from Tomina to Sopachuy, from time to time we saw some *Cleistocactus* which we took to be *C.micropetalus*. Many of these *Cleistocactus* displayed the short, hairy, green flowers or were in fruit. They appeared to have quite a high rib count, so we decided to make a check on the number of ribs and found that this was about 20 to 22.

.....from K.Troll, Petermann's Mitteilungen Vol.75 1929

(Legend to the map of phytogeographic areas of S.E. Bolivia) The dry vallies and basins with large cerei, together with xerophitic deciduous brushwood - with *Schinopsis* most abundant.

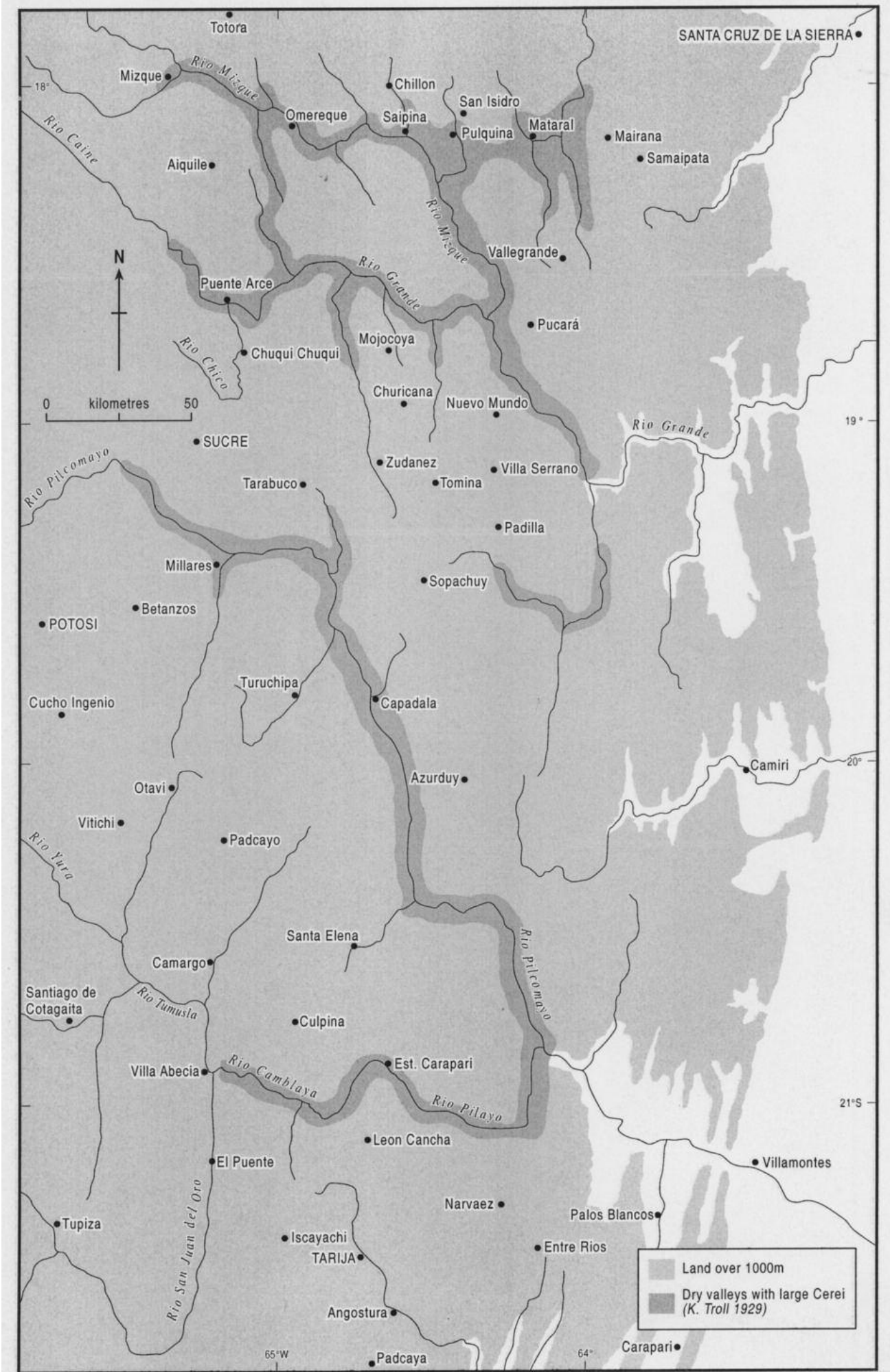
.....from H.Middleditch

As we are told (above), the first *C.tominensis* was sent to Europe, in the form of seeds, by K.Troll, who found it in the valley of the Rio Tomina. in a Habitat of "*Schinopsis* brushwood". The rib count of 18-22 for *C.tominensis*, as stated by Weingart, would match the rib count of 20 quoted by R.Hillmann for the *Cleistocactus* seen in this same general area.

In addition to the rib count of 18-22 in the original description of *C.tominensis*, the rib count for *C.mendozae* Card. is "about 25"; for *viridialabastri* "about 19"; for *C.micropetalus* Ritt. "16 to 18"; for *capadalensis* "13 to 18"; for *clavicaulis* Card. "10"; for *crassicaulis* Card. "more or less 14"; for *crassicaulis* sensu Ritter, "the number of ribs I found was about 13 to 16". Where there is an illustration of a stem accompanying the description, the number of ribs in camera view does not conflict with the text. In the available habitat photographs of *C.tominensis*, the number of ribs in camera suggests a rib count of 16 to 18. In the photograph on the front cover there are some 7 or 8 ribs in camera view, which would match the rib count quoted by Ritter for *Cleistocactus crassicaulis*. However, it is naturally an open question whether the rib count is an acceptable feature for using different names for these green flowering *Cleistocactus*.

It appears that *Cleistocactus tominensis* would be the earliest name for this group of *Cleistocactus*, which seem to be found quite frequently growing in company with Neocardenasia (*Neoraimondia*) *herzogiana*. However, the "dry valley zone" as defined by K.Troll does not extend downstream along the R.Pilcomayo to those areas from where *C.micropetalus* has been reported. This would suggest that the phytogeography of the distribution area for *C.micropetalus* may differ in some respect from the "dry valley zone" in which *C.tominensis* is to be found.

The group around *Cleistocactus micropetalus*, with FR 830 from Angostura as Type, would appear to display some differences in flower detail, but whether it could be regarded as a different species appears to be



open to question. In general terms, the external appearance of the stems on most of these plants are fairly comparable over a wide area of the distribution range, but the picture on the front cover does display a stem of somewhat different appearance. Together with the rather more hairy flower which may be characteristic of such plants, and taking account of the location at which the plant was photographed, it has been titled *Cleistocactus crassicaulis*.

There does appear to be some degree of variation in the hairiness and the length of the flowers within this overall group of green-flowered *Cleistocactus*.

### A CALL AT CULPINA From R.K.Hughes

Turning out of the Cinti valley at San Pedro, we climbed the mountains towards the pass which led to the Culpina basin. The journey to Culpina was rather vague as the rainclouds darkened the sky and we wished to reach the village before sunset. This we only just managed to do. I have a feeling that beyond the hilltop above San Pedro, the land fell away into a valley on our left for some way. Without a map I can only guess that we seemed to travel at a similar altitude until Culpina. After crossing a bridge over a dry stream gully there is a short, sharp rise before entering the village. This village appeared to be built on a slope with the only level streets running across the slope.

We stayed in rooms at the rear of the teacher's house as there are no lodgings to be had elsewhere in the village. Next day we tried to reach Yuquina by travelling through well cultivated farm fields. By well cultivated, I mean it could have passed for British countryside. The ground seemed to be good rich loam, unlike a lot of the poor stoney soils one tends to expect in this part of the world. We took a right fork, but it was the wrong one for Yuquina. We continued through the fields and across a wide, shallow, river bed with a few channels of water flowing amongst the boulders and rocks. Beyond this we were soon past the cultivation and at the foot of the hills, where the ground was mainly bare. A sharp climb took us up through the hamlet of Salitre and we soon stopped at BDH 23, where the cacti were really struggling to survive. Down at the bottom of the hill, on a relatively flat site (BDH 24), the cacti were well scattered and here I spotted the *Oreocereus trollii*. Above these cacti, as the ground started to rise gently, there were bands of a black twiggy plant about a foot high and some three to four feet wide. In among these I came across a *Rebutia* species of the *densipectinata* group. They were just peeping out of the earth with the occasional red flower. These *Rebutia* had a body size similar to the end of a finger and usually no more than two or three heads per plant.

