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*Echinopsis leucantha*  
Schaqui, La Rioja, Argentina

Photo:- G. Charles





*Weberbauerocereus weberbaueri* near Yura

Photos;- J. Arnold



My 1981 visit to Peru was also largely spent in the southern part of the country. This included a stop between Moquegua and Torata. Here we saw clumps of *Tephrocactus sphaericus* with very dehydrated and wrinkled segments, about 2 inches long by 1.25 inches in diameter. There were also shrubby clumps of *Armatocereus* which were 7 to 8 feet high. The stems had 6 to 7 ribs and they were jointed at intervals of about 18 to 24 inches. The fruits were very large and oval in shape. They measured 3 inches long by 2.5 inches in diameter, covered all over with fierce spines. Dried and blackened fruits were to be seen attached to the stems of these plants, still containing seed. Some of the fruit had been a home for a caterpillar.

There were shrubby clumps of *Weberbauerocereus* with cereoid stems standing either vertical or nearly decumbent plus all the variations in between. Almost as if in some cases the stems had outgrown their strength and sank from upright to an angle approaching the horizontal under their own weight. From the decumbent position, vertical offsetting stems would grow. The average length of stem was 6 feet, whether vertical or decumbent. 3 inches in diameter or 5 inches over the spines. On some of these stems I was lucky enough to find lodged among the spines some dark and blackened seed pods just over one inch long, with some seed still in them.

My 1986 trip to Peru was from early April to early May, which was intended to be after the rainy season of Jan.-Feb.-March had ended. But it just happened to be unusual in that the normal three month rainy season had become five months. We were told that Lake Titicaca had risen by three metres which meant that the railway from Juliaca to Puno had been flooded. But not only that, all the population who farmed the lake's fertile flood plain had been dispossessed. So our train from Cuzco to Puno had to terminate at Juliaca and passengers had to take a minibus, followed by a train journey from Puno to Arequipa.

From Arequipa we were driven out towards Puente Uchumayo, along the Pan American highway. When we came to a point with a good view over the irrigated valley below, I spotted a *Browningia candelaris* high up on the hill at the opposite side of the road. From here I walked some way along the road and then set off up the hillside to search for cacti. The first plant I came across was a *Haageocereus* sp. that was densely clothed in dark brown spines that blended in well with the similarly coloured rocks around them. The stems must have been about three to four inches across the large central spines, the stems themselves being hidden beneath the mass of smaller radial spines. On the larger of these *Haageocereus* the stems seemed to be able to support a foot or two of erect top growth, whilst below this the growth had become prostrate.

The next species to be found was a *Weberbauerocereus*. The first plants of this sort to be seen here were little different from the *Haageocereus*, being similar in the density and colouring of the spines. It was mainly size that separated them as the *Weberbauerocereus* were about one inch greater in stem diameter with stems maybe two or three feet high. It would seem that most of these *Weberbauerocereus* were dwarf growing or stunted due to the arid conditions, although later, further round the hillside, a couple of larger plants were seen.

On a previous trip to this area I had stumbled across *Tephrocactus sphaericus*. It was a while before I found a clump, then I found quite a few more. The very spiny joints were either spherical or oval, about 1.5 inches in diameter, some of the oval ones up to 2 inches long. Shortly afterwards I came across a couple of these *T.sphaericus* growing close together, with much larger joints. These joints were almost three inches in diameter and looked almost gigantic when compared to the size of those on the other *Tephrocactus* plants. In addition the mode of growth differed from those with smaller segments and by their many tightly packed joints. The larger jointed plants seemed to be rather more open clumps with joints in short branches.

This large *T.sphaericus* was found when crossing the hillside to look at a large *Neoraimondia*, the only plant of this sort to be seen in the area. It was of massive proportions with the upright stem branching from the base just above ground level. The stem colour was a bluish to greyish green against which the large dark brown to black areoles stood out. There was one green fruit found on this *Neoraimondia* which, despite not being the rich red-purple of the ripe fruits seen on these plants in the Rimac valley, came away easily when touched.

After a trip to the Colca canyon in the tourist bus, it was off by bus to Yura. Having passed the cement factory, the road descended into a narrow, shallow, valley and followed a green ribbon of irrigation. When houses lined the road we had reached the village of Yura, famous for its natural springs and thermal baths. I walked down and across the tiny stream in order to climb up the dry desert hills.

Immediately on the first hillside I was confronted by cacti. There were plants of *T.sphaericus* littering the ground, not so much in neat clumps but more open and lax, the joints one above the other tending to form short branches. The size of the joints varied a great deal as did the shape of the joints, although most did appear to be spherical. The spines and glochids radiating out from these joints were as sharp and deadly as one might expect from this species, making them almost impossible to handle. A number of these *Tephrocactus* were seen with with bright yellow fully open flowers although often the dead flowers turned red. There were also many fruits to be seen but none were found with ripe seed in them. The flowers and fruit remained firmly attached to the joint one below the top, but detached readily from the next lowest joint, with the slightest of touches.

The largest and therefore the most obvious of the cacti were the *Weberbauerocereus*, although there were only a few on the first slope, with stems only three to four feet tall. Most of these *Weberbauerocereus* here had densely spined stems with yellow spines on the new growth. However, among them there were plants with red-brown to dark-brown spines. On the smaller plants the three to four inch diameter stems densely covered in robust spines, appeared to be quite stout. Similar stems on larger plants seen later, growing to six or perhaps even nine feet tall, appeared quite slender by comparison. The smaller plants were often straggly, with stems leaning or prostrate, sometimes marked, broken, or dead. Some of the larger plants with long, slender stems

had stems and branches that became semi-decumbent after leaning or bending over, so forming straggly bushes. The better growing *Weberbauerocereus* of a large size that were seen were not only branched from the base but also from higher up on the stems. All these stems and branches swept first outward and then vertically upward. As the rainy season had only just finished here, it would probably account for the top twelve inches of many stems being clothed in fresh brightly coloured spines.

Most of these plants showed no signs of flowers or fruit, although some flower buds were to be seen. Then I found a couple of ripe fruits that had enlarged, bursting open around the floral scar and changed in colour from green to yellow or orange. It was some time before I could find a flower, the only one that was open. This strange flower seems as though it does not want to open fully, similar to a *Cleistocactus*.

The *Haageocereus* found at this site was the same as that near Puente Uchumayo. Here it seemed a little less erect and a little more prostrate. Again it was similar to the brown spined *Weberbauerocereus* but the lesser height and more prostrate stems made it possible to distinguish this *Haageocereus* from *Weberbauerocereus* when lacking flowers or fruit. The *Haageocereus* at Puente Uchumayo blended in well with the colour of the rocks there, but here near Yura they contrasted with the light sandy coloured earth.

There were a lot of small *Corryocactus* to be seen, many of them being along the bottom of the gulleys which were the obvious drains for any rain that might fall in the short wet season. Most of these *Corryocactus* looked like seedling *Cerei* with their single upright stems, although some were leaning or even prostrate. Those measured on average 14 inches tall with their 7 to 8 ribbed stems 2.5 inches in diameter, (four and a half inches across the spines). This was a quite different form of growth to the slender stems of *Erdisia* sp. which had seven or eight radial spines, half an inch long, per areole, and a single central spine up to 1.5 inches long. I found only one small orange fruit on one of these stems, there being no sign of buds, flowers, or fruit on any of the other stems, despite making a search.

Travelling further into the hills, I came across two large cereoid cacti. Around them grew rosettes of a bromeliad sp. with spiny-edged leaves, the rosettes being about 18 inches across, with large, three-foot long flower spikes. The cereoid cacti appeared to be large *Corryocactus*. The rib count and spine count was similar to the small plants described above, but here the stems were four to five or more inches in diameter. The spines were five or six inches long with some up to seven inches. Returning to Yura I walked along the sandy shoals of a dry stream bed at the bottom of a steep sided ravine. There on the banks of this dry stream grew a few more of these large *Corryocactus*. In the shadow of these large plants grew some of the smaller ones mentioned above.

The plants that caught my attention most of all at this site were the *Arequipa*. I took a trail up the first slope that continued on along a ridge. From here I could look into into each of the smaller gulleys running down from the ridge, that led into larger gulleys, that eventually became ravines and canyons. Along one of these gulleys I spotted my first *Arequipa*. It was a three-headed plant, one head globular, the other two short cylindrical, all about 3 inches in diameter, the tallest stem some 9.5 inches long. The grey-brown to dark brown spines blended in well with the surrounding rocks and soil. Having found the first *Arequipa*, I then began to see many more along the gulleys, mainly single headed plants of all sizes. Then they became even more obvious because of their bright red flowers which were quite a contrast with the drab browns of the spines. Discovering more *Arequipa*, some were found with buds, others in flower, and yet others with seed pods, although at first none of these were ripe.

