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Parodia ritteri
Impora

Photo. - F.Vandenbroeck



Lobivia lateritia



Lobivia lateritia



Lobivia lateritia



Parodia maassii

On the descent to Impora

Photos: J.R. Kirtley

THE DESCENT TO IMPORA From J.R.Kirtley

The southernmost point of the trip to Bolivia made in company with B.Bates in 1989, was at Tupiza, which we reached after driving south from Cotagaita. We left Tupiza by the road heading north, back towards Cotagaita. At about 20 km to the north of Tupiza we took the branch road leading eastwards to Impora. This took us across the Pampa Mochara. Then began the long, steady ascent of the Cerro Pampa Grande by way of the dirt road built by the army in the recent past. This took us towards the crown of the mountain ridge ahead, the road sweeping round spurs and gulleys at a modest gradient but never zig-zagging up steep inclines. As we approached the crown of the pass, we could look back over the country we had crossed, falling gradually into the distance. It was gently undulating terrain with a few broad valleys with gently sloping sides. All around were the scattered clumps of ichu grass, which had covered the countryside for most of the climb, with no sign of bushes or shrubs and certainly no trees. Here at an altitude of 4150 m on the Cerro Pampa Grande the Ichu grass disappeared almost entirely, leaving the ground at the summit of the pass largely bare of any vegetation.

Not long after we were over the summit of the Cerro Pampa Grande the nature of the ground changed from a pale buff coloured rock covered with stones and pebbles of the same colour, to a more shale-like rock of a blue-grey colour. Vertical plates of rock projected out of the ground and these would often break off underfoot if trodden on. There was also a profound change in the nature of the vegetation, whose most conspicuous feature was now the bromeliads. They did not strike me as occurring at all on the ascent to the pass. Here their numerous silver-white clumps stretched across the mountainsides almost as far as the eye could see, giving the impression that in places they almost covered the steep slopes. There was very little in the way of grasses, only a scattering of stunted trees, an occasional spindly tree, and quite a few bushes and shrubs. Sprinkled among this other vegetation were quite a lot of columnar cacti; *Oreocereus*, *Trichocereus*, and *Cleistocactus*, which were entirely absent on the gradual ascent to the pass from the west. This is the east facing slope of the mountain which would receive the prevailing rainfall.

The bromeliads varied from single rosettes barely a foot high to quite large clumps which might be three or four feet high and nearly as broad. The stunted acacias were surprisingly uniform in height, with an almost flat top that looked as though it had been sheared off by the wind. The trunk at the base of these trees was often very substantial indeed for the size of the tree, attaining nearly half a metre thick, tapering rapidly as it branched repeatedly. The main branches often carried patches of a bluish-white lichen. The numerous bare branches supported a shallow but fairly dense canopy of leaves which could be five to six metres across even though these trees were only about two metres high. In addition to these trees, the bushes of about one metre tall would occasionally grow very close together and form a quite impenetrable clump several metres across. The *Oreocereus celsianus* would approach two metres in height, whilst the *Trichocereus werdermannianus* probably grew up to almost eight metres high. The largest *Trichocerei* had a main stem about two feet thick and with branches from a metre or two above ground level, which formed candelabras with up to a dozen branches. On some plants the branches grew upright close to the main stem, on others they grew outwards and then curved upwards forming wide spreading arms.

The *Cleistocacti* had fox-red spines on the recent growth, but not all the stems on every plant carried spines of this colour. On one plant with 8 or 9 stems, there were several stems lacking these fox-red spines and when we looked at them closely it became obvious that these particular stems had no new growth on them. They had evidently stopped growing at the top. Even one of the short stems, barely knee-high, had stopped growing at the top and carried no fox-red spines. This stoppage of growth at the top of the stem is a problem commonly encountered when cultivating *Cleistocacti* but it also seems to be a natural feature of the plants growing in habitat. All the *Cleistocacti* we saw on this descent were similar in appearance, although they did not seem to be exactly the same as the *Cleistocacti* we saw at localities between Tupiza and Cuchu Ingenio. We saw plenty of buds on the *Cleistocacti* here and as there was one withered flower on a tall stem they must have started their flowering time. The buds were directed upwards at quite a sharp angle to the stem. Most of the *Cleistocacti* we saw on this trip had started to flower.

This vegetation had been cleared for traffic for no more than the width of the road. In consequence the bromeliads, the bushes, and the cacti all grew right to the very edge of the road, so that it was quite difficult to find a spot where we could park off the road. We were able to stop a couple of times during the descent to photograph the cacti which were present. There was room to walk between the bushes, the bromeliads, and the cacti, usually with bare stony ground underfoot. Now we discovered that a *Parodia* of the *maassii* group also grew here, together with a species of *Platyopuntia*.

At one spot we found what looked to be four *Parodias* growing hard up against each other. Three of them had the winding spines with the prominent, robust, curving and twisting central spines which were typical of the *Parodia maassii* sorts, the spines often of an orange-brown colour near the crown. The fourth plant had a more dense armament of less robust spines which curved slightly but all pointed more or less away from the plant body. It gave the distinct impression that it could be a different sort of *Parodia*. This group of *Parodias* was on very stony ground with patches of exposed bedrock barely a couple of feet away on all sides, which can only have had a shallow covering of fine grit in shallow pockets. There was other vegetation quite close but neither close enough nor high enough to provide effective shade to these *Parodias*.

At this same locality we also found two *Parodias* growing hard against each other, one of them having a quite large number of only slightly curved spines, so dense that the body could not be seen. The second plant had the more robust spines, curving and twisting, much less dense so that the body could be seen through the spination, which we took to be one of the *maassii* sort. Again these appeared to be two different sorts of *Parodia*.

We made another stop further down the descent to Impora and found that the Ichu grass was re-appearing,

but still in scattered tufts. The further we descended the more there was of the Ichu grass. Then we found a clump of *Parodia* of the *maassii* type with ten or eleven heads very closely packed together, forming a hummock. It is probable that they were all individual plants and not a single, offsetting, plant. A dwarf herb with minute leaves and flowers, scarcely as high as the pebbles in which it was growing, surrounded this clump of *Parodias*.

Continuing on the descent we met with a side valley with very narrow, steeply inclined sides which, if anything, were even steeper than the slope we were descending. There was a quite distinct difference in the appearance of the opposing slopes of this side valley. At one side were the abundant bromeliads, with trees, bushes, and columnar cacti, similar to those on the slope we were following; at the other side there were far fewer bromeliads and an almost complete absence of trees, tall bushes, and columnar cacti, there being only dwarf bushes and shrubs to be seen. It would be difficult to be certain of the local orientation, but the narrow side valley probably ran off in a more or less northerly direction, so that the slope with the abundant bromeliads probably had a more east facing aspect, whilst the treeless slope probably faced more to the west.

By now there was less and less bare ground to be seen; then we came to a spot where we had an excellent view over Impora itself and down the broad valley beyond, which led to the Rio San Juan del Oro. Well below the height at which we viewed this panorama, there were many bare mountainsides both around Impora and also further away along the broad valley; they had slopes of only a modest gradient compared to the one we were descending. From the distance at which we were viewing them, these slopes appeared to be rather bare of vegetation apart from an odd tree here and there. Down in the valley bottom, where Impora was situated, it appeared to be fairly level and from our viewpoint the valley floor was almost filled with greenery. This broad band of greenery wound away to the east, between the bare mountainsides, until in the distance it met with the main north-south running valley of the Rio San Juan del Oro. This could just be seen at an appreciable distance, as a thin green line. The watercourses which run into the Rio San Juan del Oro are, for the most part, home to a much greater number of plants than the surrounding areas. The mountainside at the spot where we were standing was bathed in sunshine, but the many miles of green valley and bare mountainsides spread out before us were in the shade of clouds which filled much of the sky. It was quite different from the clear blue sky which had accompanied us for most of the way from Tupiza across the Pampa Mochara and on the climb to the pass.

The descent was now much steeper, in a series of hairpins, but as we approached closer to Impora the ground suddenly levelled out and became almost covered by tall bushes and trees, now round-topped and not cut off flat. We stopped here at about 2790 m altitude, where the gradient was less severe, and made our way through bushes with bark in many shades of black, green, and white, to photograph the cacti. Here there was a quite different type of ground with lumps of stone of all sizes partially immersed in real soil. Nowhere on the descent had we seen any red sandstone. We found that those species which had gone before were replaced by *Lobivia lateritia* forms, a flat pad *Opuntia* sp., and what was believed at the time to be a *Cleistocactus* species. Here we came across a succulent-like plant with finger-thick cylindrical stems in long segments; larger plants had dozens of upright stems and reached about a metre high. It was completely lacking any leaves. On a steep bankside one of these plants drooped downwards, with many corky stems, accompanied by some long grass. Out of this undergrowth projected a cereiform cactus, possibly two inches in diameter and a foot long; the lower part grew outwards and downwards, then curved up to the growing point. The body was obscured by the dense spination, which was pinkish-brown in the new growth and greyish-white below. We took this to be a *Lobivia* of *lateritia* affinity. On flat ground where there was rather less soil and more stones, we came across a *platyopuntia* of a bright light green colour, quite different from the *platyopuntia* we had seen previously. The spines pointed in all directions - upwards, downwards and sideways. This was in bud. Not many of these plants were to be seen.

By now it was late afternoon so we decided to push on in the direction of Camargo. In the gathering gloom we arrived at the junction of the road we had followed from Impora with the north-south "highway", at Las Carreras. We turned north, and by now in darkness, drove on. In the headlights of the jeep we struggled to follow the road, which was in places pure sand, deeply rutted for most of the journey north. It was with great relief that the lights of Villa Abecia came into sight and after a few more kms we arrived in the village square. In the morning we found palms growing in the plaza and around Villa Abecia there was quite a lot of other green vegetation. From here we set off to the north, intending to go to Culpina.

.....from H.Middleditch

This was the first visit to Bolivia made by any of our UK Chileans' members so that identification of many of the plants seen during the course of that trip brought about no small amount of discussion and debate. In the intervening years since that date, we have been treated to accounts of more visits to Bolivia at several Chileans' Weekends, so that far more information is now available. But the identification of some of the cacti seen on the descent to Impora is even now still not entirely resolved.

.....from F.Vandenbroeck

Having read the account by J.Kirtley of his trip from Tupiza to Impora, down to the Cinti valley, I must say (much to my surprise) that I recognise or recollect little or nothing of what he writes! Did he take a different road? Of course the road I took from Impora to Tupiza is the same one! The problem, however, is that each person views the landscape with a different pair of eyes. Also, after the passage of several years, many impressions are, regrettably enough, forgotten - save the ones that are recollected by photographs or notes.

Anyway I give you a brief impression of my own experience, according to my own notes and pictures. We made the trip in the opposite direction, viz: from Las Carreras - Impora - Mal Paso - Tupiza. We had stayed several nights in a primitive but welcoming little hotel in Las Carreras from where we set off for

Impora. This stretch of the Rio San Juan valley is rather flat and there are few interesting plants. Past the village of Impora the road starts on a steep climb. We easily find *Parodia cintiensis* - large plants growing up to 50 cm tall, together with numerous clustering specimens of *Weingartia cintiensis*. Climbing up further we reach a crest from where we have magnificent views over Impora and, further away, we can see the valley of the Rio San Juan as a green ribbon amidst the grey mountains. After about 35 km we reach a crest where we find *Parodia cintiensis*, plants even more robust and forming small clumps, together with large groups of *Weingartia cintiensis* and flowering *Lobivia ferox*. We are desperately searching for Ritter's *Parodia commutans* but cannot find it.

I remember there was a road leading down from this crest to a valley in which we saw some buildings of a farm. This might be the Estancia Abra Negra. Further along the ascent, still well before we got to the pass, a few indian huts could be seen. Here we met with an indian woman on the road, whom we asked about the name of the place, and she gave us the name Torata. Here I photographed a prolifically flowering specimen of *Trichocereus tarijensis*, with its colourful *Lobivia*-like flowers. Near this village we find *Parodia maassii*, which did not occur lower down, only the slender *P.cintiensis*. The slides taken by J.Kirtley which you sent to me all show typical specimens of *P.maassii*, i.e. flattish plants with a golden yellow tortuous spination.

We keep on climbing. Something very distinctive in the account by J.Kirtley is the very large number of silver-green bromeliads. I cannot positively remember having seen such plants, but on my own slides they are to be seen in the area above Torata, where most of the columnar cacti occur - here we find *Oreocereus celsianus*, *Trichocereus tarijensis*, and *Trichocereus werdermannianus*, all growing together. The general appearance of these two species of *Trichocereus* is very different; not only are the flowers quite different, but the spination is unmistakable. The *T.werdermannianus* has broad green ribs with a coarse brownish spination. As younger plants, *T.werdermannianus* might be mistaken for *T. tacaquirensis*.

There are other cactus spp. here - *Tephrocactus bolivianus*, *T.pentlandii* v.*dactylifera*, *Austrocyllindropuntia weingartiana*, and *Oreocereus trollii*. It could indeed be said that *O.trollii* occurs mostly at higher altitudes than *O. celsianus*, although they may occur together. Because of its stouter and more compact appearance, *O.trollii* must be better adapted to higher altitudes. Close to the pass we still find specimens of a *Polylepis* with conspicuous red scaling bark. From the area of Mal Paso, Ritter describes several *Rebutias* such as *R.iridescens*, *R.lanosiclora*, *R.rutiliflora*, *R.tropaeoileptica*, etc. We spent a considerable time in trying to find some of these and that is when we found a *Cumulopuntia*, a *Lobivia pygmaea* - or was it one of Ritter's *Rebutias*?, and *Neowerdermannia*. On the pass itself it is icy cold with a strong wind blowing.

.....from H.Middleditch

There are fortunately slides available both of the clump of four plants and the clump of two plants. mentioned above by J.Kirtley; all these plants are slightly flattened globular in shape. In addition there is a third slide of a short elongated plant with pale spination which does project away from the body but tends to curve around the body form, as well as a fourth slide of a rather more slender, slightly taller but still short-elongated upright plant with much darker spination. Finally, a long columnar plant of saxophone-shape growth, the older portion drooping downwards out of dense undergrowth on the bank side, the newer growth forming a complete U-turn so that the apex is growing upright. None of these plants were in flower so that this valuable guide to identification was absent. It is plainly very difficult to select a name solely on the basis of a picture but perhaps others who have travelled this particular road might care to suggest an identification.

.....from K.Augustin

Some years ago Eric Haugg had found near Mal Paso a quite densely spined *Weingartia*, which might be regarded as a more elegant and more densely spined form of *W.fidaiana*, which resembles the group of four plants on the slide from J.Kirtley.

It is more difficult to assess the side-by-side growing pair of plants but I would think that a *Weingartia* as on the first slide is growing together with a *Parodia*. The other plants may also be *Weingartia*.

.....from F.Vandenbroeck

The large clumps of silvery leaved bromeliads at the eastern side of the pass which are mentioned by J.R.Kirtley, did not make an impression on me during my 1992 travel along that route. But during our return visit there in 1997 I had a good look at them and they really are a fantastic sight! They form large spiny rosettes and probably belong to the genus *Puya*. Now, looking at the five slides taken by J.R.Kirtley on the descent to Impora, the *Parodia* on the first two slides are probably *P.maassii*. The other three slides are probably all forms of *Lobivia lateritia*.

.....from J.Fahr

I have looked at the pictures taken by J.R.Kirtley on the descent to Impora. I have been at this location and had recorded these plants under the name *Parodia cintiensis*. I now believe these to be a variety of *Parodia ritterii* although really with more spines and lacking a distinctly defined zone between central and radial spines. Some days later I found similar plants in the vicinity of the Rio San Juan del Oro, on the Carrizal side of the river.

.....from K.Beckert

The photograph (on the front cover) is of *Parodia cintiensis* which is to be found above Impora; it is to be seen from about 12km before reaching Impora, over a stretch of about 6km. It grows solitary, undoubtedly belongs in the form-group of *Parodia ritterii*, and flowers dark red. In habitat it can reach a height of up to one metre and it grows only on a grey-white strata which carries some red soil. The spine colour varies from white with a relatively straight spination at the upper part of the distribution here, to pale brown with hooked spination, at about 4km before reaching Impora.

.....from R.Hillman

Coming from Mal Paso, the descent to Impora passes Agua Negra at about 4000m, then follows bends and turns into a lower valley where there is a view over lower ground to the east. Going into this valley, the nature of the ground changes to a reddish-white sandstone and it is here where the first *Parodia ritteri* and *Lobivia lateritia* are to be found. After only a few more km the road turns round the northern end of a ridge where there is a view over El Puente. After a short distance going southwards, there is now a view towards Carrizal. Then there is a series of hairpins to reach the valley floor and another 5km to reach Impora.

.....from T.Marshall

Although the group of four plants (or four heads) does have a distinct resemblance to *Parodia maassii*, it is difficult to be certain of this identification. Turning to the plant with two heads, whilst one of the pair of heads might again be *Parodia maassii*, the second head might possibly be something different. There is no difficulty in putting the name *Lobivia lateritia* to the saxophone-shaped plant; the solitary plant with the *Acacia* stems behind and a dwarf shrub in front, also looks like *Lobivia lateritia*. The two plants besides some largish stones may also be this species.

.....from R.Martin

The photograph taken by F.Vandenbroeck above Impora of a tall plant (on front cover - H.M.) is, I think, *Parodia ritteri*. I certainly did not see any *Weingartia* anything like as tall as this, and the spination looks wrong for *Lobivia lateritia*. Although I did see some *L.lateritia* which were quite elongated, none of them were both as tall and as broad as the plant in this picture.

.....from H.Middleditch

Of the photographs taken on the descent to Impora by J.R.Kirtley, and reproduced here, the *Parodia maassii* were seen at the higher altitude where these plants would be expected to grow. The other three pictured plants were seen within about half a dozen km of Impora, at round about 2800m altitude, which is getting to the lower limit at which *Weingartia* are likely to be found. For the saxophone-shaped plant, *Lobivia lateritia* would appear to be the preferred identification, but opinion is clearly divided as to whether the other two should be given this name, or regarded as *Parodia ritteri*. This provides an excellent example of how plants of perhaps three different genera adopt a similar habit to survive under common prevailing conditions.

THE DESCENT TO IMPORA from T.Marshall

In the course of our trip to Bolivia which took place from December '97 to January '98, we took the road out of Tupiza which goes via Pampa Mochara and Mal Paso to Impora. At BLMT 125, a short distance to the west of Mal Paso, when we were still on the east side of the pass, we were searching for plants in the ravines. I can remember seeing a fair abundance of silver leaved bromeliads, together with pampas grass (*Cortaderia*), *Peperomias*, tuberous oxalis and various miniature ferns. On the flatter areas above these ravines, we found *Rebutia torquata* in the cracks in the rocks; at the time we labelled it as *R.pygmaea*, but on close examination of its spirally body form we concluded it was *R.torquata*.

At the settlement of Mal Paso (whose name means 'bad pass'), we are more or less at the highest point on our route from Pampa Mochara to Impora. From here, our general direction is downhill, but our descent is fairly gradual. Not far from the settlement of Mal Paso, we start to see large stands of *Polylepis* species, which belong to the Rosaceae family, this genus being fairly readily identifiable on account of its peeling bark. This bush, or small tree, grows no more than ten feet in height. It is quite likely that it once grew quite heavily around the settlement of Mal Paso, but has been cut down for firewood. For this purpose it is excellent, especially with its peeling bark. *Polylepis* are also good altitude indicators; at their lower levels they grow in the same altitude band as *Oreocereus*.

As we drive on, the descent becomes even more gradual and the *Polylepis* become rather less abundant. Now we begin to see the columns of *Trichocereus tarijensis* standing out above the *Polylepis* bushes. These *Trichocereus* were mostly single columns, occasionally having one or two short side branches from well up the main stem, standing parallel, and close to, the main stem. The *T.tarijensis* are seen to be fairly infrequent at this point. Here and there we could now see the short white hairy stems of *Oreocereus trollii* between the bushes, as well as the occasional groups of lupins with their stems of dark blue flowers. We make a stop on the road where we are at just over 3980 metres, and see a rocky slope on our right which looks to be of interest. We walk around this rocky slope, picking our way between the bushes and the cacti, avoiding the loose stones. The site is also sparsely populated with clumps of grass (which could probably be a *Festuca* species) and a nice herb belonging to the willow herb family (*Onagraceae*). We come across hummocks of *Tephrocactus bolivianus* with fairly close packed segments, forming low cushions up to about half a metre across and 30 cms or so in height. These are not very abundant, some a few paces apart, others a stone's throw from each other. One or two yellow flowers are to be seen on these plants, but no fruit.

There is also a shortly elongate-globular *Lobivia* with a coat of long, dark, slightly curved and more or less upswept spines which obscure a view of the body. I would have said that they were related to *Lobivia ferox*, with a likelihood of being *L.kupperiana* - plants of which we had seen on the ascent to Mal Paso across Pampa Mochara. Of roughly the same size as these *Lobivia* are the globular *Parodia maassii* whose spines stand out more sideways. Both the *Lobivia* and the *Parodia* grew among rocks where there was not a great deal of grit, so their roots must find their way into the crevices, cracks, and bedding planes in the strata. Neither species were seen in flower.

There were also quite compact hummocks of *Tephrocactus rossianus*, much smaller and fewer in number than those of *T.bolivianus*. These low mounds of *T.rossianus*, had their sword-like spines laid over the surface

of the hummock. None of these were seen in flower, but we did see a few green fruits. At rocky spots almost devoid of other vegetation we found *Rebutia* again, possibly *Rebutia torquata*, with its spirally shaped body; there were a few of these in flower, which were a deep red, together with an occasional ripe fruit, which the ants had not yet consumed. These *Rebutia* were usually growing in cracks or bedding planes in the strata in a vertical (or near vertical) face of rock, which could be anywhere between a step to a few feet in height. Growing often in the same cracks as the *Rebutias* were miniature tuberous *Peperomias*, some of which were in flower; these *Peperomia* flowers were on an inflorescence of about 5 cm tall and pale green in colour.

The road, still descending, took us in a generally northward direction and then there came into view before us a valley filled with green scrub. There were still a few *Polylepis* bushes to be seen, but the *Polylepis* were now being steadily replaced by *Acacias*. These *Acacia* were still only 8 to 10 feet tall, with their tops looking as though they had been trimmed off flat. The *Trichocereus tarijensis* had now been replaced by the more branching *T. tacaquirensis* and by the more massive *Trichocereus werdermannianus*, with spreading branches. Flowering remnants were seen on these giant plants, but it was uncertain whether they were from this year, or last year. In these habitats, delicate structures such as flowers soon become dehydrated skins.

We made another stop, in the midst of this green scrub, here at about 3250m. There was a greater variety of bushes, shrubs, and herbs than we had seen at our previous stop at higher altitude, but lupins were no longer to be seen. Now we came across some thick stemmed species of *Jatropha*, growing up to about half a metre high. The short stems of *Oreocereus trollii* had been replaced by the much taller *Oreocereus celsianus*, with many stems of up to about 3m tall, their tops growing just above the bushes here and there. The *Lobivia ferox* here were growing more elongated than the *Lobivia* we had seen at our previous stop. They had somewhat barrel shaped bodies and grew up to a foot in height, but none of them were to be seen in flower. *Cleistocactus hyalacanthus* grew in clumps of slender stems up to 2m high, usually in the close company of shrubs or bushes, rarely standing isolated a few paces away from accompanying growths.

Care had to be taken when walking round the taller plants to avoid the strings of *Opuntia sulphurea*, which occasionally displayed a yellow flower; fruit on these *Opuntia* was not readily noticeable, especially as we were watching where we were placing our feet! These *Opuntia* had not been seen at our first stop at higher altitude. There were also globular plants of *Weingartia cintiensis* and *Parodia ritteri* to be seen, ranging from quite numerous to scattered here and there; seldom taller than slightly elongated-globular and usually growing a pace or two from other vegetation where they had little or nothing in the way of shade. Neither sort were in flower so they were not easy to tell apart. But the *Parodia ritteri* had pale spines standing mainly outwards from the body, only slightly curved but rather more so near the tip, with some reddish-brown colour in the spines above the growing point. The *Weingartia cintiensis* was not quite as densely spined, the spines lacking any obvious bend or curve near the tip.

Our road now followed a projecting spur of ground, clinging to a rock face. We reach the end of this ridge where the road switches round the end of the spur and reaches the east side, from where we have a view over the Impora valley. The road now follows a zig-zag course down the slope to Impora. On this descent we now pass through a comparatively thick vegetation which consists mainly of *Acacia* and *Jatropha*. As we go further down this much steeper part of the road, the vegetation gradually becomes more and more dense, but still largely growing on rocky ground. At our stop at 2830m, on this zig-zag descent, now only a few km before reaching Impora, we do find some tallish, slender growing plants of *Lobivia lateritia*, covered with a closely-packed coat of spines.

Over the short stretch of nearly level ground before reaching Impora, where the substrate is sand and sandstone conglomerate, we were still accompanied by this dense vegetation. In the main there is not a massive population of Cacti accompanying the denser vegetation, apart from the ubiquitous *Opuntia sulphurea*. Leaving Impora, heading towards Carrizal, we travel along the comparatively level floor of the river valley, which is mostly open terrain with sparse vegetation, usually of no great height - apart from when we are near water courses, when the false *Acacias* can reach in excess of 30 feet in height. But we do come across some fairly large tracts of river conglomerate which form small, densely vegetated inselbergs.

On reaching the main valley of the Rio San Juan del Oro, we turn north to reach our overnight stop at Carrizal.

WE FIND LOBIVIA LATERITIA From M.Lowry

During the course of our visits to Bolivia we have met with *Lobivia lateritia* at a number of places in and around the Cinti valley. It is only in this part of Bolivia where *Lobivia lateritia* is to be found. Indeed it is not only restricted to this area, its habitat is limited even further, to the valleys which have been cut down well below the height of the surrounding mountains. We found *Lobivia lateritia* growing at San Pedro at 2500m altitude, south of Carrizal at 2465m, near Tojo at 2745m, and on the climb out of Impora at 2830m. In the valley at Cotagaita it occurred at 2844m and in the Paicho valley near Cana Cruz, at 2840m. At seven of the spots where we saw these plants, they were not in flower. Near Tojo, a few were in flower, with yellow flowers. When we were at Cana Cruz we went about 10km up the valley to Huanillos where we came across more *Lobivia lateritia*, and here there were a few plants in bloom, with red flowers. One of these plants was carrying about forty flowers, a magnificent sight. Back in the Cinti valley, on the climb out of San Pedro, in the direction of Culpina, where *Lobivia lateritia* have been seen by many different travellers, many of the plants were out in bloom, with a great range of flower colours - white, pink, red, and yellow.

Although *Lobivia lateritia* certainly can grow up to about half a metre tall, most of the plants we saw were nothing like this height. Indeed they can range from slender columnar to only shortly elongated. By

comparison, *Lobivia longispina*, in general terms tends to be shorter and fatter than *Lobivia lateritia*; indeed, *Lobivia longispina* usually ranges from globular to depressed globular. It is to be found generally in the area adjacent to and on both sides of the Argentine - Bolivia border.

In the upper part of the valley of the Rio San Juan del Oro, we found some *Lobivia* in the valley bottom at a spot about 30km to the south of Talina, at 3446m altitude. These plants were only slightly elongated globular and there was very little to distinguish them from *Lobivia longispina*. At this point we were quite some way to the south of any other reported habitat for *Lobivia lateritia*, and also in the general area where *Lobivia longispina* might be expected to occur. But we were still in a fairly narrow valley, some 500m below the mountains and altiplano at either side. So it might be said that local circumstances might have favoured *lateritia* to some degree whilst the location not far from the Bolivian-Argentine border is the area where *longispina* grows.

Beyond what would usually be regarded as the northern end of the distribution area for *Lobivia lateritia*, we came across some *Lobivia* near Muyuquiri, at 3230m. Again, these plants were seen at an altitude above that at which we had found all other *lateritia*; and again, they were short and fat, unlike a typical tall and thin *lateritia*. They were carrying red flowers which were wide open and had a short tube, giving an overall impression which hinted at *Lobivia cinnabarina*.