From here we turned back along our tracks. The return from Culpina again seemed to be reasonably level. We had another stop at 18.4 km west of Culpina at BDH 25. Here the ground fell away on our right on a slope that supported a number of large, well scattered *Cerei*. My own list of plants seen here records *Parodia*, *Cleistocactus*, *Oreocereus celsianus*, *Lobivia ferox*, a *Trichocereus* of the *macrogonus* type, and another *Trichocereus* of the *Helianthocereus* type. We also came across some gravel beds which I was told was the habitat of *Parodia occulta*. We kept a sharp look out for a flash of flower colour, but with no luck. Without flowers there is little chance of finding them hidden under the gravel and we were pressed for time.

.....from P.Down

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

As the light was beginning to fail we decided that we would stop here on our return journey from Culpina in order to take some photographs. From the top of the climb we could look back and see the conspicuous red rocks near Palca Grande, where we had come from Cotagaita and left the valley of the Rio Tumusla and entered the Cinti valley. Ahead of us, in the direction of Culpina, the mountains rose in relatively gentle slopes at either side of the road. The road which we were following avoided the tongues of the gently sloping mountain spurs as it swung now a little to the left, now a little to the right. There were no signs at all of any habitation here. We had been told that between here and Culpina was the habitat of *Parodia occulta*, but we were unable to find it. As we continued, the mountains receded steadily at either side, the road took a more direct line to Culpina and we gradually saw opening out before us a broad, flat valley surrounded on all sides by mountain tops.

As we drove further into the Culpina basin, the mountain sides around us appeared to be quite lacking in vegetation. The tops of the surrounding mountains looked as though they rose to more or less the same height in all directions. On the horizon these mountains had jagged outlines in some places and smooth in others. But nowhere did a conspicuous peak rise above the rest of the mountain tops. As we approached nearer to Culpina there was no sign of cultivation or farming, and only an occasional farm building. Nevertheless we passed dozens of *campesinos* coming away from Culpina and I have no idea where they could disappear to. The ground at either side of the road looked sandy coloured and appeared to consist mostly of stones and grit, over which were scattered a few clumps of dwarf shrubs.

As we came nearer still to Culpina, we could see an almost continuous line of cumulus clouds coming over the mountain tops to the east, but over the Culpina basin itself there was little or nothing in the way of clouds, although the sky was perhaps somewhat hazy. It is my impression that it was the same on the following day. No rain fell here, either on that day or the next.

In Culpina itself, we had great difficulty finding any accommodation and even greater difficulty obtaining any food to eat. The next morning we picked up a young local man with the intention of going to Yuquina, but instead we were guided to Salitre. The Culpina basin was probably about 2 miles (3 km) wide at Culpina, but narrowed to about 1 km wide as we climbed out of the flat ground towards Salitre. The flat sandy valley had very little in the way of cultivation, but with sparse scattered vegetation just like on our approach to Culpina. In some areas the rocks had been cleared of stones which were piled in low, long, broad heaps to form walls dividing the ground into fields. But apart from a few patches of potatoes there was little sign of agriculture. In these "fallow" fields there were a few tufts of coarse grass, a few scattered *Jatropha* shrubs and some magnificent clumps of *Oreocereus trollii*. There were flowers on only a very few of the *Oreocereus trollii* and then only one or two flowers on a plant. There were *Lobivia ferox* and *Echinopsis obrepanda* in this area, including some fine big specimens of up to 8 inches (20cm) in both height and diameter. Of the *Lobivia ferox* there were again only occasional plants with an odd flower and I do not recollect seeing any flowers at all on the *Echinopsis*. But they were widely scattered, with a great deal of largely bare ground between individual plants. Obviously they must have been growing for many years undisturbed by any farming activity.

Still climbing gradually, we passed through the village of Salitre. Beyond Salitre, we found *Oreocereus celsianus* on the slopes, with a few *O.trollii*. However, the *O.trollii* does seem to be more prolific in the flat valley whereas the *O.celsianus* was more prolific on the sloping ground. Here too we found *Parodia culpinensis*, which is probably the same as *P.subterranea*, as well as *Lobivia culpinensis*, *L.ferox*, and the purple flowering *Opuntia weingartiana* with spines about two inches long. The *Parodia* and the *Lobivia* had particularly impressive spination, the spines on the *Parodia* covering much more of the body than on the *P.subterranea* we usually see in cultivation. In fact nearly all the cacti seem to have extra long spination. Again we saw only one or two flowers on a very few plants of the *Oreocereus*, the *Parodia subterranea*, and the *Lobivia ferox*. These plants were all well scattered, a few metres from one another; many of them were covered by a fairly thick coat of fine dust, due to the wind blowing the sand about. There were also a few *Helianthocereus tarijensis* on these slopes, nearly every one solitary.

The road was now deteriorating badly and with one eye on the clock as usual, we decided to retrace our steps. On the way back to Culpina we stopped once more in the valley, where we now found seed on *O.trollii*. It was here where R.K.Hughes found some flowering *R.albopectinata*. We then dropped our local guide at the spot where we had found him and set out along the road away from Culpina, back towards San Pedro. At about 18 km from Culpina we stopped again where there were lots of cacti, but nothing different from what we had seen earlier that day or on the previous day. This time we stopped high above San Pedro for some photography in good daylight. There were only one or two flowers on a few of the plants of *Parodia maassii* here, as there had been at places down in the Culpina basin itself.

## A VISIT TO CULPINA From R.Hillmann

Most of the flat basin of Culpina is used for agriculture, except for the lowest part in the south-west corner of the basin where the drainage has no outflow and so forms a salt pan, usually without water. So this flat area is not very interesting for plants. To the south of the Culpina basin there lies another distinctive area: the basin of La Cueva. This area is situated somewhat higher than the Culpina basin but it has quite a different botany. Also the sorts of cacti are quite different from those found around the Culpina basin, with typical Altiplano plants such as *Oreocereus*, *Tephrocactus*, *Lobivia* and *Mediolobivia*, but no *Aylostera*. The climate is very arid with only occasional low-growing bushes over the hillsides.

The *Oreocereus celsianus* were in flower and there was a large form of *Lobivia ferox*. *Rebutias* were to be found in the shrubby vegetation, but they are mostly higher up on the hills. *Rebutia friedrichiana* was in bloom, with one of the biggest flowers in the *Mediolobivia* group, about 5 to 6 cm across. There were also some *steinmannii* forms. Even though I saw these at this location in 1992 and have some propagations in cultivation, it is still not possible to be quite certain as to their identity. The problem is that from Ritter and Rausch there have been about twenty different varieties of *Rebutia* described from La Cueva, which it is difficult to accept. On a steep hill there were *Oreocereus trollii* in bloom, with flowers a little darker than on *O.celsianus*. Then we come across *Lobivia pugionacantha v.salitrensis*, which cannot be found near Salitre because the altitude is too low; it can only be found near La Cueva where it is quite common. The problem is that they are covered with gravel and cannot be seen, so one has to rake in the gravel with one's fingers to find a plant. We only found one flower on these plants in habitat, and that was of *Lobivia salitrensis*. Then we came across a *Rebutia* which we think is *R.diersiana*; there is a darker form, but this is a yellow spined form. They are very small plants. only about 1cm in diameter.

Now we take the road down to Salitre, with Culpina hidden behind the hill. We come to a large area of cultivated fields, where no cacti are to be found, so we must go up into the hills. Perhaps Rausch found his *L.pugionacantha v.salitrensis* nearer to Yuquina. We failed to stop and make a search in the area where we supposed *Lobivia rauschii* might be found, only remembering when we were back home.

Then from Culpina itself we go north up into a little pass. On the pass there are bigger forms of *Rebutia diersiana* than we saw in La Cueva. The road continues north over a low ridge and brings us to another flat basin at a higher altitude, where the river sediments have also formed an area suitable for agriculture. Once

again we find that this basin also has a different selection of plants. In this Inca Huasi basin there are no cacti to be found in the bottom which is all cultivated fields, so again we must go up into the hills.