A little later I was to find ripe fruit that detached easily from the plant. Then one had to be careful that there was not a hole in the base of the fruit which would let the seed escape. Some of the *Arequipa* were in clumps, commonly due to an old plant becoming top heavy, leaning over, and finally lying flat, with new offsets forming along the laid-down stem, whilst the growing tip turns upward again. In time, these offsets had grown to produce multi-headed clumps. Sometimes the heads in these clumps would be of a similar size, with others they would vary considerably. In one large gully I found some really large clumps, at first one with eleven heads, then an even larger plant with thirty four heads. The stoutest stems of *Arequipa* did not seem to exceed four inches in diameter and five inches across the spines. It seemed that stems only remained upright until about 12 or 18 inches tall, then they became decumbent, or even hung down the slope.

The *Arequipa* seemed to be confined to the gulleys until the trail reached a couple of large *Weberbauerocereus*. As the trail started on the gentle slope to the top of the hill, the *Arequipa* seemed to be everywhere. Here too, many of the *Arequipa* had buds, open flowers, or unripe fruit, sometimes all three on the one plant. Occasionally some ripe fruit was found. There were so many *Arequipa* on this hillside at perhaps no more than a yard apart that it made a truly spectacular sight.

Yura is situated where the coastal desert reaches the slopes of the volcano Chacani. The shallow hills in this area seem to be of a dusty, sand to clay soil mixture over a rock formation that only shows through in a few places. The soil mixture has been compacted or baked to give a surface resembling the underlying rock and much of it is equally as strong when walking or scrambling over it. But care must be taken as the surface is liable to collapse when trodden on, disintegrating into a dry dusty soil, like a sand dune, making it difficult to stand upright, never mind walk up or down hill.

.....from J. Arnold

Our visit to Peru took us to the very southernmost parts of that country, going past the shores of Lake Titicaca and then over the Cordillera to the Pacific coastal region. From Tacna, we went on to Arequipa, where we occupied a full day in an excursion to the north and west of that city.

Driving out from Arequipa towards Yura took us through some rather mountainous countryside. The ground was covered with pumice and was very dusty, appearing to carry little in the way of vegetation and no obvious cacti. As we were getting nearer to Yura, we came to a fairly level patch of ground, with rocky cliffs

to our right. From this high ground we were able to look back and see the city of Arequipa in the distance. It was here, at 3648m some 6km SE of Yura, that we first saw columnar cacti along this stretch of road, both to our right and to our left. We decided to stop here to take a look round.

The first columnar cacti were only just off the road, dotted about this level area, and some were in flower. After walking a fairly short way over this level ground we found ourselves looking down on our left into a vee shaped valley whose sloping sides came together at what looked like a dry stream bed along the bottom. The sides of the valley were largely covered with stones ranging in size from pebbles to huge boulders, as well as there being patches of bare ground that were covered with the dusty pumice. The columnar cacti were scattered over the sloping valley sides, mostly a good stone's throw apart from one another, whilst low-growing shrubs, barely knee high, were present in fair abundance between the boulders. Considerable care had to be exercised in picking a suitable way over this very rough ground, up and down the slope.

In this valley there were a great many cacti, in surprising variety. There were low growing clumps of *Tephrocactus*. There were lots of *Loxanthocereus* as well as *Arequipa* and *Haageocereus* - none of which were in flower. The *Loxanthocereus* and *Arequipa* were difficult to tell apart without their flowers, but the *Arequipa* displayed somewhat stouter and thicker columnar stems than the *Loxanthocereus*. There were also the small segments of *Corryocactus meyenii* which arose out of the ground as separate stems of about 15cm tall, none of them in bud or flower. The taller *Corryocactus brevistylus*, growing in columns of up to 2m in height, rarely carried any branches., but some of these plants were in flower, seldom having more than just the one yellow flower open.

The *Weberbauerocereus weberbaueri* were by far the most imposing plants to be seen. There were few, if any, short solitary plants were to be seen, mostly they grew in clumps of tall, robust stems all arising from close to the base of the plant, growing up to three or four yards high, with a dozen or more branches to one plant. Most of the branches adopted a slightly curve shape, the upper portion being more or less vertical. In addition there were often one or two branches - or several on the larger plants - which were procumbent, most of these not looking in very good condition, or completely dried up. The upright branches carried a dense coat of long, very dark greyish-brown spines. Most branches had a short length of what looked like fresh growth at their tops, with spines of a light yellowish-brown colour. Some of the longest stems did not have any of this new growth, so perhaps they had reached their mature height.

Possibly half of the sound branches could have had a bud or flower, but seldom with more than two or three flowers open on any one plant. Many of the stems had only one bud or flower, others only two. The flowers did not arise from the very crown of the stems, but either just below the shoulder or at some distance below the shoulder of the crown, sometimes quite a way down the stem. It was particularly interesting to see that these *Weberbauerocereus* displayed either red or white flowers - some plants with red flowers, others with white flowers. Apart from the flower colour, there did not appear to be any other difference between the flowers. The flower tube adopted a slight S shape and there were just short dark hairs in the axils of the small scales on the tube, so that the flutes running the length of the tube were easily seen. Compared with the length of the tube, the flower petals are fairly short, the external petals reflexed almost backwards and the inner petals only slightly open, with a ring of close-packed anthers standing almost level with the tops of the inner petals. The stigma projects almost an inch outside the flower opening, carried on a long, stiff, style.

As with the flowers, we did find fruits on a number of these *Weberbauerocereus*, but again it was usually only one or two fruits on some stems, although some plants did carry both flowers and fruit. This gave the impression that that we were looking at "this year's" fruit. The fruit was still green, almost globular, about an inch in diameter, with numerous tiny scales with short hairs in their axils and usually with the flower remains still attached. We did not see any dried-up fruit, but brought some of the fresh fruit back with us. The seed proved to be embedded in a thickish semi-solid white filling. The plants grown from this seed are now about 4cm high and it remains to be seen if the fruit from the red flowering plants will eventually also produce red flowers, and white flowers from the others.

.....from W.Rauh. Peruvian Cactus Vegetation 1958

*Weberbauerocereus weberbaueri* v. *humilior*. Plants only 1.5 to 2 m high, branching from the base and forming a large bush. Habitat location: vicinity of Arequipa, as well as at the foot of the volcano, also west of the city on the Cerros de Caldera. In comparison with the other sorts of *Weberbauerocereus*, this variety distinguishes itself by a noticeably low growth and forms bushes with widespreading arms.

It is not improbable that in the less well explored highland to the south of Arequipa, up to the border with Chile, still further spp. of *Weberbauerocereus* may be found.

.....from H.Middleditch

This low growing specimen of *Weberbauerocereus* of "about 3 Feet high" seen by R.K.Hughes in 1986, may well be a representative of the v.*humilior* Rauh & Bckbg.

.....from F.Ritter, Kakteen in Südamerika, Vol.4

*Weberbauerocereus torataensis*. A bush of up to 2-3 m high, branching abundantly from the base and from part-way up the stem. .... Type location Torata, E. of Moquegua at about 2000m altitude.

.....from H.Middleditch

This Ritter name would appear to be applicable to the low-growing *Weberbauerocereus* found by R.K.Hughes, also in the close vicinity of Torata. At this point it may be advisable to draw attention to the distinction between Torata which lies some 30km NE of Moquegua, and Tarata which lies some 90 km NNE of Tacna, both places located on the western side of the highlands, south of Arequipa. See map "Southern Peru" in Chileans No.61.

.....from M.Williams

In the course of our visit to Peru, we were travelling from Puno (on the shore of Lake Titicaca)

southwards towards the coast. Before reaching Moquegua we made a stop within 5 km of leaving Torata, where some *Weberbauerocereus* were to be seen growing on a slope above the road.

These *Weberbauerocereus* grew rather like a shrub, with many stems arising from the base of the plant or more rarely from the lower part of the main stems. The tallest plant was about 2 meters tall, with stems of about 8 cm in diameter, but I also photographed one lower growing plant which had over 30 stems barely reaching one meter tall. This particular one made an almost rectangular clump about 2 meters wide by less than one meter deep, all but a few of the stems having growing heads. On those stems which did have damaged heads there were new offsets arising only inches above the level of the ground. There were remains of old flowering points and also signs of the beginnings of new flowers, so it does not appear to have been a juvenile plant. On a typically tall plant the flowers were red when fresh, going off to a reddish-brown.

Growing with these *Weberbauerocereus* were a few *Arequipas* and a large plant of *Corryocactus brevistylus*. I do not recall seeing any seedling plants, but the locality was very dry with only vestiges of grass and odd herbs dotted about. All the cacti were well spaced out and in total there were not a great number there.  
.....from R.Senior.

It will be about 25 years since sowing some seed of *Weberbauerocereus johnsonii*, which I had purchased from the Winter catalogue. From the resulting germination, the plant which I kept has now flowered. It did produce some buds two years before the flowering episode, but those two buds aborted. Until quite recently it has been a single stem which is over a metre high, but now it has one new shoot which has appeared from ground level. The spines are a golden brown colour on the upper part of the stem, fading to buff lower down the stem. On the lowermost third of the main stem, the longer spines are about 4-5cm in length, then there is some 20cm of stem with spines that are only 2-3cm long, whilst above that there are spines of 8-10cm in length. On the very topmost 6cm of stem there is a narrow line of dense spines which are about 2-3 cm long, together with some much longer spines, which looks like a pseudo-cephalium. From this pseudo-cephalium arose the two aborted buds and also the eventual flower. Right on the very crown of the stem there are more long, upright golden yellow spines about 8-9cm long. Whenever I have to move the plant and its pot, I try to keep the pseudo-cephalium facing south, but this year there is one new bud, quite isolated, appearing on the north side, with no accompanying pseudo-cephalium.