HYMENOREBUTIA (LOBIVIA) CINTIENSIS By F.Ritter
Translated by H.Middleditch from *Kakteen in Südamerika* 2. 1980

On my first trip to South America I discovered near Curque in the Department Arica [sic!] in March 1931 a very slim thickly spined *Lobivia*, from which I was able to collect a number of seeds, which were then offered for sale in the Winter catalogue under No.606/592 as *Lobivia longispina* Br.& R., which was an erroneous identification. They were in fact an interesting new discovery. Perhaps there still are in collections propagations from these same seed and perhaps they still remain identified as such. When I came to Bolivia once again in 1953, I quickly sought out again my old finding place of 22 years before, and from there made a trek of several days' duration in the area lying immediately to the north of it. I thereby established that this species had a wide distribution in the provinces of Mendez and South Cinti and that it had developed regional forms and varieties. Subsequently I gave these my new numbers FR 82, 82a, 82b, 82c, and 82d, whilst the plants which I had first discovered from Curque, of which I was not sure for want of materials taken with me, whether they were perhaps valid as species of their own, were later denoted with the number FR 1084. In 1958 I named my FR 82b as the *Typus* of the species and called it *Lobivia imporana*, after the village of Impora, where this species is characteristic and abundant; I called the other numbers forms and varieties of the former. *Lobivia imporana* was a n.n. by me, initially to have a name for the sale of the seeds; publication would have ensued after the species had been comprehensively and thoroughly studied by me.

In December 1954 I had on a brief transit collected examples of FR 82 and FR 82b, and sent designated specimens of them to Prof. Cardenas in Cochabamba (living specimens), together with many other cacti, among which were many new species; some of them were published in the subsequent years by Prof. Cardenas (when my name also was only mentioned once); others are still unpublished at present. In a brief note accompanying the foregoing numbers, I had indicated to Prof. Cardenas "No.82: I do not know this one. No.82b; *Lobivia*?"

After my FR 82 and FR 82a had been offered for sale by me for the first time in the Winter catalogue at the start of 1959, under the names *Lobivia imporana* and *Lobivia imporana* var., there was amongst others a *Lobivia cintiensis* Card. spec nov. published by Prof. Cardenas in the French Journal "Cactus" in the December issue of the same year; Impora was indicated as the Type location. In fact it seemed not only from the statement of the finding place, but also from the diagnosis, that it was my own *Lobivia imporana* n.n.

In his publication, Cardenas indicated that he had found it in February 1958. He expressed the opinion at the end: "This comes from an area where no cacti have yet been collected to my knowledge". But my name *Lobivia imporana* previously listed in the Winter catalogue already quoted Cardenas' *Typus* location for this species name. Already five years earlier Prof. Cardenas had received from me a specimen of the same species and variety FR 82b with my location defined as La Torre, which is 24 km away from Impora, according to the map. Cardenas had certainly already written to me in 1955 that he would only describe my cactus when he himself had searched for and found it and after he had studied his own specimens. Now I must of course withdraw my name *Lobivia imporana* in conformity with the Code of Nomenclature. My own earlier discovery of this species remains unmentioned in the publication by Cardenas. My offer concerning the citing of discovery material and a statement of the finding place, leading to the scientific description of my own material had been curtly declined by Prof. Cardenas in 1955. In any case he only wanted me to perform as a provider for his own description. Unfortunately however in the majority of instances this was scientifically completely inadequate, so that I was obliged to turn my back on him entirely.

The flower colours are extraordinarily variable, and since the colour varies not only at one location, but also regionally, these details complicate making a start on the establishment of varieties. In addition, there is a regional variability of size, thickness, and length of the body and in the length and stoutness of the spines. With a thorough search throughout the whole area the demarcation and establishment of criteria for regional varieties became always more and more difficult, since I saw too many smooth transitions. I have therefore come to the conviction that the establishment and naming of such varieties would not have achieved anything for the systematics, much less still for the cactophile, who only in a certain number of instances can comprehend a positive varietal designation.

At first I had established varieties with the numbers FR 82 up to FR 82d, from which one was published: FR 82 as var. *elongata*. I now once again withdraw this name and prefer to regard it as a combination of some forms. Since I am of the opinion that, for the benefit of the systematics, only in exceptional cases should forms be registered with special names, consequently I make no recombination of the variety names.

.....from H.Middleditch

It would appear to be quite probable that the only reason Ritter erected his new genus *Hymenorebutia* was in order to put his name as author behind the name *cintiensis* and so reduce Cardenas' *Lobivia cintiensis* to a synonym. In this way, he thereby got his own back (as he saw it) on Cardenas who had described *Lobivia cintiensis* under his own authorship but making use of the original Ritter discovery, plant, and data. It seems to be most unlikely that Cardenas would ever have been acquainted with the Winter catalogues and so he may not even have known that Ritter had used the name *Lobivia imporana* for this plant.

LOBIVIA CINTIENSIS sp.nov. By M.Cardenas
Translated by H.Middleditch from Cactus (France) No.65 1959

Plant simple, short cylindrical, 10-50 cm tall, 8-10 cm broad, grey-green, slightly depressed at the apex. Ribs about 20, rather shallow, 8mm high, 15mm broad. Areoles 10 mm apart, circular to elliptical, 5 mm in diameter, with protruding grey to black wool. Upper areoles lacking spines, but with a dense white wool. Spines 15-17 stiff, some slightly pectinate, acicular, slightly [appressed], not clearly differentiated although certain areoles display 6-7 at either side regarded as radials, of 5-15 mm long, and 2-3 centrals of 20-25 mm long directed upwards. All the spines white.

Flowers variable, originating from the upper part of the plant, funneliform, 5 cm long, 4.5 cm wide. Pericarpel dark green, with long scales, with a pointed tip 1-2 mm in length, bearing short, white, curly hair. Tube short, about 1 cm long, enlarging abruptly in the upper part, covered with scales of 4-6 mm in length, green, furnished with curly white and brown hairs. Exterior petals lanceolate, green in the upper part, reddish below, 12 x 4 mm; the intermediate petals spatulate, 20 x 8 mm, centre stripe vermilion red with white margins; interior petals 22 x 9 mm spatulate, rounded at the tip, vermilion red. Stamens inserted in two series, the lower series starting at the base of the tube and terminating at 5 mm below the upper series, 1.5 - 2 cm long. Upper series of stamens 1.5 cm long; filaments dark vermilion red; anthers yellow. Style 2 cm long, light green, 1.5 mm in thickness. Stigma lobes 8, pale green, 4 mm long.

Fruit globular, 1 cm long, splitting open longitudinally, reddish, carrying acuminate scales with short white hairs. Pulp white. Seed black, 1.2 mm long, with dull spots.

Habitat: Bolivia, department Chuquisaca, South Cinti province between Impora and Mochara. February 1958. M.Cardenas No. 5505 in Cardenas herbarium; co-type in U.S. Nat. Herb. Smithsonian Institute.

.....from H.Middleditch

From the Cardenas autobiography Chapter XXV we find that at the start of the year 1958 Cardenas was concerned with arrangements for making a collection and study of cultivated potatoes from throughout the Republic of Bolivia. Then in May of that year he attended the Third Southamerican Botanical Congress in Lima. Then in November of the same year he was joined by Prof. I.S.Nelson from Southwest Louisiana University for a visit firstly to Padre Hammerschmidt at San Ignacio, then to the Yungas of La Paz. Here he came upon the campment of the Mulford Biological Expedition to which he had been attached 38 years previously. At the end of November he went to a further Latin-american Conference in Santiago, Chile. There is no reference to any trip to Impora in 1958, to which Cardenas refers in his description of *Lobivia cintiensis*.

However, in his autobiography Cardenas does refer to a trip made in 1959, which would appear to have been the occasion on which he found the *Lobivia* subsequently named *Lobivia cintiensis*.

.....from M.Cardenas, *Memories of a Naturalist (Autobiography) 1972*

In the course of the year 1959, I realised various botanical expeditions to the more distant regions of the country. In the month of January 1959 we organised a trip to the south and south east of Bolivia. We left Cochabamba and drove via Epizana via Aiquile and Puente Acre to Sucre. Continuing via Potosi and then passing through San Pedro de Vilcaya, where a fine cactus was discovered which was later described as *Weingartia vilcayensis*.

Continuing along our route we arrived at Vitichi where at an altitude of 3100m our attention was drawn to a an extensive and dense stand of columnar cacti of which the majority were *Trichocereus werdermannianus*. We passed through the historic one-horse town of Tumusla, then via Cotagaita and Rio Blanco to Tupiza. From Tupiza we took the road to Sud Cinti which had been constructed by the army, crossing the Cumbre de Impora at 4270m. From there we descended to Impora which lies at only 2740m. Here we came across various interesting cacti and among them a semicolumnar *Lobivia* with white subulate spines and redflowers which I described much later as *Lobivia cintiensis*. From Impora we finally descended to Las Carreras situated at only 2500m altitude.

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

[Under *Lobivia cintiensis*] As a supplement to Cardenas' publication I add some essential data: The ribs are somewhat crenate, the areoles are located on the upper slope of the tubercles and go down into the notch. Particularly characteristic is that the areoles, unlike most representatives of the genus *Lobivia* are not displaced obliquely but sit directly upon the rib. [Together with a few other minor points]

.....from H.Middleditch

Despite this dissension over authorship of the name *cintiensis*, neither author acquired a permanent place for his own name because the plant concerned had been described at a much earlier date.

ECHINOPSIS LATERITIA sp.nov. By M.Guerke

Translated by H.Middleditch from Monatschrift für Kakteenkunde 1907

Body ellipsoid, slightly depressed and unarmed at the apex, without woolfelt, greygreen, the specimen to hand 7cm tall and 6cm diameter. Ribs 16, separated by broad furrows, almost 1cm tall and of similar breadth at the base, fairly blunt, not very markedly indented. Areoles 2 to 3 cm apart, circular to elliptical, up to 7mm in diameter, furnished with yellowish grey-white wool which gradually becomes sparser and finally disappears altogether. Radial spines usually 10, frequently however only 8 or 9, the uppermost and the lowermost the shortest, specifically about 1 cm long, occasionally however much shorter; those pointing sideways up to 2 cm long, all of them slightly curved. Central spines 2, one above the other, curved upwards; frequently only the lower one appears and this is stronger and longer than the radial spines, up to 24 mm long. All spines are swollen onion-shape at the base, at first a rich pale brown with darker cross-bands, soon becoming grey and then frequently only remaining brown at the tip. Flowers from the side, arising from near the crown, overall length 45mm. Buds pale green externally, with dark grey hairs in the lower part. Flower tube funneliform, 4 cm diameter at its widest. Pericarpel 7 mm long and the same in width, passing into the tube without any parallel portion, furnished with scales, likewise the lower, olive coloured part of the flower tube. The scales narrow triangular, thick fleshy, pointed, green, the lowermost 1 mm long and of similar width, the uppermost 6mm long and 4 mm wide; under each scale a bunch of up to 8mm long crinkly hair, grey-black becoming grey-white at the top. The outermost petals olive green,, elongate, up to 12 mm long and 5mm broad, rounded above and provided with a short point. The inner flower petals lanceolate-spathulate, up to 22mm long and 7 mm broad, with a short point, the margin finely denticulate towards the tip, a grubby vermilion, merging into a cermine sheen at the tip. Filaments in three groups; the lowermost originate from the inner wall of the tube, near the base, the filaments 10mm long, dark purple-red, curved inwards so that their lower third is inclined inwards, the upper two thirds is upright. The central insertion likewise arises from the inner wall of the tube, above the first group; their filaments are not curved but straight and upright, 10 to 16 mm long, purple red at the base, merging upwards into a more carmine red. The uppermost filaments, separated from the others by a wide gap, are at the throat of the tube in a single ring; their filaments are 10mm long and pale carmine red. The anthers are very short, almost globular, half a mm long, and of almost similar width, yellow. Style without stigma lobes 14 mm long, green, becoming somewhat brownish above.

This species was collected by Fiebrig in Bolivia.

.....from R.Hillmann

When we were in the vicinity of Impora in 1992 we came across *Lobivia lateritia* and fortunately there was a plant in bloom which we photographed. It had a red flower. In 1999 we were just a few km north of Tojo where again we came across some *Lobivia lateritia* and here we also found a few red flowers. But there were no flowers to be seen on the *L.lateritia* near Carrizal.

The *Weingartia cintiensis*, *Parodia ritteri*, and *Lobivia lateritia* are very difficult to tell one from the other when they are not in flower.

.....from F.Vandenbroeck.

As to *Lobivia lateritia*, we saw this species with red, with orange, and with yellow flowers. We never saw these colours intermixed in one and the same population as is sometimes the case with *Parodia*. It may perhaps be remarkable that between El Puente and Carrizal we saw only lemon yellow flowers on these plants, while northwards from El Puente they tend to flower orange or red. In addition, we found a red flowering population near Chaupi uno.

.....from J.Cooke

I have two clones of *Lobivia lateritia*, one is an ex ISI *Lobivia lateritia v.cintiensis* which is too small to flower. The other one is grown from PM 173 seed. It is about 15 inches tall and 2 to 2.5 inches in diameter. It is certainly not barrel shaped, but most definitely columnar. Spines are very dark brown to black - straight, not hooked, and about half to three quarters of an inch in length. Despite being in full sun, no flowers.

.....from R.Purslow

At one time I had a plant of *Lobivia lateritia* with a KK number which grew to almost 20 inches long but was no more than a good 2.5 inches in diameter.

.....from H.Middleditch

From the foregoing travellogues it would appear that *Lobivia lateritia* can be found as a fairly readily identifiable form at the lower levels of the relatively steeply sloping valley sides at places along the Rio San Juan del Oro valley. But in the upper reaches of this river, and also to the north of Camargo, where the gradient of the valley floor brings about a comparatively small change in altitude over a greater distance, it appears that transition forms occur. At the same time it may be advisable to acknowledge that usable roads ascending the sides of the Rio San Juan valley are few and far between, so that we only have spot samples of any altitude zoning of the vegetation.

FINDING WHAT SORT OF ECHINOPSIS? From L.v.d.Hoeven

It was in December 1992 that I returned from my longest journey ever entirely for cacti in Argentina and Paraguay. From Buenos Aires I went straight to Jujuy and then to General San Martin (Ledesma). Almost a week was spent making trips from here; to Fraile Pintado at 650m altitude, finding *Cleistocactus smaragdiflorus* and three different types of *Rhipsalis* growing in the trees. Temperature was about 22°C. Then Ruta 19 to Higuieritas, at 1200m when I found many orchids, *Rhipsalis*, and *Pfeiffera*. Next to Valle Grande at 1600m, and the Callilegua National park. On this trip I found *Trichocereus thelegonoides* and also *Parodia saint-pieana* which grew on the few rocky places that were to be found along the road. Again there were *Cleistocactus smaragdiflorus*, *Pfeiffera*, *Tillandsia*, and *Rhipsalis*. There is no road north from Valle Grande, one would need to go on foot. Then I went to Oran almost as far as the Bolivian border, but found nothing of interest. Then I went back towards Jujuy and through the Sierra Santa Barbara, visiting Santa Barbara and Santa Clara, then going south-east to Maiz Gordo. From there I went to various places in the Quebrada Humahuaca and paid a visit to Iruya. Then I went to Paraguay, both almost to the western border with Bolivia and then to Cerro Amambay; finally returning to Argentina via Misiones and Corrientes.

In the Sierra Santa Barbara not all the roads are marked, even on the local maps. But I had some help from a local boy in travelling from Santa Barbara to Santa Clara. In following route 6 to Palma Sola, I came across *Trichocereus terscheckii* and *Opuntia schickendantzii* at about 1700m. I was told that El Sausal was previously a dead end but tracks continue past that place, where a four-wheel drive vehicle is needed. At El Sausal at 2000m there were again many epiphytic cacti, *Trichocereus terscheckii*, *Cleistocactus baumannii*, *Cereus peruvianus*, *Opuntia retrorsa* and *Harrisia pomanensis*. From El Sausal on the route to El Fuerte was where I first found *Echinopsis* in fruit, but later on I found a great many more, over a stretch of perhaps 100 km. There were some of these plants in flower but more often in fruit. Some of the seed are being sent to you.
.....from H.Middleditch

What actually arrived was a complete ripe fruit with the thin-walled and fairly strong leather coloured shell containing a nice quantity of what appeared to be ripe seed. This seed was divided into about half a dozen packets which were sent off to several of our members who regularly grow from seed; germination was reported to be fairly good. Some resultant seedlings became available at a later date at our Chileans' Weekend, when I was able to obtain a specimen. This is now occupying a four inch pot, the central spines projecting beyond the rim of the pot. At a body diameter of almost twice its height it is certainly depressed globular. It has 14 ribs, the body of the rib being steep sided but the very crown of the rib is blunt. The single central spine projects about one inch directly away from the body, with a generous radius at the tip, more or less forming a hook; if it was possible to measure the central spine strictly along its length, it would be more than one inch long. There are some 6-10 radial spines approximately 15-20mm long which vary not only in number but also in disposition, attitude, and shape; some radiate, more or less following the overall curvature of the body; others stand at an angle to the body, often one or more curving to a greater or lesser degree in varying fashion, sometimes the uppermost one having a curled-over end. The ribs are infused with a deep purple colour along the crown, over the upper half of the body.

The general impression conveyed by this plant is of an *Echinopsis ancistrophora* form, as it is in the habitat photograph of the plant from which the fruit was taken - shown at The Chileans' Weekend. My JL253 with 14 ribs has no sign at this time (May) of any purplish infusion at the crown of the ribs, but a smaller JL253 which is not growing well at the present moment does have a deep purplish-brown infusion over much of the body. This coloration may possibly owe more to a combination of the prevailing temperature/watering regime and the general condition of the plant, rather than being an inherent feature of this type of plant. The JL253 was found at Las Tacanas near the border of Salta and Tucuman provinces, effectively in the foothills of the eastern Andes bordering the Chaco plain. Of similar overall appearance is my Lau 942 from Angusto de Villa Montes, similarly emanating from the eastern foothills of the Andes. And the Sierra Santa Barbara is very roughly half way between those two locations, likewise where the foothills approach the Chaco.
.....from M.Lowry

When I was able to pay a visit to the collection of O.Ferrari in Buenos Aires, I found both *Echinopsis ancistrophora* and an *Echinopsis* from the Sierra Santa Barbara. The latter plant had a matt pale green body whilst the *E.ancistrophora* was dark green and glossy.

.....from H.Middleditch

What were the surroundings like where this plant was growing in Sierra Santa Barbara?

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

These plants were up to 4 inches across, quite flat sort of barrels, mostly growing on rocky slopes in areas of open field. There were no *Gymnocalycium* growing anywhere in this area.

.....from M.Muse

I have two flowering plants which were raised from the seed collected by L.v.d.Hoeven from the vicinity of Sierra Santa Barbara. It is probably what Backeberg thought of as *Pseudoliobivia hamatacantha*. The spination is both stouter and longer than that of most *E.ancistrophora* forms.

My plants are about 5 cm in diameter and one and a half cm deep, being distinctly flattened-spherical. I would describe the epidermis as glossy dark green and the central spines are distinctly hooked. The flowers to date have been between 15cm and 17.5 cm long with the corolla opening to 7.5 to 9 cm in diameter, with the tube 0.7 cm in diameter immediately above the ovary; this latter is covered with dense blackish hair. The style is green with yellowish stigma lobes, which can be variously exerted beyond the stamens, or level with the uppermost stamens, or in the throat, but not recessed in the strict sense. There is a gap of 2.5 to 2.8 cm between the two series of stamen insertions and as such it is in line with measurements of the inter-staminoidal

gap taken from flowers on 20 other forms of *E.ancistrophora*. All these measurements have involved at least two plants of each collection number and three or four measurements per plant.

LOBIVIA CHRYSANTHA - FLOWERS From D.Schweich

It was the second week in February when I had the opportunity of a brief visit to Argentina. Our trip started in Tucuman from where we drove to Tafi del Valle. We did not stop to look for cacti until we were on the west side of the Abra del Infiernillo, then stopped the night at Amaicha del Valle. After a drive through a fantastic landscape with several stops to admire the cacti we arrived in Cachi late at night. The following day we went through the Cachipampa and Quebrada Escoipe to arrive at Salta.

The next day we left Salta to go to Quebrada del Toro. Numerous *Rebutia xanthocarpa* in the subtropical part of the valley up to Chorrillos. After Chorrillos, an unidentifiable *Rebutia* - it looks like *xanthocarpa* even though it grows in a desert area. I found a dried flower remains about 3 cm long very similar to *R.senilis* and the location was very close to the habitat of Rausch's *R.senilis v.chorrillosensis* WR 706. I should know better what it really is when it flowers in cultivation. At Golgota I climbed up the mountain and discovered the marvellous *Parodia nivosa* and *P.steumeri*. In Santa Rosa de Tastil I visited the huge ruins of an old indian city, which were quite unbelievable. At the car park, I found *Lobivia chrysantha* with roots about 20 cm long whereas the plant body was no more than 10 cm. At first I did not know what the plant was, because the spination was previously unknown to me - greyish spines up to 2 or 3 cm long, not appressed but projecting, strong, and a curved central spine, almost hooked. In addition we found some of the beautiful *Pyrrhocactus umadeave*. After fording the river for a total of 27 times we were back in Salta late at night. The next two days were spent in the Quebrada Humahuaca, where we found some *Lobivia marsoneri*, absolutely indistinguishable from *L.chrysantha*. The week was all too short.

Roughly speaking there are three "forms" or *L.chrysantha*, from what I was able to see; those with short and thin whitish to glassy spines of the lower area from Ingeniero Maury to Puerta Tastil; those with strong, short, and often blackish central spines of the higher regions from Puerta Tastil to Cachinal; and those with longer and stout spines from Puerta Tastil to Santa Rosa, which may extend further to the north-west. I do not know if these forms intergrade or not. After discussion with others who have information about these plants, it transpires that any relationship between spine length and geographical location could be open to question. It is very likely that *L.chrysantha* is astonishingly variable. I would regard *L.chrysantha v.hypocyrtia* as a typical *L.chrysantha* but with a strange and absolutely magnificent flower. The *Lobivia chrysantha* with the longer spines are most similar to some *L.marsoneri*, although their spines are more curved and a little shorter. Obviously they are immediately recognised when *L.marsoneri* has long, straight spines, when analysing the seeds, and when *L.marsoneri* exhibits a red flower. However, there is a striking similarity, even the seeds not being so different.

.....from E.Scholz

In my own collection I have plants of *Lobivia chrysantha* WR5, and DSW9, as well as of *L.chrysantha v.hypocyrtia* WR 161, which all have fairly short spines, of which the outer spines really do radiate. On each plant there is just a single projecting central spine. My plant of *L.chrysantha v.klusacekii* ES 21 which was found near Puerta Tastil, however, is of quite a different appearance, with much longer, slender, spines all of which stand away from the body. On all these plants the flowers are generally very similar. The picture of *L.chrysantha v.janseniana* [Chileans No.52 p.35] shows a slender tubed flower. But who today has such a plant in his collection? I think, nobody! In his commentary, Backeberg says nothing about the flower tubes, except to say that the flowers of *L.chrysantha* are very variable. So perhaps we should not put too much emphasis on the flower tubes.

.....from R.Purslow

My own plant of *L.chrysantha* B.98 is somewhat similar in body form and spination to the *v.janseniana* which is illustrated in Chileans No.52. p.35. But the upper photograph of *L.chrysantha* shows what I would regard as a typical plant of this species, not only in body form and spination, but also in flower proportions. On occasions the new spines near the growing point on *L.chrysantha* may stand erect from the plant body, but after a season or two's growth the spines usually lie fairly close up against the plant body.

In my experience the flowers of *L.kuehnrighii sensu Rausch* usually have a light coloured throat.

.....from H.Middleditch

Does this mean that the adnate filaments on the inside of the flower tube on *L.chrysantha* convey the impression that the throat is a purple colour, whereas on *L.kuehnrighii sensu Rausch* the adnate filaments are of a lighter colour?

.....from M.Lowry

The review of *Lobivia kuehnrighii* in Chileans No.51 made very interesting reading. It does appear to be unlikely that the plant originally described as *kuehnrighii* actually came from the same area as the plants we now label with this epithet. Indeed even Rausch seems to agree with this but does not follow through to the logical conclusion that that the name *kuehnrighii* is a synonym of *L.chrysantha*. The brief 1931 description, and for that matter the more complete description by Kreuzinger in 1937, could equally well apply to Rausch's *Lobivia chrysantha v.hypocyrtia*. Compare for instance the description of the flower as "shiny velvety orange" with the picture on page 23 of Rausch *Lobivia* '85. Further, on page 108 of *Lobivia* 1,2,3 Rausch says of the *v.hypocyrtia* "the ribs are rounded and more tuberculate and the spines somewhat curved". The type locality of *v.hypocyrtia* is Cachinal, only 17 miles west of Estancia del Toro, and a similar distance from Cerro Concerro. Either would be an easy four day trip for an Indian girl!

If this is correct and *L.kuehnrighii* Fric is actually the correct name for *L.chrysantha v.hypocyrtia* Rausch,

then we need a new name for the plants from La Poma - Portrero - Cachipampa area. The earliest available name is probably *L.drijveriana* Backbg, published in 1933. If this taxon is to be considered a variety of *L.haematantha*, then the combination *L.haematantha* v.*drijveriana* (Backbg) Rowley in CSJGB 44 (4) p.81 could be applied. The other solution is to accept these plants as falling within a broader view of *L.haematantha* and reduce the name *L.drijveriana* to synonymy. It all depends whether one is a lumpner or a splitter!

.....from E.Scholz

No one has been able to tell me about finding *L.kuehnrchii* on the Cerro Cencerro. In May, I had a visit from G.Winkler and we had a discussion about this problem over the original *L.kuehnrchii*. We both know W.Rausch quite well, and Rausch was on good terms with Fleischer in Bruno, who in turn knew Fric very well. Fleischer told Rausch that Fric did not find *Andenea kuehnrchii* by himself. He interrupted his trip in Puerta Tastil and during his stay there he got his plants from an indian girl, who was two days on the way to the other side of the Nevada de Acay. In fact several people, myself included, have found this very plant near La Poma! *Lobivia kuehnrchii* and *L.chrysantha* are NOT the same!! You can believe what you like, but I know that the finding place for *Lobivia* (*Andenea*) *kuehnrchii* is not the Cerro Cencerro but the area from Cachinal to La Poma.

.....from H.Middleditch

What sort of everyday duties would a young indian girl normally be expected to undertake, bearing in mind the very sparse natural resources for life support which are available at higher altitudes in the Andes?

.....from G.M.McBraide, Agrarian Indian communities of highland Bolivia. American Geographical Society, Research series No.5, 1921.

Large tracts of the highlands are utterly unfit for cultivation. It is easily seen that only the most meagre subsistence can be secured from the plots of land held by the indians. To supplement the scanty living obtained from the soil they must engage in various other pursuits. Some carry on a number of home industries: weaving blankets from the wool of sheep, llamas, alpacas and vicunas, or making hats or sandals. Still others, with their droves of llamas, gather llama dung, the principal fuel used on the plateau. Under these geographical conditions it was but natural that there should grow up a system of communities, where each separate valley or secluded corner of the plateau developed its individual life, centred about the cluster of dwellings where lived the closely related members of a clan. Such a social organisation seems to have existed on the highlands of Peru and Bolivia from the very earliest times. The lands held by the clan included the grazing land which was free to all members of the clan, and upon which the common flocks of llamas and alpacas were herded by a designated representative of the community.

.....from Handbook Of South American Indians Ed. J.H.Steward Volume 2. The Andean Civilisations 1946 The Aymara By H.Tschopik

The herding is usually done by women and children

The contemporary Quechua By B.Mishkin

At the age of 3 or 4, children are given little tasks to do around the house; they take care of the chickens and learn to pasture sheep. At the age of 5 they are put in charge of a few lambs which are pastured in the vicinity of the house. By this time the boys are carrying wood and water, looking after the fire, and learning to spin. All girls of 6 can spin. At 8 they begin to do a little weaving. Meanwhile boys of 10 learn to work in the fields, help their parents in the ploughing, sowing, and harvesting.