Here we find a form of *Rebutia albopectinata*, at about 2400m; the original Rausch location was at about 2700m. Now we go further north and climb up another one of the hills. From here can be seen the main river and the tributaries flowing through the flat plain below. To the west of the Incahuasi basin it is a very dry climate, the mountains rising steadily up to some 4000 m altitude. From here we are looking over Villa Charcas to the hills on the east side of the basin, but these tend to level out into 'serranias' of about 2500 to 3500 m altitude from where they fall down to the big canyon of the Rio Pilcomayo. This mountain range between the Inca Huasi basin and the R. Pilcomayo is largely formed of sedimentary sandstone. It has a climate with a lot of clouds, mist, and rain. When looking from the Incahuasi basin at these hills to the east, they look very naked at first sight, but in company with various mosses there are tens of thousands of *Aylostera* to be found. I have never seen so many plants of *Aylostera* all together at one spot! There are also terrestrial orchids, *Anacampteros* sp., *Portulaca* sp., and very occasionally large heads of *Lobivia ferox*.

More to the north-east is Pucara, where forms of *Rebutia albopectinata* and *R. schatzliana* are to be found, and also Quebrada Sumaya, the location for *Rebutia sumayana* Rausch. But this name is just a repeat description of *R. tarvitaensis*, *rubiginosa*, and *tuberosa*, which are all the same, and which has a wide distribution in the east of these hills. There are also thousands of *R. supthutiana* on every one of these hills, with different forms on different hills. Here we have a form which could well be *R. froelichiana*, but then that is only a form of *R. supthutiana*. Then we come across a long spined form of *R. supthutiana*, so long spined that it looks like *Sulcorebutia losenykiana*! And then a larger growing form of *R. supthutiana*. Although these rocky hills look very dry from a distance, it is the clouds coming up from the Rio Pilcomayo which provide the dampness upon which these plants survive.

Now we come across some *Aylostera* with quite typical *heliosa* flowers, with the same long thin flower tubes. There are forms of *Aylostera heliosa* growing at Abra Condor, and then these plants here, but nothing in between. These do not seem to fit into *R. supthutiana*. Here I think we are at Ritter's Type location for his *Rebutia densipectinata*; in his book he gives this as a synonym of *R. albopectinata* Rausch, but I do not think that these are the same plants. At places we find some white flowers. The flowers look a little bit more like *Mediolobivia* than like the slender tubed *Aylostera* forms, so it could be one of those plants that is a bridge between *Mediolobivia* and *Aylostera*. Other bridging forms are *R. eos* f. *leucanthera* and *R. mamillosa*.

At the top of the hill there are *Tephrocactus subterraneus* in flower and at the bottom of the hill there is a form of *Austrocylindropuntia verschaffeltii* in flower. In between there are the *Rebutia densipectinata*. There is also another *Aylostera* here, *A. culpinensis*, but that is only a thicker spined form of *Rebutia fiebrigii*. Here we also see a very strongly spined form of *Echinopsis mamillosa*; Ritter wrote in his book that this plant does not extend north of the Rio Pilaya! There are also *Parodia* growing here, which I think is *Parodia subterranea*.

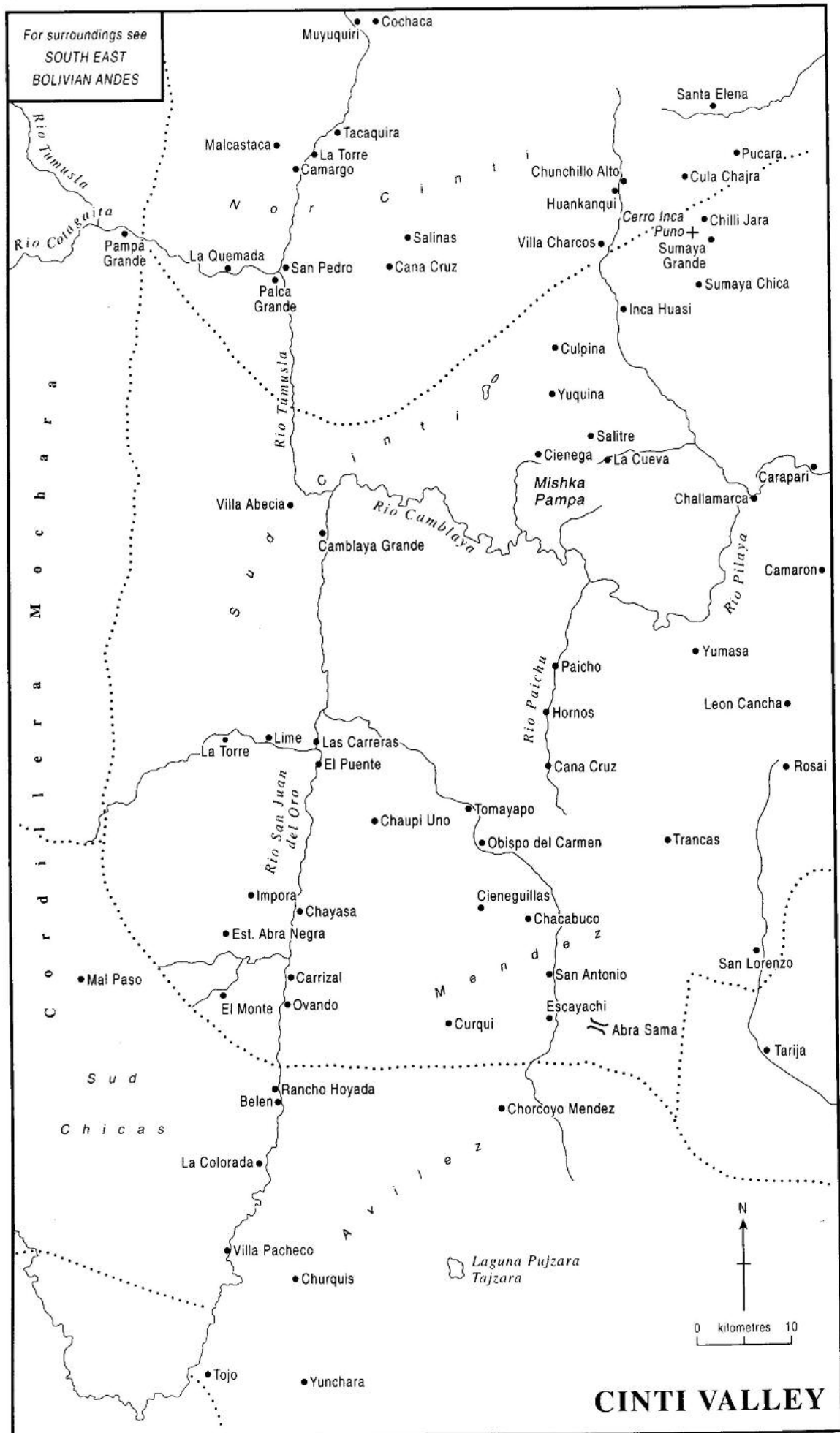
We are now in the range of hills near Santa Elena, some 30 km to the north of Inca Huasi. There are some forms of *Lobivia chrysochete* in flower, with different flower colours - orange to red. They have the very typical short flower tubes, just the same sort of flower that we saw on *Lobivia chrysocheta* v. *minutiflora* at Santa Victoria. These plants here are up to about head size. We also see here what is probably a form of *Echinopsis obrepanda*, together with *Rebutia huasiensis*.

From this area between Culpina and Santa Elena, various new species of *Rebutia* described by Rausch were named after the type locality, or village, or place; with only four villages in this area it can be a problem finding a suitable name for about twenty varieties! In his first description of *Rebutia huasiensis*, Rausch wrote that these plants are "up to 3cm diameter" but we can see these plants here at up to about 6 cm in diameter. It is still the same plant although there is probably variation from one location to another. In all these Rausch descriptions the plants seem to be larger in habitat than he has stated in all his first descriptions. Possibly the plants were so dried out when he re-examined them after his boat trip back to Vienna that the plants were much shrunken.

This *Rebutia huasiensis* is merely a form of *R. supthutiana*. On the hills to the east of Inca Huasi it is about 2700 to 3100m where this form of *R. supthutiana* grows. Further to the north the altitude of the hills goes up to 4000m and there are still forms of *R. supthutiana* here together with *R. huasiensis*. At this location we can see some flowers where it is very difficult to say for certain if it is *supthutiana* or *huasiensis*. But from the appearance of the body of some of the plants there are more *supthutiana* forms.