The flower which did open had a bud that was completely covered with a dense coat of woolly brown hairs which are also to be seen on the flower tube. The flower itself was 9cm long and 7cm in diameter, straight, and stood out from the stem at a half-upright attitude. It opened late at night and remained open for less than ten hours, closing by 10.00 a.m. the following morning. The white flower petals opened wide but not quite flat, above a set of pale pinkish petals. The widespreading stamens stood out above the petals, a large number of stamens drooping to in a bunch to lie against the lower part of the flower. The stigma and style also lay against the lower part of the flower, holding the stigma just above the anthers. The stigma lobes were not seen to open.

This plant has always been kept under glass, but of my two *W.weberbaueri*, one has been kept under glass whilst the second plant has been grown out of doors. The plant grown under glass has produced a crop of short hairs in a sort of pseudocephalium, which again faces south, but it has never flowered. The plant grown in the open air has no sign of a pseudo-cephalium but it did produce a flower.  
.....from P.Hoxey

In southern Peru the genus *Weberbauerocereus* is represented by a small group of closely related species - *W.cephalomacrostibus*, *horridispinus*, *rauhii*, *torataensis*, and *weberbaueri*. There is a fairly continuous distribution of this genus from as far north as the Pisco valley in the province of Ica, southwards as far as Moquegua in the province of the same name.

*Weberbauerocereus weberbaueri* grows in large numbers close to the city of Arequipa. In fact a few plants can be seen within the perimeter of the airport. The city of Arequipa lies at an altitude of about 2400m, just to the east of the arid desert belt and to the west of the high altitude Andean plateau. The environment is dry for most of the year but there is a short rainy season in January and February with regular afternoon downpours. Taking the road which goes to the west out of Arequipa, *Weberbauerocereus* are common from 2600 to 2900m and dominate the rocky hillsides. In January of 2008, after a particularly wet period, the slopes had taken on a green tinge with the rocks playing host to algae and mosses. Other plants had not come into leaf and the *Weberbauerocereus* did not appear to have benefited from the rain yet, although the ground underfoot was saturated.

The *Weberbauerocereus weberbaueri* branches freely from close to ground level with a spreading habit, growing at least as wide as tall. The largest plants are perhaps 3m wide and tall. The spination was fairly variable, mature stems with flower remains having finer and more flexible spination than juvenile growth which tends to have stronger and more robust spination. These *Weberbauerocereus* stopped abruptly at 2900m and above this altitude the *Corryocactus brevistylus* dominates the hillsides.

The *Weberbauerocereus torataensis* is a southern extension to the population of *W.weberbaueri*. Above the town of Moquegua they are common on dry, dusty hillsides where I saw them in November 2005 at the end of the dry season. They are very similar to *W.weberbaueri* and are often considered a form of that species, although they are generally more strongly spined. They share the same much-branched and spreading form. They also grow in the same altitude band up to about 2900m and rely on the short rainy season for moisture.

*Weberbauerocereus rauhii* grows to the north of Arequipa and appears to be a northern form of *W.weberbaueri*. However, it does display a number of significant differences in its growth form which makes it a very different looking plant. The *W.rauhii* grows as a much more upright plant with a smaller number of branches which grow parallel to the main stem. The spination is much finer and more lighter coloured - often near to white. I have found plants in the Cotahuasi canyon between 2000 -2800m altitude where conditions are

quite favourable and not as arid. These plants do not grow as extensive colonies but as a low density population mixed in with other cacti species such as *Neoraimondia* and *Armatocereus*. The preferred habitat in the Cotahuasi canyon was on gentle slopes rather than on the steep canyon walls.

Inland from Chala in the northern part of Arequipa province we came across a very heavily spined *Weberbauerocereus* in an area of gently undulating hills composed of granite rocks and grit, at 2600m. These plants had the structure of *W.rauhii* with upright stems and non-spreading branches but did have large areoles and the spines are the strongest and densest that I have seen in this genus, sometimes completely obscuring the body. These plants were described by Rauh as *W.horridispinus*. The habitat is dry and occurs just to the east of the completely arid desert belt so perhaps the nature of the spination is due to the more arid conditions. Apart from the cacti, which include *Browningia* and *Neoraimondia*, there is little other vegetation present.

Isolated from the other species in southern Peru is *Weberbauerocereus cephalomacrostibus*. This grows in a very limited area on the coastal hills above Mollendo. Although rainfall is absent for years at a time, there is a rich lomas vegetation which lives off the coastal mists. This *W.cephalomacrostibus* is not to be found in the most favourable spots - which is where the non-succulent annuals and grasses predominate - but a little further inland at higher altitude in a relatively narrow band from 750 to 950m altitude. Some mist must penetrate this far, but the habitat is very arid. The slopes are covered in fine sands and only occasionally do underlying rocks break through to the surface. There is practically no non-cactus vegetation. This *W.cephalomacrostibus* has a very distinctive growth form compared to the other species. Branches emerge from the base of the central stem and grow initially upright. Eventually the weight of the stem causes it to arc downwards and if the growing point touches the ground it roots down and a number of new offsets form there and grow upwards. If the original branch dies off then a new plant is established and continues to grow independently. Plants of this species often grow in small groups and it is possible that they all originate from the one mother plant. I have not seen this method of propagation in any other *Weberbauerocereus* species and it is probably an adaptation to the very arid environment where seedling establishment must be very infrequent. The spination is very formidable, with strong central spines of up to 10 -15cm in length, although it is a little less strong on flowering stems.

## **GETTING TO KNOW COPIAPOA COLUMNA-ALBA From B.Burke**

Before undertaking our very first visit to Chile we sought information and advice from several Chileans' members who had previously visited that country. Nevertheless we did meet with some unexpected problems and difficulties during the trip. On the other hand, we found the scenery was splendid and the cacti proved to be of great interest.

We were travelling north along the coast from Chanaral when we passed the Park Rangers station shortly before we reached Pan de Azucar. From here, the road took us inland. We were barely 3 km from the coast when we made our first acquaintance with *Copiapoa columna-alba*, which were growing in the company of little else but a few small bushes. There was a colony of these *Copiapoa* growing on a low terrace, on a flat area of ground made up of grit and stones which extended a short distance from the road to the foot of the range of hills to our right. Many of these plants were only 3 to 4 inches tall, whilst others were taller. The bodies were mostly spineless for up to three-quarters of their height. The spineless part of the stem was a bluish-black colour, but many offsets carried a coat of rime. Most of these plants grew vertically, but others leant in various directions. We followed this colony for perhaps about half a km; beyond that, there were no longer any of these *Copiapoa* to be seen near to the road.

Further along this same road, we turned off north into the Pan de Azucar National Park, heading in the general direction of Las Lomitas. Hillsides and valleys stretched around us on all sides, the slopes starting to carry a sprinkling of low growing bushes. The faint track gradually brought us higher into the coastal hills until eventually we came out near to the crown of one of these hills, which was identified on the map as El Mirador. From this hilltop, the view inland took in a huge expanse of hillsides which appeared to be dotted with vegetation, although at that distance it was impossible to say if it was made up of *Eulychnias*, or bushes, or both. The shoulder of the hill where we had stopped was covered mostly with gritty sand, with stones or lumps of rock standing out here and there above the surface. Scattered over this part of the hill were tall *Eulychnias* growing up to about three yards high, with ascendant branches. There were also some occasional clumps of compact, low growing, green bushes as well as a few bare-branched bushes of up to almost shoulder height.

Over the whole of this shoulder of the hill of perhaps a football field in size, there was spread a colony of *Copiapoa columna-alba*. Some of these plants were growing within a pace or two of each other, many of them a few paces apart. A large number of these *Copiapoa* were leaning in all sorts of directions, very few growing bolt upright. The black spines on these plants were heavier than those we saw at most other places in the course of this trip. This colony extended some way down the gentle sandy slope, but only the bushes and the *Eulychnias* seemed to occupy the steeper and more stony slopes, as well as the very crown of the hill which was largely made up of piles of rocks.

We walked over the hillside in the direction of the coast and after barely a couple of hundred yards we found ourselves standing looking down the steep drop which fell almost to the very edge of the waves below. Looking towards the south, we could see the Bay of Pan de Azucar with its offshore island. Here and there on the almost cliff-like drop below us there were occasional bushes and *Eulychnias* to be seen. The *Eulychnias* near to hand, over the hilltop, were hung with untidy strands and bunches of some epiphytic-like plants, in great quantities. So it came as no surprise to have an almost continuous cloud-like layer of mist build up over

our heads, rapidly covering the sky above us. What did catch us out, however, was to find ourselves all of a sudden completely enveloped in the mist. This caused us no little concern whilst we struggled for almost half an hour in the all-enveloping mist, to find our way the short distance back to where we had parked our vehicle.