Herding may be done by anyone. Children 3 or 4 years old, barely able to walk, are put in charge of a flock of ewes with their new-born lambs. The oldest and most decrepit women will take a herd to the punas. Men will herd when they have nothing better to do. The customary herders, however, are the women and the young people.

.....from H.Middleditch

The Handbook of South American Indians appeared in five separate volumes. The volume 2 from which these abstracts are taken consists of just over 1,000 pages. It is mainly concerned with ethnographic studies, mostly covering customs, religion, history, pottery and other artifacts, whilst also mentioning trade and agriculture. Studies of some of the indian tribes (such as the Quechua and the Aymara) ran to a great many pages; far less were devoted to the tribes centred on Salta. However, all available evidence would tend to suggest that herding practices did not differ to any great degree over the whole area of the high Andes occupied by indigenous indians. It may be reasonable to suggest that the daily life of any young indian girl brought up in the Quebrada del Toro would be largely taken up by herding the family flock - including "Taking the herd to the punas".

.....from E.A.Holmberg, Trip to the Puna de Atacama, 1900

At Santa Rosa de Pastos Grandes, all the ranchos have a corral made of dry stone walls into which the llamas, as well as the sheep, are brought back on an evening from the places of pasturage where they are sufficiently well looked after by a child. Here we came across one of the women who was occupied in producing a woollen poncho, making use of a loom manufactured from the wood of the cardon. In the provinces all the inhabitants are familiar with the loom, but rarely a man is encountered who lives exclusively by this work, since they divide the household duties; the men go off to hunt for vicuna, guanaco, and chinchilla in the hills and quebradas whilst their wives or sisters prepare the wool for blankets or ponchos. The necessity of working a loom, in the absence of any other occupation, has gone beyond being a custom to become something like a vice. When travelling the valleys, if one passes nearby a woman, if she is at the rancho, she will assuredly be working at the loom; if going along the road, she will assuredly be carrying an infant on her back with another clinging to her skirts, while she will be playing with a spindle between her fingers, converting hunks of raw wool into fine threads.

.....from C.Pugh

When we were travelling east from Yavi, close to the border with Bolivia, we could see a flock of animals on the move some distance away from us. As far as we could see they were goats and they were being shepherded by two indian women, possibly one older and one young one. This was not far from the spot where we turned round on our tracks and we also saw what appeared to be a very rudimentary abode which may have been used as accommodation by these shepherds. We were particularly struck by the number of condors that were flying round quite low here, unlike those we saw in other places. At another spot where we stopped, there was a woman or women moving along with a flock of animals not far from what we took to be another temporary abode. Unfortunately the precise location escapes me although I can bring the picture clearly to mind, as we watched them for some time. On another occasion we were descending from the pass above Purmamarca when we stopped to look at some Rebutia and Oreocereus trollii; down in the valley below was a more permanent looking abode with someone shepherding a flock nearby. This was no great distance from Purmamarca itself. One of the men came up the hillside to ask us what we were doing and where we came from.

.....from K.Gilmer

When we were in the course of our travels in the Andes of north-western Argentina, we must have seen hundreds of flocks of animals. These were mostly llamas, sometimes sheep, as well as one or two flocks of vicunas, but practically no goats. Sometimes there were a few donkeys but these were usually near the houses. It was usual to see one, or two, people looking after a flock of animals. Sometimes this was being done by small children, but my recollection is that it was mainly the men who were doing this work.

.....from F.Kasinger

When we have been travelling in north-western Argentina, we must have seen flocks being shepherded on a great many occasions. Almost always it was children, and not adults, who seemed to be carrying out this work.

.....from M.Nilsson

I can remember one particular occasion when we were camping west of Alfarcito in the Quebrada del Toro. One evening, just before dark, we saw hundreds of animals running over the hillsides - a fantastic sight! But I do not remember seeing any shepherds on that occasion. You can see animals being shepherded everywhere in Argentina - I have seen men, women, and children doing this work, but most often it is women or children.

.....from R.Senior

During a three week walking holiday in the Andes, we frequently saw small herds of llamas, or vicunas, etc.; in Peru our route took us over the highlands above Cuzco and into the "Holy valleys". When we stopped near any herds it was usually children or women who would appear, the men drifting up later. I got the impression that the children or the women were really in charge of the herd.

In Bolivia it was more pronounced. The animals were used as pack animals on our walks. Herds in the open and the pack animals were invariably controlled by the women. It was a matter of some surprise to us. At the end of our day's trek, the animals were just let loose to forage for themselves and early next morning the women would go out to find them and bring them in - often from many miles away. How they herded them was also a wonder. Sometimes they flicked at them with ropes made from llama hairs (we brought back home with us a specimen of this rope), or simply 'guided' them with the ropes. There seemed to be little actual physical contact. The relationship between the women and the rather timid, flighty animals seemed to be mental rather than physical, although this might be a flight of fancy.

.....from P.Down

With regard to the shepherding of flocks, we saw two separate instances on the outskirts of La Paz on the very first day of our visit to Bolivia. It was usually the quite young and the quite old women who were looking after the flocks as they scavenged for grazing. It was a very widespread activity in the parts of southwest Bolivia that we passed through, so much so that we observed it almost daily in the course of our journey. These women seemed to spend much of their time throwing small pebbles. I can imagine that they must have had constant practice in pebble throwing from a very young age, as they were able to throw a pebble and strike just the right spot on whichever animal was tending to stray. In this way they could keep the flock together without having to chase after the animals - in fact, almost without moving from their position.

.....from C.Sainsbury

In regard to the tending of animal herds in Chile, I would say that the women and children only look after them if they are returned to a corral at night. This is very often the case with Llama, sheep, and cows. In the remoter parts of the country it is very common for herds of goats and cattle to be left roaming unattended during the summer months. When they are rounded up, children often assist but I have never seen women taking part. I cannot remember seeing a woman riding a horse for any purpose other than a means of transport.

.....from "Aguirre" by S.Minta

[En route from Arequipa to Chavin de Huantar]The next morning the countryside was deserted and empty. We climbed on into a broad valley. The path became a mass of tiny stones but walking was easy here. A young girl of about twelve passed by, at about twice our speed, on her way to pick up a flock of goats. A single woman, driving a donkey, crossed in the other direction. As we climbed over a slight rise, we spotted a flock of sheep coming towards us. Behind them was a woman on a mule, with a child walking at her side.

.....from H.Middleditch

Our correspondent who has convinced himself that the original Fric Lobivia kuehnrighii did not come from near Toro, may possibly not be entirely familiar with the routine of everyday life of the indians who dwell in and around the Andes. The vegetation in these higher altitudes is sparse, to put it mildly, so that what we would regard as farm animals need to range pretty widely in order to find sufficient fodder to keep body

and soul together. Quite apart from the virtual absence of timber and wire, the provision of fencing would be entirely impractical over the considerable areas involved. Either the domesticated animals are left to their own devices to find fodder, or else each herd needs to be shepherded by one or other member of the family. The bleak and inhospitable nature of the more elevated terrain over which the herds roam will not provide any but the most meagre sustenance for the human herder - if any. This situation imposes a pattern of existence, in which each of the scattered small groups of indian families occupy a slightly better niche at a lower altitude, in the valley or quebrada, where some crops (however poor) can be grown. The animals must range over the more elevated terrain, where they may be herded along by one member of the family. In such circumstances it is necessary to keep the animals within a day or two's walking distance of the family hut, so that either the herder returns to the family abode daily or provisions can be taken to the herder. For the herder to be found by the bearer of provisions, there has to be an accepted area beyond which the animals are not allowed to roam. Only natural features can be utilised as boundary markers to separate the areas foraged by each family herd but this does not mean that boundaries are not recognised. This situation requires the whole family to be familiar with their own herding area.

In a bad year with less rain the animals and the indians would both suffer. It would be a waste of time ranging further afield for other pastures since all the highland indians would be facing the same ill fortune. Come good or bad times, the herds which are accompanied by herders would be expected to be confined within tacitly accepted but undefined bounds. It would usually be the men who would range further afield, to hunt vicuna, to seek flamingo eggs, to visit the nearest town to barter for requisites, to seek work as muleteers or drovers. The herding duties commonly fall to the women or to the younger members of the family. Not too surprisingly, this breeds a familiarity with the terrain above and behind the family hut and at the same time a complete ignorance of any other mountain terrain. To suggest that an indian girl would trek from Estancia Toro over Nevada Acay disregards the daily pattern of existence followed by the indians. It is most likely that one of the indian girls whose family resided near Toro and who shepherded the family flock over the slopes of Cerro Concerro would be the natural choice to travel over ground she was familiar with and collect there the original *Lobivia kuehnrichii*. The men would probably be otherwise engaged, possibly the women, too.

.....from E.Scholz

In that case why did it take four days just to get some plants from the Cerro Cincerro?

.....from H.Middleditch

When Fric first enquired from the indians about going out to collect cacti, the "Young indian girl" would probably have already set off with her flock at the crack of dawn; of the "four days" mentioned, she would presumably be back on the fourth day. This leaves not much more than two full days not just for travelling but also for searching for the required cacti and uprooting them. We have received a graphic account from M.Nilsson of his 16 - hour long trek from Caspala to Udquia, at a roughly similar altitude, where the absence of water posed no insignificant problem; this particular day's trek amounted to about 25 km as the crow flies, but with ups and downs plus bends in the track, it may have been far more. From Estancia Toro to La Poma is some 90 km as the crow flies, but half that would be across uninhabited terrain on one stretch, where water availability is questionable, especially on the ridge terminating in the Cerro Acay. A more practical route via habitations and possible water supplies would be some 150 km or more, without allowing for ups and downs and bends in the track. Taking the foregoing considerations into account, even allowing for the better acclimatisation of the natives to the altitude, it would appear to be physically impossible for this feat to be achieved by any of the indians, never mind a young girl. In any case there is little to suggest that the usual social regime of the indians would permit one young girl to travel alone any great distance outside the family curteilage.

The tales are legion of travellers in the Andes hiring mules and indian guides and getting up before dawn to make a pre-arranged good start. And how the tempers of the gringos gradually frayed during the day whilst the indians took their time in getting provisions together, sorting out the mules, loading them up, taking leave of family, and so on, until the day was well advanced before they actually made a start. There is little if any likelihood of anyone setting off the same day that the indians had acceded to Fric's request to collect cacti for him. More probable is that the "young indian girl" would take her flock on its daily search for herbage and head in the direction of the Cerro Concerro; when she had found the plants she had been sent to look for, she would return with the flock to the family abode. That would probably take the better part of two days.

So - Fric makes his request on day one, the indian girl sets out in the family's own good time, takes perhaps two days on the trip up Cerro Concerro, and Fric gets his plants on day four.

Now in regard to the information passed on by Fleischer who was a prominent name in the Czechoslovak cactus world, and who was one of those whom we were able to visit on our 1964 Continental Cactus Tour. It would presumably have been in Fleischer's interest to keep himself abreast of the discoveries of his fellow-countryman Fric and in consequence it is hardly surprising that Fleischer and Fric would be on good speaking terms. It is also to be expected that Rausch would cultivate an acquaintance with Fleischer between his own visits to South America, it being no great distance between Vienna and Bruno. By comparison, a great deal was written by Kreuzinger about the new Fric discoveries, so much so that it gives the impression of a joint effort between Fric and Kreuzinger. Indeed there are a number of references in the literature to just such a joint authorship. Consequently in the search for facts, more weight might properly be given to contemporary writings by Kreuzinger rather than to later hearsay via several parties. In particular the review of *Lobivia kuehnrichii* which originally appeared in *Succulenta* for 1937 and was reproduced in *Chileans* No.51 pp 118-119, was written by Kreuzinger, with Fric and Kreuzinger being quoted as joint authors of the original name, *Andenea kuehnrichii*.

Subsequently Buining was in touch with Kreuzinger prior to writing about this same plant [Ibid]. It seems

that our correspondent in Germany may not be familiar with these two articles, which are based almost on first-hand information. Kreuzinger tells us that the indian girl set off from Toro, (not from Puerta Tastil as our correspondent asserts) and went west to Cerro Cincero. Toro itself lies in the upper section of the Quebrada del Toro (not in the Quebrada Tastil) at a spot where indian families would be able to raise some limited crops to keep body and soul together. The animals would be herded over the heights above Toro where there was no permanent habitation - for example, over the slopes of the Cerro Cincero. The indian girl at Toro would most likely travel within the family curteilage where she herded the family animals, not over country she did not know to a place she would not even know existed. It only needs a tourist to go to Toro to check where the indians there herd their animals today - the Andes are no different now to what they were when Fric travelled there, herbage is still just as sparse and the indians have no different choice of herding ground to that which they had in 1929. It was the same this time last century and only overgrazing will make it different this time next century.

In summary, the assertion by E.Scholz that he knows *Lobivia kuehnrhichii* Fric does not come from the Cerro Cincero near Quebrada del Toro, does not appear to be supported by an encumbrance of facts.

FINDING WHICH SORT OF ESPOSTOA From P.Hoxey

We met up with Alfred Lau in Ecuador, with the aim of visiting various places in northern Peru which Alfred Lau had not seen for many years. We travelled south through Ecuador and into Peru, coming to Piura which lies not far from the coast. From Piura we headed inland to Olmos, and then over the Abra de Porculla into the valley of the R.Huancabamba. We followed this river valley until we reached the R.Maranon, which we crossed near Corral Quemado. After a trip down the Maranon valley to find Matucana madisoniorum, we take the road to Chachapoyas, following the valley of the R.Utcubamba.

Some 8 km after passing the turn-off to Tarapoto, at 1500m altitude, we were able to see, with the aid of binoculars, an *Espostoa* growing on the other side of the river, in company with a *Rauhocereus* sp. and much green vegetation. About 10 km further on we made another stop at PH 203 where we started to see the same sort of *Espostoa* on our side of the river, where the valley was narrow and steep sided. The *Espostoa* grew here not on the floor of the valley, but on the sloping sides, where there was very little other vegetation. These sides were so steep that it was not possible to get close to the *Espostoa*, but from what we could see of them they appeared to be mostly young plants, without cephalia. Another 10 km or so further along the same road, at 1600m, we make a stop where the slope at the side of the road is not so steep and we can see the *Espostoa* in amongst the thick scrub. With no small difficulty we forced our way through the scrub to reach these plants. They were also growing on the steep slopes above the river.

After a further 8 km we came to the hydroelectric plant and here the ground was of a different nature, a sandstone with some limestone. On this ground we found none of the *Espostoa* which we had seen up to now along the Utcubamba valley, although we did see *Browningia*, *Corryocactus*, *Borzicactus*, and *Melocactus* growing here. But after crossing the river and climbing up the hill at the opposite side we come across some more plants of the same *Espostoa*. We record all these *Espostoa* as *E.calva*. We then continue to Leimabamba which is now quite a large town and the surroundings have been mainly given over to cultivation.

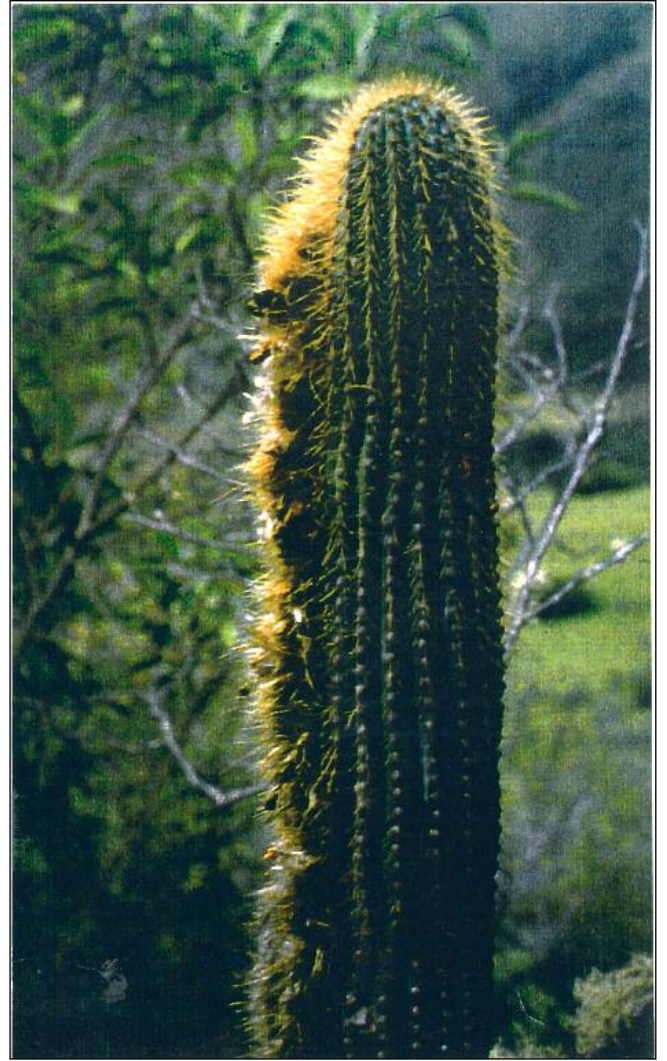
Leaving Leimabamba, we are climbing in order to cross the mountain chain which separates the Utcubamba from the R. Maranon drainage system. We travel through a grassland with some dwarf bushes, which become sparser the higher we climb. At the pass the surroundings are almost alpine. Once over the Abra Barra Negro we start the descent to the river Maranon, down at Balsas. On the way down we found a place to stop at the roadside where A.Lau wanted to trek down into the valley of a small tributary to the R.Maranon, and continue further on foot to search for Matucana. At this point on the road there are a few houses and we discover that it is called Chanchillo. We find there a man who had several mules who was just about to take the trail into the side valley and he carried our sleeping bags and all our baggage down for us. At the bottom of this side valley, on a much more gentle slope, there were a number of dwellings and cultivated fields. Whilst still on the steep slope and just before reaching these fields, we were able to see an *Espostoa* at a distance, standing up above the surrounding vegetation.

After finding a place where we could stop overnight, we walked uphill and shortly spotted the interesting golden-spined *Espostoa*, growing in a fairly dense thicket. These large mature plants have a single trunk which carries many branches, which in turn rebranch, so having up to 30 heads on one plant, which may be up to 8 m. high. This population, although small, was reproducing well with many small seedlings which grew in the protection of bushes where they have a moist environment. These plants have to be 3 or 4 m high before the top of the stems appear above the surrounding canopy of bushes and it is at that point when the cephalium starts to form.

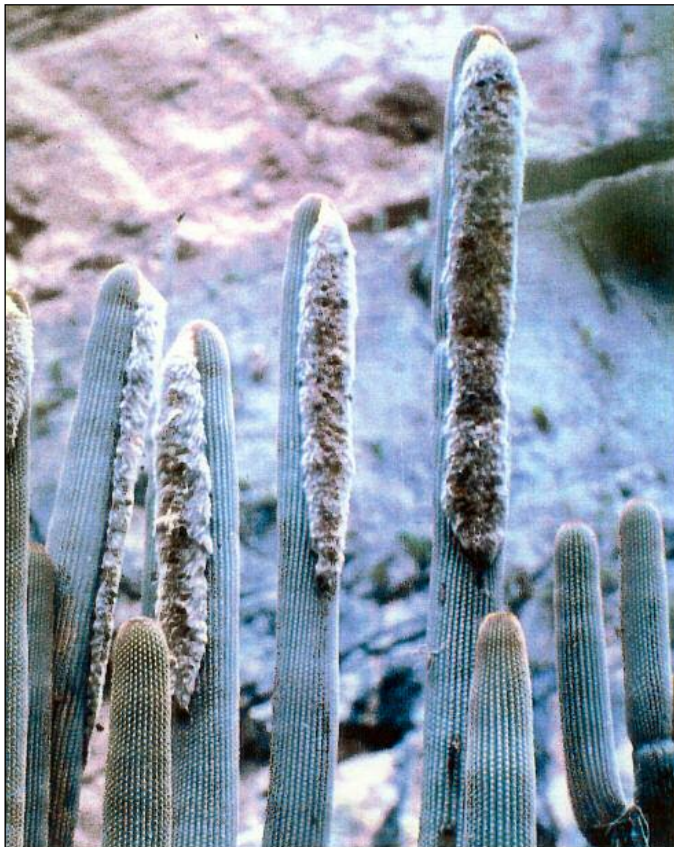
After looking at all my slides, I have found it more difficult than I imagined to describe this plant. I have read many descriptions but it is only when you try it yourself that you appreciate the difficulties. It really does help if the actual plant is in front of you! There are about 20 ribs with areoles having dark brown wool and about 12 spines per areole, all the spines being the same brownish-orange gold colour. These are arranged radially with about three which are slightly longer and project outwards a little. There are no hairs or bristles at the areoles. The single main trunk had longer and stronger grey coloured spines. The cephalium has golden hairs, but no flowers were seen. All the plants seen were very similar indeed in their characteristics and there did not appear to be much variation. The height and structure of these plants closely matched the *Espostoa* "calva" we had seen in the Utcubamba valley. But these latter *Espostoa* "calva" are immediately distinguishable from the golden-spined plants seen on the descent to Balsas, which is the same plant as Lau



Espostoa calva,
Chanchillos, Rio Maranon



Espostoa calva,
Chanchillos, Rio Maranon



Espostoa sp. Utcubamba
Rio Utcubamba

Photos:P.Hoxey

219. The population of golden spined plants which we found whilst making our descent to the R. Marañon at Balsas is most certainly isolated from the E. "calva" along the R. Utcubamba by the high mountains. It may be that Ritter described the golden spined plant as *Espostoa calva* and the name is misapplied to the *Espostoa* seen along the Utcubamba valley where it is far more abundant.

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

Espostoa - In almost all species the lower part of the areoles produce long white hairs, very crinkly woolly to very straight; in many species they are poorly developed, only in *Espostoa calva* are they completely absent.

The most characteristic feature is the side cephalium which develops from the crown, usually one-sided, so that several adjacent ribs as well as the plant tissue below them are very reduced in growth compared to the rest of the plant, so that it forms a deep, wide, one-sided groove in the branches, which goes down close to the central axis [vascular bundle?] of the branches. In contrast to this reduction, the flower bearing part of the areole enlarges, whilst the lower spine-bearing part always becomes more reduced until it ceases altogether; and also the areoles are lined up very close together, so that the areole wool forms collectively a thick mat, which projects forward several mm on account of its elongation. In *Espostoa calva* the reduced spine-bearing part of the areole is still maintained, with soft bristles; in *E. mirabilis* it is still further reduced, whilst in other *Espostoa* spp. it appears to be completely eliminated.

.....from H. Middleditch

In Ritter's Kakteen in Südamerika he appears to provide descriptions for all known *Espostoa* from Peru; would a summary of these species names provide an indication of a possible identification for the golden-spined plant seen by P. Hoxey above Balsas?

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

Espostoa calva, east of Balsas; *Espostoa haagei* = *E. melanostele*, western slopes of Andes above the coast; *Espostoa huanucoensis*, from Huanuco, headwaters of R. Huallaga; *Espostoa hylea*, from Magdalena, near Bagua; *Espostoa lanata*, distribution from Huancabamba as far as half way to Cajamarca; *Espostoa lanianuligera*, from Puente Crisnejas, upstream from Balsas; *Espostoa mirabilis*, from Balsas; *Espostoa nana*, from Huallanca, R. Santa valley; *Espostoa ritteri*, from Bellavista, a short way downstream from Corral Quemado; *Espostoa ruficeps*, from Rahuapampa in the upper reaches of the R. Marañon; *E. superba*, from Jaen

.....from H. Middleditch

Ritter indicates that *Espostoa lanata* is to be found growing over an area extending "from Huancabamba southwards at least half way to Cajamarca". The area covered by this description would not take *E. lanata* as far as Balsas, so it is a little peculiar to find that Ritter states that his *Espostoa calva* was found "east of Balsas at ca. 1800-2400 m altitude, at a somewhat higher altitude than the *Espostoa lanata* which likewise still occurs there". And no mention at this place in his text of his FR 670 *Espostoa mirabilis* for which the type location is Balsas.

.....from P. Hoxey

On the second day of our trek near Chanchillo, we were following a trail around the mountain at about 2100m altitude. We saw a few more plants of *Espostoa calva* as well as other *Espostoa* with white hair, white cephalium, and mainly white spines, which we noted as *E. lanata*. We did not see these two sorts growing side by side and nor did we see any sign of hybridisation.

.....from H. Middleditch

There is no record of Ritter having travelled in the Utcubamba valley, but that does not mean he never travelled there. The Ritter location for *E. calva* "east of Balsas" would seem to be a match for the location of the golden-spined *Espostoa* seen by P. Hoxey; how is it described by Ritter?

ESPOSTOA CALVA From F. Ritter, Kakteen in Südamerika

Tree 4-9 m tall (attains the greatest height of all *Espostoa* spp.) branching closely above ground level [from?] up to 2 m above the base, up to 2 to 6 m above the ground; branches rising parallel, up to 30 and more to the one tree, green to somewhat bluish-green, 6-9cm thick.

Ribs 19-23, 5-7 mm high, somewhat three sided in cross section, blunt crown, somewhat crenate up to 1-2 mm, separating grooves narrow.

Areoles dark reddish brown, later becoming dark grey, rounded or oval, 2-2.5 mm long, extending down in the notch or half into the notch, 4-5 mm apart.

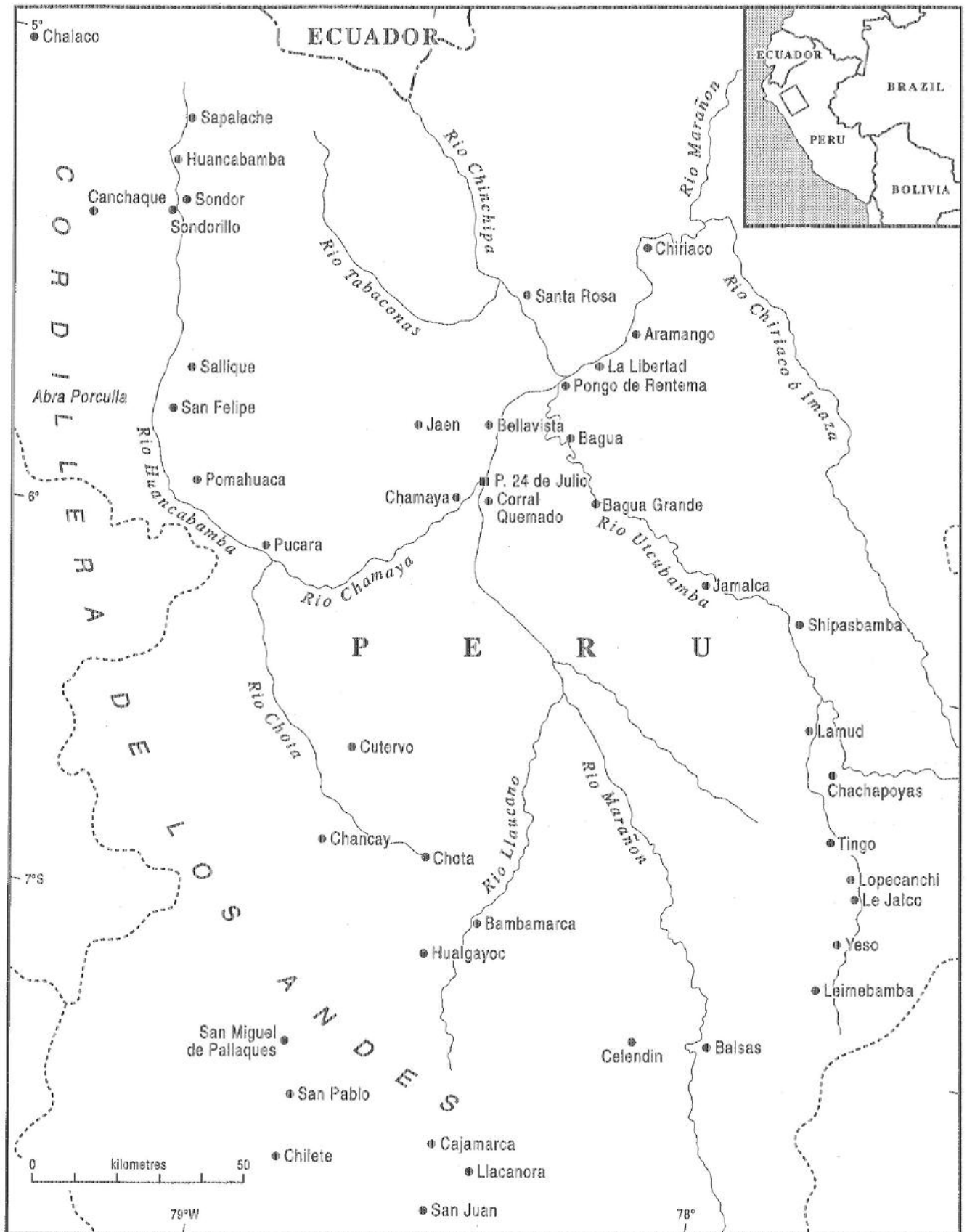
Spines slender needle-like, golden yellow, ca. 4-8 mm long, about 12-18, of which only few are central spines, of which the lowermost is sometimes a little longer and thicker; no hair other than the short areole wool.