From the Incahuasi basin the road then climbs steeply and takes us across the undulating mountainous terrain to yet another basin at Chini Mayu. The Estancia here is partially surrounded by a crescent of cliffs which may be about half a kilometre across, all at the same level, and perhaps four or five metres high. Here we find magnificently spined *Weingartia cintiensis*, also *Tephrocactus rossianus* displaying different flower colours, and *Rebutia fiebrigii*. It is a really sandy soil here and at the bottom of the basin we find an interesting *Rebutia* of *pygmaea* or *haagei* form which grows in poor sand or on sandy flats. The body colour is very similar to the stones so that I first saw only the flower, and then the plants. This is probably an undescribed form, one of the biggest forms of *R. atrovirens*. It has a body diameter of up to 7cm. At first I thought that it was a *Rebutia huasiensis*, but they have somewhat different flowers. We only found this *Rebutia* at the one single spot.

From Chini Mayu we then followed the better road which brought us to Padcoyo, to continue our travels.



## GROWING WHICH SORT OF REBUTIA? From A.de Barmon.

I have some *Rebutia* which were raised from seed that came from W.Krahn, which was set on plants originally collected by Heger and Alber near Inca Huasi. More of this seed went to Uhlig and I also have plants raised from the Uhlig seed, but they are all similar, so it does not seem to be hybrid material. The young seedlings produce a considerable number of fine, short, white and almost hair-like spines at each areole. When the plant reaches flowering size, the new spines are pale brown in colour, up to 10mm in length but still rather fine and somewhat bristly, which project outwards from the body in various directions. These longer brown spines not only grow out from the new areoles around the crown, but also from existing areoles lower down on the body. As a result, the appearance of the plant changes dramatically so that the younger plants and the flowering plants almost look like two different spp. The flowers are quite large, about 40mm in diameter, of a blood-red colour, with short, white bristly hairs in the axils of the scales on the flower tube. This is an *Aylosteria* type of flower, with a long tube where the style is partially fused to the wall of the tube. The seed of this *Rebutia* sp. Inca Huasi is somewhat larger than the general run of *Rebutia* seed and from the way the plants are growing it will probably produce quite a large body. In respect of both these features it could be related to *R.tarvitaensis*, *R.tuberosa*, and *R.huasiensis*; whilst on the basis of the size of the seed, then *R.albopectinata*, *R.densipectinata*, *R.froehlichiana*, *R.huasiensis*, *R.tuberosa*, *R.tarvitaensis*, and *R.schatzliana* would form a group. In addition, all my plants carrying these names have no central spines.

Whilst the flowers on *R.tarvitaensis* and on the sp. Inca Huasi are quite large, the flowers on my *R.albopectinata* raised from WR 312 seed are 30% larger in all dimensions! Although it should be kept in mind that flower sizes are not constant, even on the one plant. The flower size can vary greatly both with the size of the plant as well as with the weather. Large plants can produce really giant sized flowers during cloudy weather. So that my *R.albopectinata* can also produce flowers of about 40mm across. Although Ritter, in his book on the South American cacti, places *R.albopectinata* Rausch as a synonym of his own *R.densipectinata*, these two plants do not look identical in my own collection. On my *R.albopectinata* the radial spines are short, spreading sideways so that they nearly follow the contour of the plant body, either not overlapping, or only slightly overlap the spines from the areoles on the adjacent ribs. There are no central spines on my younger plants of *R.albopectinata*, but old plants do develop one or two short black centrals - this has never been seen on my plants of *R.densipectinata*. The spines are also more rigid on my *R.densipectinata* than on *R.albopectinata*. Whilst my *R.albopectinata* tend to grow taller than wide, my plants of *R.densipectinata* usually remain globular.

Taking the size and colour of the flower on my *Rebutia* sp. Inca Huasi together with its *Aylosteria* flower form, I would place it close to *R.duteineana* WR 826 - which also has a red flower of about 4cm across. And both are self-sterile. But my WR 826 has much shorter spines than my *R.sp.* Inca Huasi. Looking at the size of the seed, I would place *R.duteineana* WR 826 in the same group as *R.sumayana* WR 826a, both these having *Aylosteria* type of flowers, but WR 826a has a shorter tube. It is possible that *R.rubiginosa* Lau 407, with its distinctive purple body, short spines, and *Aylosteria* flower form, will also fit within this group, but my plants of this species which have been raised from FR 767 and WR numbered seed, are quite dissimilar - perhaps wrongly named seed?

.....from M.Winberg

The *Rebutia* sp. ex W.Krahn as grown by A.de Barmon looks to me like *Rebutia sumayana*. This is a very variable plant, as evidenced by my two plants of WR 826 *R.sumayana* from Santa Elena which I got from Rausch in 1990, when we met in Salta just after his return from Bolivia. These plants are more cylindrical and longer spined compared to the original WR 826 *sumayana* from Chunchillo, and the colour of the spines varies as well. One of the original clones has soft whitish-brown spines, the other has darker brown spines, which are not as soft as the spines on the other clone. But this sort of variation is something that you will find in most populations of *Rebutia*. But the clustering habit is similar and the flowers are very close - I was able to compare them as both plants flowered at the same time, the buds having both long hairs and bristles.

.....from H.Middleditch

It appears that these specimens of WR 826 were conveyed by hand from W.Rausch to M.Winberg in Salta, shortly after these plants were collected by W.Rausch near Santa Elena in Bolivia, and hence before they had actually arrived in Europe. It also appears that, at that point in time, Rausch regarded these plants as comparable to the WR 738 collected on a previous field trip near the "Rio Sumaya" - as in his 1978 Field list. However, later reflection appears to have generated second thoughts, as the later Rausch field number list in my possession has one entry for *Aylosteria duteineana* WR 826, and one for WR 826a *Aylosteria sumayana* "from Chunchuli". Consequently the "two plants of WR 826 *R.sumayana* from Santa Elena" acquired by M.Winberg may well be WR 826 *R.duteineana*.

.....from M.Winberg

Yes of course, my WR 826 will be *R.duteineana*. I believe that WR 826 is merely a long-spined form of *R.sumayana*. As you may see from the original description in the 1986 *Succulenta* and the photograph which accompanied it, there is a variation in spine colour and length in *R.sumayana*.

.....from H.Middleditch

On the two pictures from M.Winberg of his WR 826, one clump of heads display mostly white spines, but one head has brownish spines; on the other picture, most of the heads display brownish spines, but two or three smallish heads have only white spines. Does one and the same plant produce heads of different spine colour?

.....from M.Winberg

No, one of the two clones produces heads with only white spines, the other with heads having brown spines among the white.





Rebutia duteineana WR826



Photos: A. de Barmon



Rebutia  
duteineana  
WR826

Photo:  
M. Winberg



Rebutia sumayana  
WR738

Photo: W. Rausch  
Succulenta 65(4)1986

.....from W.Rausch, Succulenta 65.4.1986

*Rebutia sumayana*. [ Fully detailed description provided ]. Growing place - in the south of Cinti in the surroundings of Sumaya at an altitude of 3200m. The plants of this species are so variable, that scarcely two of them are alike. The spination can be either short or long, whilst the colour can vary from white to brown or black. The tips of the flower petals can be pointed or rounded.

In 1963 Ritter described *R.tuberosa*, a species which comes from the self-same surroundings. Since he offered no indication of the breadth of variation of that species, I was initially under the impression that my R738 belonged to that same species. However, it became established that all plants of *R.tuberosa*, as in the progeny, displayed a clearly longer spination as well as a more elongate body. Consequently I have made up my mind to describe these lighter green, more globular growing plants from the surroundings of Sumaya as an individual species.

.....from H.Middleditch

If "scarcely two of these plants are alike" then the variation must be even more than in *R.duteineana*.

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

*Rebutia tuberosa* [Fully detailed description provided]. In mountainous terrain around the lower Rio Challamarca at about 2600m, Prov. Sud Cinti.