Seeking a track to escape from the mist, we went near to Las Lomitas, where we came across a semi-decumbent *Trichocereus* as well as scattered *Eulychnias*. There was plenty of Lichen clinging to the bushes and the *Eulychnia* here. The surroundings were rather reminiscent of where we had stopped not long before, near to Caldera. Once again we met with some *Copiapoa columna-alba* here. Eventually we drove back to a better road where we turned north in the general direction of the Pan-American Highway, passing a colony of *Eriosyce* on the way.

Still further to the north we took a track leading away to the west, to the coast at Esmeralda. Not far from the coast we came across the great numbers of *Copiapoa columna-alba* dotted all over huge area of the level floor of the Quebrada de Cachinal, which have been seen and photographed by all the visitors to this spot. A great many of these plants were lacking in spines over the lower part of the stem, which was black or reddish in colour. Grubbing round the base of one of these plants we found some offsets almost hidden in the ground.

From Esmeralda we drove over the intervening hills to the Quebrada Guanillos. Roughly half way along this track, we came across more *Copiapoa columna-alba*, scattered over the ground both near to the track and up the rocky slopes, over both the brown lava-like ground as well as over the black coloured ground even further up the hillside. These plants were quite substantial, growing as high as 12 to 24 inches tall. These were probably the tallest *Copiapoa columna-alba* that saw during our visit to this part of Chile. We were also able to see some *Copiapoa grandiflora* here, but in fairly small numbers.

Turning down Quebrada Guanillos towards the sea, we did not notice any *C. columna-alba* on the valley floor. But when we were about a quarter of a mile from the edge of the beach we met with *Copiapoa longistaminea* growing in company with *C. grandiflora*, both of which reduced in numbers the closer we came to the beach.

Driving along the shoreline to Quebrada Tigrillo did not seem to be practicable, so we drove inland and then took the road crossing the intervening ridge in order to get into Quebrada Tigrillo. In Qu. Tigrillo, we turned inland, up the valley. Once again there were no *Copiapoa columna-alba* to be seen in this valley. After perhaps 5 or 6 km we came to an extensive flat area almost devoid of vegetation, where the road to Sierra Esmeralda bore off to the right. Further still along our track, in two or three places the valley became very narrow over a short distance, only just wide enough for us to pass with the vehicle. Between these narrow defiles were flat, broad patches of ground which could have been anything from 200 to 400 yards wide. When we must have been all of 12 or 15 km away from the edge of the coast, the *Copiapoa columna-alba* started to appear again, on these flat patches of ground. All the plants we saw were blackened near the base as usual, and were about 6 to 12 inches in height - we saw no seedling plants. They were even growing in the track that we were using and it was impossible to avoid driving over some of them. After a few more kms, an extensive rock fall completely blocked our track, so we were unable to continue as we had hoped, round the coastal hills and on towards Cifuncho.

On the following day we drove up the Pan-American Highway towards Taltal, but before reaching Quebrada Cifuncho, we turned to cross some very broad, level terrain taking us in the direction of Cifuncho. We saw no signs of any *Copiapoa columna-alba* along this stretch, until we were quite close to Cifuncho. When leaving Cifuncho we took the road going directly towards Taltal, along which we made two or three stops. About 3 or 4 km out of Cifuncho we stopped to walk perhaps 200 yards or so across perfectly flat ground to the rocky hill slopes on our north side. It was on these rocky slopes that we found some *Neochilenia* that are not yet identified, together with more *Copiapoa columna-alba*. There were none of these plants on either the level ground or at the foot of the hillside. These *Copiapoa* were not abundant, being perhaps 15 or 20 yards apart from one another, and up to a foot in height. The great majority of these *Copiapoa* adopted a leaning attitude, leaning towards the north. The angle at which they were leaning coupled with the steepness of the hillside meant that many of these plants were lying quite close to a rock or to the ground. Of course there were always odd plants growing nearly upright. Most of these *Copiapoa* were solitary, but here and there we saw plants which had one, or two, offsets from part-way up the stem, all the growing points appearing to be quite healthy.

Finally we drove into Taltal, with the vehicle running on little more than fumes from the petrol tank.

## **AROUND ESMERALDA From R.M.Ferryman**

As one leaves Chanaral to head north, the Pan American highway takes you through the bleakest desert. This is the start of the true Atacama, where stark bare mountains are punctuated only by the endless desert floor which to all intents and purposes appears to be barren of all plant life.

To the west of the Pan American lies the coast, but the distance from the coast grows greater as one heads further north. The mountains to the west are generally lower than those to the east and some 30km after leaving Chanaral there are numerous tracks to be seen heading west towards the coast.

A sign indicating a known mine takes one off the Pan Am and towards those low mountains and ultimately the coast. Once one leaves the Pan-Am, there are no signs, simply tracks indicating vehicle passage. One is left to one's own wit or a little local knowledge in selecting the right track across to Esmeralda. As one reaches the coastal range of hills, there is series of tracks, many of which lead only to a used or disused mine. Seldom is there any indication of where the track will lead.

One can visit Esmeralda at a time when the flora is truly remarkable, with green shrubs and masses of



annuals. Or one can be unlucky and choose a time when the flora is less obvious - no annuals, dry shrubs, and only the cactus are conspicuous. The flora around Esmeralda owes its origins to the cloud base that frequently hovers over this area. Rarely does it move inland beyond the small coastal mountain range. It can however be unpredictable. During my brief visit here in springtime of 1944 the mist or fog never lifted, making it a very miserable visit. After four days of continual mist, I left the area behind me.

Within the area fed by moisture from the mists and overnight dew, the flowering desert of Esmeralda plays host to a number of different plants. There are great areas of hillside clothed with scattered bushes and shrubs of two or three genera. Accompanying these are shrubs of *Euphorbia lactifolia*, a red flowering bulb of the *Amaryllis* family, Bromeliads, Tillandsias and numerous other herbs and annuals such as *Nolana paradoxa*, a small tuberous rooted *Oxalis*, and a stinging type of *Solanum*. There is no doubt however that the cactus - the *Eulychnia*, the *Trichocereus*, and the *Copiapoa* are the dominant features of the landscape. Sometimes these larger plants are spaced no more than a few meters apart from each other whilst in other areas they are spaced much further apart. The *Copiapoa longistaminea* can make extremely large clumps, perhaps 1.5 meters across. The *Eulychnia* are scruffy clumps, with branches rarely 2 to 3 meters high. The larger mound forming *Copiapoa* wander over the landscape, covering flat areas, undulating hillsides, as well as fairly steep rocky outcrops. Down on the beach they mix with *Copiapoa cinerascens* and *C. columna-alba*.

In many places there are rocky outcrops of greater or lesser extent, almost completely bare of vegetation outside some clefts and crevices. Exploration of these rocks and crevices reveals some interesting surprises - *Theलोcephala esmeraldana*, *Neochilenia taltalensis*, or *Copiapoa esmeraldana*. Among all the shrubs there are also smaller cacti to be found - *Copiapoa laui* and *C. grandiflora*. Also found growing on the beach is *Theलोcephala malleolata*, displaying rather more areole wool than *T. esmeraldana*. But *Theलोcephala esmeraldana* is to be found growing in various circumstances - on level sandy patches, in the hills, and on the coastal slopes.

Different again are the flat valley bottoms, mostly quite wide, with a covering of a granular quartz type of sand. On these flat areas there is often very little vegetation other than the cacti. Only very occasionally will a tall *Trichocereus* or *Eulychnia* appear on these flat areas, and then it is usually near where some rock outcrops to the surface. There are some similar flat patches of granular sand to be found here and there in the hills, but almost always much more limited in extent. It is on such broad flat sandy areas, and only on such areas, where *Copiapoa columna-alba* is to be found. *Copiapoa longistaminea* can also grow here and there on these flat valley bottoms, but this plant seems to favour the hillsides or the upper beach.

Higher up on the hillsides from where the sea may often be seen, the *Copiapoa columna-alba* can be seen following the contours along the hills, but usually wearing a jacket of lichen or moss on the western face of the plant. The spanish moss may even grow profusely, straggling over the shrubs and bushes, drooping down from the tall *Trichocereus* or *Eulychnia*, or even almost encasing the smaller *Copiapoa* or *Neochilenia* with a bright green cover. This sort of habitat appears to run from the south near Pan de Azucar, towards Cifuncho to the north, and illustrates perfectly the moisture laden air arriving from the Pacific. Indeed one can take handfuls of moss from a *Eulychnia* and use it as one would a hand flannel - it is that wet.

It is important to point out that all these various plants will cover an area that whilst sometimes is extensive, it is not continuous. There is bare ground, sandy or stony, between the bushes, shrubs, bromeliads, and larger cacti so that it is possible to walk around without much difficulty. In addition, the bushes and shrubs are seldom taller than waist height, whilst the hillsides seldom lie at a steep gradient. All this makes the surroundings of Esmeralda a pleasant place to explore on foot and the entire area of Esmeralda is of great appeal to me.