Cephalium formed only on old plants about 4-6m high; they are on the side facing the sun and can become 2-3 m long, are unbroken, and take in 6-8 ribs, which are very flattened and sunken into the stem; the cephalium groove approaches half or three-quarter the way towards the central axis. Cephalium areoles lined up close together and enlarged to over 5 mm diameter, densely furnished with yellowish felt becoming white on the outside, of just 3-4 mm long silky hairs. The flower-bearing part of the areole is enlarged at the expense of the lower spine-bearing part, which is still 2 mm diameter and is furnished with short wool-felt and soft straight golden yellow bristles of 2-3 cm in length.

.....from P. Hoxey

From this description, together with the location quoted by Ritter, it would now seem that the tall golden spined *Espostoa* which we saw on the descent to Balsas was indeed *E. calva*. This was at an altitude of about

NORTHERN PERU



2000 - 2200m, in a thicket where the vegetation was quite dense, so dense that we could see no ground which would be exposed to the sun. Because the bushes and other vegetation were so dense it was difficult to penetrate into the thicket. There were no other cacti to be seen at this stopping point.

.....from M.Williams

We only saw what we took at the time to be *E.calva* after we had crossed the watershed between the Marañon and Utcubamba valleys and gone beyond Leimabamba, heading down the Utcubamba valley. Our first sighting was at about 1930m and these *Espostoa* were to be seen here and there as we went on towards Chachapoyas, then more abundantly. Indeed we must have seen many thousands of these plants as we travelled down the valley. It was clearly very successful and quite commonplace. They were quite tall plants, with branching occurring from a trunk. They were often growing among trees, whilst the trees themselves were often hung with spanish moss and bromeliads. Further down the Utcubamba valley, below Chachapoyas, the *Espostoa* became more infrequent whilst *Browningia* became common. At 1500m we were really down into the tropical forest with *Rauhocereus* and *Armatocereus*, with still quite some distance to go before we came back to the Marañon valley again.

We were able to remove a top cut from one of these *Espostoa* in order to examine it more closely. It was 6 cm thick, the epidermis British racing green in colour, with 20-22 ribs, with areoles at 8 to 10mm spacing. New spination honey coloured with 9-11 very short radials ca.3 mm long, together with 1 or 2 marginally longer and often indistinguishable central spines which had a tendency to point downwards at about 45°. Most significantly there was absolutely no evidence of hair, wool, or bristles.

.....from G.Charles

After we left Leimabamba the road was descending into the Utcubamba valley. The bushes became taller and quite soon we were going through surroundings covered with tall trees. Then we started to see the tall *Espostoa* which we took to be *E.calva*, standing out above the trees. As we went further down the valley we must have seen thousands of *Espostoa* growing among the trees. We made a stop and had to force our way through the thicket in order to get close to one of these *Espostoa*. The ground was wet from recent rain. These *Espostoa* had areoles lacking any hairs which suggested the name *calva*, but it now seems that they are not quite the same as the *Espostoa calva* described by Ritter from the mountainside above Balsas.

I have grown the plant we saw in the Utcubamba valley from KK 282 seed some years ago, that came as *Trixanthocereus jelinkyanus* from the Utcubamba valley. The same plant came from the seed offered by DeHerdt in 1969 as *Espostoa* sp. Utcubamba which I assume was habitat collected. With their areoles having a complete absence of hair, they looked very similar to *Weberbauerocereus* seedlings.

When Lau visited the location near Chanchillo described by P.Hoxey, he evidently sent at least one top cutting off these *Espostoa* to De Herdt - in the early 1970's I photographed one of these plants which had become established in De Herdt's nursery. Presumably it was from seed off these plants in cultivation which De Herdt subsequently offered seedlings of "*Thrixanthocereus* sp.n. de Amazonas with dense dark-goldenyellow spines" in his plant list of 1973. I later bought one of these from DeHerdt at his nursery which he called *Espostoa calva* and is now about a half metre high. It looks just like the plants in my picture taken at DeHerdt's and P.Hoxey says it looks like the plants he saw near Chanchillo when he was with Lau.

.....from P.Hoxey

It must be some fifteen years ago that I acquired a small plant of *Espostoa jelinkyanus* at a cactus jumble sale. It is now just under two feet high and two inches thick; I am now quite certain that it will grow up to be like the *Espostoa* we saw in the Utcubamba valley.

.....from A.Lau, In Search of Cacti, N.C.S.S.Jnl Vol.27 (Abstracts)

From Jaen we decided to take the road to Chachapoyas and from there, on to Leimabamba and Balsas. There were high cliffs in the Utcubamba river gorge, but we only stayed on the road. As we headed for Leimabamba there were many beautiful *Espostoas* with very short and fine spines and a thick, light grey cephalium. Although I could not find it described anywhere at the time, I was sure that it must be a known species - who could believe that a plant that surrounds the capital city of Amazonas [Chachapoyas] would be unknown? Years later I found that K.Knize had described it as *Espostoa baumannii*.

From Leimabamba we climbed on and on up a narrow winding road - and then, far below, we saw a narrow glistening band - the Marañon river. As we went steadily downhill it became very warm. We passed small side canyons which were overgrown with trees. One expects to find cacti in exposed and rocky places but here was the most stately of *Espostoas*. Many of the plants were 20 ft. high, with golden cephalia and very short, dark yellow spines adorning the tops of the long stems. Once more this was a species I did not know. Often we could see only the tops of the stems protruding into the sky from among trees and shrubs. As it was impossible to reach the tops, I was unable to collect cuttings, but from the fruits, which were deep-seated and hard to reach, I secured a few seeds.

.....from G.Charles

Looking at the photograph taken by P.Hoxey on the descent to Balsas, of the golden spined *Espostoa* with the golden cephalium, I accept that it is really not the same as the *Espostoa* in the Utcubamba valley, where the cephalium was of a grey white colour. Indeed, the difference is shown by the difference between my plants of *E.calva* ex de Herdt and the *jelinkyanus* ex KK seed, which presumably originated respectively in the Marañon and Utcubamba valleys.

.....from P.Hoxey

By comparison with the golden colour of the cephalium on *E.calva*, the cephalium on the *Espostoa* in the Utcubamba valley was a greyish-white colour. But on some of the larger cephalia it was more of dirty brown colour, possibly due to the brown colouration being leached out from the dead flower remains by the rains.

The Utcubamba *Espostoa* had a single trunk and then branching, the branches rising vertically, attaining up to about 8 m in height. With 26 to 28 ribs, white areoles about 3 mm x 2mm and 5-6 mm apart, with about 14 very short (3-4 mm long) spines, brown in colour, and soft - one member of our party actually managed to climb a short way up the trunk of one of these plants, and that was without wearing any gloves. The stems and branches which had not yet produced a cephalium had some hair right in the growing point, which seemed a little unusual.

The colour of the cephalium, the spine colour, and the areole colour differ on the Utcubamba *Espostoa* from the Ritter description of *E.calva*. In addition, the seed collected from the Utcubamba *Espostoa* are 2 x 1 mm in size, whilst the seed from the golden spined plant is noticeably smaller at 1.5 x 1 mm. If I get germination then I will know if viable seed is being compared with viable seed.

My *Thrixanthocereus jelinkyanus* has 21 ribs, with white areoles about 2 mm x 2 mm and 6 mm apart, with 16 spines per areole, 3 mm long, brown near the growing point, going a light grey-brown lower down the stem. There are a few white hairs per areole, up to 5 mm long and there is an occasional spine up to 15 mm long. Having now had an opportunity to view the ex-De Herdt plant of sp.*Utcubamba* grown by G.Charles, I can say that it is the same as my *jelinkyanus* - and certainly the same as our Utcubamba *Espostoa*.

Some comments have been received from T.Mace, as follows:

"I have in fact three plants possibly referable to *E.calva*. They all came from De Herdt as seedlings, I understand grown from seed collected from cephalia of habitat top cuttings he had received. Two were called *Espostoa* sp. de Amazonas and the other spec. de Utcubamba. They were similar as seedlings having some similarity to *Thrixanthocereus mirabilis* (long spines at the basal areoles but only shorter spines on the more mature growth). The sp. de Utcubamba has a dull matt grey-green body and dull brown spines. The sp. de Amazonas has a brighter green body and more golden spines. One of the two is getting on for 3m and the other about 2.4m high. The larger has two heads with cephalia, the other none as yet. Last year one of the cephalia produced about twenty flowers over a period of two to three weeks. The flowers strike me as rather small compared with those say on *E.lanata*. The sp. de Utcubamba seems to be especially susceptible to winter cold with the result that it is still only about 50 cm tall. The two different sorts are easily distinguished and could be different species."

The *E.Amazonas* is, I believe, *E.calva*. The description of the body colour is interesting and ties in exactly with what I have seen. The cold susceptibility of *E.sp.Utcubamba* makes sense as we saw this plant at 1600m compared to over 2000m for the *E.calva* with the golden spines. I must be lucky with my clone of sp. *Utcubamba* as it has survived temperatures down to 5°C every winter without marking but perhaps that is why it is so slow growing for me.

.....from H.Middleditch

Very fortunately it is now apparent that the Lau abstract on this page 20, i.e. unable to reach the tops, is not the DeHerdt *Espostoa* de Amazonas.

A reference is made by T.Mace (above) to "long spines at the basal areoles" on the *Espostoa* originating from the Utcubamba valley and on the *Espostoa* from above Balsas = Sp. Amazonas. This is a feature which might be considered typical of those plants traditionally classed as *Thrixanthocereus*.

.....from G.Charles

Yes indeed one would expect to see long hairs at the basal areoles of *Thrixanthocereus blossfeldiorum*, *T.senilis*, or *T.cullmannianus*. These long hairs are also very evident on the basal areoles of *Espostoa mirabilis*. But I do not associate them with the *Espostoa* which we saw in the Utcubamba valley. My young plants of both *E.calva* or of *T.jelinkyanus* are now a good two feet or so tall but neither of them are displaying any sign of long hairs from the basal areoles,

.....from P.Hoxey

Neither on the *E.calva* which we saw to the east of Balsas, nor the *Espostoa* seen in the Utcubamba valley, displayed any long hairs at the basal areoles, that I can recollect. Nor are there any on my own ex-KK *jelinkyanus*. It is also rather surprising that one of the sp. Amazonas (= *E.calva*) grown by T.Mace has produced a cephalium when it is not yet quite 3m high. When I stood next to the *E.calva* in Peru, and stretched up, I could not reach even close to the base of the cephalium, and I am over six foot in height. I would estimate that the stems on these plants had to be about 4m high before they produced a cephalium.

.....from H.Middleditch

In addition to the golden spined *Espostoa calva* seen by P.Hoxey on the slopes to the east of Balsas, and the *Espostoa lanata* growing at a lower level than the *Espostoa calva*, the FR records also tell us that there are: FR 670 *Espostopa mirabilis*, Balsas and FR 660a *Espostoa lanianuligera* v., at 1700m above Balsas to the east. Were these different sorts seen by those of our members who crossed the Marañon river at Balsas?

.....from M.Williams

During our visit to Peru in April 1998 we had the advantage of being accompanied by C.Ostolaza, who was fairly familiar with the plants which could be seen along the greater part of our route. This was exemplified after we had made an overnight stop at Celendin and on the following day we crossed a pass at 3085m, and then followed a winding road down to Balsas. We were told by C.Ostolaza that we should make a stop on the ascent of the eastern side of the valley, and he told us just where we should stop in order to be able to look at two very old plants of *Calymanthium* fertile. Without his guidance it is most unlikely that we would have been able to find these particular plants. There was no sign of any regeneration of the *Calymanthium* at this location. But at about 400m further up on the ascent we stopped to find *Lasiocereus fulvus* and there we were able to see a surprisingly large number of *Calymanthium*; they were roughly 80 feet above the road on a very steep mountain side, so that we could not climb up in order to look at them more closely.

After leaving Celendin we made a stop on the descent to Balsas, at 1530m, then another stop shortly

before reaching Balsas, now at 1000m, and a third stop was made in order to see the two *Calymanthium* at 1270m on the ascent of the eastern side of the valley. At each of these three places we saw some *Espostoa* which all displayed the same mode of growth. These *Espostoa* would be about 2m high, branching from ground level and only by exception from some way above the base, so forming a bush-like shape. My recollection is of their growing clear of any trees or bushes and certainly it was not a case of seeing only the tops of the stems projecting out above any bushes. It was possible, with care, to pick places where you could walk between the bushes and round the *Espostoa*. We recorded them as *Espostoa mirabilis* as their overall appearance was quite a good match for Ritter's description of this species.

.....from P.Hoxey

After stopping to look at the golden spined *Espostoa* we went further down the road towards Balsas, making another stop at 1350 m where we saw some plants of *Espostoa* which Alfred Lau called *Espostoa ritteri*, but I have recorded them as *E.mirabilis*. From Balsas we took the road going south which follows the line of the Marañon valley, to Bolivar. We stopped at five different places along this road at each of which we recorded the presence of *Espostoa mirabilis*. These plants displayed a very similar sort of appearance wherever we stopped to look at them. Compared with the *Espostoa lanata* that we had seen further north in Peru, the *E.mirabilis* were much shorter, being about 2m tall, although some might possibly have approached 3m high. It was quite easy to stand besides them and pick fruit out of the cephalium. There was no real trunk to these plants as they branched from the base, and also from part way up the stems, although that may have been brought about by stoppage of the growing point. The gingery cephalium was about two feet in length. There was very sparse hair at the areoles, which is what suggested to me that these *Espostoa* were *mirabilis*. On some of the branches there were quite longish central spines. At the places where these plants grew, the overall impression was of a dry vegetation. There were usually bushes growing in company with these *Espostoa*, but they did not form a dense vegetation.

Going south out of Balsas, the road followed a ledge roughly a stone's throw from the river for several km and then gradually started to climb diagonally up the side of the valley. When we were better than half way to Bolivar we made a stop at about 1250m where there was a veritable thicket of *Espostoa mirabilis*, and even one or two taller trees.

.....from M.Williams

Where we stopped on the ascent from Balsas on the east side of the Marañon, at 1700m, we found an *Espostoa* which displayed a rather different mode of growth compared with the *Espostoa mirabilis* that we had seen at the lower altitude, and we felt that it was a reasonable match for *Espostoa ritteri*. Certainly we saw no *Espostoa* on this ascent which resembled the picture taken by P.Hoxey, which is an *Espostoa* that does not appear to have any hair at the areoles and so would be called *E.calva*.

.....from H.Middleditch

So why should Alfred Lau called the *Espostoa* above and to the east of Balsas, *E.ritteri*; and why should M.Williams also call it *E.ritteri*, when *E.ritteri* reputedly comes from Bellavista, not far from Jaen, in the north of Peru?

.....from G.Charles

Yes indeed I would confirm that when we crossed the Marañon river at Balsas, the *Espostoa* which we saw at the lower altitudes were to my mind certainly *E.mirabilis*. The *Espostoa* which we saw at a higher altitude on our ascent to the east was indeed initially thought to be *E.ritteri*, but it now seems to me that this is much more likely to be *E.lanata*, which Ritter does mention from this location. In regard to the FR 660a *E.lanianuligera* reported from Balsas by Ritter, it seems to me to be very difficult to draw any clear distinction between this species and *Espostoa lanata*. It is quite probable that *E.lanata* will occur from Huancabamba southwards along the Marañon valley as far as - and perhaps even beyond - Puente Crisnejas.

Hence at Balsas we have a situation where there is an altitudinal division between two species of *Espostoa*, *E.mirabilis* occupies the hot, dry lower parts of the valley and *E.lanata* is to be found at a higher altitude.

We were getting a little pressed for time as we ascended out of the valley from Balsas because we needed to be over the pass and down into the Utcubamba valley for our overnight stop, so we did not see the golden spined plant reported by P.Hoxey. But it does seem to be a good match for Ritter's description of *E.calva*.

.....from H.Middleditch

It is suggested here by G.Charles that there was an altitudinal zoning of *Espostoa* spp. on the climb out of Balsas to the east. Is this idea supported in any way by an altitudinal zoning of the general vegetation in the Marañon valley?

THE PLANT WORLD OF THE PERUVIAN ANDES By A.Weberbauer 1911 **Abstracts translated by H.Middleditch from Die Vegetation der Erde Vol.XII.**

The interandine area comprises the country between the eastern and western slopes of the Andes. Within this area the Marañon valley is that most deeply entrenched. Near Balsas the bed of the river lies at about 900m above sea level, hemmed in between steep mountainsides rising up to over 3000m. Along these mountainsides run the boundaries of four vegetation regions at about 1500m, at around 2500 to 2600m, and at around 3400 to 3600m. The climate of the valley zones to be considered here is also characterised by a scanty but apparently regular summer rainfall.

In the lowermost vegetation region an open xerophytic formation is to be seen, consisting of cacti, *Fourcroya*, desert shrubs, and small trees of the genus *Bombax* which are green in the rainy season, whilst on

the river banks there is an evergreen thicket of bushes of the coastal types. Between 1500 and 2500/2600m, a grass steppe which is green in the rainy season alternates with steppe-like thickets that are half evergreen, half rainy-season green. Then up to 3400 or 3600m there grows a less variable grass steppe with evergreen bushes of the Ceja character. Finally there extends over the peaks and ridges the true grass steppe of the Jalca.

The following descriptions are based upon observations made by the author in the Marañon valley between 6°35'S and 6°50'S and specifically near the Tupen ford at 800m and Balsas at 920m. This zone extends upwards to 1500m. Of the characteristic plants of this zone, there are many of those detailed by Humboldt and by Raimondi both at Bellavista at 441m and at Tomependa at 403m. At those places however, the valley is already broader and less enclosed. The height of the surrounding mountains has appreciably diminished and the Marañon maintains a flow which is adequate for navigation. It therefore appears to be possible that east andine tropical plants advance as far as into that area. According to Bruning 1905 the forest vegetation of the Hylea - with palms, etc., - commences more or less below the confluence with the Chinchipe at around 5°20'S.

The evergreen thickets on the river banks stand out sharply from their surroundings in the Marañon valley, just as they do in the coastal zone. Beyond these, however, on the stony to rocky mountain sides of the valley, may be seen the patchwork vegetation cover of a semi-desert, thickets with varied components, made up of rainy-green bushes and dwarf trees, xerophilic bromeliads, *Fourcroya*, numerous cacti, some other succulents and few deciduous herbs. The large number of cacti in particular as well as the low individual numbers of the herbs particularly attract attention as the essential distinction from the adjacent related formations of the mountainous zone between the Marañon and the western slopes of the Andes.

[There follows a list of specific plant names for this lower zone up to 1500m, including: *Tillandsia* spp., *Bromeliad* and *Puya* spp., *Cereus* spp., *Pilocereus* spp., *Cephalocereus* spp., & *Melocactus* spp.]

The Marañon valley vegetation zone between 1500m and 2500-2600m, comprising grass steppe and bush steppe.

The grass steppe, more especially on the eastern valley side, attains a very great extent and over wide stretches remains well-nigh free of other intrusive components. To the latter belong the bushes [various spp. listed] in addition to the succulents *Cotyledon weberbaueri* and *Echinocactus* spp.

Groups of bushes forming steppe like thickets stand apart from one another separated by grasses and shrubs; over them rises an occasional 20m tall tree. Some epiphytes such as lichens and mosses, *Tillandsias* and orchids, colonize the stems and branches of the thickets. Most of the bushes and trees lose their leaves completely in the dry season. The "yarabisco", *Jacaranda acutifolia*, seems to open its lilac coloured flowers at the time when the leaves begin to fall, and other components of these steppe-like thickets also appear to follow suite. The *anona cherimolia*, well known as a tropical fruit plant, grows here in the wild form - the stem and branches can attain a thickness of half a metre and tend to grow horizontally close to the ground.

In the Utcubamba valley, there is a comparable vegetation formation between 1600 and 2500-2600m. At about 2000m altitude, below Leimabamba, there is the typical grass steppe formation. More frequent than a true grass steppe is a mixture predominantly of grasses and bushes from the bush-steppe formation, whereby both formations overlap one another. The bush-steppe formation displays a predominance of thickets. At the bottom of the valley there are some trees to be seen here and there, but generally only dwarf forms predominate. Below 1800m, individual *Cereus* spp. intermingle among the bushes. Bromeliads and epiphytic *Tillandsias* are to be seen.

On the banks of the Utcubamba river there is a strip of evergreen woodland which is taller and richer in components than in the narrow valley of the Marañon. This may be seen above all in the greater number and height of the trees; all other components are overshadowed by *Ochroma lagopus*, the huge palo de balsa, whose wood serves for boat building. The bamboo *Gynerium sagittatum* which is already rare at about 900m in the Marañon valley extends here up to nearly 1700m. Everywhere on the tree branches hang long strands of the epiphytic *Tillandia usneoides*.

.....from H.Middleditch

This account by Weberbauer describing a parallel series of vegetation zones along the sides of the Marañon valley would indeed fully support the idea put forward (above) by G.Charles that altitude is the controlling factor that determines which species of *Espositoa* grows where in the Marañon valley.

.....from C.Roots, Tropical Birds 1971

The tropical mountains show a great diversity of bird life, ranging from the many species inhabiting the luxuriant jungles on the lower slopes to the sparse populations of the high alpine regions. Below 1000m is considered to be lowland forest, but the altitudinal zones are seldom clear-cut boundaries that form barriers to the avifauna, but blend into each other with recessions on either side. On the slopes of the highest mountains there has been telescoped a complete range of vegetation from the sparse lichen of the polar regions to the luxuriant jungles of the tropics, all within a space of perhaps 10 miles. In each zone there is a marked difference in temperature, rainfall, and vegetation.

Apart from the seasonal migration of some species, the avifauna of the mountain slopes is adapted to the conditions prevailing in its chosen habitat, and does not wander into the adjacent zonal habitats. Characteristic species of the subtropical zone 1500 - 2400m are unlikely to occur in the temperate zone at an altitude of 3000m, and visa versa. In addition, the temperature and vegetation - or lack of it - of extensive mountain ranges forms a barrier which prevents the movement of species from one side of the range to the other. Likewise where there are adjoining ranges the dividing lowlands also form an effective barrier for the temperate zone and higher altitude species. The result is that subspecies evolve.

.....from H.Middleditch

The diagram accompanying the foregoing text indicates: Tropical zone up to 1500m, Subtropical zone 1500 to 2400m, Temperate zone 2400 to 3000m. These altitudinal divisions are remarkably close to those indicated quite independently by Weberbauer.

.....from G.Charles

The pass over the dividing range between the Marañon and Utucubamba valleys was at well over 3000m and it was indeed decidedly cold there, with surroundings that I would be inclined to describe as almost Alpine.

.....from F.Vandenbroeck

I remember very well from my 1996 trip the pass over to Chacapoyas from Balsas, and in 1981 I came down into Balsas over the pass above Celendin. These trips down into the bottom of the Marañon gorge are among my most beautiful experiences. From a phytogeographic point of view the area is highly interesting because, within the gorge, a great number of different vegetation zones can be seen. Near the pass over to Chacapoyas there is a cold and extremely damp, foggy area with an opulent vegetation. The fog forest originally existing here, however, has been mostly devastated. As herbaceous plants, great numbers of ferns, composites, and fuchsias can be observed. From this cold humidity one eventually, via different intermediate stages, attains a dry hot cactus area deep down in the valley. Somewhat half way down we searched for the *Matucana krahni* (*calliantha*) but failed to find it. I remember the area we searched as very rough, at places hardly accessible because of the steep rocks and deep crevices.

.....from H.Middleditch

If the birds are effectively prevented from migrating between the 2400m zones in the Marañon and Utucubamba valleys by the dividing range, as might be supposed from the comments made by C.Roots and by F.Vandenbroeck (above) then the bats, moths, butterflies, bees, wasps, flies, ants and beetles are equally likely to be confined to their respective valleys. Hence, there would hardly be any cross-pollination between the *Espositoas* in these two valleys, so admitting the development of two quite different forms - or perhaps species.

CERRO ACAHAY- A PRODUCTIVE TRIP By A.Arzberger Translated by H.Middleditch from Internoto 14.4.1993

My first trip to the legendary Cerro Acahay was a unique experience, which I will now present in a travelogue. The massif of the Cerro Acahay had already attracted my attention for a long time, especially because I was already acquainted with references to it in the literature and advice from A.M.Friedrich.

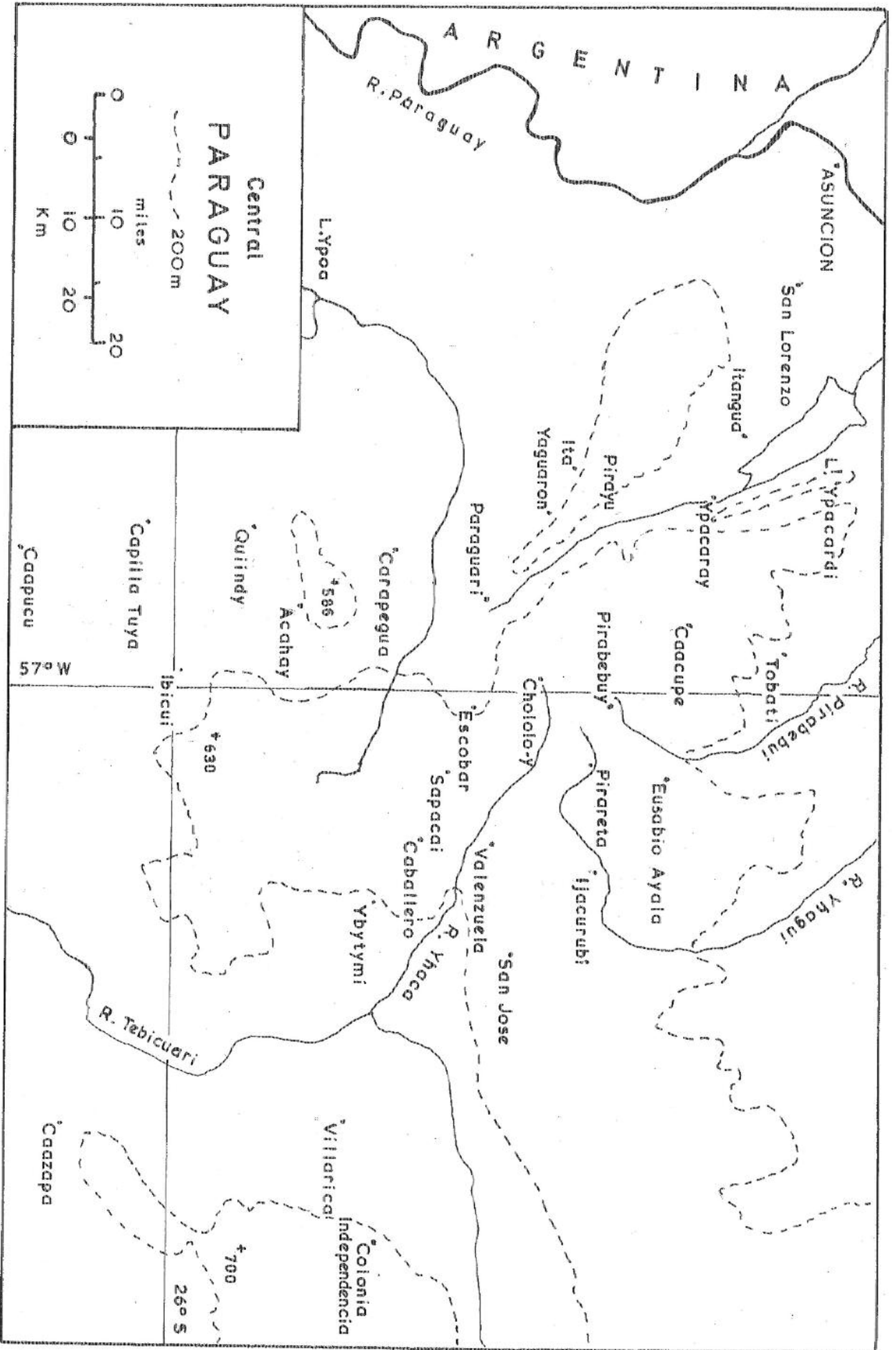
After the decision was made the trip was quickly prepared for. Together with my friend I set off at 5.30 in the morning by omnibus down ruta 1 to the south, via Carapegua, in the direction of Acahay. The weather was overcast and close, as almost always in the paraguayan summer. We got out of the bus when we were 4 km from Acahay in order to cover the rest of the way to the mountain on foot. Despite the heavy rucksack the couple of kilometres to the mountain appeared to pose no problem to us. The weather suddenly proved however to be anything but settled and the summer heat came to an end in a thunderstorm. A large mango tree provided us with some degree of shelter against the cold lashing rain, but only for a while. The rain came to a stop again and we sought for shelter in someone's dwelling. By that time we were soaked to the skin, but finally we found a house at the foot of the mountain. There at a wood stove in the kitchen we could get ourselves warm again and dry our clothing. Finally we were allowed to taste grandmother's homemade herbal liqueur and it was really agreeable. On being asked what we were looking for on the mountain, we explained our interest in the cacti and how we naturally sought after a thorough understanding of them. How could anyone but a pair of disreputable looking creatures undertake such an excursion and come from Asuncion specially for that reason? Well, who knows? Perhaps the story about the spiny plants was only a pretence and we were in reality interested in searching for gold, or so the man imagined. There was a legend of a rich vein of gold on the mountain peak!