.....from H.Middleditch

On the vintage map of Bolivia received from F.Brandt many years ago, the river which runs through Inca Huasi and goes on to join the Rio Pilaya at Challamarca, is named as the Rio Challamarca. On later maps it is identified as Rio Inca Huasi. Ritter does provide an account of his trek downstream from La Cueva to Challamarca, so it does seem to be most likely that he followed the valley which joins the Rio Pilaya at Challamarca. Which would place his *R.tuberosa* in the same catchment area as e.g. Sumaya, Chilli Jara, and Villa Charcas.

.....from R.Hillmann

The plants in the picture from A.de Barmon of Sp. Inca Huasi raised from seed received from W.Krahn, are indeed *R.supthutiana*. In the last few days I have repotted my plants in this group round WR 826, where there is a great range of variety. The names of *sumayana* and *tuberosa* need particular attention. I have no *R.duteineana* in my collection, but I find that some of my collected plants are almost identical to the WR 826 on the picture from A.de Barmon.

.....from R.Martin

My own plants of WR 629 *R.supthutiana* (obtained from J.Pilbeam) has a dark shiny green body rather like *R.pygmaea*, albeit with erect orange spines. The flower is of the *Aylostera* type. I also have small cuttings or seedlings of *R.supthutiana* RH 895 (from Villa Charcas) and RH 2081a and RH 2082a (both from Chili Jara) which are too small to evaluate at present. The plants in the pictures from A.de Barmon of his *R.albopectinata* and *R.supthutiana* look very closely related, and also not too far from *R.sumayana*, from where we get to *R.tuberosa*. Another closely related plant to *supthutiana* in my view is *R.leucanthera*.

.....from M.Winberg

To me, *R.supthutiana* and *R.albopectinata* are the same species - I would call them both *R.heliosa*.

.....from W.Rausch, K.u.a.S. 27.6.1976

*Rebutia (Aylostera) supthutiana*. [ Fully detailed description provided, including ....] *Aylostera* type fruit and seeds. Habitat - NE of Culpina and Inca Huasi at 3,200m.

*Aylostera* as well as *Digitorebutia* display the peculiarity of an adnate flower tube, only the "characteristic" vertical, continuous ribs and spirally disposed tubercles serve to separate them. As instanced with *Rebutia albopectinata*, a decisive separation is not really possible. As I describe this species, I am confident that I recognise these continuous ribs, although they display in certain growing conditions a strong spiral tendency. Consequently it approaches *Aylostera heliosa* Rausch, with which it also has in common the very variable flower form. To this *Aylostera* group there now also belongs the here described form-circle, which distinguishes itself however on account of the large warty tubercles and by the longer, spreading spination.

.....from H.Middleditch

The two specimens of WR 826 *R.duteineana* which were collected in habitat by W.Rausch and conveyed to M.Winberg, who established them and grew them on, display a clear variation in spine colour. A somewhat similar variation is displayed in the spination of the *Rebutia* raised from ex-Krahn seed, by A.de Barmon. If it is accepted that both these forms fall within the compass of *R.duteineana*, how is a dividing line to be drawn between this species and others of not too dissimilar appearance? It is then hardly surprising that opinions are expressed, as above, that various names should be lumped together. But perhaps it would be preferable to have more observations on e.g. the form of the flowers, as well as body habit, in order to fairly assess where a line might (or might not) be drawn between one name and another?

## **DID WE FIND TEPHROCACTUS COLOREA? From C.Sherrah**

Travelling east from Copiapoa, we took the road that leads to Salar Maricunga and then on to the San Francisco pass at the border with Argentina. About 12 km beyond Puquios we left this road and turned into the Quebrada San Andres, which would lead towards the northern end of Salar Maricunga. There is a large active mine and processing plant just below the last crest before descending to the Salar Maricunga, so the road is excellent all the way.

Beyond Puquios there are goat herders, but we also saw horses and donkeys. Further to the east, the road

goes through narrow passes in places. When we were about 90km from Copiapo, we came to the Salto pass which was at 2,036m altitude, where we found clumps of *Tephrocactus* growing. They were high up on the sides of the pass, which were steep with loose rock as well as cliff-like sections. We stopped to look at these plants but found neither flowers nor fruit. So we continued further up the valley, which had become much wider, with no more *Tephrocactus* to be seen. Then at 2560m we came to another narrow section of the valley, again with shale cliffs above the level of the road, where there was evidently some moisture source. Here again we came across hummocks of *Tephrocactus*. From the road, the size of the clumps as well as the spine colour appeared to be the same as at the previous pass. There were buds and a few flowers to be seen, but no mature fruit. We did find some old fruit pods down inside the spines, but they had all been cleaned out. There were a great many *Visacha* droppings to be seen around all the plants, so we imagine that these animals could have been responsible for consuming the seeds. We opened an immature fruit and found what passed for seeds immersed in an opaque gel. There appeared to be hairs around the seeds, but we could not tell if this was attached to the seed or part of the fruit material.

.....from D.W.Whiteley

I am wondering if the route taken by G.Hole from Salar Maricunga really did go round the south side of that Salar and so passed by Laguna Santa Rosa. [Chileans No.59 p.76]. On my own maps of this part of Chile, there is only one road from the San Francisco pass to Copiapo and that goes round the north side of the Salar Maricunga.

.....from H.Middleditch

Not too surprisingly, it rather depends upon which map you consult as to what it tells you. My 1930's vintage American Geographical Society map has a road passing to the south of the Salar and a rather better road passing to the north. The 1997 Lonely Planet travel atlas for Chile marks both these roads, as does the larger scale flight map of the area received from C.Sherrah.

.....from D.W.Whiteley.

But my 1971 Esso map and my 1976 ex-Chile map both show only the road going round the northern side of the Salar. Could one of these two roads become closed, by such as a landslip, and remain closed for quite some time before being re-opened? Looking at the date of my two maps, which is round about the time that Ritter was travelling in Chile, could he have used the road round the north of the Salar? Would that not make his two sites of Km.90 and Km.130, along this northern road, and not along the road round the south of the Salar?

.....from H.Middleditch

It will be a few years ago that a traveller from Germany was met by A.W.Craig whilst both were on a visit to Chile, and he subsequently came over to the UK to visit A.W.Craig. He brought a fine selection of slides, including a selection which were taken on the Chile side of the San Francisco pass, crossing the plateau to the south of Salar Maricunga and then continuing down the road to Puquio and Copiapo.

.....from C.Sherrah

From where the road divides at some 20km to the east of Puquio, we turned to the left and headed up to the northern end of the Salar Maricunga. Here there was almost nothing else but bunch grass and bare terrain. We then drove via the eastern side of the Salar to its southern end, returning along the other road to Puquio.

.....from R.Ferryman

There is no doubt at all that the condition of not only this road, but of many other roads outside the main highways, are liable to change, even from one year to another. When travelling along that way with K.Preston-Mafham, the road became so badly rutted and the vehicle was shuddering so badly that we felt it wise to turn back rather than continue along our intended route.

However, I do believe that we found some *Tephrocactus* not far beyond Puquios, before we arrived at the junction where there is a choice of taking one of two roads, which go either round the north or round the south side of the Salar.

.....from H.Middleditch

That would be at a spot less than km.79 from Copiapo, which nevertheless falls within the Ritter Type location for *T.colorea* of "from 70 to 100km northeast of Copiapo".