From the occasion of my very first visit here with Adriana Hoffmann - nearly twenty years ago - when we spent two days exploring the area, only to return two days later for another look, such was the appeal. The following year I returned with two companions, in order to spend a week simply walking through the hills. Since those early days, I have returned to Esmeralda many times, some like the whistle stop in company with G. Charles and C. Pugh, and others of two or three days' duration. The area has great appeal, a truly enchanting place. Having said that, the last three occasions on which the family visited Esmeralda, has seen the area covered in coastal fog for the entire day. It does not have the same appeal under dark cloudy skies that it has with a full backcloth of blue sky. Our last visit there saw us escape from Esmeralda whilst it was still under cloud to enjoy unbroken sunshine at Cifuncho!

The slopes of the Sierra Esmeralda of course covers quite an expanse. Dependant upon who you talk to there, it is either where you are standing, or beyond! During a recent trip to Sierra Esmeralda, I was directed to Alto Esmeralda - a place that I have seen no map reference to, but clearly known to the locals. It is Alto in so far as it is a high vantage point but without a clear view to the sea. It is on the slopes of Sierra Esmeralda where Mina Esmeralda is to be found, whilst Planta Esmeralda is much nearer to the coast along the Quebrada de Cachinal.

.....from F. Vandenbroeck

I have been reflecting for a while after reading about so many Ritter species of *Copiapoa* being lumped together. As a matter of fact, most *Copiapoa* species sensu Ritter grow, relatively speaking, close to each other. At least there do not seem to be any geographical or ecological barriers of material importance separating one from the next. Taking this into account, it throws into disarray the accepted pattern of names when so many different forms (varieties or species) are fused or lumped into one or just a few species names. The result will inevitably be that all these forms are bound to end up in one or a few uniform melting pots. Ritter, as an experienced field explorer, must of course have been aware of this when he established his various species names for *Copiapoa*. I am very much aware that taxonomy is an extremely sterile matter, a merely subjective

arbitrary and artificial construction, but of course one always tries to find some logic in the things one observes. However, I am not able to find any logic in the lumpers ideas, even when I try to do so.

When I ventured the thought that the lumping which seems to be so much in favour these days is going too far, you answered that "it is simply a matter of ignoring those authors whose prime interest is getting their names into print". This may well be true, but it keeps amazing me how far they will venture to go.

Take for example the growing side by side without merging of the two Ritter species *Copiapoa longistaminea* and *C.columna-alba*, which have been put forward as varieties of one and the same species (in this case *C.cinerea*). I am sending to you a picture of these two species growing together, which we saw near Guanillos. In my eyes, if these two Ritter species were to be one and the same species, such as the lumpers pretend, it would not be possible for them to maintain their distinctive forms as shown in this picture. Two varieties of the same species coming into contact necessarily merge and wipe each other out. A variety can only maintain itself through geographical isolation. Or do the lumpers consider the notion of "varieties" differently? There is also *Copiapoa krainziana*, which has also been proposed as a mere variety of *Copiapoa cinerea* and grows quite close to the latter, separated only by a difference of altitude of some hundreds of metres. This is a poor geographical barrier for varieties to maintain themselves as distinct entities. If varieties do not merge, then they prove themselves to be different species and may form occasional hybrids. Considering *Copiapoa longistaminea* and *C.columna-alba*, hybrids are not often seen. I believe this is so because the different species bloom at a different period. When we were at Guanillos in November 1990, most of the *C.longistaminea* were in bloom, but we did not see any of the *C.columna-alba* with a flower. The foregoing may be a somewhat brief and bare exposition, but I believe that some criticism of the current ideas for "lumping" is not out of place.

.....from H.Middleditch

This observation from F.Vandenbroeck was accompanied by a photograph taken near Guanillos (which lies not far to the north of Esmeralda) of a wide, flat valley bottom which carried little or nothing in the way of vegetation with the exception of plants of *Copiapoa longistaminea* and *Copiapoa columna-alba*.

.....from A.W.Craig

In this photograph taken by F.Vandenbroeck there is no mistaking the quite clear difference between the multi-headed clumps of *Copiapoa longistaminea* and the mostly solitary tall stems of *C.columna-alba*. On the largest clump of *C.longistaminea* it is possible to count well over fifty heads in camera view, all closely packed together with no single head particularly larger than the rest nor standing more than two or three inches at the most above all the other heads in the clump. This particular clump may even have upwards of one hundred individual heads and in overall appearance is fairly typical of the plants of this species which we saw ourselves in this area.

The *Copiapoa columna-alba* which we have seen were almost all single heads, although this is not universal. But at some habitat locations nearly every plant was solitary. Of the *Copiapoa columna-alba* to be seen in the Vandenbroeck picture, by no means all are solitary - three or four of them are twin headed. We also saw a few twin-headed plants and in addition a very occasional plant with several offsets arising from well up the stem, One such plant which we caught on camera had offsets from perhaps two-thirds the stem height which had grown so they were nearly level with the crown of the main stem. However, we suspected that this form of growth may have been brought about by stoppage of the main stem growth.

The leaning attitude of the *Copiapoa columna-alba*, which is to be seen on almost all of these plants in the foreground of the Vandenbroeck picture, is quite typical for these plants, according to our own observations. Generally they tend to lean towards the north so that the crown of the plant faces the midday sun. Those *columna-alba* in this picture which have a disk of pale coloured wool at and round the growing point are probably in active growth. Below the crown, the body carries the usual silver-grey-blue coat of rime whilst the lowest section of the body is a darker colour. On those plants of *C.columna-alba* which I have examined in habitat, the lower part of the body has a reddish-brown coating like a scaly bark and is denuded of spines. This appearance can extend either a short way up the body, or occasionally almost up to the crown, or to any extent between these two extremes. It is a feature which is to be seen fairly consistently from one population to another. There are also places on the plant where you might imagine that it seems to have some sort of tarry exudation. This occurs at any point on the body - and it does not usually cover large areas but is only to be found over limited areas of eruption. Is it a fungus?

Apart from the *Copiapoa columna-alba* to be seen in the foreground of the Vandenbroeck picture, more of these plants appear in the form of short, dark, columns on the lowermost gentle slopes of the hills in the background. We must have driven past this self-same spot when we visited the Quebrada Guanillos, which is separated by a range of hills from the Quebrada La Cachina in which Esmeralda lies. When we were going through the flatter parts of the Qu. La Cachina, above Esmeralda, we likewise found *Copiapoa longistaminea* and *C.columna-alba* growing more or less side by side. Here again, as near Guanillos, there is a predominance of plants of *C.columna-alba* whilst the multi-headed clumps of *C.longistaminea* are far less abundant.

However, when we drove along the very broad beach from the mouth of the Qu. Guanillos to the mouth of the Quebrada below Esmeralda, the situation was quite different. On the higher part of the beach, that is between roughly one and two km from the shoreline itself, we saw a very considerable number of the multi-headed hummocks of *C.longistaminea* but a relative paucity of the *C.columna-alba*. There were also big clusters of *Copiapoa grandiflora* growing in company with the abundant *C.longistaminea*, on the high beach. The *C.columna-alba* seemed to have a preference for a slightly more inland location, growing mostly on fairly level washes. There were, for example, no multi-headed clumps of *C.longistaminea* to be seen near Tigrillos, in Quebrada Guanillos.

We saw both these species of *Copiapoa* in flower in late October, in November, and in early December. In

any case flowers are seldom numerous on any Copiapoa - even a multi-headed clump of *C.longistaminea* might have just a single flower open on each of two or three different heads. But we believe flowering effectively starts in November and continues through December and January, possibly even into February, so that it is difficult to imagine a staggered flowering season for these two species. However, we certainly do not recollect seeing both species in flower side by side. On the other hand we did see one species in flower at one place and the other species in flower quite some distance away, on the same day. We were never able to find ripe seed to collect off these plants as we were probably too early in the season for that. In any case one has to be very sharp in being right on the spot when the fruit finally ripens, as the ants certainly are.

There were also plants of *Copiapoa columna-alba* to be seen on a flat area along the Quebrada Tigrillos (AWC 683) about 3 km from the shore. In addition, only two or three km from the shore up the Quebrada Madera, there was a wide, flat area of valley floor on which there was a whole crop of *Copiapoa columna alba*, all leaning to the north, all with the darkened lower stem, the greatest number solitary. From our slightly elevated vantage point we could see that these plants extended over half a km or more from one side of the valley floor to the other, and away from us along the valley for a good km or more. Apart from a scattering of a few dwarf bushes, there appeared to be no other vegetation on this patch of ground.

In the 1953 US C&S Jnl, P.C.Hutchison illustrates various clumping plants of *Copiapoa cinerea*, but none with more than about a dozen heads, certainly none anywhere approaching the scores of heads to be seen on the *Copiapoa longistaminea* in the Vandebroek picture and which we have also seen in the field.

.....from F.Vandebroek

Of course I am also aware that *Copiapoa columna-alba* can be seen branching half-way up the stem. This is by no means a rare phenomenon and somewhat in contradiction with Ritter's observations "body solitary". The observations from A.W.Craig as to the occurrence of *C.longistaminea*, *columna-alba*, and *grandiflora* are largely identical to my own impressions from the field.