As midday came round the weather became brighter again and we resolved to defer the ascent to the next day. It is not only unpleasant to push through dripping wet bushes, but in addition the ground would still be very slippery.

We went back again to the main road and straight away caught the last bus to Acahay. Naturally there was no hotel in such a small place, but instead a small pension, where it was possible to obtain a room. Breakfast next day was rustic and simple. To judge by the map, it would be best if we set off directly from Acahay to the mountain, instead of making a diversion around the main road with the bus. According to a few comments from the locals this direct route should be "somewhat damp" but passable. So the trek started off. According to the map it should be 7 km to the mountain, no real problem. The weather was sunny with a moderate south wind and hence agreeably fresh.

As we progressed the track split up and became narrower, so that we had difficulty in following the path. Despite that we kept our direction without difficulty, since we always had the mountain massif in view. After about 5 km it became really wet. Wet was not the right description; it was a swamp! Part of the time we had to wade knee-deep through water, without wellingtons of course, as if we had left our wits at home. After all, who thinks of such things for mountaineering? Now something bit me on the leg - it was a leech! Now we hurried forward, so rapidly as we had never crossed a swamp before.

Finally there was no more of it. We had already reached the foot of the mountain. Now there was only a stream to cross. In the original manner an old tree trunk served as a bridge. My friend first wished to demonstrate his skill, but lost his footing straight away and brought himself upright once again on a liana.



After ten minutes we were then really at the foot of the mountain and started the ascent. On account of the open woodland the progress was a pleasure. Here and there we found a ground orchid among the leaves. Cacti were still sparse here, only scattered tree-like *Brasiliopuntia brasiliensis* and a long-stemmed *Monvillea* species. The higher we ascended the rockier became the ground and the lower and denser the woodland. Occasionally the thickets were so impenetrable that we had to fight our way through by the metre with a machete. In doing this we were particularly careful not to get hold of any *Jatropha* with a hand, since they are so to speak the South American stinging nettle. In the somewhat more open places the cacti become very abundant and form dense, ground covering scrub, with *Cleistocactus baumannii*, *Monvillea*, *Opuntia* sp., *Cereus* sp., etc. Interesting was the discovery of a rosette-like succulent which looked like an *Echeveria* and another with a succulent tuber, similar to a *Reichsteineria*. Here and there we had great difficulty in getting through these cactus thickets, in particular we had stops to shorten the cacti with the machete. But much worse were the thorny bromeliads (*Aechmeas*) which made themselves very evident through the trousers of my friends, who unwisely had no jeans to put on.

We climbed steadily higher, but of *Eriocacti* there was still nothing to be seen. Had we misled ourselves and climbed up the wrong side? The boulder strewn slope appeared from below to be so close, perhaps we had already gone past where we were supposed to be? Finally we came to a 5 m high cliff. Two green iguanas rapidly took refuge in clefts in the rock. At that I reminded myself that there would be poisonous snakes here and subsequently watched where I put each foot down. It appeared to be really difficult to climb up the rock cliff, so first of all we looked for some way round the cliff. But that proved to be still more difficult, especially as we met up with a bamboo thicket. Even with a machete, a thick grove of iron-hard dwarf bamboo is impenetrable. We even made a wide sweep round them and by good fortune found a slot in the cliff where we were able to scramble up. As I put my head up over the top of the cliff, I let out a whoop of joy, it was quite overwhelming! In front of me on the clearing between the rocks stood hundreds of yellow spined *Eriocacti*. Even an artificial planting could not be more magnificent. We were both completely bowled over by the splendour of these plants and could not satisfy ourselves with taking in the sight. Then I began to take photographs and collect some ripe fruit. The toil of the whole expedition was forgotten at once and I believed it was the finest cactus habitat that I had ever visited. The *Eriocactus* grew mostly in clefts in the rock, where some humus had collected, occasionally even directly on the self-same rocks between bromeliads, moss, and lichen. Very abundant are *Tillandsia* (*T. rupestris*, *T. tenuifolia*), *Dyckias*, and various orchids, which colonised the naked rocks, (*Oncidium*, *Brassavolka*, etc.).

The patch of rock we were examining was not very big, about 2000 square metres. From the top no more such rocky patches could be glimpsed, but the natives afterwards expressed the view that there were a dozen of them. It was just at the time for the seed to be ripe and I was able to collect a quantity of it. However, in spite of that I still found a couple of flowers out, even though the flowering time was already long over and gone. Just as in cultivation, one also finds in habitat the best abundance of flowers in the specimens most exposed to the sun. On specimens in more shaded positions the fruit was very sparse, but those plants are longer, less stout, and more feebly spined. The longest specimen I saw was about one and a half metres long and at the same time only 12 cm thick. At this habitat location I was indeed able to take note of a broad range of variation, but no transition towards *E. nigrispinus* was to be found.

After a good two hours sojourn at this location, and zealous photography, note taking, and seed collecting, I then had in mind inspecting a couple of particularly fine specimens close beside a dried up tree stump. Suddenly there was a buzzing round me and I saw, as a couple of bees emerged from a nest, that I had evidently come rather too close to it. Immediately I thought of the horror stories of the killer bees and started to beat them off with my hat. A steadily increasing number of bees whirred round me and before I could protect myself, two of them stung my arm. To try and run away between the rocks was just not possible, and the situation seemed to be critical. My friend was about 100m away from me and was well aware of my panic but did not dare to get any nearer the swarm of bees. Suddenly I remembered the insect spray. Quickly I jumped to the rucksack and sprayed as much of the stuff as possible over and around me. This cloud of insecticide took effect very promptly and the first bees tumbled down after only a couple of seconds. The fright stayed with me in my limbs for quite a while and my arm began to swell up and ache. But now it was time to return. A couple of small specimens of *Eriocactus* and one or two other interesting plants found a place in the rucksack and the slow descent began. With the extra weight in the rucksack, the spines in the fingers, and the stings in the arm, the descent took much longer than the climb up, but despite everything we had had a unique experience and were very pleased about the discovery. As usual after the descent we came out of the forest at a quite different place and had a fair amount of difficulty in finding the road back.

Obviously we did not want to go back through the swamp to Acahay but more directly towards the main road. Finally we reached the asphalt road and soon saw the bus to Asuncion. It stopped for us despite our dishevelled appearance - dusty, soaked with sweat, scratched and with torn trousers. One is accustomed to such a thing there. During the return journey it also got dark and the fatigue made itself very evident. Despite all the exertion the experience was unique and is not forgotten to day.

.....from R.Chodat & W.Vischer. *La Vegetation du Paraguay*

South eastern Paraguay is a countryside of low hills or of gently undulating plains. It is interrupted in its monotony by a massive mountain group. These mountains are bordered on the southwest by the Cordillera de Los Altos, where the mountain massif attains its greatest height and, in the form of a fault scarp, drops abruptly into the plain below. From the summit of the Cerro San Thomas above this scarp there may be viewed the level plain, grassy, semi-marshy, ribboned by the courses of the two major rivers, the Pirayu and the Mbaei. On the horizon to the west, the elongated profile of the Acahay massif, terminated sharply at both

extremities. In the middle of the level plain arise isolated cones like giant molehills, attaining 200m altitude above the plain.

.....from D.Metzing, At The Chileans' 1990 Weekend

In Paraguay we visited four habitat locations of "Eriocactus": the Cerro Acahay - *Notocactus grossei* (K.Schumann) Bckbg, the Cerro Santa Thomas - *Notocactus amplicostatus* Ritter, Chololo-i and Tobati - *Notocactus nigrispinus* (K.Schumann) Bckbg. In my opinion these are two species: the yellow spined plants are *N. schumannianus*, the more or less dark grey plants are *N.nigrispinus* (or a variety, if you prefer). At the habitat localities I noticed a difference in the nature of the habitat: the yellow spined plants are growing on slopes with big boulders of granite, whilst the dark spined ones are growing on plates of sandstone. This is a clear ecological difference. But this has to be a preliminary statement as up to now we have not visited the other habitats of *N.schumannianus* near Villa Rica, or in Misiones (Argentina).

.....from G.Neuhuber

The only Eriocactus I have found was close to San Ignacio, near Posadas, in the province of Misiones, Argentina. The plants are growing there on a vertical wall of about 130 feet high. I was able to get down by rope and take some slides of them.

.....from J.Lambert

On my visit to Argentina in 1986 I entered this country from Brazil, in order to visit the famous waterfalls of Iguazu. From Iguazu, we move southwards, along the main road to Posadas. The subtropical, humid forest harbours but little in the way of cacti. Here and there we discover, with the help of our field glasses, a *Rhipsalis* species high in the crown of the trees, where they are often difficult to distinguish among the much more numerous epiphytic bromeliads. Before reaching Posadas, we visit a well-known spot on the Parana river, at Teyu-Cuara, where a "penion" or large isolated rock rises on the bank of the stream. However, it was a disappointment to us; there were indeed no cacti to be found at the foot of the rock, nor even on the flat crown, which we reached from the back after an exhausting spot of climbing. The cacti were in fact restricted to the absolutely steep front face of the rock. Besides cerioid forms there were also globular ones, which we could identify by means of our field glasses as *Eriocactus schumannianus*. To collect them was out of the question, as this would have required an alpinists equipment.

.....from H.Middleditch

This location at San Ignacio, Posadas, lies part way between the Cerro Acahay and the nearest habitat location for Eriocactus in Rio Grande do Sul.

THE CERRO DE ACAHAY By F.Vandenbroeck

Translated by H.Middleditch from Succulenta 73;1.1994

The Cerro Acahay (in Spanish Cerro signifies mountain) is a surprising phenomenon in view of the mountain formation being in a completely flat area, swampy here and there. The mountain is a well-known habitat of *Eriocactus schumannianus* (Nic.) Bckbg.

For an expedition up the mountain one comes at first to scattered small farms in the type of landscape that is reminiscent of european alpine meadows. The steep sides are heavily overgrown with woodland. With an average annual rainfall of 1450 mm and an average annual temperature of 22°C a luxurious woodland vegetation can develop here. Because we find ourselves here in a transition from subtropics to tropics, certain species of trees are leafless during the cold season. In the midst of these barely penetrable woodlands there occur here and there scattered open spots of rough granite boulders, where a remarkable vegetation has developed. It was the intention to reach these open rocky patches with the aim of finding Eriocactus there.

After a fruitless search we eventually met up with a friendly peasant who lived in a wooden hut among the citrus trees on the flanks of the Cerro Acahay. He knew the plants we were looking for and would lead us towards the growing place on the next day.

Our guide lead us at first towards a thickly wooded area. Descending through luxurious vegetation we reached the course of a small river with clear water, small waterfalls, and tranquil pools. The slope of the opposite side of the valley runs to the north-east and by clambering up there we found among trees and lianas, epiphytic orchids, typical ferns, and *Rhipsalis* sp. The number of xerophytes increased in proportion to the distance we ascended. Mostly they are epyphytes or cacti lying about among the red rocks, such as *Rhipsalis*, *Epiphyllum*, *Lepismium cruciforme* and *Mediocactus coccineus*. *Lepismium cruciforme* is a plant branching from a central growing point with branches that usually have three sharp ribs, set with areoles that carry the striking long greyish-white hair. The plants display small berries at the areoles. *Mediocactus coccineus* looks like a tougher, hardier plant with usually three ribs. The plant grows many meters long and often winds itself around stems and branches of trees. Still higher there appear specimens of *Brasiliopuntia brasiliensis*. The wood now becomes more open and we see open rocky slopes coming nearer. There appears the first specimens of *Monvillea*, slender, twining, and creeping columnar cacti. At the junction of the wood and the rocky patch grows a half lying and creeping *Piptanthocereus*. Here there also occurs the first clumps of *Tillandsia*, lying upon and between the rocks. That also goes for *T.tenuifolia*, a species with fine somewhat soft green leaves, just as the name suggests.

On entering into the open area with boulders, a world of new and strange forms opens up before us; we were confronted with a most remarkable association of plants which differed completely from the vegetation of the surroundings. Almost immediately we found specimens of Eriocactus. The plants struggle among the huge bare boulders and are present in great numbers. The roots of the plants are very long and fine and reach deep between the boulders. This is already noticeable with young plants. Older specimens must possess root

systems over a metre long.

Older plants often form clumps; they offset usually about the middle of the oldest stem. There are now few flower remains and there is almost no more seed to harvest (in July it is the winter season in Paraguay). Some individual plants attain a height of 1.5 metres. The greater part of such plants is weathered. Only the uppermost quarter of the stem is green and exhibits the characteristic spination, whilst the remainder of the stem is weathered bare and often clothed with different sorts of lichen. Very striking is an orange-yellow lichen, which partially envelopes the plants with bristly wreaths.

Eriocactus schumannianus is a plant already known from old. It was described in 1893 by a certain Nicolai under the name *Echinocactus schumannianus* and this on the basis of an imported specimen of barely 7 cm in height by 9 cm in diameter. Later the genus *Eriocactus* was classified with *Notocactus*, so that at present it is often spoken of as a *Notocactus*. The names *Eriocactus grossei* and *E. amplicostatus* probably relate to mere forms or varieties of *E. schumannianus*.

Also with this species is found the slant on the crown of the plants, typical for *Eriocactus*, so that it is facing the sunlight. The areoles in the centre of the crown usually produce copious wool, so that a white woolly head develops.

The yellow green *Eriocacti* contrast magnificently with the darker boulders, still more handsomely do they stand between the greyish-white colonies of *Tillandsia rupestris*. The accompanying vegetation is indeed fascinating. Between and upon the rocks grow the *Tillandsias* already mentioned. Sometimes the *Eriocacti* were encircled by them. Here and there we found groups of the large white felted *Tillandsia decomposita*, which is not only remarkable on account of its imposing size, but at the same time on account of its long curly-edged leaves. Both *Tillandsia* spp. lie rootless on and between the rocks. The small *Tillandsia distichia* rests epiphytically on larger plants, as well as on *Eriocactus*, or attaches itself to the stones.

Of the bromeliads there are everywhere the yellow-flowering clump forming *Dyckia floribunda* and some tube-bromeliads such as *Aechmea polysticha*, which has a large flower stalk with red bracts and blue flowers; and the even larger *Aechmea pulchra*. Of the smaller plants, we found a *Peperomia*, begonias flowering pinkish-white, and tradescantias winding among the rocks. A larger species of orchid bore black capsular fruit. Here and there occurred a bush-like white flowering *Jatropha* with stinging hairs on the leaves. *Monvillea paxtoniana* ventured somewhat further from the course of the margin of the wood and crept over the rocks. Hidden somewhat deeper between the boulders grew a small sort of osmund [fern] with the typical brown spore nodules.

Ecologically these rocky formations appear like islands in the middle of subtropical woodland. Evolution has brought together here a series of life forms which are ideally adapted to these surroundings: sunburnt granite rocks with a great deal of rain but which rapidly flows away, in the shelter of moist surrounding woods. We have a view that extends far over the hazy plain in a north-east direction. On all sides we are surrounded by wooded hills. The vegetation on these rocks survives unharmed in its isolation. A priceless experience in the world of today.

.....from R.Ferryman

My collection includes plants of both *Eriocactus leninghausii* and *E. magnificus*, which certainly flower well. They also set seed without any help from me, producing great quantities of fine, lightweight seed which finds its way all over the place. These plants come up from seed like carbon copies of each other.

.....from N.Gerloff

A great deal of seed is obtained on my plants of *Notocactus leninghausii*, *warasii*, *magnificus*, and *claviceps*. But on the other hand the plants from Paraguay and Argentina, such as *N. schumannianus*, seldom yield any seed. Possibly these are self-sterile and with just one plant in a collection cross-pollination cannot be achieved. I have just photographed my *Notocactus grossei* (= *schumannianus*) at 22.00 hours with the flower still wide open. These plants flower for almost twenty days (or less when kept on a bedroom windowcill) and do not close their flowers at night.

.....from R.Ferryman

My own experience with *N. schumannianus* is exactly the same, as I do not recollect ever getting a single fruit to set on this plant. Similarly my plant of *N. claviceps* does not set fruit.

.....from H.Middleditch

But if this *N. schumannianus* is only the one plant, does that explain why it is disinclined to set fruit - do you have more than one plant of the Brazilian species?

.....from R.Ferryman

Yes indeed I have more than one plant of *N. magnificus* and six of *N. warasii* and. But the *N. magnificus* flowered very late in the season one year when there were no other *Eriocactus* out in flower, but it still set fruit of its own accord. Even when I had more than one plant of *N. schumannianus* I am fairly certain that on some occasions more than one plant would be in flower at the same time, but even then none of them set fruit of their own accord.

.....from N.Gerloff

Yes I do have several specimens of *N. schumannianus* in my own collection. Unfortunately this species is somewhat reluctant to flower. I have to be satisfied if I see flowers on one or two plants in any one year.

.....from R.Ferryman

Certainly *N. schumannianus* is a shy flowerer. I suppose there will be four or five flowers on my *N. magnificus* for every flower that appears on *N. schumannianus*.

.....from J.Arnold

Although I have not made a point of checking that flowers on my *Eriocactus* do stop open day and night,

but from the various times of day, as well as in darkness, when I have seen the flowers open I would be inclined to believe that once the flowers open, they do stay open without closing up, until they finally wither. On my *Notocactus magnificus* I am fairly sure that the flowers do stay open for a full week and quite possibly for an even longer period of time. The two plants of this species have not previously flowered at the same time, which may perhaps explain why no seed has been set on them. I have only one plant of *N. warasii*, which does flower, but again does not set seed of its own accord.

.....from D.W.Whiteley

My *Eriocactus* were kept in a greenhouse which is unheated over winter; in order to provide added protection from the cold, I lay sheets of newspaper or polythene over the top of the plants at the coldest times. *Eriocactus leninghausii* seems to grow well under these conditions, but *schumannianus*, *warasii*, and *claviceps*, all suffered with cold marking so that now they have to be brought indoors over winter. Many years ago I had a plant of *E. leninghausii* which would produce a ring of flowers round the crown, all open at the same time; the plant of this sort which I am growing now is about 18 inches tall but it only puts out one or two flowers at a time. A different plant with a different flowering routine, perhaps? *Eriocactus schumannianus* will set fruit most years of its own accord, but this might easily be brought about by insects flitting from flower to flower between one plant and another, in the greenhouse.

....from G.R.Allcock

In describing his trip to the Cerro Acahay, Arzberger says that it was undertaken during the Paraguayan summer. And yet he also speaks of being caught in a thunderstorm and "cold lashing rain". It seems to be rather odd that cold rain should occur in a tropical country

.....from Exploration Fawcett, by P.H.Fawcett

Where the Beni and Madre de Dios rivers join, there is a width of 500 yards from shore to shore. Riberalta, standing at the confluence, was almost a town, for the palm-leaf huts were arranged in blocks, and a few roofs were covered with rusty corrugated iron. Situated almost in the heart of the continent, Riberalta is only 500 feet above sea level, not far from the plains of Moxos. The heat here can be almost intolerable, yet there are frequent surusus, when the temperature drops suddenly from 110 degrees in the shade to 40 - and sometimes even to freezing point. On such occasions, the people retire to their open, draughty huts and bury themselves under all the blankets they possess until the surusu passes.

When the Surusu blew, Riberalta could be bitterly cold, and one morning there was actually a thin film of ice on the puddles of the so-called roads. On these occasions it rained for three or four days without stopping, and no-one possessed enough clothing to keep out the cold.

.....from Colonisation in the Paraguayan Chaco, by R.C.Unruh, 1973

A part of the Chaco was settled and developed by the Mennonites, with three contiguous colonies located about 280 miles NW of Asuncion. The climate of the area is characterised by extreme variations of temperature and rainfall. Temperatures of 110°F have been recorded in the summer months (Dec., Jan.) and a low of 26°F for the winter months (July - Sept.) During the winter, strong north winds of 30-40 m.p.h. commonly raise the temperature into the 90-100°F range. Then a strong cold front moves up out of Argentina and the temperature drops as much as 40° in two or three hours. The lowest temperatures of winter are brought on by these cold fronts. But the effects of the cold fronts last only four or five days.

.....from G.Kerr, A Naturalist in the Gran Chaco 1950

[Along the Rio Pilcomayo from Asuncion] During the night and morning the north wind blew, with its usual effect of making one feel tired and fagged. However, in due course it changed round through west to south west and brought a great drop in temperature from 90°F to 66°F - a fall of 24° in one hour.

.....from H.Middleditch

The absence of a major land mass at higher latitudes in the southern hemisphere means that the west winds which flow clockwise round the antarctic continent have an almost unimpeded passage and blow with very considerable force - the old sailors' Roaring Forties. The solitary significant impediment to their passage is the southern tip of South America - Patagonia and the tall ridge of the Andes rising from the Pacific.

At not infrequent intervals a great body of cold air will escape from the Antarctic air mass and find its way north, in the lee of the high Andes, passing under the roaring forties. The further north this body of cold air travels, the greater becomes the temperature difference between this air mass and normal ambient temperature of the countryside over which it passes. Hence its effects, as noted here, in Paraguay. On occasions it will travel over Amazonia even further north than the plains of Moxos and bring cool weather to the southeast corner of Colombia.

.....from The Climate of Paraguay, by T.F.Sanchez, 1973

Daily variations in temperature are often marked, commonly changing 15 or 20 degrees in a few hours. For example, at Presidente Puerto Franco, Alto Parana, on 23 November 1951, the temperature dropped from 35.2 °C to 4.2°C due to the sudden arrival of a cold front from the south.

.....from Climate of Paraguay, by R.Chodat (in Vegetation of Paraguay, R.Chodat & W.Vischer)

The maximum temperature can reach 41.8° in summer but this figure is rarely attained; usually it does not exceed 37.5 °C. However the thermometer drops to 0°C in the night when the south wind blows, even in summer (October). At Asuncion there are on the average ten nights with frost, but the months of November to March never have a frost. The frequency of frost, as in Europe, varies from place to place; it freezes most readily in the low ground (canadas).

On our trip, rapid changes in temperature were encountered in the course of a few hours. On the Cordillera Carrier, close to Lago Ipoa, we noted on September 24th a drop from 36°C to 16°C from nine in the morning up to noon.

.....from H.Middleditch.

The Lago Ypoa lies barely twenty miles from Cerro Acahay. In the hand sketch provided by Chodat & Vischer, the Cordillera Carrier is depicted as a high ridge rising up out of the woodland covered plain, in exactly the same manner as Cerro Acahay. If Chodat & Vischer had indeed ascended the Cordillera Carrier when they encountered the sharp drop in temperature, then presumably exactly the same effect would occur over Cerro Acahay, and the Eriocactus growing on its slope would be exposed to the same sort of a spell of low temperature.

THE ELUSIVE ECHINOPSIS TUCUMANENSE from G.R.Allcock

In the Fric biography, Lovec Kaktusu, there is an account of his seventh expedition to South America, made in 1927. This includes a passage headed "The journey into Tucuman and further to the north". Here, Fric tells us that the natives called *Echinopsis tucumanense* by the name *cardoncilla*. He then goes on to say that "When I speak of *cardoncilla* I must say something more germane to this plant. It was the first globular cactus which I found, when I stepped into a species of bush - or, to be more precise, when I dived into it. I had already seen it at an earlier time, from the train, but this was at a speed and at a distance and also I was unable to recall, where exactly that was. My first reaction, when I had it before me, was that it was undoubtedly Rose's *Echinopsis aurea*. Actually I had seen this plant on my visit to Haage jnr. and there in such great numbers that I considered a new collection to be un-necessary.

But how surprised I was when later I came upon the alleged *Echinopsis aureiflora* carrying large, white flowers. The appearance, the colour and the hardness of the body, and likewise the spines, in these respects both plants are exactly the same. But it is not however *E.aureiflora*, but a new plant which I have called *Echinopsis tucumanense*".

However, the subsequent account of the eighth visit which Fric undertook to South America (1928/1929) includes a reference to a repeat visit to Tucuman, when he called to see Santiago Venturi. Fric then "set out on an excursion to the north and revisited known locations from two years earlier", during the course of which he met with "*Echinopsis albispinosa*". I have to say that I find it very puzzling that there is no mention of *E.albispinosa* in connection with Fric's 1927 visit to the north of Tucuman and no mention of *E.tucumanense* on the 1928/29 expedition, when apparently the later visit returned to the same location as before. After leaving Tucuman to visit Catamarca and La Rioja, Fric arrived at Sanagasta where he found "in large numbers plants which match the description of *Lobivia shaferi* Br. & R., which is truly, as with *Echinopsis aureiflora* n.n. [*Lobivia aurea*] a true and confirmed *Echinopsis*. like *Echinopsis albispinosa*."

.....from H.Middleditch

In the course of Fric's recollections of his visit to the northern part of Tucuman during his last trip to South America (1928/29), there are two clear references to *Echinopsis albispinosa*, and no reference to *E.tucumanense*. By comparison, in his commentaries on his 1927 trip to the same part of Tucuman there is reference to *E.tucumanense* but no mention of *E.albispinosa*. This might suggest that between his 1927 trip and that of 1928/29, Fric had become convinced that the plant which he initially called *Echinopsis tucumanense* was more deserving of the name *Echinopsis albispinosa*.

The name *E.albispinosa* was first published in the German Cactus Journal M.f.K. for 1903 where it was described by K.Schumann, accompanied by an illustration of a plant with a mature head together with a younger offset at the base. If the flower on the picture matches the 19.5 cm length quoted in the text then the main head is about 16 cm high [6.5 inches] and possibly 8 or 9 cm diameter. This description commenced with "Body solitary, apparently having no great inclination to offset, globular ..." Having stated that the body is globular and solitary, the accompanying illustration is of a plant with the main head of a height almost twice its diameter, having a small offset from the base. There is no indication whatsoever of a possible habitat for this plant name. For some time there have been suspicions that the plants to which this name was attached would probably originate from northern Tucuman. Such suspicions would be mirrored in the apparent change of name selected by Fric to attach to the *Echinopsis* which he had seen in northern Tucuman province.