.....from K.Preston-Mafham

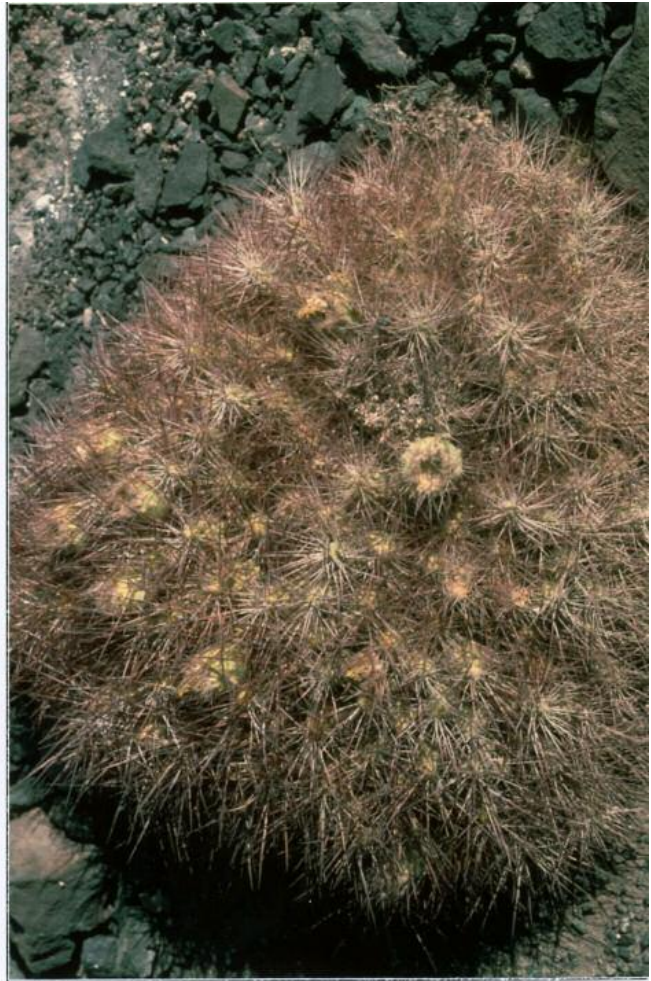
Our *Tephrocactus colorea* PM 231 grown from seed collected in the upper Copiapo valley is now making a nice compact hummock. I now realise that in habitat the spination is much more colorful than in my cultivated plants, in which the spines lack the intensity of the pinkish-purple tinge seen in habitat.

.....from H.Middleditch

Ritter describes the spines of his *T.colorea* as white below and reddish brown above.

The fruit on the picture taken by K.Preston-Mafham at about Km90, the Ritter location for *T.colorea*, appears to have a number of spiny areoles disposed round the rim of the floral scar. together with several spiny areoles within a short distance below that rim. If this interpretation of the picture is correct, this fruit would appear to pass for that of *T.camachoi* (inside front cover, Chileans No.60). By comparison, the fruit of *T.glomeratus* would be expected to be spineless (Chileans No.60 p.107).

The accompanying picture from C.Sherrah was taken at 2560m altitude at a G.P.S. position which is about 120km from Copiapo. The flower on this picture carries spines at the uppermost areoles, from which it might be expected that the fruit will likewise be spiny around the rim, which is characteristic for *T.camachoi*. The spines on the segment are white (or very pale coloured) for their lower length, but the upper part appears to be a pinky-brown colour, which is not greatly different from Ritter's description of the spines for his *T.colorea*. In addition, the nature and attitude of the spination on the segment does not depart markedly from



*Tephrocactus colorea* PM 231 East of Puquio

Photos: K. Preston-Mafham



*Tephrocactus camachoi* En route to Salar Maricunga 2560m

Photo: C. Sherrah

that displayed on the photograph of *T.camachoi* taken by F.Vandenbroeck which appears on the front cover of Chileans No.59.

.....from R.Moreton

On the front cover of Chileans No.59 there is a picture of a *Tephrocactus* supposedly *T.camachoi*. But the segment form of the plant on this picture is long and slender, which does not seem to be any sort of match for the stumpy segment form quoted by Espinosa for *camachoi*.

.....from H.Middleditch

That is quite correct - but it may be advisable to bear in mind the range of segment form, not to mention the variation in the spination, displayed by many species of hummock forming *Tephrocactus*. For example, the numerous habitat pictures of *Tephrocactus bolivianus* shown to our Chileans' Weekends, from which a selection of segment forms were sketched and reviewed in Chileans No.55. Similarly the range of segment form from squat to almost spindle shape which can be displayed by *T.glomeratus*. Indeed it is almost characteristic of many of the hummock forming *Tephrocactus* that any one species rarely displays uniformity in the segments - even within a limited area. In consequence, it should not occasion any great surprise to find diversity of segment form in *T.camachoi* as well.

.....from R. Ferryman

Travelling inland towards San Pedro de Atacama, our first sighting of *T. camachoi* was at 40km from Calama. There is little doubt that this is the type locality. This plant is to be found here on the flat plain and on the small hills alongside. It seems to prefer growing at an altitude of about 3,000 - 4,000m, which probably explains why it does not grow nearer Calama. On the stretch between 38 and 50km from Calama they seem to be on the edge of their distribution. Numerous large mounds can be found, but many of these having reached a meter across, die back at the centre. Regeneration is not high. The length of the segments is variable according to whereabouts on the plant the segment is taken and the condition of the plant. Two segments from the same clump show a marked variation in length from 2.5 to 4.5cm, but of roughly comparable breadth.

.....from K.Gilmer

Very fortunately I have a small cutting from a seed-grown plant of Eggli-Leuenerger 2705, the seed for which was collected at 3000m altitude at a spot 36km east of Chiu-Chiu, en route to Caspana and 10.5km east of the branch trail to Aiquina. This is identified as *T.camachoi*.

.....from H.Middleditch

For practical purposes the Vandenbroeck picture on the front cover of Chileans No.59 will have been taken in the same population as the foregoing Eggli-Leuenerger specimen. As indicated by J.Iliff in Chileans No.59, the Ritter name of *atacamensis* for any *Tephrocactus* growing in this area is an error. For any *Tephrocactus* in this area displaying a "Maihueniopsis" seed there is ostensibly only a choice between the names of *camachoi* and *glomeratus*. At the present moment, *T.glomeratus* has only been positively reported from the stretch between San Pedro de Atacama and Cuesta Diablo, as well as from the vicinity of Talabre and Socaire, but not from the stretch between Chiu Chiu and Aiquina. There would appear to be only *T.camachoi* to be found out to the west of San Pedro de Atacama.

.....from D.W.Whitely

Apropos the apparent difference between the hairy and non-hairy *Maihueniopsis* type seed which was discussed in Chileans No.59, I did have a note in the BCSJ Vol.11 (2) 1993 received from R.Kiesling on this subject, as follows:

"Some *Opuntias* have hairy seeds, the aril has juicy hair outside, this can be seen when a fresh fruit is opened. In herbarium specimens these do not show unless the seed is boiled for a few minutes until the hairs are completely re-hydrated"

.....from H.Middleditch

Or, as pointed out by G.J.Swales, the hairs can be re-hydrated by a good overnight soaking.

The degree of similarity between the *Tephrocactus* seen at Km90 and at Km130 east from Copiapo, would suggest that the Ritter *T.colorea* should be simply regarded as *T.camachoi*.

## **PARODIA SPLENDENS ? From M.Cardenas, Autobiography**

In the April of the year 1960 a field trip was made in company with Zabaleta, via Potosi to province Cinti. From Potosi we went via Cuchu Ingenio, Otavi, Pampa Lecori, Sivingimayu and Muyuquiri, to Camargo and on to San Pedro. We stopped overnight with Don Miguel at his vineyard. On the following day we decided to go to Culpina, a hacienda situated at some 2500m altitude. Going out of San Pedro, still having the barrier which securely controls the entry to Culpina, it was here we came across an abundant population of cacti with splendid white spines, *Parodia ritterii*.

From Culpina we went back to spend the night at San Pedro. This country estate lies on the bank of the river with the houses built on a gentle sloping mountainside, where the climate is most agreeable. From this almost paradise-like sanctuary we carried on in the direction of Abecia coming across - at the ascent of the cuesta - abundant colonies of *Parodias* which I described as a new species, *Parodia splendens*, which appeared to form caespitose clumps with long flexible yellowish white spines and at the apex splendid flowers of a clear yellow colour. In addition, there appeared significant numbers of the other species, *Parodia camarguensis*. From Abecia (or Camataqui) we came next to Las Carreras and from there went in the direction of Escayachi.

.....from H.Middleditch

This account in Cardenas' autobiography might be compared with his statements in the first description of *Parodia splendens*.

.....from M.Cardenas, US C.&S.J Vol.33. 1961

Parodia splendens .....Bolivia, prov. Sud Cinti, on the way from Las Carreras to Chaupi Uno, 2500m, April 1958.

.....from H.Middleditch

The Cardenas' autobiography provides a fairly comprehensive resume of Cardenas' activities in the year 1958; trips to Arica, to Lima, a field trip east of Santa Cruz, a Congress in Santiago, Chile. No mention of travelling down the Cinti valley. One might be excused for suspecting that the two different years quoted for the discovery of *P.splendens* is yet another anomaly between Cardenas' autobiography and his other publications. Can we rely on the 1961 statement from Cardenas for the location of his *Parodia splendens*?