.....from G.Charles

As a rule the *Copiapoa columna-alba* which we saw were certainly solitary, but we also saw a few plants that were branching. From our own observations, it was rather exceptional to see such branching plants. But there were always a few branching plants to be seen in each population, from those near Pan de Azucar, to those near Cifuncho. However, these branching plants did appear to be in healthy growth at the crown of the main stem so that branching did not appear to have been induced by any stoppage of the main stem. In the course of our trip to Chile in 1998 we went south from Taltal and then turned off along the road which took us in the direction of Cifuncho. Roughly half way along this road to Cifuncho we turned north, taking a track along a quebrada going towards the coast. Along this quebrada we came across a population of *C.columna-alba* where there were thousands of plants to be seen. Again, with but few exceptions, they were all solitary.

From here, we went on to the coast at Cifuncho, where *C.columna alba* was reported by Lau - although he did list them as *C.cinerea*. But again they were almost all solitary plants. Of all the places where we saw these plants during our trip to Chile, it was at Cifuncho where I saw the tallest plants of *C.columna alba*. Some of them must have been very nearly one metre tall.

However, one feature has now come to my attention which could well have some relevance to the standing of these two names as species or varieties. *Copiapoa cinerea* seems to have a typical bunch of fine roots, whereas *C.longistaminea* definitely has a thickened rootstock. In respect of this latter feature, it is similar to *Copiapoa calderana* which is to be found no great distance to the south of Esmeralda, around Caldera.

.....from H.Middleditch

Looking at the large-scale map of this area it would appear that G.Charles et al. must have followed the Quebrada del Griton towards the sea. At the mouth of the quebrada they noticed a road going north along the coast and this is marked on the map.

A photograph taken by M.Krönlein of *Copiapoa columna-alba* in the field takes in quite a number of these plants, all of which do appear to be solitary. In addition, alongside the original description of this species in Cactus France there appeared a photograph taken by Ritter "at the Type location" on which there are not so much dozens of these plants but probably hundreds of them - and again they all appear to be solitary.

.....from G.Charles

It was near Pan de Azucar, fairly close to the shore, where we came across a population of *Copiapoa columna-alba* when we also found a small number of these plants with the yellowish type of spination.

.....from H.Middleditch

Perhaps there have been other instances of more than just the one single sort of *Copiapoa* being observed growing in fairly close company to one another?

## **WHAT IS ECHINOPSIS MINUANA?.....from M.Muse**

My own conception of the genus *Echinopsis* is based on those plants which appear to fall within the concept of *Echinopsis* sensu Zuccarini, rather than that of more recent proposals to embrace various other generic names - such as *Trichocereus* - under the umbrella of *Echinopsis*. Even in the restricted sense of *Echinopsis* sensu Zuccarini, the distribution of these plants covers an enormous extent from 16°S to 39°S and from 42°W to 62°W, so far as is presently known. Within this very extensive area of distribution, it is possible to consider these plants as falling into a number of naturally occurring groups on the basis of their external appearance. But there is one particular group of these *Echinopsis* which can be separated from all other groups within this genus by the characteristics of the flowers and seeds.



In the majority of *Echinopsis* spp., the flowers have their stamens attached to the inner wall of the tube for a part of the length of the tube, upwards from near the base of the tube. This leaves a length of the upper part of the inner wall of the tube devoid of any attached stamens, up to the ring of stamens which arise from close to the base of the petals, commonly described as the hymen ring. These stamens are fairly long, often 40mm or more, long enough to project some way out into the open mouth of the flower. Because of their appreciable length, and because flowers are usually not vertical, the stamens do not remain upright around the style, but usually droop against the side of the tube so that they lie in a bunch against the lower part of the open mouth of the flower.

There is one group of *Echinopsis*, however, which have a quite different arrangement of their stamens, as they are quite short and are attached to the inner wall of the flower tube over almost the full length of the tube, without leaving any gap between those stamens and the ring of stamens inserted close to the base of the petals. Along much of the upper part of the flower tube, these short stamens bend over and face the style, carrying their anthers like a cylinder around the style. They adopt this attitude right up to the mouth of the flower where they can be seen forming a ring, pointing towards the style. My own experience of growing and flowering plants of this group tends to confirm the view expressed by Piltz, that the floral tubes are all bister brown to a sort of pinkish green in colour.

The *Echinopsis* which fall within the group which is characterised by this feature of the flowers are to be found mainly in the lower lying areas of Argentina, Paraguay, and S.E.Bolivia and are commonly designated as the *Echinopsis leucantha* complex. Most of my *Echinopsis* of the *leucantha* group have been obtained from contacts on the continent and do have a provenance, with such as a P, B, MLV, WP, VG, HT, DJF, GN, or LB prefix. This group includes a number of species names, such as *E.melanopotamica*, *E.campylacantha*, *E.rhodotricha*, and *E.chacoana*, whilst *E.intricatissima*, *E.shaferi*, *E.klingeriana* and *E.cordobensis* may also belong here. They are all usually found growing at altitudes between 200 to 1000m.

Not only is this group clearly separated from all other *Echinopsis* by the characteristic of the flowers, it also differs in the appearance of the fruit, a feature which is apparent in respect of both the colour of the ripe fruit and its size. Most other *Echinopsis* produce a fruit which remains green when ripe and of a somewhat egg-shape, whereas the fruit on the *leucantha* group *Echinopsis* are more or less globular. However, I think that *E.leucantha* and *E.melanopotamica* may be separable at sub-species level if only on account of the difference in the shape of their fruit, whilst the fruit colour is variable throughout the range of this group. For example, my *Echinopsis* B.29 from Tucuman has a small, spherical berry which is slate grey when ripe, whereas the Piltz P.98a *melanopotamica* has a cylindrical fruit ca. 30mm long by 12mm wide, which is initially green, later maturing to a dirty red.

However, there is one particular species which was described as *Echinopsis minuana* by Spegazzini in 1905, as originating from Province Entre Rios, Argentina, whose affinity to this *leucantha* group is far from certain. I have a large *minuana* received some time ago from G.R.Allcock, and now around 30cm tall and 8cm in diameter, which produces a spherical berry of about 20mm across and the colour of old gold. Some years ago I saw some *Echinopsis* P.255 *minuana* in the collection of P.Smart, which I was told originated as cuttings from Piltz - they were columnar, some 8 inches tall and 2.5 inches in diameter. My P.255 grown from ex-Piltz seed produced a flower about 15cm long and only about 5cm across the wide open petals, followed by a near spherical berry of some 10-15mm across, of an intense near-fluorescent pink. Unfortunately both these plants seem to have fallen victim to some form of creeping discolouration.

But flowers of similar size to this are not uncommon amongst the *leucantha* group of *Echinopsis*. My Lau-collected *E.klingeriana*, regarded by some as synonymous with *E.chacoana*, had flowers which were only 12-14cm long and 5cm across the wide open petals. An exception is the large *E.minuana* ex G.R.Allcock, whose flower is ca.8cm in diameter and 20cm long and is a deep rose colour.

.....from R.Allcock

I was certainly not aware that this *leucantha* group of *Echinopsis* had their stamens inserted over the full depth of the flower tube. I must take a close look at the flowers on my *Echinopsis* plants of this group when they next come into flower.

Having recently acquired a copy of the Kiesling compilation of Spegazzini's writings on cacti, I find it does contain more information on *Echinopsis* than, for example, Britton & Rose, which is quite gratifying. In looking at some entries under *Echinopsis* I see that Spegazzini puts *Echinopsis molesta*, *intricatissima*, *melanopotamica*, and *baldiana* into his section *Kyptacantha*, but *Echinopsis minuana* and *cordobensis* into his section *Euthyacantha*. Sad to say neither he nor Kiesling explain the meanings of these two Greek-based words.

.....from H.Middleditch

A meaning for these two prefixes does not appear in either Marshall & Bock's work on Cactus terminology nor in the NCSS publication on this subject. Nor is it included in the section of Stearn's "Botanic Latin" covering prefixes derived from the Greek.

.....from G.J.Swales

The "Kypt-" prefix probably derives from the Greek word *Kyptos* which means bent, whilst the "Euthy-" prefix will derive from the Greek word *Euthia* which means straight. Of course the "acantha" part of the word means spine, so the *Euthyacantha* means straight spined and *Kyptacantha* means bent-spined.