.....from J.Lambert

After due consideration I decided to name my JL 255 as *Echinopsis albispinosa*. This plant was found near Vipos, in the north of province Tucuman. It has certainly nothing to do with the *E.leucanthus* complex, for the flower is not of the "leucantha-chacoana" type, but clearly belongs to what might be called the "Trichocereus" type. The plants do offset from the base; in my own collection 2 out of five adult plants of JL 255 are offsetting, one rather strongly. The "albispinosa" character is also noticeable i.e. the white spines which are especially noticeable in young specimens; in older plants the spines may become dirty or greyish, even with a black tip.

.....from H.Middleditch

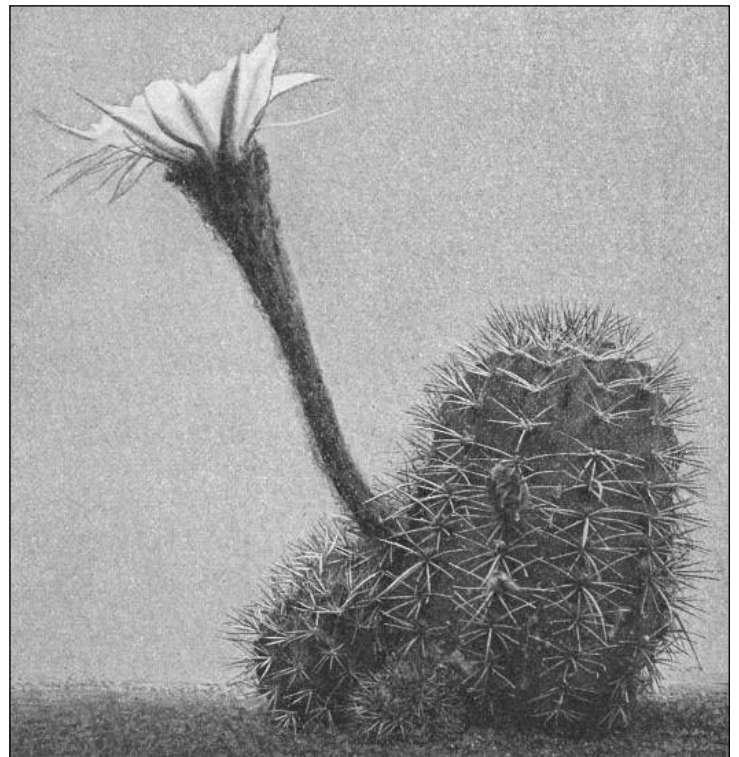
Among the plants which I have in my own collection there is a GN90-303/1019 labelled *Lobivia aurea*, but the plant itself is almost a duplicate of an *Echinopsis silvestrii* from near Alemania raised from seed collected in habitat by G.Charles. On both plants the ribs are similar in number, very sharp and quite deep, the areole spacing is similar, the spines are grey-white in colour, barely half a dozen radials and a single, correct, central. Very odd that the names should be different!

.....from G.Neuhuber

These GN90-303/1019 are undoubtedly an *Echinopsis*. The plant has a long white flower; it produces offsets and they are growing under large bushes in the shadow where they always have adequate moisture. Other accompanying cacti there are *Cleistocactus smaragdiflorus*, *Gymnocalycium saglionis* and



Echinopsis "silvestrii"
Las Curtiembres,
Lerma Valley
Photo: H.Vertongen



Echinopsis albispinosa K.Sch. n. sp.
Monatsschrift für Kakteenkunde 1903

Gymnocalycium delaeetii. The location is between Ruta Nacional 9 and Ruta provincial 25 near the border of Tucuman and Salta provinces, not far from El Tala.

.....from H.Middleditch

The location given by G.Neuhuber for his GN90-303/1019 would be a match for the location of Spegazzini's *E.silvestrii* "between Tucuman and Salta provinces"; also the observation by G.Neuhuber that his GN 303 *Echinopsis* always grew there in the shade of bushes would equally seem to match the "in thickets" for Spegazzini's *E.silvestrii*. As much of a match would be the location of "in forested parts" quoted by J.Piltz for his P.166. But this brings us back to the appearance of this plant of GN90-303/1019 which is wellnigh a duplicate of that of GC 65 from near Alemania; on the basis of the grey-white spines, the name *albispinosa* would indeed be appropriate for GC 65.

.....from G.Charles

The *E.silvestrii* which we found growing in the valley of the Rio de Las Conchas certainly were fairly well shaded by the accompanying bushes.

.....from F.Vandenbroeck (Chileans No.49 p.44)

The *Echinopsis silvestrii* in the valley of the Rio de las Conchas were growing under fairly lush and wooded conditions, where the plants were in half shadow.

.....from R.Moreton

My two plants of *Echinopsis* WR 160 both have white spines.

.....from M.Muse

The *Echinopsis* sp. GN 90-303-1019 raised from seed shows a marked similarity to my GN 1018 and 1018a, also from Tala, Tucuman.

.....from J.Lambert

The plant of GN 90-303-1019 raised from seed by G.Charles matches quite well my JL 255 and JL 300, so I would regard it as *Echinopsis albispinosa*. However, the plant of GC 65 from Alemania seems to be something different. Comparing it with the *Echinopsis* sp. known from Alemania, though, it appears that it cannot be *E.silvestrii*. If it is indeed a white flowering plant, then it would be a third species growing at Alemania, for which there does not yet appear to be a name.

.....from R.Hillmann

On the way from Choromoro (province Tucuman) to San Vicente, before reaching Yarami, we were passing through a dry area with typical xerophytic Chaco-like vegetation with *Acacia* trees, *Opuntia*, *Cleistocactus*, *Harrisia*, *Gymnocalycium antherostele* and *Echinopsis silvestrii*. These *Echinopsis* grew in shaded spots and branched from ground level to form clumps of a few heads.

.....from J.Lambert

I myself collected a couple of *Echinopsis* along the road to San Vicente, namely JL.357 and JL.358, of which the latter is again *E.albispinosa*, but the former is a different form, to which I again cannot yet put a name.

.....from H.Middleditch

It has already been noted (Chileans No.53 p.81) that *Trichocereus terscheckii* grows both in the stretch of the Rio de las Conchas valley between Cafayate and Alemania, as well as in the north of Tucuman province and the adjacent part of Salta province. Both the *Gymnocalycium saglionis* and *G.delaeetii* are mentioned by G.Neuhuber from near El Tala; would they also be found in the valley of the Rio de las Conchas? In Chileans No.46 there are comments from J.Lambert and from J.Piltz regarding the occurrence of *G.delaeetii* in the Rio de las Conchas valley. It is observed by J.Piltz that *G.delaeetii* may be found in this same valley near Tres Cruces, whilst it is noted by J.Lambert that *G.delaeetii* may be found much further downstream near General Moldes. This distribution for *G.delaeetii* extends over the same stretch of the Rio de las Conchas valley as that in which *E.silvestrii* occurs. It also approximates to the distribution of *Trichocereus terscheckii* in the valley of the Rio de las Conchas; hence the same three species of different genera are found both in the Rio de las Conchas valley and near El Tala.

.....from R.Hillmann

But at the spot between Choromoro and Yarami where *Echinopsis silvestrii* grew, there were no *Trichocereus terscheckii*. This particular locality was more or less flat ground, whereas *T.terscheckii* prefer to grow on hill slopes.

.....from J.Lambert

Checking the STO listings, I see that *G.delaeetii* is also recorded from Balbao and Santo Domingo in Salta province, and from Choromoro (south of Trancas) in Tucuman province, whilst I collected the species myself at Trancas and also a little more eastwards, along the road to San Vicente. Turning to *G.saglionis*, this was found near Osma (Colonel Moldes), which is by no means the northern limit for this species.

.....from H.Middleditch

Balbao lies some 18 km or so to the west of Rosario de la Frontera i.e. no great distance from the parts of Tucuman from where *G.delaeetii* has been reported.

.....from J.Piltz

We saw plants similar to *Echinopsis* P.166 at various places between Vipos in Tucuman province and the river Juramento.

.....from G.Neuhuber

In addition to finding *Echinopsis* at GN 303 near Trancas, similar plants were also seen at El Vipos GN 304, whilst *E.silvestrii* was seen between Alemania, Guachipas, and Pampa Grande.

.....from H.Middleditch

This location to the south of Guachipas is most informative, since it lies along the road running from

Trancas on the northern border of Tucuman across the Cumbres Calchaquies to the valley of the Rio de las Conchas. It approaches the distribution area of P 166 extending north from Tucuman to Juramento, as indicated by J.Piltz. One might be tempted to presume that it is all the same sort of *Echinopsis*, just as GC 65 and GN 303 are almost identical in appearance. However, if that were so, why does G.Neuhuber draw a distinction between his GN 303 and GN 304 *Echinopsis* from Tucuman province and the *Echinopsis* which he calls *E.silvestrii* from Alemania- Guachipas- Pampa Grande?

Can an explanation be sought in the quite different appearances of the B35 *E.silvestrii* and B.36 *E.silvestrii* which were offered as imported plants a decade or more ago? The plants of B35 were comparable with GC 65 and GN303, whilst the B.36 were comparable with the plant photographed by L.v.d. Hoeven near Campo Quijano near the entrance to the Quebrada del Toro.

.....from G. Neuhuber

I also found *Echinopsis* in the province of Salta near Campo Quijano. They were in groups offsetting from the base.

.....from H.Middleditch

The plant photographed by L.v.d.Hoeven near Camp Quijano is quite similar in appearance to the picture of *Echinopsis silvestrii* in the pages of the 1936 Blossfeld catalogue. The 1935 Blossfeld-Marsoner collecting trip did call at Salta, and in the 1937 Blossfeld catalogue their pick-up truck is pictured near San Antonio de los Cobres. Presumably they travelled between these two places via the Quebrada del Toro, passing Camp Quijano on their route. It is possible that the Blossfeld picture and that from L.v.d.Hoeven may be of the same population of *Echinopsis* near Campo Quijano.

.....from J.Lambert

The plant photographed by L.v.d.Hoeven at Campo Quijano which is a clump of three or four heads of similar size, does indeed match *E.silvestrii*. My *E.silvestrii* JL 156 from Alemania and JL 236 from Sumalao have young spines on the crown which are yellowish to orange with a light brown tip, whilst on *E.albispinosa* JL 255 from Vipos and JL 300 from Cabra Corral they are reddish with a black tip. Both these species do seem to prefer to grow in the shade under bushes, but they also seem to be capable of surviving without the benefit of this sort of shade.

The easiest way to distinguish *E.albispinosa* from *E.silvestrii* is the relative length of the central spines: longer than the radials on *E.albispinosa* and shorter than the radials in *E.silvestrii*. In addition, if one is able to observe the flowers, the interior petals are lanceolate on *E.albispinosa* and spatulate in *E.silvestrii*. These plants also show the quite common feature of all white-flowering *Echinopsis*, in that the flowers of those species grow vertically with long, slender tubes.

.....from R.Allcock

There appear to be many forms in the group around *E.silvestrii* and *E.albispinosa*. The salient points which stick in my mind as pertinent to the original *E.albispinosa* diagnosis are that (1) the radial spines interlace and (2) that the epidermis shows a bluish shimmer. I imagine that epidermal cell structure must be accepted as a diagnostic feature by present day botanists. For example, it is used to distinguish between two related and otherwise intergrading spp. of *Gasteria*. Thus the bluish shimmer is something to look for. Spine interlacing is just a matter of spine length, so might this feature be regarded as less crucial?

I have three plants of B.36, each about 2.5 inches in diameter, two received from A.W.Craig which are solitary and also a very caespitose form obtained from Oak Dene nursery. The spines are short and thick, some dark brown at first, fading to a very pale horn colour. The picture taken by L.v.d.Hoeven near Campo Quijano appears to be identical to the B.36 received from A.W.Craig, as does the illustration of Shafer's No.41 in Britton & Rose 3. p.69. I also have two mature plants obtained under this name where the rib edges are obrepand with the areoles in the depressions, again with short, thick spines, some dark brown at first, fading to yellowish; the radials and the central spine project straight outwards, all lying in a common plane so they are less effective in shielding the body.

Both my OF.60/80 and P.166 I would regard as *E.albispinosa* as the epidermis is very noticeably bluish green, somewhat lighter on P.166. Both have more or less straight rib edges, with spines interlacing, whitish, some dark brown at first.

.....from H.Middleditch

And how do they compare with my last spare offset from an ancient imported *E.silvestrii* acquired when the J.Forrest collection was sold up?

.....from R.Allcock

It matches none of my *E.silvestrii* forms with its grey epidermis and the central spines bent downwards, which strikes me as most unusual.

.....from H.Middleditch

But the ex-J.Forrest *E.silvestrii* is a duplicate of GC 65 from Alemania and GN 303/1019 from Trancas.

.....from P.Allcock

A plant which I received from A.Ridley was identified as "*Echinopsis silvestrii* Omar Ferrari 60/80, Piltz seed". It came with apologies for its lack of roots, but it did re-root and made a very fine plant indeed, growing at breakneck speed. I was also told that it came from the borders of Tucuman and Salta. From the original description of *E.albispinosa* by K.Schumann in M.f.K., and from the illustration which accompanies it, I believe that this plant is indeed *E.albispinosa*. To the Schumann description, Backeberg adds "spines interlacing laterally" and this is quite evident on the plant of OF 60/80, more so than on the Schumann illustration. Although the Schumann description states "the crown ... is adorned by dark brown spines" and also "in youth all spines are a beautiful dark reddish brown, fading later to white", a careful examination of the crown of my OF 60/80 reveals only central spines. These are a brilliant rich chestnut, a dark red-brown colour.

Only later do the radials emerge, at about the shoulder of the plant, and these are a pure luminous white from their inception. It is quite easy to see how Schumann's statement could arise from a too cursory inspection of the plant. Again, the Schumann description gives "spines 11-14, of which one can speak only of about 2 as centrals, but even so only through their position, less so through the other attributes"; but when my OF 60/80 is growing strongly it can make 3 or 4 centrals in the usual Echinopsis cross formation.

.....from M. Wimberg

The Echinopsis which we found growing near Cabra Corral (MN 94) were indeed offsetting and were more or less identical to MN13a found near Alemania. In appearance they were similar to the plant photographed by H. Vertongen near Las Curtiembres.

.....from H. Middleditch

The JL 236 *E. silvestrii* site at Sumalao lies barely 25 km to the south of Salta; the GN 88/58 and /59 location at Campo Quijano lies a similar distance to the south-west of Salta. There appears to be a further Echinopsis location no great distance away near Salta, in the form of Shafer No.41.

.....from New York Botanic Garden

A copy is enclosed of the page of the Shafer notebook with the entry for the collection no.41. There is a great deal of difficulty in deciphering the handwriting, which appears to read as follows: "41. Echinocactus. Globose, old plants somewhat elongated light green 4-5 in[ches] diameter, spines numerous nearly white with yellow tip. Flo[wer] tube 5-6 in[ches] long thin shining light green with few scales and much long grey hair, corolla rather spreading, outer brownish, inner white, filaments green ?anthers cream, style green, stigma greenish white, no odour, seems to be a night bloomer.

Dry hill S.E. of town on shaly banks with scarcely any shrubbery, facing Camino Nacional to Tucuman."

.....from H. Middleditch

The flower length and the "night bloomer" seem to fix the Shafer no.41 as an Echinopsis; the "old plant somewhat elongated" can hardly be *E. ancistrophora/kratochviliana*. So it may well be *E. silvestrii*. But whereabouts is the location, facing the "Camino Nacional to Tucuman"? There are entries in the Shafer field note book (also provided by New York Botanic Garden) under the heading of "January 5, Salta" for No.37 for a *Cleistocactus* "on hillsides beyond cemetery", and under No.40 for a *Cereus* on a "hill beyond cemetery". Then entry No.42 refers to a location for a "*Cereus*" at 8 km from Salta alongside the Camino Nacional Salta to Tucuman, in the direction of Mojotoro. From this entry we could presume that the "Camino Nacional to Tucuman" as understood by Shafer is the road running due east from Salta.

.....from J. Lambert

The cemetery at Salta lies at the south-east corner of the city, just to the south of the main road, route 9, the traditional route to Tucuman, which is probably the "Camino Nacional to Tucuman". Indeed, the cemetery lies quite close to where Route 9 leaves the city, at the foot of Cero San Bernado. This may well have been a good biotype for cacti in Shafer's time, but nowadays, due to the extension of the city, the San Bernadino itself has become largely covered by residential accommodation.

.....from H. Middleditch

Thus it would appear that the Shafer expedition out of Salta started with No.37 not far beyond the cemetery and proceeded no great distance further to No.41, still on the south side of the main road, to the east of Salta. This site does not appear to have been revisited in more recent years but may well also prove to support *Echinopsis silvestrii*. Unless it has fallen victim to urban expansion.

.....from New York Botanical Garden

From the Shafer field note book: "January 8. No.42. *Cereus*. Cordon Grande. Stem upright, few branched to 30-35 feet. Trunk woody, hard, often over 12 in[ches] diam[eter]. Branches 6-8 in[ches]. Spines short, stout, dark yellow often wanting on branches. Flo[wer] 6-8 in[ches] long, spreading 4-5 in[ches] not fragrant. Tube constricted above ovary, dark green, scaly and brown woolly hairy - outer petals brown thru' red[d]ish, inners white, filaments green, anthers cream, style white, stigma greenish yellow. Fruit globose, slightly elongated somewhat scaly and brown wool[l]y tufted, scales black."

.....from H. Middleditch

With a woolly tube and fruit we appear to be concerned here with a *Trichocereus* rather than a *Cereus*. If it is *T. terscheckii* then there may be a similar association with *E. silvestrii* and *G. delaetii* or *G. saglionis* in this locality.

.....from J. Lambert

Nowadays the eastward bound section of the route 9 outside Salta is a first rate road with heavy traffic, which I used as a fast means to reach less disturbed biotypes, but along which I did not stop. However, from the road, there may be noticed numerous *T. terscheckii* projecting above the canopy of trees and bushes covering the hillside to the south.

.....from H. Middleditch

It may now be appropriate to refer to the original 1905 Spegazzini description for *Echinopsis silvestrii* where the habitat location, given as "In thickets on rocky mountains between Tucuman and Salta provinces", needs to be considered. The relevant border between the provinces of Salta and Tucuman runs roughly west to east; the western section of this border crosses the Rio Santa Maria quite some way south of Cafayate; it then crosses the high mountain range separating the Santa Maria valley from the Chaco lowlands, crossing the northern tongue of the Sierra Medina before dropping into the Chaco. There are no reports of any Echinopsis similar to *E. silvestrii* from where the border runs into the Chaco or from the adjacent flanks of the Sierra Medina. Nor from the high mountains lying to the east of the Santa Maria valley. This leaves two sections of the border to be considered - the one section crossing the Santa Maria valley and the other section lying between the high cordillera and the Sierra Medina.

Did Spegazzini mean that his *Echinopsis silvestrii* was to be found on the border between Tucuman and Salta provinces in the valley of the Rio Santa Maria? But we have several reports of *Echinopsis leucantha* occurring in this valley to the south and to the north of the provincial border here, as far north as Cafayate. At the same time, there is not the slightest suggestion that *E.silvestrii* might occur so far south up the valley of the Rio de las Conchas that it approaches even anywhere near to Cafayate, never mind to the south of Cafayate as far as the vicinity of the provincial border.

.....from G.Charles

The rivers Santa Maria from the south and Calchaqui from the north, meet together to the east of Cafayate and form the Rio de las Conchas. Here they all flow across an area of fairly wide and level countryside which is pretty arid. We did not see any *Echinopsis leucantha* in this area but we had seen these plants in the Santa Maria valley and from the nature of the surroundings I would not be surprised to be told that they did grow in this area to the east of Cafayate. Some 25 km or so after we left Cafayate, roughly at La Punilla, the Rio de las Conchas starts to cut its way through the mountains. The next 20 km or so are called the Quebrada Cafayate, a fairly narrow section of the valley with a most barren aspect. The immediate sides of the valley are often formed of vertical rock faces, above which the rock continues to rise steeply; here and there it has been carved by wind and water, into eye-catching shapes such as El Sapo (the shoe). The Quebrada Cafayate continues roughly as far as Santa Barbara and then from about Tres Cruces, the valley becomes a little more moist. From hereabouts there are steadily more and more bushes and other vegetation to be seen as one continues down the valley. But the Quebrada Cafayate is an extremely barren section in which we saw neither *Echinopsis leucantha* nor *Echinopsis silvestrii*. It appears that *Echinopsis silvestrii* starts to appear from about Santa Barbara northwards, going down the valley from there; whilst *Echinopsis leucantha* may well reach La Punilla, but is unlikely to extend further downstream.

.....from H.Middleditch

Thus the area near the provincial border to the south of Cafayate appears to be excluded from the Spegazzini location for *E.silvestrii*. This would leave the area in north Tucuman province (where Fric came across his *Echinopsis tucumanense*) as the Spegazzini location for his *E.silvestrii* i.e. the same area in which *E.albispinosa* is apparently found. The Spegazzini *E.silvestrii* was said in the Latin to be “simplex vel subprolifera e globoso subcylindracea” i.e. simple to sparsely offsetting and globular to short cylindrical. Body dimensions of 5 to 10 cm tall and 4 to 8 cm diameter were quoted. In this and in other details the original descriptions of these two species compare well, as do the plants observed in northern Tucuman. There would appear to be nothing to suggest any real difference between *E.silvestrii* Speg and *E.albispinosa* Schu. either in description, in habitat location, or on the ground. This in turn would suggest the necessity of regarding *E.silvestrii* published in *Cactacearum Platensium Tentamen* 1905 in the *Anales del Museo Nacional de Buenos Aires*, as a synonym of *E.albispinosa* published in 1903.

This is rather unfortunate as it would have been very handy to have been able to describe the white-spined sharp-ribbed plant (e.g. B.35) as *E.albispinosa* and the blunt-ribbed plant with short centrals (e.g.B.36) as *E.silvestrii*. It may be convenient to continue to use these names for ease of communication, whilst at the same time acknowledging the priority of *E.albispinosa* as the species name.

FRIEDRICK SCHICKENDANTZ By A.Marsal

Translated by H.Middleditch from Boletín de la Academia Nacional de Ciencias XLVIII 1970.

Friedrick Schickendantz was born in 1837 in Rhineland. He studied chemistry firstly at Heidelberg University under Professor Bunsen and then under Baron Justus von Liebig at the University of Munich, where he also read Physics, Botany, Zoology and Mineralogy. In order to improve his knowledge of Chemistry he then went to Oxford University to study with Professor Brodie.

On the first of January 1860, Samuel A.Lafone Quevedo took over the enterprise of restoring the mines of Catamarca - La Restauradora, La Rosario and La Carmelita. At this time the smelting plant was located at Santa Maria, to the north of Capillitas, close to the border of Tucuman in the Calchaqui valley. Samuel Lafone junr. tried to persuade his father in Montevideo, and his uncle who was the owner of the mines (Alexander Lafone in Liverpool, England), that as a first priority he needed a metallurgical chemist. His uncle, after consulting Vivian in Swansea, resolved to seek a suitable metallurgist and advertised in the English papers for a chemist to take charge of the smelting plant. Schickendantz, whilst at Oxford, saw this advertisement and following the advice and recommendation of Professor Brodie, took the post. He signed the contract and set off for the Rio de La Plata.

On his arrival at Montevideo in 1861 he found that the affairs of the house of Lafone had suffered a serious blow and Schickendantz was offered repayment of his contract bond. But after discussion with Samuel Lafone he decided to honour his engagement. In due course Schickendantz arrived at Santa Maria via the fort of Andalgalá. Here lay the smelter of Lafone. Samuel Lafone junr., who had just taken charge of the enterprise, realised that he was in an awkward situation. The civil war engulfed the country, guerilla fighters were everywhere, resources were lacking for the enterprise, and all this at precisely the time when the smelting works were being moved from Santa Maria to Pilciao. This place was previously called Pilzihao and lay in the midst of the woodlands of the Campo of Andalgalá, some ten leagues southwest of the copper mines, more conveniently placed for transport of the product towards Córdoba.

At Pilciao, Lafone delegated control to Juan Heller, the superintendent whilst Schickendantz took charge of the furnaces used to reduce the copper ore. At that time the smelting process produced a concentrate described as “bottoms”. Following a suggestion which originated from Alexander Lafone in Liverpool,

Schickendantz developed a much improved process of reducing the copper ore. This was a more efficient process and also improved recovery of the trace amounts of gold and silver in the ore. It was so successful that it was rapidly adopted by the other mining enterprises in that part of Argentina. Together with Samuel Lafone, Schickendantz organized the participation of Catamarca province in the world and continental Expositions at Paris in 1867, Vienna in 1872, Santiago (Chile) in 1875 and Philadelphia in 1876, with displays of minerals and metals from that province.

With an excellent laboratory at his disposal, Schickendantz undertook other scientific investigations. One of his frequent pre-occupations was the determination of the alkaloids which he extracted from various native trees such as the quebracho blanco. When knowledge of these studies reached Berlin and Paris it led physicians in France to seek therapeutic applications for these alkaloids, whilst industrial uses were also found for them. Schickendantz also studied the deposits from the salinas which were common in this region of Argentina. In 1874 he published notes regarding the supposed method of formation of the salinas, followed in 1875 by a chemical analysis of their composition.

His account of his travels between Pilciao and Catamarca, also between Pilciao and Tucuman, were published in Petermann's *Mitteilungen* in 1868 in collaboration with Burmeister [Chileans No.48]. He also carried out a series of meteorological observations at Pilciao between 1866-1879 which continue to be a valuable record.

In 1871 his ten-year contract with Lafone had been completed and he was appointed by President Sarmiento and the Minister for State Education Avellaneda, to be director of the School of Agronomy founded at Tucuman, whilst at the same time retaining his post of Professor of Physics and Chemistry at the National College at Tucuman. However he relinquished the appointment as director of the School of Agronomy after a short period, as a result of disagreements with the local governor of Tucuman, and returned to Pilciao in 1872, remaining there until 1881.

During his residence at Pilciao, Schickendantz introduced the cultivation of barley there, in order to ensure the supply of provender for the mules which were used to transport the mineral to and from the smelting works. He wrote on the theme of "The Agriculture of Catamarca" in the *Bulletin of the National Department of Agriculture* in May 1881. In this work he described the primitive methods of cultivation; he criticised the custom of burning the stubble and recommended re-forestation with useful species of trees.

In 1881 he was appointed Rector of the National College at Catamarca. In addition to his other preoccupations, Schickendantz was also concerned with the natural wealth of Catamarca province, which featured in several articles which were published in *Deutsche Rundschau*. In 1881 the Provincial Governor arranged to publish these and other data from Schickendantz concerning the industries of the province, in Spanish, in one issue of the periodical *La Union*. During the years 1881 and 1882, Schickendantz published in the *Annales del Circulo Medico Argentino* his "Itemised catalogue of medical plants of Catamarca".

As a diversion in the midst of his more serious studies, Schickendantz formed a herbarium, of which he sent many examples to botanists in Europe, and this earned him the recognition of those most distinguished in this science. Among so many other matters, he sent curious collections of cacti (*cardones*) and *Opuntias* (*pencas*) of which there were quite a variety in Catamarca and many of them unknown species. He sent one of these collections to Weber, a distinguished medical practitioner in the French army corps and a competent naturalist, resident in Bezancon, who named *Echinocactus cossionii* in honour of the deliverer of the gift on the recommendation of Schickendantz.

When Schickendantz moved in 1883 to a sugar refinery in Tucuman, the Governor of Catamarca, without consultation, relieved Schickendantz of the rectorship of the National College there, although he entrusted him with some important chairs and increased his salary. At the Trinidad sugar refinery in Tucuman province, Schickendantz applied his mind to his new tasks, especially those concerned with sugar cane. One of his next important developments was the replacement of the then traditional refining process by the use of sulphurous acid, which not only gave better results but also improved the economics of the whole process. Schickendantz published the methods used and the results obtained in German periodicals, and in the Tucuman newspapers "La Razon" and "El Orden", so that they became widely known. One of these articles was worthy of inclusion in the *Ann. Soc. Cien. Arg.* of 1886 under the title of "Studies concerning sugar cane". At the same time, Schickendantz openly criticised the monoculture which had exhausted the Tucuman plain. He proceeded to analyse the earth and suggested logical methods of manuring, making use of those products which were the cheapest and most readily accessible for agriculture (potash, lime, guano, etc.). He recommended crop rotations and the use of new varieties of canes. These were constructive proposals designed to improve the industry, which had passed through a deep crisis.