.....from M.Lowry

The identity of Cardenas's *Parodia splendens* has long posed a problem, as indicated in Chileans number 54. The location for *P.splendens* which is given by Cardenas in his original description in the US C&S Journal is stated to lie between Las Carreras and Chaupi Uno at 2500m altitude. Now Las Carreras is down in the bottom of the valley of the Rio San Juan del Oro at an altitude of approximately 2500m, whilst Chaupi Uno lies at well over 3000m. So after leaving Las Carreras there is no "2500m altitude" to be found on the way between these two places.

.....from H.Middleditch

The route between San Pedro and Villa Abecia would generally lie not far off the 2500m altitude quoted by Cardenas in his first description of *Parodia splendens*. This section of the Cinti valley is well before Cardenas arrived at Las Carreras, (not after that place), However, it is still difficult to visualise any real "ascent" approaching Villa Abecia, as indicated by Cardenas in his autobiography as the finding area for his *P.splendens*, as the road going south from San Pedro effectively follows the valley floor.

.....from Klaus Beckert, Field record

KB 84 - at Villa Abecia, at 2510m

KB 83 - at 1 km before Villa Abecia, at 2810m, heading towards the pass.

KB 136 - 6 km north of Villa Abecia, right at the top of the pass, at 2810m.

KB 138 - 11 km north of Villa Abecia, at 2340m

.....from H.Middleditch

Clearly there is a pass, with an ascent of possibly as much as nearly 500m, which would match the account in the Cardenas' autobiography of finding *P.splendens* on the ascent before Villa Abecia.. But are there any yellow-flowering *Parodia* to be found near Villa Abecia?

.....from J.Fahr

On my first trip to Bolivia we followed a narrow path for a few kms above Villa Abecia, and found there some interesting *Parodia*, growing up to 25 cm in diameter. These plants were not in flower but we did find one fairly young bud which was coloured orange on the back of the very immature petals. My picture of this plant has been put in front of our Inter-*Parodia* Kette members but there has been no real suggestion for a name for it. The figure 59 in the US C & S Jnl alongside the Cardenas description for *Parodia splendens* is surely this plant seen at FA 12 above Villa Abecia.

.....from H.Middleditch

Villa Abecia also lies close to the valley of the Rio San Juan del Oro - see Chileans' Cinti valley map. The altitude of FA 12 lies at 2750m which is comparable to other reported locations for *P.ritteri*.

.....from J.Brickwood

Looking at this picture from J.Fahr of his *Parodia* found at FA 12, I am inclined to view it as a *Parodia ritteri*.

.....from J.Fahr

No, I could not accept my FA 12 being regarded as a *Parodia ritteri*.

.....from H.Middleditch

Included in the Ramirez Bros. seed offerings there is *Parodia splendens* RCB 325 from Villa Abecia. This may well be the same location as FA 12 and the two references may apply to similar plants

.....from J.Brickwood

My *Parodia* RCB 325 raised from seed has now flowered and it is a good example of a red flowering *P.ritteri*. The flower colour is probably tending to the orange side of red.

.....from P.Down

I do have several plants of *P.splendens* raised from RCB seed and they do not look to me to be a match for the Cardenas description of this species.

.....from KK field list

KK793 *Parodia splendens* Villa Abecia 2600m

.....from H.Middleditch

It could of course be very useful to hear if any *Parodia* KK 793 raised from seed have flowered - and especially what was the flower colour? How did Knize decide that Villa Abecia was the location for *Parodia splendens*, as opposed to the "way from Las Carreras to Chaupi Uno" of Cardenas' 1961 publication?

Has *Parodia splendens* been found elsewhere in or around the area of the Rio San Juan del Oro?

.....from K.Beckert

Near to Villa Pacheco (north of Tojo) we found some *Parodia* which had a surprising similarity to *Parodia splendens*; they were growing on the red sandstone. But they flowered red and so were *P.ritteri*.

.....from M.Lowry

The red sandstone rock which is very common in this part of Bolivia, especially in and around the valley of the Rio San Juan del Oro, is present at all the locations where we saw *Parodia ritteri* - above El Puente,



*Parodia splendens*

Photos: R. Hillman



near  
San Pedro

above San Pedro, at three different stops going east from La Torre, and at some 5km to the north of Camargo.  
.....from J.Brickwood

In the 2001 I.P.K. publication there is an article and photographs from K.Beckert of what is believed to be *Parodia splendens* Cardenas, rediscovered as a local population immediately behind the vineyard at San Pedro. This includes a comparison with the original illustration, from which it would appear that this is where Cardenas collected the holotype, since they are an identical match, even down to the spination and the yellow flower colour. We would appear to now be dealing with yet another *Parodia* name displaying relatively local variations in flower colour from reddish, through orange, to yellow, though in this case all the populations bear a similar whitish spination. Ritter's *Proseoalba* (with yellow flowers) and the var. *australis* are now no more than synonymous names, since they were published later. The correct name for this plant would probably now be *P.ritteri* v.*splendens*.

.....from H.Middleditch

Unfortunately the Type locality for *Parodia splendens*, as given by Cardenas in his autobiography, does not lie above San Pedro, but on the "ascent to Villa Abecia". But that does not alter in any way the observations from K.Beckert of a yellow-flowering *Parodia* being found on the first part of the climb out of San Pedro.

The *Parodia* monograph which was produced by W.Weskamp has been regarded as a useful source of valuable information about the genus *Parodia*. However, like many publications, it has its shortcomings. Weskamp refers to the "red-flowering *Parodia splendens* found by Lau (Lau 917)" whereas the original Cardenas description for *P.splendens* effectively quotes yellow flowers, Accompanying Weskamp's reference

to Lau 917 there is a Fig.13 entitled *Parodia splendens*, which is a direct reproduction of Fig.213 in the Lau Cactus Log in the US C.& S. Jnl. These pictures are printed back to front (Chileans No.55 p.47) in both publications. Despite these mistakes, this Lau picture taken on the ascent from San Pedro on the road to Culpina might possibly be the yellow flowering "*Parodia splendens*" seen by Beckert at this location.

.....from P.Down

Looking at the Cardenas photograph of his *P. splendens* in the US Journal, it does seem to me to be similar to plants that we saw on the climb out of San Pedro, at BDH 22, of which I took a photograph and labelled it *Parodia ritteri*.

.....from H.Middleditch

Weskamp goes on to observe that an imported plant supplied from Uebelmann as *Parodia splendens* and grown by Hilberath, flowered yellow and so "could not be *Parodia splendens*"; however *P.splendens* does in fact flower yellow, so that the ex-Uebelmann *Parodia splendens* could have been correctly named. Were all mis-statements so easy to spot! Weskamp also observes that in 1965 he received a letter from Cardenas telling him that some plants of *Parodia splendens* attained 30 cm or more in diameter. This dimension represents a considerable increase in body size from Cardenas' original 1961 description, a piece of information probably not available to Ritter when he expressed his doubts about the existence of *P.splendens*.

If Cardenas regarded these plants as caespitose and so forming clumps it would hardly be surprising if such an offsetting plant did attain the "30cm diameter" reportedly quoted to Weskamp by Cardenas.

Keeping in mind that Beckert's yellow flowering *Parodia* from San Pedro was found just above the valley floor, where all other observations from that patch of mountainside record reddish flowers, then for a location apparently at Villa Abecia, perhaps it may be desirable to look at Ritter's *Parodia camargensis*, especially the var. *prolifera*. The solitary *camargensis* v.*camblayana* with a Type location near Villa Abecia and the "Very proliferating" var.*prolifera* from near Las Carreras. Because two different Type locations are quoted by Ritter does not mean that each sort is confined to that spot. Bearing in mind that Cardenas recorded both *P.camargensis* (perhaps solitary?) and his proliferating "*P.splendens*" from near Villa Abecia, could these two equate to Ritter's *P.camargensis* v.*camblayana* and his *camargensis* v.*prolifera*?

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

The description of *P.splendens* by Cardenas applies to none of my published *Parodias*, even though the habitat area mentioned by him has been well explored. Unlike Buining, Cardenas has declared it is the same as my *P.camargensis*, but that is incorrect. On the route between Las Carreras and Chaupi Uno, quoted by Cardenas, *P.camargensis* is represented by the var.*prolifera*.