.....from H.Middleditch

In Chileans No.54 it was suggested by G.Piltz that his P.255 may be counted among the *leucantha* group of *Echinopsis*. The seed of P.255, photographed by F.Fuschillo to his usual excellent standard, would certainly fit happily into the *leucantha* group. Indeed it would hardly fit any other *Echinopsis* seed group. My own plant

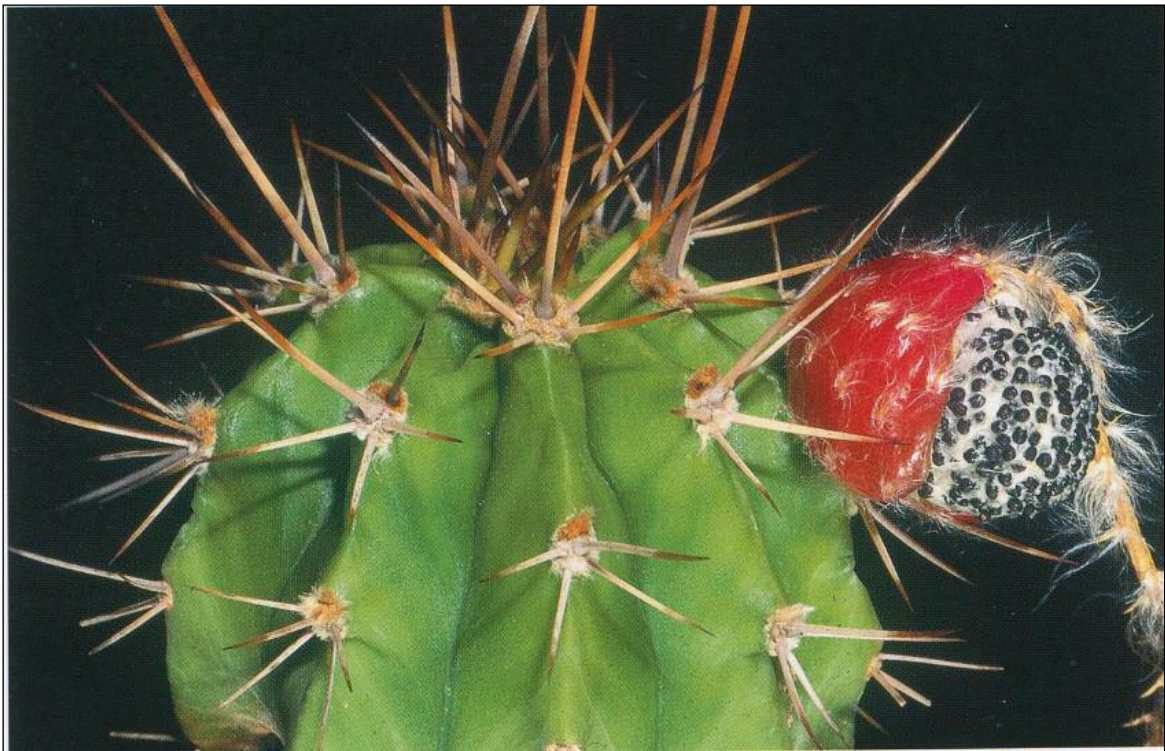


*Echinopsis* P255



*Echinopsis rhodotricha*

Collection and Photos:- M.Muse



*E. chacoana* D. Metzinger

KuaS Supp. 17 2006

of P.255 has a columnar stem about 5cm thick and some 15cm tall. The 8 ribs are acute but quite thick and blunt at the tip. They are certainly not as sharp as any of my Rio Grand do Sul Echinopsis and in this feature it gives me the distinct impression of being a Trichocereus. It has now flowered, but the flower is rather unusual, being distinctly smaller in all parts than I would have expected to see on an Echinopsis. It was only 120 mm long (petals unopened) or about 100 mm long when open, and some 50 mm across the open flower, with a tube of some 8 mm in diameter. The tube was a very brownish green colour, with quite small dark brown scales with sparse, short hairs in their axils; the petals were slender, tapering gradually to a point, with a pinkish-brown tinge to the white. On the second day of opening the stigma was carried 20 mm above the open flower. A flower section revealed that the stamens were short and distributed along the whole length of the inner wall of the tube, with a concentration near the mouth of the flower, and without any apparent gap in the insertion pattern. On the basis of this last feature, I would find myself in agreement with the placing of P.255 in the leucantha group.

.....from M.Muse

The P.255 is not a Trichocereus but an Echinopsis of the leucantha seed group. Piltz himself suggested to me that it was an E.minuana or something similar. At even the seedling stage it resembled the plants I grew from ex-Lambs seed, which are also minuana. This latter and the genuine E.rhodotricha (also from ex-Lamb seed) are both elongated as small plants and are short columnar by the time they are in 3" pots.

.....from J.Piltz

The Echinopsis minuana P.255 does grow up to about 80cm in height in habitat and displays well rounded ribs when mature. Some plants of P.255 which were grown for me in Andalucia were almost 30cm tall when I received them and they had well rounded ribs. But at the seedling stage these plants do indeed have ribs which are not so rounded.

.....from M.Muse

The seeds which were obtained from Lamb came as Echinopsis minuana, E.minuana v.roseiflora, and as E. sp, de Toba. The last named is an unidentified plant from the Chaco region as may be discerned from its propensity for turning purplish when dormant. I was told by Lamb in 1985 that these seeds came from a collector in Paraguay who had since died. I received these seeds in 1981 and I believe that the period between the two dates coincides with the decease of A.M.Friedrich, hence it is very likely that he was the collector.

My E.minuana and E. rhodotricha, both from ex-Lamb seed, show yellowish or purplish-red suffusions on a more or less seasonal basis, My own P.255 are still short columnar, whereas the E.minuana grown from ex-Lamb seed has increased on girth recently and has changed from short columnar to almost spherical.

.....from G.Charles

My own Echinopsis P.255 is of flowering size so I have had a look at a flower section and find that it has very short stamens which are inserted along the inner wall of the tube right up to the hyman ring. This would place it in the leucantha group.

.....from H.Middleditch

The location for P.255 is given as Formosa, presumably Formosa province. But does this entry in the Piltz field list refer to a location close to the town of Formosa? This location is close to the Rio Paraguay and a considerable distance from other reported locations for E.leucantha. Consequently it might be expected to display some degree of similarity with E.chacoana/rhodotricha.

.....from J.Piltz

We came across P.255 growing in the Espinal formation to the south of Formosa town, on our way between there and Resistancia/Corrientes, but still in province Formosa. This plant is not very close to E.leucantha, but I would think it has more in common with E.chacoana or rhodotricha. At maturity, the P.251 E.chacoana has sharper ribs than P.255

.....from H.Middleditch

In Gymnos 13,25/26;1997 there is a photograph of Espinal vegetation. It consists of an open woodland with trees of perhaps 10 to 12 feet in height, mostly well spaced like a park land but also with patches where the trees grow close enough together to impede or prevent passage; together with a very occasional dwarf bush as well as grass and herbs underfoot. Is this like the Espinal where P.255 was growing? It does look as if any cacti above a few inches in height would make themselves quite obvious.

.....from J.Piltz

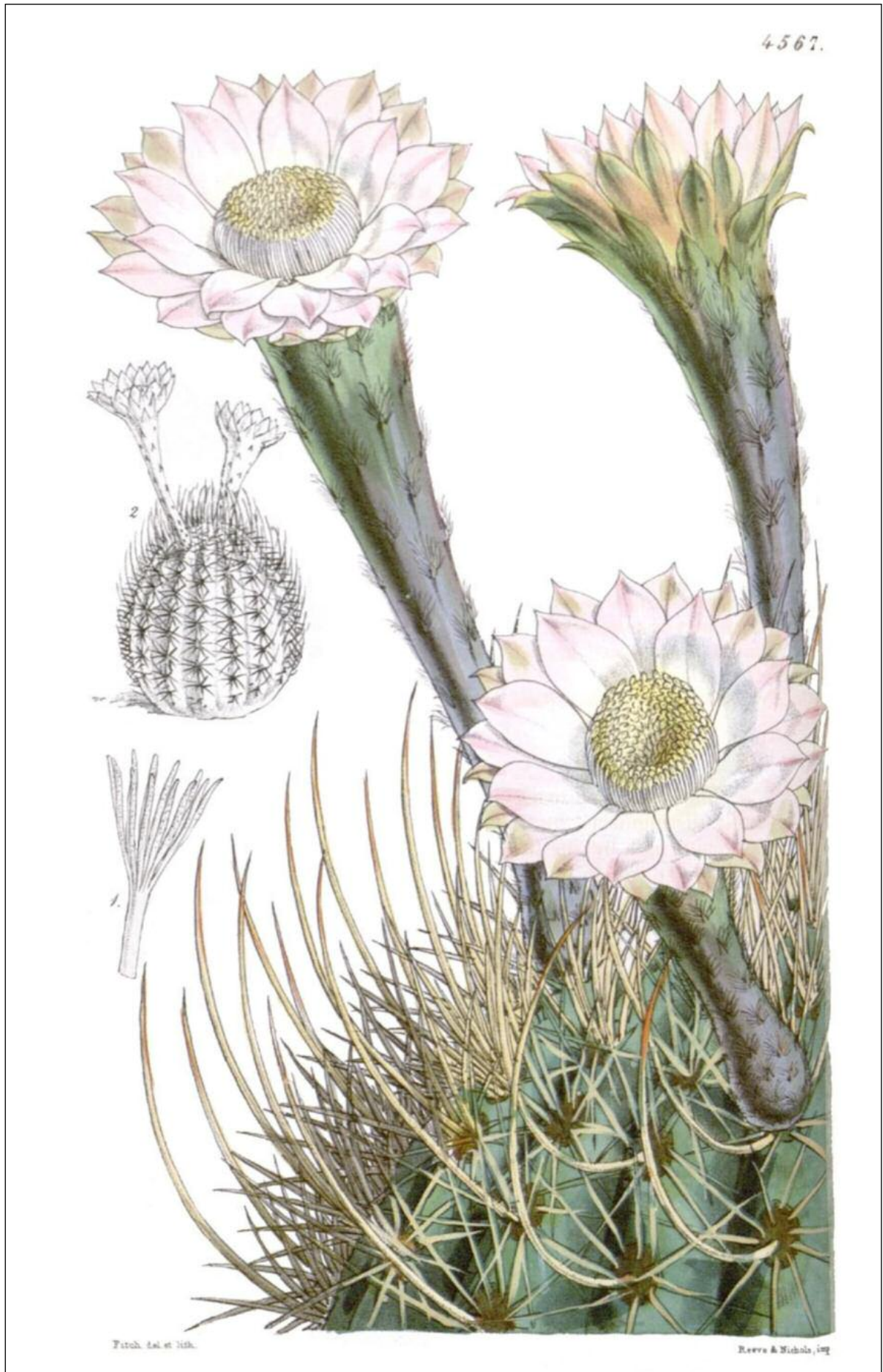
The location where we found P.255 was more an area of transition vegetation between the Espinal and the Chaco, with more undergrowth and more shade from the trees than there would be in the Espinal seen in the picture in Gymnos 25/26. It certainly took quite a bit of searching to find the Echinopsis at that location.