In 1885 the Municipality of Tucuman created the analytical laboratory and placed it in the charge of Schickendantz. With the ever-increasing body of data on hand, Schickendantz inaugurated the *Anales of the Analytical laboratory* in 1888. This publication was largely concerned with viticulture but also covered many other subjects, with original monographs concerning the alkaloids of several plants, studies of the salitre, and important works relating to the mineral waters and hot springs of Rosario de la Frontiera, etc. Subordinate to Schickendantz at first, then his deputy, later collaborator and finally his successor, was the then young Miguel Lillo. So in the *Annales de la Cientifica Argentina* for 1887 there appears an article concerning the determination of glucose in vines and in the products of sugar cane, under the joint authorship of Schickendantz and Lillo.

In September 1885, Schickendantz inaugurated a herbarium at the Tucuman analytical office, specimen number one being *Chusquea triflora*, recorded on 27 September 1885. Officially, Lillo was engaged in analytical chemistry, but in October 1885 he paid a visit to Cordoba for a discussion with Doering and with Prof. Kurtz. Whilst there he botanised along the river margins near San Vicente where Kurtz lived and around

Alta Cordoba where no-one lived. This brought the Tucuman herbarium up to No.314 specimen. During the course of 1886 the herbarium acquired No.365 *Frigia volubilis* and Lillo carried out more than twenty excursions as apprentice collector in the neighbourhood of the town and as far as the adjoining mountains. On 24 December 1886 Schickendantz wrote to Ignacio Colombres in Buenos Aires in response to a long list of identifications which the latter had requested: "I am not a professional botanist but purely an amateur. I do not then have sufficient knowledge to enable me to classify all the plants which I have gathered on my various excursions".

In 1892 Samuel Lafone was obliged to break up the Pilciao works solely on account of the taxes, duties, and other obstacles placed in the way of a continuing successful operation of the enterprise by certain parties in government circles. Also in 1892 Schickendantz moved to Buenos Aires to take up the post of Professor at the National College there and to be in charge of the chemical section of the La Plata Museum. He was subsequently offered an appointment of director of the analytical office of Mendoza but died in 1896 before he made the move.

He may have belonged to many scientific bodies; he was a member of the National Academy of Sciences in Cordoba, of the National Mining Society of Chile, vice-president of the Industry Centre of Catamarca, and resident correspondent in Andalgalá and Tucuman of the respective meteorological offices.

.....from H.Middleditch

In addition to the information provided by the article quoted in the title (above), further details of Schickendantz' life and work were obtained from: Federico Schickendantz, *Ann. Soc. Cient. Arg.* Vol.XLII 1896; Federico Schickendantz, *Physis* Vol.XIX No.52 1942; Samuel A.Lafone Quevedo, by G.Furlong n.d. *Nuevo Diccionario Biografico Argentino* 1985; together with numerous other brief references, all of which were provided by the Ibero-Amerikanisches Institut in Berlin. For convenience of continuity, much of this additional data has been consolidated into the above translation in chronological order.

In view of the 1868 account of his travels between Pilciao and Tucuman, it does seem probable that Schickendantz had held the post of professor of Physics and Chemistry at Tucuman prior to his "retaining the post" on his appointment to the National College at Tucuman in 1871.

During the short period of his residence in Catamarca from 1881 to 1883, Schickendantz is on record as having conveyed a batch of collected plants to Weber. Presumably these would be plants collected in the environs of Catamarca. Some of these plants may have been cacti and as Schickendantz is also on record as "not having sufficient knowledge to classify all the plants collected on my travels" it is quite probable that he would send cacti to Weber who was a wealthy collector of such plants. Is there any record that he did in fact do so?

.....from "Cactees Nouvelles du Genre *Rhipsalis*" by A.Weber, from *Revue Horticole* 1892 Number 64 *Rhipsalis tucumanensis* Web.

Belonging to the section of the *Rhipsalis* with sunken ovary and flaky areoles. Sent in 1885 from the neighbourhood of Tucuman by Mr. Schickendantz. Found in association with *Rh. lubricoides* and *Rh. aculeata*. Likewise recollected by M.Neiderlein at Alpachiri (Catamarca province) and mentioned by Schumann (Flora Brasil.) as a form of *Rh. pentaptera*. The specimens which I received in 1885 were somewhat dried up and quite angular, like *Rh. pentaptera*
Rhipsalis aculeata Web.

I received this species in a dry state in 1882, from Mr. Schickendantz, who had found it at Catamarca and who then sent me a living plant in 1885, recollected in the sub-tropical forest at Tafi Viejo, near to Tucuman, where it is an epiphyte, in association with *Rh. Lumbricoides* and *Rh. Tucumanensis*. In the herbarium of Miguel Lillo at the world Exposition of 1889, it stood under the number 606, originating from Cebil Redondo, close to Tucuman, with ripe fruits. The living specimens which Dr. Manuel Cossio brought to me from Tucuman in 1885 bore some barely ripe berries

.....from H.Middleditch

So this must have been the person that *Echinocactus cossionii* was named after, by Weber; but where, if anywhere, did this name appear in the literature?

.....from W.Haage, K.u.a.S

I have looked through my old cactus correspondence from the last century and traced a long letter from Dr. Albert Weber of 17 December 1896: Dr.Weber writes: "I have currently still some new finds available. In the first place I will speak to you of *Echinocactus microspermus* Web. Seedling plants, grown from seed ripened here from plants originating from Argentina. These seedlings, about 6 cm diameter, have themselves already flowered, very handsome orange colours or marigold-yellow as large as *E.concinnus*; the plant is similar to *Mammillaria* with hooked spines, like *M.glochidiata*. It is a very fine sp., completely new. I have not given it to Rebut and up to now have given it only to the Botanic Garden in Berlin and to Herr Heese."

.....from H.Middleditch

The original *Parodia microsperma* may possibly have been sent to Weber from Catamarca in 1882, or alternatively it may have been taken by hand to Weber, by Cassio in 1885. It might even have been despatched at any time up to 1892 when Schickendantz left Tucuman for La Plata. Unfortunately this does not tie the original finding place to any one of the several routes travelled by Schickendantz between Catamarca and Tucuman.

.....From K.Schumann, *Bluhende Kakteen*, 1900 *Echinocactus microspermus*

The species of the genus *Echinocactus* here illustrated is one of the group found in the regions of the Andes both on the east and west sides of the slopes. We owe its introduction to the indefatigable efforts of Dr.Weber in Paris, honorary member of the German Cactus Society. Through his kindness I came into

possession of this plant, which is a great rarity in Germany. It comes from the state of Catamarca in Argentina, and is without doubt one of the finest species under cultivation at present, commanding the attention of all by its leaf-green colour and beautiful whitish spines becoming yellowish towards the tip of the stronger spines. One of the spines is hooked, a characteristic peculiar to this species; it is not duplicated in any other genus in South America.

We have cultivated this plant since 1896 with excellent results. The plant makes no demand for special treatment; it grows vigorously and blooms each summer with numerous, large, golden-yellow flowers. Seeds are abundantly produced with artificial pollination, but the number which germinate is rather moderate, a condition probably due to the too near relationship of the flowers. Thus, in spite of all care, we have had no real success in the cultivation of seedlings, and thereby lies the reason for its scarcity in German collections.

.....from H.Middleditch

If we are prepared to accept the statement by Schumann that the original *Parodia microsperma* came from Catamarca, this would rather upset the current acceptance of *Parodia microsperma* having a habitat in northern Tucuman province. The *Parodia* of the *microsperma* group found in the north-east corner of Catamarca province, on the hills and mountains around Catamarca city, are currently classified under species names other than *P.microsperma*, such as *P.catamarcense* and *P.sanguiniflora*.

If Schickendantz took the trouble to collect *Rhipsalis* from trees, as well as comparatively smallish *Parodia*, which he evidently sent to Weber, there would seem to be every possibility that the original *Echinopsis schickendantzii* also came to Weber from Schickendantz. This would place a limit on the possible locations where this plant might have been found. At the present time, there are only two recorded finding places for plants of *T.schickendantzii* affinity which lie on one of the routes known to have been travelled by Schickendantz, viz:- Condor Huasi (between Singuil and Suncho) also between Tafi del Valle and Abra Infiernillo.

.....from R.Mottram

In addition, *Opuntia schickendantzii* was published in 1898, the source being given as Schickendantz, from near the boundary of Tucuman and Salta. There is also *Echinopsis catamarcense*.

.....from H.Middleditch

Britton & Rose refer *Opuntia schickendantzii* to an affinity with *O.aurantiaca*, which would suggest that the segments may be relatively long and narrow and flattened to some degree, rather than cylindrical

.....from J.Lambert, *Succulenta* 70.2.1991

The branched bushes of *Opuntia schickendantzii* Web., attain a height of 1 to 2 metres. The stem is round, with a diameter of 4 cm or more; the young growths are also cylindrical but older sideways segments become flattened. The length of the segments amounts to 50 to 60 cm, the diameter of the round segments being 15 mm.

From the external appearance it could be supposed that we have here a transition towards *Platyopuntia*. A number of *Platyopuntia* are in fact known to form a round stem with age. Here it is the other way about; the young growths are cylindrical and the flattened segments appear at a later stage. It is also to be noted that the flattened segments attain a much more oblong form than in the majority of *Platyopuntias*.

Also here there are tubercles present, but they are markedly flattened and not very obvious. Spines already start from quite young areoles but increase in number as they age, going from 2 up to 8-10 main spines, together with a number of small secondary ones. The longest spines measure 1 to 2 cm. The flowers are a deep yellow, the outermost petals with a red midstripe, the 5-6 stigma lobes being dark green.

.....from H.Middleditch

The habitat picture of JL-256 accompanying this article displays areoles quite widely spaced. If the segments are some 20 mm broad then the areole spacing will be about 15-20 mm.

.....from M.Nilsson

When travelling along the Quebrada Escoipe by the local bus which runs from Rosario to Cachi, I decided to break the journey at El Maray. From the road I crossed the river to have a look at the tall columnar cacti on the opposite slope, which may have been *Trichocereus terscheckii*. Growing epiphytically on the main trunk of this plant were some *Tillandsias* and also a well-branching plant of *Opuntia schickendantzii*, which was growing sideways. The flattened segments were quite long and narrow. Most of them were carrying flowers and fruit.

.....from J.Lambert

The plant of *Opuntia schickendantzii* which I observed on the Cuesta El Lajar, north of the Salta-Tucuman border, grew under the shelter of trees. It stood perfectly upright on its own. It reached a height of 85 cm with a main stem of 4 cm diameter. Fig.142 in my book shows the head of this plant.

.....from H.Middleditch

The description given by Schumann in his *Gesamtbeschreibung* of *Echinopsis catamarcense* Web. might suggest that this plant was the rather elongate form of *Lobivia aurea*, known from the Catamarca area. Schumann gives the distribution as "near Catamarca: Schickendantz" which might suggest that it was one of the plants sent to Weber by Schickendantz.

.....from *Monatsschrift für Kakteenkunde*. 1893

September monthly meeting: Herr Mundt presented a *Cereus* which he had cultivated for years and used for its excellent qualities as a grafting stock. He had been presented with this in a number of examples from an old collection in the neighbourhood of Berlin, where it had certainly already been grown for 30 to 40 years. Now it had been established that this *Cereus* had been imported five years earlier by Major-General Weber in Paris as *Cereus huascha flaviflorus* and is well-known.

October monthly meeting: *Cereus huascha* Weber. As noted at the last but one monthly meeting of the

Gesellschaft der Kakteenfreunde, Herr Mundt presented a *Cereus* which had been identified as *Cereus huascha* Web. Since a description of this plant was not known to us, and to our knowledge one had not been published at all, we turned to Major-General Dr. Weber in Paris with a request for fuller particulars. With the greatest kindness this eminent cactus specialist acceded to our request and informed as follows:- Among the seeds of cacti which reached him between 1880 and 1890 from Argentina were to be found *Cereus pasacana*, *Echinopsis catamarcense*, several species of the genus *Rhipsalis* which had already been published, as well as a *Cereus* whose seeds were offered in the seed catalogue of the Paris Garden of Plants under the name *C.huascha*; there were two varieties to be distinguished in habitat, the yellow flowering *C.huascha flaviflorus* which was found near Yacutala and the red flowering *C.huascha v.rubriflora* found near Andalgalá.
.....from H.Middleditch

It is known that Schickendantz had purchased a ranch near to Yacutala; taken together with other references to plants being sent from Schickendantz to Weber, it might be presumed that these *Cereus huascha* were also originally collected by Schickendantz

BROWNING IN THE SUN From J.Gamesby

During the course of this year quite a number of my plants have suffered a peculiar browning effect, rather similar to the damage brought about by red spider, when the epidermis changes from its natural colour to a more or less uniform pale brown, commonly around the crown. But on careful close-up examination, no sign of red spider could be found. My *Rebutia* have suffered by far the worst from this problem, together with a few *Sulcorebutia* and one or two other plants.

It is only by a process of elimination that I have finally tracked down what I believe to be the cause of this problem. From time to time I spray my plants and in order to more effectively wet any form of aphid or mealy bug which may be around, a small amount of soft soap is added to the water; this soft soap is readily available at garden centres and is about the consistency of runny honey. How much is used in the water is left to the user, so I use about a teaspoonful to a watering can full of water. The conclusion that I have come to is that this very dilute soap solution is dissolving away the wax from the surface of the epidermis; once the epidermis has lost its protective wax coating then the surface of the plant body can suffer from scorch, even on a normal sunny summer's day. Several other cactophiles in this area whom I have spoken to, tell me that they have also suffered this very same problem this year.
.....from P.Bint

A lot of my *Rebutias* have suffered from what I consider to be the South American problem that afflicts soft bodied plants, that of a pale brown fungal type of attack in the crown of the plant in particular, which disfigures the plant and can often be peeled away eventually but leaving the plant badly scarred. A severe attack can even cause the whole plant to dry up.
.....from H.Middleditch

With few exceptions, most of my *Rebutia* have fallen victim this year to the browning of the epidermis. In addition, quite a few other plants - the odd *Gymnocalycium*, *Matucana*, *Lobivia*, etc have also shown the same signs, but far more plants outside the *Rebutia* seem to have escaped the problem. The thought has often occurred to me of using a drop or two of washing up liquid in the water used to dilute insecticide, in order to thereby more effectively wet the mealy bug, but this year it has been a thought only and not acted upon. This year *Bio Long-life* has been tried as an insecticide, the epidermis browning having only appeared after starting to use this particular product. In consequence I am rather suspicious that some component of this product may have been the basic cause, either directly or indirectly, of the browning of the epidermis. It is quite possible that this product does contain a component which is intended to dissolve the waxy coating on mealy bug that would otherwise protect them from the dilute insecticide.

One occurrence in particular has led me to this belief. Early in the summer my two multi-headed ex-habitat *Lobivia amblayensis* did show some slight signs of browning in the immediate vicinity of the growing point. Suspecting that this was a sign of red spider, both plants were drenched from all sides with diluted *Bio Long-Life* applied by means of a pressure sprayer. Not long afterwards, the whole of the surface of the stems of both plants turned into a pale brown colour, virtually down to ground level. In addition, my ancient *Euphorbia* of tuberculata affinity attracted some mealy bugs among the leaves at the crown of the branches; these were also treated to a spraying with *Bio long-life* and the uppermost 10-15mm of the stems shortly seemed to lose its chlorophyll and turn a pale yellowish brown colour. Since nothing else has been applied to this particular plant it tends to confirm the thought that the cause of the pale browning effect lies with the *Bio long-life*.
.....from J.Ring

We would not recommend the use of soap sprays. These are sold as "Green alternative" pesticides which do not damage the environment; however, as you rightly guess, it does damage the plant cuticle. You may remember that people used to use soap solution on roses to kill aphids - this idea is just a reversion to that earlier method. However, soft soap achieves a fair kill rate without the inclusion of any other insecticide. It removes the waxy coating which is on all insect cuticles, not just mealy bugs. This leaves them very vulnerable to dehydration and to attack by bacteria and fungi. We did try these products but we found that great care is needed to avoid permanent marking on cacti, so we use them no longer.
.....from H.Middleditch

The following conversation from one of the TV gardening programmes may have some relevance here:

Interviewer - You have some aphids on these rose leaves, do you have anything to spray them with?

Householder - Yes, I just spray them with diluted washing-up liquid and it seems to be quite effective in

getting rid of the aphids.

Interviewer - It should be quite effective as the aphids almost explode when they come into contact with it. This sort of spray is very useful on fairly tough leaves like roses, but if you use it on any tender leaved plants like tomatoes, you must spray them again immediately afterwards with plain water in order to remove any traces of the washing up liquid or else they will very rapidly scorch.

.....from R.Ferryman

Yes, I have had this sort of problem, mainly on my Lobivia and Acanthocalycium and in fact it has been with me for two or three years. My initial suspicions were that this effect had been brought about by some sort of mineral deficiency. As I grow my plants in a compost which is almost all grit, feeding is essential and so feed is included with every watering. However, certain mineral components in the feed can undergo a chemical change in storage - the suppliers effectively warn of this. My 25 kg container of feed lasts for about a year and consequently I have been suspicious that certain of the mineral components may have been rendered ineffective over that period of time. To which storage and shelf time prior to sale is not to be neglected. However, after making various enquiries I have now been able to satisfy myself that mineral deficiency is not the cause of my problem with browning of plant bodies.

At the present moment I am somewhat inclined to put this problem down to high humidity within the greenhouse, as I believe that this permits the full waveband of light to be transmitted more readily and hence lead to scorching. But this would not explain why my problem seems to be confined only to the immediate vicinity of the crown. Incidentally I neither use Bio Long-Life nor do I add any wetting agent (soap or washing up liquid) to my water.

.....from M.O'Neill

For years I have had very few (if any) problems with pests on my plants and I put this down to my regular practice of drenching all my plants twice a year in a dilute solution of Murphy's systemic insecticide. Unfortunately the formula for this product was changed about two years ago and is now virtually the same as Tumblebug. More to the point, it is no longer anything like as effective as the product to the previous formulation and that was when my problems started. Now a great many of my Rebutia have been afflicted by scarring by red spider, as well as many Sulcorebutia. Apparently even Bio long-life is no longer available.

.....from H.Middleditch

Where the dirty brown scarring has occurred on my own plants, a close inspection has not so far revealed any signs of minute moving red dots, so I had ruled out red spider as a cause. But perhaps in this instance the red spider has actually been seen.

.....from M.O'Neill

No I have not actually seen any red spider on the affected plants - I had simply assumed it was these pests from the nature of the damage that was occurring.

.....from H.Middleditch

This would appear to leave us without an explanation for the real cause of the pale brown discoloration. Unless it is that the same effect is brought about by more than a single cause.

.....from J.Ring

I would suspect spider mite as the cause of epidermal browning even though none could be seen. We have read that two-spot mite is the usual problem in the UK which I assume is Tetranychus urticae. This species is a copious web spinner and people may be familiar with the web symptoms. Our problem is the european red mite, Panonychus ulmi, which produces hardly any visible web. Both of these species are common in the Nelson district, which is a commercial orchard region. There is a "mite forecasting service" here, rather like a weather forecast, for the commercial growers, which tells them when mite numbers are increasing rapidly and thus spraying is necessary. These mites have a rather short proboscis so that they can only attack cells close to the surface. They rapidly suck cells dry and move on. By the time damage is noticeable the pests have left. It would be unusual to see any mites of this species on plants exhibiting visible damage.

A FLOATING ALTITUDE?

.....from H.Middleditch

The information received from J.Fahr in the form of a field record of his visits to Bolivia, includes locations by longitude and latitude, as well as a note of the cacti seen together with certain brief references to accompanying flora. However, many of the entries include two differing figures for the altitude of the one and same location.

.....from J.Fahr

Why are there two different altitudes given in my field record? From the Global positioning system (GPS) the longitude and latitude is obtained together with an altitude. In addition I also carry with me my normal altimeter. Since this instrument will be affected by a drop in barometric pressure, differences in the readings are quite possible!

.....from A.W.Craig

Using a GPS instrument in the field gives a surprisingly precise location for the spot where it is being used, in longitude and latitude co-ordinates. The GPS instrument will also give an indication of altitude, but if the instrument is switched on for a few minutes, the altitude figure will usually drift quite appreciably from the initial reading.

.....from K.Gilmer

We also made use of both a traditional altimeter and the GPS instrument. There is no doubt that they can indicate different values for altitude at any one spot. One possible reason for this is that the GPS instrument may not be given enough time to settle down. It can sometimes take quarter of an hour for the GPS instrument to register the correct altitude. And if one does not wait a sufficient length of time until the GPS instrument has levelled out to the correct value, then the read-off altitude is possibly not right. Above all, in deep valleys with close sides the GPS can have problems. For precise longitude and latitude figures the GPS needs at least three satellites, whereas for altitude readings the GPS instrument needs four, or preferably five, satellites for a clear signal. And that is not always possible. The conventional altimeter, on the other hand, can be readily adjusted to take into account changes in barometric pressure.

.....from R.Ferryman

During my visit to Chile in 1999 it was the first occasion when I made use of my GPS equipment but I am not greatly impressed with this technology. Previously, when travelling in company with G.Charles, we both questioned the accuracy of this device, particularly in relation to altitude. The manufacturers confessed that this instrument is not accurate for altitude recording due to satellite positioning, but I was surprised to find out just how inaccurate it was.

A FROSTY RECEPTION From W.Christie

Before I put up the extension to my greenhouse recently, space was at a premium. Having acquired an increasing number of plants of known provenance, many of the others were suffering from neglect, mostly those of horticultural origin which had been acquired over the years. They were really dubious assets and many were marked. So two years ago, in order to create some space, I bedded out in the open garden a number of Lobivias, Echinopsis, Opuntia, and Trichocereus, in order to give them a last burst of glory before they departed this world. The Lobivias, Echinopsis, and Opuntias did not survive the winter, but I was astonished to find that Notocactus concinnus together with another ancient Notocactus, not only survived the winter snow and rain, but seemed to thrive and flowered again profusely the following summer. The Trichocereus terscheckii and T.candicans also survived and have put on new growth. They are in the NW corner of the garden, in a poorly draining, heavy soil and completely open. It will be interesting to see if they survive a second year.

AN UNEXPECTED HARVESTING. From B.Burke

When I obtained the Schultz and Kapitany book about Copiapoa, it came with an offer of habitat collected seed of Copiapoa. This offer stated that there were 300 lots available from each of some 21 different collecting points. I decided to take up the opportunity to purchase this seed offer. When this arrived I found there was up to 30 seeds per packet, so I suppose I might have received as much as 600 seeds all told. They did advertise 300 of these seed collections, so that adds up to a possible grand total of perhaps 180,000 seeds that Schultz and Kapitany must have collected during their visit to Chile.

All accounts from our members who have travelled in Chile suggest that fruit on Copiapoa is not abundant - also that one has to be on the spot at just the right time to catch the ripe seed before it is carried away by the ants. In addition, a single fruit on a Copiapoa will hold about 30 seeds so this means that they would need to find about 300 ripe fruit full of seed for each of their collections. It does seem to be rather surprising that Schultz and Kapitany were able to offer such a large volume of habitat collected seed.

.....from C.Sherrah

Schultz has two large commercial nurseries and employs about 60 people there. This activity includes an official quarantine house, all plant imports into this country having first to be held in a registered quarantine house until they are cleared by government inspectors.

It appears that Schultz & Kapitany not infrequently receive container loads of cacti into this quarantine house. Although I have not visited this establishment myself, various members here did visit him on the occasion of the local Cactus Convention. The ex-habitat Copiapoa had apparently been put on to grafts in order to push them along and promote flowering, so one can draw whatever conclusions one wishes to regarding the source of the seed offered with the Schultz and Kapitany book.

.....from H.Middleditch

In the Copiapoa book by Schultz & Kapitany there is reference to their visits (p.51) and seed collections (p.69) taking place in April and May, with a further reference (p.18) to making observations on fog over a period of forty days. If travelling, making observations and notes, as well as taking photographs, occupied about half their available time, this would have made the equivalent of one full day available at each of their 21 seed collecting locations to search for seed. To find and packet the contents of perhaps 300 ripe fruits within this period of time at each of their seed collecting locations i.e. one useful fruit every two minutes, would be no mean achievement.

.....from J.Ring

We have not visited R.Schultz but I do not think that any of the seed he and Kapitany offered was produced in Australia. There was not sufficient time between their collecting trip and the offer. Is it being suggested that Schultz and Kapitany are trying on a huge hoax? The evidence would suggest in reality that they are trying to assemble information on Copiapoa and have asked all interested parties to co-operate.

The seed they offered was linked to particular populations of plants, all identified by GPS references, and in most cases with photographs; in some cases the plants were tagged on site with aluminium tags attached

with copper wire, but Schultz and Kapitany evidently know insufficient chemistry to know that this may not be a good idea for the mist zone!

While Schultz and Kapitany quote from Knize 1970 that ants consume up to 90% of ripening seeds, they also suggest that fruits are only vulnerable when the operculum has opened, and that fruits may contain ripe seed some time before this happens. It may take some experience to find such fruits. They also mention a discussion with Kattermann on this topic.

I do not wish to cast aspersions at Chilean members but I do wonder just how much experience of botanising and in particular, seed collection, they may have had. A field trip with little or no experience is unlikely to be productive. Perhaps those unable to find Copiapoa seeds were unable to recognise a ripe fruit unless the operculum had lifted? In that case they are likely to have been disappointed. Schultz and Kapitany do give detailed accounts of how to proceed to collect ripe seed - they had previously been to Copiapoa habitats and there is no substitute for experience.

.....from A.W.Craig

When we were travelling in Chile, we found that the lid opens on top of the Copiapoa fruit when the walls of the fruit are still fleshy and turgid - it is only after the lid has opened that the walls of the fruit start to dry out. When we have seen the ants carrying seed away from a fruit with an open lid, the walls of the fruit are still, at that stage, green, fleshy and turgid. So that the fruit on Copiapoa which we looked at in Chile would be still green and turgid with no clear indication of whether the seeds within might yet be ripe - or not. Sometimes we would open a fruit and find that the seed contents were still white and completely unripe, sometimes the seed content was brown and not quite ripe, and sometimes we were lucky and the seeds were black and ripe.

.....from H.Middleditch

It is quite probable that fruits are set on a few of my own Copiapoa every year, but on many of my Copiapoa it is far from easy to see the state of any fruit without poking about in the wool at the crown of the plant. From time to time I feel obliged to engage in a tidying up session in the greenhouse, removing dead flower remains. It not infrequently happens that it is only when a dead flower is removed from a Copiapoa that I discover there is a fruit in the wool. In view of the general absence of rain in Copiapoa habitat it is difficult to imagine this wool at the crown becoming lost in habitat. Or is it sandblasted off by the wind and so reveals the fruit to view?

.....from R.Ferryman

Goodness knows how many Copiapoa I have looked at to see if they might be carrying any ripe fruit. One thing I am quite convinced about is that the soldier ants keep a watching brief on each and every Copiapoa so that they are on the job the very minute that the lid lifts on a Copiapoa fruit. If I put my tweezers on a Copiapoa fruit to test it for ripeness, there are ants running all over the place almost before I have had time to squeeze the fruit. If I am fortunate in finding a ripe fruit containing ripe seeds, whilst I am picking up the seed to put it in the packet the ants are running back out of the packet with it nearly as fast as I am putting it in. I am quite sure in my own mind that it is the funicular attachment that is really of interest to the ants, not the seed itself. Certainly the fruit is often pretty well hidden by wool and one has to get used to interpreting the slight hummock on the wool as giving away the presence of a fruit. There will be no flower remains to give away the existence of a fruit - ripe or unripe - because the flower remains die off very quickly indeed in habitat. I do not think I have ever seen a dead flower on a fruit on a Copiapoa in habitat.