.....from H.Middleditch

Many other travellers appear to regard the *Parodia* from this ascent above Las Carreras as *P.ritteri*.

.....from M.Lowry

After leaving the Rio San Juan del Oro valley at El Puente and starting the climb towards Chaupi Uno, it is *Parodia ritteri* which is to be found until, climbing to an ever-higher altitude, it is replaced by *Parodia maassii* at around 3200m altitude. Further to the north, and still in the Rio San Juan del Oro valley, another road climbs out of the valley at San Pedro, again in an easterly direction, this time towards Culpina. After leaving San Pedro on this climb. there occurs another form of *Parodia*, usually described as *P.roseo-alba* v.*australis*, which extends upwards until it also becomes displaced by *P.maassii*. According to Ritter's description, *Parodia roseo-alba* itself has a yellow flower, whereas the so-called *P.roseo-alba* v. *australis* from above San Pedro has an orange-red flower. Now *Parodia ritteri* has, again according to Ritter, a pale red to yellowish-red flower, which is a fairly reasonable approximation to the orange-red flower colour of the so-called *P.roseo-alba* v.*australis*. It would seem preferable to recognise that the so-called *roseo-alba* v.*australis* above San Pedro is really another habitat location for *Parodia ritteri*.

This means that *P.ritteri* is to be found on the valley sides both when climbing out of San Pedro towards Culpina and when climbing out of El Puente towards Cieneguillas, at similar altitudes.

.....from H.Middleditch

It will be several years ago that a communication from W.Krahn made reference to *Parodia ritteri* growing on the climb out of San Pedro in the direction of Culpina, prior to reaching the altitude at which *P.maassii* are to be found. This view would appear to match that put forward by M.Lowry.

.....from K.Beckert

Above El Puente, along the road leading to Chaupi Uno, of course only *Parodia ritteri* is to be found. I have thoroughly searched the whole of this area at the time I was there. Further to the south along the valley of the Rio San Juan del Oro, at Chayasa, forms of *P.ritteri* were seen again.

.....from H.Middleditch

Much has been written in the cactus literature relating to *Parodia splendens* - a great deal of it contradictory, some of it e.g. Weskamp (above) ill-founded. It is quite probable that Cardenas' original discovery of his *P.splendens* was made on the ascent prior to Villa Abecia, travelling south. Other yellow flowering *Parodia*, of external appearance somewhat similar to *P.ritteri* (in the wide sense) have also been found near the floor or lowermost sides of the valleys of the R.Tumusla and R.San Juan del Oro. The comment from J.Brickwood in regard to *Parodia* flower colours changing from yellow, through orange, to red, when observed by travellers ascending the sides of a valley elsewhere, would appear to apply in these particular valleys, too.

It would be difficult to justify the retention of the name *Parodia splendens* as a species in its own right, but it would be useful as a means of designating the yellow flowering variety of *Parodia ritteri*.



## **NOT SETTING FRUIT ON BUINGIA From J.Arnold**

I have had many flowers on *Buiningia aurea* this year including five in one week, How they are to be pollinated I do not know, because they do not seem to open at all. I have kept a careful watch on them from late afternoon when the green petals start to roll back, but the inner ones always remain closed! Sometimes though there seems to be a tiny aperture only big enough to get a pin into! What pollinates them? I cannot detect any scent.

.....from Zappi & Taylor, *Cacti of Eastern Brazil*, *Piante Grasse* XIII. No.4, 1993

....species of *Coleocephalocereus* which open their flowers at night...

.....from H.Middleditch

Perhaps the *Buiningia* group of *Coleocephalocereus* also open their flowers at night time?

.....from R.Ferryman

When *Buiningia* do set fruit, these grow up very quickly indeed in a single day. In fact there is a distinct difference even in the course of two hours. I well remember being in De Herdt's nursery in company with P.Sherville and when we first entered the greenhouse there was little more than flower remains visible above the cephalium on some *Buiningia*, but before we left the fruit was already standing above the wool which covers the crown.

## **A PLASTIC GREENHOUSE From G.R.Allcock**

It would be about 1994 that I put together a home-made form of polythene tunnel to accommodate part of my collection during the summer months. This was a very simple construction consisting merely of some logs stuck vertically into the ground and some sawn timbers laid horizontally across them, to support the polythene sheeting. With a bit of patching, the polythene lasted for 5 or 6 years, but by then the logs had rotted.

On the strength of the good growth achieved by the plants housed in this structure, I invested in a commercial polytunnel of some 25 ft in length by 14 ft wide. This produces excellent results indeed. Such is its ability to store up heat - the polythene cover being infra-red reflective ("Thermal" polythene) that I can start watering the plants in it even three weeks before those in my greenhouse.

The steel arches which support the polythene cover are zinc plated, whilst the Visqueen cover itself seems to be remarkably durable - it is now entering its eighth season. In order to provide a good overall warmth in winter, it has a removable inner skin of lightweight polythene. This lining is held in place by wires running the length of the tunnel which are hung from the arches by wire clips.

Major problems are condensation and ventilation. The outer skin of Visqueen is of the anti-fog type i.e. with a water repellent surface coating, nevertheless copious amounts of water condense on it during the months of November to March. As the upper portion of the polytunnel roof is well-nigh horizontal, massive amounts of water drip off. But the inner lightweight polythene lining carries all these drips away to either side of the tunnel.

In summer there are openings at either end of the tunnel, but the ventilation so provided is inadequate. One or two small fans are intended to avoid any accumulation of overhot air. But after some bad cases of burning, I now have a quite heavy coat of external white shading (Coolglass or the like) which is rainproof and burning of plants in summer no longer occurs.

.....from J.Arnold

It will be about fourteen years ago that I decided to try housing some of my cactus collection in a polythene tunnel. It occupies a place in the garden which is fairly sheltered from the winds on account of adjacent properties and fairly high walls, but still gets plenty of sun for many of the daylight hours. The original Visqueen polythene cover lasted six or seven years, before the inevitable breakdown occurred in the form of lengthwise tears. These first manifested themselves at the metal half-hoops.

There are large doors at each end of the tunnel to provide ventilation, together with two 16 inch diameter fans to keep the air moving inside the tunnel. When there is some wind, there is quite a good through draught. But if there is no wind at all and it is a sunny day, the temperature inside the tunnel can rise surprisingly high, very quickly. On one sunny and windless day in February the temperature rose to 140°F inside the tunnel, alongside the south side. The effect of this overheating on a sunny summer day was to cause problems with plants being scorched on this side.

Heating over the winter months is by means of a gas heater together with a fan which is in operation for most of the time. This fan is intended to keep the air moving round inside the tunnel in order to avoid any pockets of stagnant cold air. Originally there was no additional liner inside the tunnel, but after putting up a bubble polythene internal liner for the winter months, the gas bill was significantly reduced.

It became such a chore to fix the bubble polythene liner inside the tunnel that three years ago I thought that I would try it on the outside, secured at ground level with wooden battens and paving slabs. This has worked quite well even in stormy weather, having had problems with it coming loose only on about three occasions. The heat efficiency is just as good with the bubble polythene on the outside. I also used to do this with my Alton greenhouse.

Last summer, the bubble polythene was left in situ on the outside as an experiment. Growth of the plants was just as good, with no evidence of any etiolated growth due to reduced light. Most significant was the complete absence of any scorching, even though there were a good number of very sunny and almost windless days. The other advantage from using the bubble polythene lining has been the reduction in the amount of condensation on the inside of the Visqueen cover. In turn this has improved the situation with plants suffering from a high degree of humidity over the winter months.

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### Slide 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
\$ <i>Cleistocactus</i>	T.Lavender, Kalanchoe, Market Place, Tetney DN36 5NN	
\$ <i>Copiapoa</i>	B.Burke, 23 Jessica Way, Leigh WN7 4QG	brendanburke@blueyonder.co.uk
<i>Echinopsis</i>	M.Muse, 32 Fielding Road, Birstall, Leicester LE4 3AJ	
\$ <i>Frailea</i>	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	
\$ <i>Islaya</i>	M.Williams, 62 Bickerton Ave., Higher Bebington L63 5NB	m.williams207@ntlworld.com
<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
<i>Neoporteriae</i>	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 OJR	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

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