There is definitely an art in deciding whether, once having found your Copiapoa fruit, it is worthwhile opening it for seed. Sometimes you are unsure and you take the fruit off, only to find that the seed contents are not yet ripe. So then you tend not to bother to open other fruits that you may find on other plants in that population, or perhaps you might not bother to even look for any more fruits at that spot. At other times you open a fruit and find ripe seeds, so then you continue to persevere in searching for more fruit in anticipation that those, too, may well contain ripe seed.

.....from C.R.Pugh

On previous visits to Chile in 1994 and in 1997 we had naturally kept a look-out for ripe fruit so that we could take whatever opportunity was offered to collect seed. We had very little success when it came to collecting seed off Copiapoa. We did see plants in flower, but the flowers were literally in ones and twos to a plant. Even the multiheaded clumps rarely had the odd flower on more than a few of their heads. And the fruit was difficult to find. Near Pan de Azucar, for example, we could find no seed at all on the Copiapoa that we stopped to look at in autumn (Chilean Spring) of 1994, nor in autumn of 1997. In fact the plants looked pretty desiccated.

We wandered down into (I think) Chanaral, to make a purchase and the shopkeeper was obviously keen to try out his English on us. We asked him if the surroundings were usually as dry as this at that time of year and he commented, without any prompting, that he could remember as a child the hills behind the town being green, but they were never like that today. We even got the impression from reading Ritter's works that at the time he was travelling around in Chile, there was more thriving general vegetation and the cacti as a whole were in better condition than the state in which we were now seeing them.

When we made another trip to Chile in early 1999 it was after the onset of El Nino and we went with the specific intention of trying to make a good seed collection from as many different Copiapoas as we could find. Certainly in the vicinity of Pan de Azucar the plants gave the impression of being in a distinctly better condition than when we had seen them on the two previous occasions. However, it seemed that we were still rather too early at one or two locations, such as the *C.longistaminaea* not far from the shoreline at Esmeralda. These plants must have started their flowering season not long before the time of our visit, as they were indeed displaying flowers but they must just have set their first fruit of the season, because only a few of the fruit which we found were ripe.

On the other hand, the *Copiapoa.krainziana*, *C.dealbata*, and *C.columna-alba* had ripe fruit in abundance and were still flowering. The relative abundance of fruit may have been because of the timing of our visit, or it may have been due to the better availability of moisture, in the wake of El Nino. To judge by the better growth of the shrubs and the cacti, and their greener appearance, compared with the impressions from our previous visits, there did seem to be more moisture available to the plants. Possibly there might also have been more insects flying round, although we were never able to satisfy ourselves which insects were responsible for pollinating the *Copiapoas*.

We did occasionally pick a fruit pod off a *Copiapoa* only to find that the seed was not quite ripe, but it did not take many days for us to be able to decide whether a fruit was or was not ripe. There may well have been a slight yellowing of an otherwise green pod to indicate ripeness but it would be very difficult to describe in words just what feature or appearance of the fruit indicated that it was ripe. It was rather a matter of use and familiarity and not really by any particular feature, that we were able to pick on the fruit that were ripe. I can distinctly recollect giving some fruit on one *Copiapoa* a gentle push with my penknife and deciding that they were not yet fully ripe. Their appearance would be changed very little, if at all, when they did become ripe. Of course the "feel" of a ripe fruit was not the same when we left behind one species and came to another! Sometimes the lid on a turgid yellow fruit would be just starting to break open, to show us that it was ripe.

Very occasionally there would be as many as four ripe fruits on the crown of a plant. On the big clumps with many heads there could be ripe fruit on one part of the plant and none on the other part. Perhaps one part of the plant was more exposed to the sunlight, or less exposed to the wind, but we were not able to decide what particular factor or combination of factors brought about this effect.

We certainly saw plenty of ants visiting fruit which had opened, but we also saw a few open fruits which were still partially filled with ripe seed - even to half or three-quarter full - with no signs of any ants. Perhaps they had had their fill?

.....from A.Johnston

The comment from B.Burke poses some interesting questions. It had not occurred to me to work out the amount of seed they must have collected. But I have now watched out for fruit setting on my own *Copiapoa* and kept a record of them. Not really surprising was the fruit being quite visible on *C.lauii*. There were also three visible fruits on *C.cuprea*, three visible on *C.totoralensis*, and one fruit visible on each of four other species. In addition, the top of the fruit was visible on *C.lembeckei* which has a very woolly crown. The fruit was hidden by the wool at the crown on *C.cinerea v.alba*, on *C.haseltoniana* and on *C.minima*.

It may be that the habitat plants would have much more wool and the fruit would be hidden. You can open these fruits whilst they are still firm and fleshy and the seed can be removed and is ripe. I will count the seed that I find in each fruit of about five species that still have fruit in the plants.

.....from Schultz and Kapitany, *Copiapoa* 1996

A thick growth of wool is produced in the apex of mature *Copiapoa*. This wool protects developing ovaries and fruits from predators, sunlight, wind, and aids in the moisture retention of the buds.

.....from B.Burke.

In general, germination of the S & K *Copiapoa* seed was good, but there was zero germination for *C.esmeraldana*, *C.solaris*, and for one packet of the *C.krainziana*, with but a single germination from the other *krainziana* packet. But what was rather annoying was that *Copiapoa krainziana* germinated from the packet of *cinerea* seed, from the packet of *haseltoniana* seed, and from others, too. Yes, it is *krainziana*, but the whole point of buying this seed was its attachment to a specific GPS location. So which GPS location did this admixture of *krainziana* seed come from?

.....from J.Ring

Incidentally if anyone got seed from the offering that accompanied the *Copiapoa* book by Schulz & Kapitany, some *Copiapoa krainziana* seed got into some of the *Copiapoa albispina* packets. We have now got some nice *C.krainziana* seedlings labelled *C.albispina* and I asked R.Schulz if we had made an error, or if this was evidence the two were part of the "hybrid swarms" mentioned in the literature. He said that his own seedling plants contained this mixture of types so it had to be their error, and not mine. I guess the best collectors get this problem occasionally.

.....from G.Charles

Yes. I did obtain the batch of seed which were offered by Schulz and Kapitany and although germination was not very good, the seedlings do look true to the names on the packets, so far. My own collected seed from habitat came up much better because I think that it was from a more recent flowering.

.....from B.Burke

Now a list has arrived from Schultz and Kapitany offering *Copiapoa* seed from 34 different locations "collected during 1996" together with seeds of other cacti.

.....from J.Ring

After hearing from you about the doubts expressed over the practicality of collecting a large quantity of *Copiapoa* seed, an approach was made to R.Schutz who provided the following response; "As you rightly pointed out, gathering *Copiapoa* seed is a far more complicated matter than just looking for ejected pods on the surface of the plants. There is a technique which we developed which allowed us to obtain the quantity of seed we offered. Some days we would spend two hours only collecting seed from one population, but this would give us 5-6,000 seeds. Some days we might only find 100 seeds in old dry pods on the surface, the rest came from carefully pulling out pods which were just ripe, from the wool. Timing was also important. Some populations had hardly any ripe seeds but two weeks later they had plenty. We were there for 6 weeks which allowed us to return several times to the same locations and check for seeds. Someone travelling through with a day here and a day there has little chance of timing it just right to get any quantity of seed.

FINDING A WEINGARTIA - OR A SULCOREBUTIA? From K. Augustin

In the course of my last trip to Bolivia we rediscovered one of Ritter's Weingartia just by chance. Between some plants of *Parodia ocampoi*, two of these Weingartia were found in their natural habitat. In the intervening period they have developed well and already produced seed. You will, I am sure, understand if we ensure our own propagation first. The plants look like a small, less robust form of *W. sucrensis* (or a form of *W. neocummingii*) and produce its flowers in a curious manner from the base of the plant - yellow flowers with reddish brown tips to the outer flower petals. Considering the habitat location, it would not be the *v. catarirensis* according to Ritter's description, but rather the species *erinacea*. In any case it is no *lanata*-form, but a form of *neocummingii*, only smaller and finer. These K.59a were certainly found only as quite small plants. In their close vicinity there also occurred Weingartia *riograndensis* (*longigibba*) which are similar in regard to their flower but apart from that, on the spot the two appeared to have nothing to do with each other. In any case the usual *W. longigibba* (or *riograndensis*) are moreover both only forms of *W. lanata*.

In addition, I now also know that this species had already been found two or three years prior to our discovery by a Tillandsia enthusiast, Frau Hromadnik, and transferred thence to E. Markus. From conversation with both of them I gather that the plants grew in the close vicinity of Puente Arce and flower from the base of the plant, on account of which one of the then travelling companions spoke of it as a *Sulcorebutia*.

.....from C. Sherrah

Whilst we were in Bolivia I purchased some seed from Ramirez Bros. which I understood was a *Rebutia* form. This seed was planted in October 1995 which germinated quite well and 1998 was the second year in which it flowered, with a total of up to 60 blooms during Spring and summer. The plant body is now some 50cm in diameter and 30cm high, the flowers only opening out to a narrow funneliform shape. A picture was taken of them in an air temperature of 41°C and shown to a friend whom I consider knowledgeable in *Sulcorebutias* and relatives, and he thought that it was a Weingartia, with affinities to *W. multispina*. I do have a plant of *W. erinacea v. catarirensis* which is virtually identical in body shape and spination. Putting both plants of equal size side by side, then the dead flowers on *W. erinacea v. catarirensis* start just half way up the body at the widest point and continue towards the crown, whereas the "Rebutia" flowers start at the base and stop where the Weingartia starts - it is uncanny! In addition, the flower tubes on the "Rebutia" appear too narrow at the base compared with the form of flower on my other eleven spp. of Weingartia. To me, it looks more like a *Rebutia* than a Weingartia. I have written to Ramirez Bros. to ask where this plant originated.

.....from R. Hillmann

The picture of the yellow flowering plant grown in Australia is very interesting. Without flowers the plant for me is a Weingartia sp. - but unusual are the flowers from the base of the plant. This feature would suggest *Sulcorebutia*, but the flower itself looks rather like a somewhat elongated form of Weingartia; *Sulcorebutia* has a smaller, thin flower tube. On the group around *Sulcorebutia torensis* and *S. purpureus* there are wider flower tubes and with flowers nearer the centre of the plant. It gives me the impression of being like a Weingartia *multispina* from near Aiquile. But there is also a form from Pasorapa RH 786 with this appearance.

.....from C.S. Sherrah

In response to my written enquiry to Ramirez Bros. for more information about this plant, they have now replied saying that it is Weingartia *chuquichuquitensis*.

.....from K. Augustin

The photograph from the Australian cactophile is of a plant with finer spination than my own discovery, but despite that compares very closely to my KA 59a. Of course I wonder if this plant also originates like KA 59a from the general area of Puente Arce, south of the river and east of the road. On my last field trip to this area I looked for both Ritter's Weingartia *erinacea* and *W. erinacea v. catarirensis*. Despite an intensive search, Weingartia *erinacea* was not found, so that my KA 59a could be the variety. Both my own KA 59a and the Australian plant do not display markedly woolly areoles, in accordance with Ritter's description in *Kakteen in Südamerika 2*, nor do they offset readily. Ritter must surely have also been struck by the flowers originating from the base of the plant.

In addition we should not forget that Ritter also describes a Weingartia *gracilispina* from this area, from some km further to the south however, south of Chuquichuqui but still before Weingartia *sucrensis* appears. But this find does not match the description of our plant and moreover, on account of the undoubted closeness to Weingartia *sucrensis*, is likely to be a form of that sort.

Moreover, I also found just the same sort of plants a few km to the south of Sucre (KA 90), and this also is in all respects a smaller form of *neocummingii*. The body is of similar habit to KA 59a, with a diameter of 6 to 7 cm at the most, and there is again no sign of wool at the areoles. The flowers on KA 90 arise from the crown, are pale yellow, and lack the rusty red tips to the flower petals to be seen on KA 59a.

Seed from the now cultivated plants of the original Hromadnik collection has been offered in the 1999 seed list of the G.O.K. under the name of "Weingartia sp. Puente Arce". I will try and obtain some of it and if this purchase should materialise I will send you some of it. ... [Later] In the meantime the seed requested from the GOK has been supplied and a portion is enclosed.

.....from H. Middleditch

This seed arrived in a packet in a normal envelope which lacked any form of protective packing. A very cautious examination of the contents of this packet suggested that there were no unbroken seeds. It was then forwarded for a second opinion.

.....from C. Garnham

Regarding the seed of the unusual Weingartia received from the G.O.K. The contents of both packets



Weingartia erinacea v. *catarirensis* Photo: C.Sherrah



Weingartia erinacea v. *catarirensis* KA59a Photo: K.Augustin

appeared to be little more than chaff, with no obvious seed. However, these contents were sown but nothing has materialised.

.....from K.Augustin

There are also plants with a more robust spination which appear to be a form of the aforementioned plants. However, we lack any sort of overview of the diversity of forms in either population.

.....from R.Hillmann

If this Australian plant has more than 50 seeds to a fruit, then it is a *Weingartia*; if less than 50, it is a *Sulcorebutia*.

.....from H.Middleditch

The suggestion from R.Hillmann that fruit contents of under 50 seeds would be expected in *Sulcorebutia* and of over 50 seeds in a *Weingartia*, is not an idea that I have heard of before now.

.....from E.Markus

Although I grow mainly *Lobivia* and *Sulcorebutia*, I would not have thought that the number of seeds in a pod is an acceptable means of distinguishing between *Weingartia* and *Sulcorebutia*.

.....from J.Pot

In regard to the number of seeds in fruits of *Sulcorebutia*, I have often found 50 or more. These are mostly types like *S.tiraquensis*, but also *S.verticillicantha* and *S.loosenickyana* can have many seeds in a fruit.

.....from A.de Barmon

Having made a few seed counts on my *Weingartia*, the number of seeds per fruit were: *W.sucrensis* 90; *W.longigibba* 140; *W.knizei* 40; These figures are from normal fruits, although smaller fruits with fewer seeds did occur. The fruit on my *Sulcorebutia* are so close to the ground that I harvest them as soon as possible; by recollection, the seed count is very variable, from more or less 100 seeds per fruit in the likes of *S.arenacea*, *S.caniguerali*, to some 20 to 30 seeds per fruit in *S.candiae*, *S.arenacea*, *S.breviflora*, *S.krahni*, and others.

.....from A.Glen

Without any thought of counting I would have had no hesitation in saying that *Weingartias* had far more seed per fruit than *Sulcorebutia*, although I have never bothered to make an actual count. When I have tried doing so, I find 69 seeds in a fruit on a plant labelled *W.sucrensis*, as well as 54 and 90 in two fruits on *Weingartia* sp. Mizque KK 1578, There were 12 seeds in the fruit on *Sulcorebutia tuberculato-chrysantha*, the yellow flowered *Sulcorebutia steinbachii*. On the face of it that looks a pretty clear-cut distinction, but I am sure that a wider survey would start to show up figures more in the middle range. It would be particularly interesting to know how many seeds were to be found in a fruit of say, *Sulcorebutia torotorensis*. Another thought that crosses my mind is what happens in a poor year in habitat - does one get poor fruit formation and low seed production?

.....from H.Middleditch

And incomplete pollination may yield low seed counts, to confuse the issue.

FLOWERING BROWNINGIA From F.Vandenbroeck

During our visit to southern Peru in July and August of 1991, we found *Browningia candelaris* at many places along our route. Many years later we found more of these plants in northern Chile, when we were travelling along the road which runs from Pisagua to Camina and on to the Bolivian border at Cochane. Coming from the coast and going eastwards into the Andes, *Browningia* is one of the first cactus to be seen, at about 2000m altitude, both in Peru and in Chile. With increasing altitude as one travels further eastwards, these plants quickly disappear, to be replaced by quite different sorts of cacti.

However, there is something strange about these plants, for going more to the north this situation no longer applies. Thus, when travelling east into the Chaparra valley or the Nazca valley, *Browningia* is met with as one of the last species before coming on to the Puna at approximately 3500m altitude. These high altitude forms are much more robust than the forms growing at lower altitudes; they have their bluish green arms nicely erect into the air in the shape of a real candelabra. At lower altitudes the *Browningia* are smaller and mostly having a "scabby" appearance, their brownish-red arms often hanging down sluggishly. The difference between the two forms are striking and may not be accountable solely by the difference in the nature of the habitat. As you know, Ritter creates two species: *Browningia candelaris* and *B.icaensis*. Others, such as *Ostolaza*, do not seem to make any such distinction.

.....from H.Johnson, On a collecting trip to Peru. Translated by J.Brickwood from Ku.a.S. 3.1952

From Chala we turned inland, eventually up to an altitude of 3800m, to see how the coastal flora compared with the inland flora. At approximately 2000m we discovered a *Browningia*. This was a distinctive species with different fruits, seeds, and stems. The subsequent journey from Chala on the coast to Nazca inland did not prove to be very fruitful as that region is without rainfall. The Pampas beyond Nazca are completely without any plant life and only a few tiny villages lie in the mean river valleys. The following day we travelled onwards to Puquio on another inland journey, with the aim of arriving in the highlands. The lower valley was terribly dry, so much so that even the *Armatocereus* were completely lax because of the long drought. Soon we came across a *Haageocereus*, then further up, a *Cereus*. We again saw the new *Browningia*.

.....from H.Middleditch

At no great distance to the south of the Nazca-Puquio route there lies the 15°S parallel of latitude which roughly approximates to a significant phytogeographic divide, which was reviewed in *Chileans* No.43. It was noted there that, in his book about the Peruvian Cactus vegetation, published in 1953, W.Rauh observed that "in the Nazca-Puquio area on the west side of the Andes a conspicuous change in the Flora takes place, of which it is characteristic that a number of the vegetation-determining plants that have a distribution area stretching away to the south or south-east, reach their northern limit here ... the genera *Browningia* is to be noted in this respect". In general terms, this observation could be taken as a justification for the establishment of *Browningia icaensis* as a separate species.

In regard to the Nazca-Puquio divide being the "northern limit of *Browningia*", it was reported by R.K.Hughes (*Chileans* No.46) that *Browningia candelaris* was to be found in the Tinajas canyon, some 25 to 30 km to the south-east of the capital city Lima, a very considerable distance to the north of the Nazca-Puquio route. Appended to that report there was a communication from W.Rauh to the effect that in 1975 he had likewise found *Browningia* in the Lurin and Chillan valleys, to the north-east of Lima. However, the first report of *Browningia* being found in the Lurin valley seems to have been at a rather earlier date.

.....from C.Backeberg, *Kakteenkunde* 2. 1941

The range of *Browningia* has up to now been confirmed between Tacna and Arequipa. However, I found it still further into northern Chile and a number in the vicinity of Lurin, near Lima. It has thus shown itself to have a far greater habitat range than was earlier acknowledged. When the west coast exhibited a much damper climate than it does today the *Browningia* may have extended even further towards the north, towards the

Gymnanthocereus with which the Browningia themselves may once have been united. Truly the southernmost representatives of this group is Stetsonia, in Argentina, whose flowers are likewise nocturnal and naked as well as scaly, with numerous scales on the ovary.

.....from R.K.Hughes

We had very little opportunity to take a close look at the Browningia we saw in southern Peru, but I seem to recollect seeing a plant with the down-hanging branches as mentioned by F.Vandenbroeck. In the Tinajas canyon the overall impression was of a much moister environment than the Browningia habitats in southern Peru - indeed the Browningia growing in the Tinajas canyon were certainly quite green. However in 1980 and 1981 I saw the Browningia near Puente Uchumayo in southern Peru in October-November before the onset of the rainy period in January - February - March. In 1986 I saw the Browningia in the Tinajas canyon in April - May when the rainy period had already lasted for five months instead of the usual three months. Having said that, it is debatable whether any rain hits the ground on the landward side of the coastal desert. Another factor is that the coastal desert is quite narrow behind Lima and Tinajas, whereas at Arequipa it is much wider, the city being a long way both from the sea and from any coastal mists. Even then, in Arequipa they say that rain falls on the high passes around the city but not on the city. However in that exceptional year of 1986 I returned to Arequipa from Yura to find it raining in the city. People did seem surprised, running around holding anything over their heads to keep dry - such as brief cases or plastic bags. On our return from the Colca canyon to Arequipa in the dark we passed through a snow storm, roughly where the road goes above the 4900m contour for a short way. This snow fall was a news item on the following day. By comparison, in the Tinajas canyon distant views were hidden in the mist, so atmospheric moisture was about despite the hot sun and the dry earth.

.....from K.Gilmer

Our visit to southern Peru in the September of 1998 started off from Arequipa. From here we drove south towards the coast and then followed the Pan-American highway until we came to Tacna. From Tacna we turned northwards into the Andes, first seeing Browningia near Paicha at 1565 m altitude, up to 2365m en route to Palca. Then on the road to Tarata we found more of these plants at 2446m altitude. After travelling to Puno and Cuzco we returned to Arequipa and not far from that city we again found Browningia, at 2,800m. At all the localities where we saw these plants, on rocky hills and mountains, the surroundings were comparable. The Browningia grew mainly in the valley bottoms, but also on the mountain slopes and there mostly in small gulleys where there would be a more reliable supply of ground water for a longer period. Both the nature of the ground and the accompanying vegetation were comparable at each location. We were able to collect a few fruits, but we saw no sign of any flowers on these plants.

.....from H.Middleditch

In Rauh's book on the Peruvian Cactus vegetation there are one or two pictures of Browningia in fruit, but no pictures of this plant in flower. Indeed I am not able to find any habitat photograph in the literature of this plant in flower, nor any record of it being seen in flower. But photographs of it in fruit are by no means rare. As most cactus travellers tend to time their visits to follow the end of the dry season - September onwards - it might be suggested that the Browningia flower in the course of the dry season and set fruit in time for the arrival of the cactus enthusiasts - and the rain.

.....from E.Markus

When I was travelling near Arequipa in late July of 1976 I did see two or three flowers on Browningia, high above our heads. Perhaps these plants do not flower every year? Maybe only after a good rainy season do you have the chance to see the flowers?

.....from F.Vandenbroeck

On our visit to Peru in the November of 1988 we did indeed find Browningia in fruit in the Rio Majes valley. But in July 1991 we saw these plants in flower and fruit to the west of Galeras.

.....from G.Charles

In the course of our trip to Peru in 1994 we visited the Tinajas canyon, where there are some fine Browningias. We looked closely at one of these plants which must have been a ripe old age, with branches rebranching so that the crown had so many stems it was really impossible to count them, but there were probably over fifty. There were quite a few fruits on this plant, mostly near the top of the branches, but we could also see one single flower. That was on the 18th of November.

.....from H.Middleditch

It may be that this particular flower was late in the season, at a time of year when only fruit is reportedly to be seen on Browningia. But perhaps it is an instance of the exception proving the rule, that this plant normally flowers and sets fruit before the onset of the rainy season.

PARODIA NOGALITO Members

.....from H.Middleditch

My plant of Parodia sp. Nogalito which came from J.Brickwood was apparently raised from seed supplied by J.Piltz under this name. It is almost indistinguishable in overall appearance from my two plants of P.nivosa, all three being covered by a coat of fine white spines. But the sp. Nogalito has now flowered, with a rich yellow flower, so in that respect it is quite different from P.nivosa.

.....from J.Piltz

The seeds of this Parodia species Nogalito were received from R.Wahl who collected them in Tucuman province, in a part of the Serra Medina, but I do not have any information regarding the actual finding place.

.....from H.Middleditch

On the Argentine automobile club map of Tucuman there is a Cumbre Nogalito near the southern end of the Sierra Medina, and a Sierra Nogalito near Rio del Nio, close to the northern end of the Sierra Medina. Do we have any idea of the original finding place for this *Parodia* sp. Nogalito?

.....from M.Wimberg

On the enclosed 1:250,000 scale map of this area you will see that there is a place called Nogalito a few km to the west of Rio del Nio on the eastern side of the Sierra Medina. I understand from R.Wahl that this is where he found a *Parodia* which he collected under his number RW 2a, as Sp. Nogalito.

.....from J.Brickwood

I do have a number of plants of *Parodia* sp. Nogalito RW 2a in my collection, which not only display quite a variation in the spination, but the flower colour varies from plant to plant, ranging from yellow to reddish-orange. It would be interesting to know if these variations are evident in habitat and whether they occur within the one population, or perhaps at slightly different elevations. The flowers and seed suggest that this *Parodia* belongs with the *P.microsperma* group and has no relationship at all with *Parodia nivosa*.

.....from P.Down

At The Chileans 1998 Weekend there were some plants of *Parodia* sp. Nogalito on display. My own two plants of sp. Nogalito are also very similar in appearance to *P.nivosa*, but they had a rather more open spination than the other sp. Nogalito which were on display.

.....from J.Brickwood

My own selection of *Parodia* sp. Nogalito RW 2a display a range of spination. At one extreme are plants with close-pitched areoles carrying fine white projecting radial spines together with fairly short, weak, white central spines. At the other extreme are plants with more widely-pitched areoles, longer off-white to pale cream radial spines and much longer golden brown central spines. With various permutations between. There is no correlation between flower colour and spination.

.....from F.Kasinger

From D.Herzog I have been told that R.Wahl visited the Sierra Medina, that he collected some *Parodia* near Nogalito, and gave the plants to D.Herzog in Cafayate. I have been to Nogalito twice myself but have not found these plants there. From D.Herzog I have now received some seedlings of this *Parodia* sp. Nogalito.

.....from J.Lambert

My collection of *Echinopsis ancistrophora* JL 258 was made to the west of Rio del Nio and so lies on the eastern slope of the Sierra Medina. The biotype there consisted of a rather heavy, reddish soil, covered mainly by grass, without any bushes. Figure 21 in my book was actually taken at this spot. Presumably this will not be a long way off the place called Nogalito

CHILEANS 2001 WEEKEND

This event will be held from the 7th to the 9th September 2001 in Nightingale Hall, Nottingham University. An outline indication of the anticipated programme will be sent to members who regularly attend this event and, on request, to any other member.

CHILEANS - BACK NUMBERS

On account of considerations of storage space, reprinting costs, and demand, issues up to and including No27 can no longer be supplied as complete volumes. Those residual numbers still in stock can be obtained at a nominal cost of 50p per issue plus £1.00 per order for post and packing, whilst stocks last, from the membership secretary (see opposite page).

CHILEANS MAP COMPENDIUM, 2nd Edition

This edition contains 8 further maps together with additions to several of the earlier maps. Copies are available from the membership secretary at £5.00 each (inc.p&p) or £5.70 overseas.

CHILEANS PLANT OFFERS

When suitable material is available, a list of plants for sale is sent to interested members. If you are not on the current mailing list but would like to be, please send your name and address to G.Charles (address on the opposite page or E-mail: graham.charles@btinternet.com) who will send the next list when it is published.

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Particular interests

Austrocactus	A.Johnston, 11 Malvern Rd., Scunthorpe DN17 1EL
Cereanae	G.J.Charles, Briars Bank, Fosters Bridge, Ketton, Stamford PE9 3UU
Cleistocactus	T.Lavender, Kalanchoe, Market Place, Tetney DN36 5NN
Copiapoa	A.W.Craig, 32 Forest Lane, Kirklevington, Yarm TS15 9LY
Discocactus	R.Moreton, 91 Umberslade Rd., Selly Oak, Birmingham, B29 7SB
Echinopsis	M.Muse, 32 Fielding Rd., Birstall, Leicester, LE4 3AJ
Frailea	C.Holland, Newling Farm, Litcham, Kings Lynn PE32 2PB
Lobivia	M.Lowry, 7 Bygot Close, Leconfield, Beverley HU17 7NN
Matucana	D.Aubrey-Jones, 62 Rosehill Park, Caversham, Reading RG4 8XF
Melocactus	J.Arnold, Suffolk House, 2 Oak Hill, Washingborough, LN4 1BA
Neoporteriaanae	R.M.Ferryman, Nichelia, Leckhampton Hill, Cheltenham GL53 9QJ
Opuntia	R.Crook, 35 Cardinal Close, Worcester Park, Surrey KT4 7EH
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When contacting any of these members please enclose an s.a.e. in the first instance.

THE CHILEANS

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