The typical Espinal landscape that is illustrated in Gymnos 25/26 covers large areas in Entre Rios, Corrientes, and the east of Formosa province

.....from H.Middleditch

It appears that the word "Espinal" has different meanings from the pens of different authors. Thus it is observed by Frenguelli that "The term Monte has been used with different perceptions by different authors. By Engler it was given the unsuitable name of Espinal". In an article by L.Hauman, A.Burkhart, L.R.Parodi, and A.L.Cabrera in Geograf. Rep. Argent. 8, 1947, the section dealing with the Monte is headed "Monte or Espinal". Looking at the particular species which gives rise to the expression "Espinal", the Espinillo or Acacia cavanea, this is quoted as a prime component of the monte vegetation by Frenguelli. The Acacia cavanea is also quoted as a significant component of the Chaco vegetation by both Kanter and Hauman, whereas Frenguelli makes no mention of it in his list of components of the Chaco. By contrast, the Acacia cavanea seems to be absent in the hygrophyllic Chaco forest to be found alongside water courses. It appears that J.Piltz is indicating that Echinopsis rhodotricha was only to be found in company with Acacia cavanea





*Echinopsis campylacantha*  
Curtis's Botanical Magazine 1851

whilst *Echinopsis minuana* was only found when *Acacia cavanea* was absent i.e in hygrophyllic forest and not in xerophyllic forest. Is this why my P.255 does not like being cultivated in conditions unlike those of a warm, moist, forest?

**ECHINOPSIS MINUANA** By C.Spegazzini

Translated by H.Middleditch from *Cactacearum Platensium Tentamen, Anales del Museo Nacional de Buenos Aires, Vol.XI (Series 3, Vol.4) 1905.*

*Euthycantha*. Solitary, columnar, intense green not glossy; ribs 12 upright scarcely undulating with fairly sharp edges; spines all straight, 4-7 shorter radials, 1 central profoundly bulbous at the base; flowers borne laterally large without scent, on the outside faintly tinged green, sparingly furnished with scales, with long grey soft straight ascending hairs at the scales, petals white with very slight tinge of pink.

Habitat. In dry plains along the River Parana in Entre Rios.

Body soon subcylindrical, 50-80 cm tall, 14-15 cm diameter, solitary when old, very rarely offsetting at the base. Ribs very prominent, 30 mm high, fairly broad, 20mm wide at the base, crown slightly crenate; areoles not quite circular, 15-20 mm apart; spines initially honey coloured with dark chestnut brown tip, later nut brown to greyish-brown, all stiff, very straight and strong, radials not quite all the same length 20-30 mm long, centrals profoundly [longer] 50-60mm long. Flowers straight 20 mm long, petals oblanceolate 45mm long by 8 to 9 mm wide, stamens with greenish-white filaments and white anthers, style greenish white divided into 17-18 stigma lobes of the same colour. Fruit almost globular 45 mm long by 40 mm diameter, becoming reddish green, almost without juice.

.....from H.Middleditch

The size and colour quoted by Spegazzini for the fruit on his *Echinopsis minuana* would exclude this species from the group of *Echinopsis* such as *eyriesii* and *oxygona* which are to be found in Uruguay and Rio Grande do Sul and in the east of provinces Entre Rios, Corrientes, and Misiones. This same feature would, however, place *E.minuana* in the *leucantha* group.

.....from J.Piltz.

The typical Espinal landscape that is illustrated in *Gymnos 25/26* covers large areas in Entre Rios, Corrientes, and the east of Formosa provinces.

.....from H.Middleditch

Spegazzini stated in 1905 that his *Echinopsis minuana* originated from "dry plains along the Rio Parana" which forms the dividing line between the provinces of Entre Rios and Formosa. Not too surprising then that Piltz might expect one form of *Echinopsis* is to be found within a defined phytogeographic location. Hence it would be possible to place *E.minuana* Speg. into synonymy with *Echinopsis rhodotricha* - if it were not for the quite different appearance of *E.minuana* P.255 to this latter species.

.....from F.Vandenbroeck

In my view *Echinopsis chacoana* (*E.rhodotricha*) is very different from *E.leucantha*. We found *E.chacoana* in dense Chaco bush in the immediate vicinity of Filadelfia and only in small numbers. I do not remember finding this species at any other place. The maximum height of the plants which we saw was only about 25 cm. The plants were very green and very open spined. I am inclined to believe that this species is rather rare in nature, or it may occur in parts of the Chaco which we did not see. We found this *Echinopsis* while we were searching for *G.mihanovichii*. It was very curious that whenever we came across this *Echinopsis* we also found *G.mihanovichii* nearby. Possibly these two species have a certain preference for the same habitat conditions, although further away from Filadelfia we found *G.mihanovichii* without any accompanying *Echinopsis*.

.....from J.Piltz

To the north of Resistancia, in the Argentine Chaco close to the border with Paraguay, we met with *Gymnocalycium mihanovichii*, which were dotted on odd patches of bare ground under the canopy of the trees, separated by tracts of thick bush. It was here that we also came across *Echinopsis chacoana*, growing up to 60 cm high. In cultivation these plants also carry a flower with a brownish tube. The *Echinopsis* found by P.Braun in the part of the Brazilian province of Mato Grosso which lies closest to the Chaco, also produces flowers with a brownish tube.

.....from M.Muse

At present I also have two representatives of *E.chacoana* - both seedling size - one as Piltz 251 and the other vegetatively propagated from one of Fearn's own habitat plants. The Piltz 251 grows very slowly during the first two years from seed. It is utterly unlike my *E.chacoana* FR 985. Fearn has six mature plants of *E.chacoana* at Abbey Brook but tells me that he has never managed to induce them to set seed. I would add that *E.rhodotricha* and *E.chacoana* are probably the most attractive species and have until recently been the most difficult to obtain.

.....from J.R.Kirtley

My own collection includes seedlings of P.255 and several of these are of the columnar form with sharp-edged ribs. But one of them is depressed globular with well rounded ribs

...from J.Piltz.

It would surprise me if this last plant is a hybrid with *E.chacoana* as the two have different flowering times.

.....from H.Middleditch

It has previously been noted by J.Piltz that he met with *E.chacoana* to the north of Resistancia and that P.255 occurs in the south of Formosa province. Does this mean that there is an overlap in the distribution of the two sorts?

.....from J.Piltz

We found *E.chacoana* P.251 growing in what I would call Chaco vegetation, whereas P.255 *E.minuana* was growing in a different type of vegetation, the Espinal.

.....from R.Mottram.

I used to have an *E.rhodotricha* whose flower tube was a fairly dark brown. The fruit on this plant was more or less globular, 4cm in diameter, of a pinkish-red colour. When it split longitudinally it exuded the seed which was held together in a semi-solid white pulp which was pushed some 4cm out of the fruit, still holding together in one piece, with no obvious shrinkage of the fruit.

.....from H.Middleditch

So the different flowering times and the different nature of the accompanying vegetation may well justify the separation of *E.chacoana* and P.255 as different species. But are the flowering times of *E.minuana* P.255 and *E.rhodotricha* comparable? And when the fruit of these two sorts is ripe, does it split and exude a mass of stiff white pulp in which the seeds are embedded, as described by R.Mottram for his *E.chacoana*?

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

*Echinopsis rhodotricha*

The Type station is Arroyo La Cruz, 6 km from San Salvador, on the R.Tigatiya, Department Concepcion, between the villages of Concepcion and Puerto Casado, Paraguay. I was in both places and this species is not only very frequent there but also in other areas to the west and east. It is moreover apparently the only species of *Echinopsis* in the northern part of Paraguay.

In *Sukkulantenkunde* III 1949 p.26 ff Schütz published a supposedly new *Echinopsis chacoana*. I found a particularly strongly spines variety of this near Taringuiti and at other locations in the Bolivian Chaco and published it in *Succulenta* 1965 No.2 as *Echinopsis chacoana* v.*spinosior*. As I travelled through the Paraguayan Chaco I established that *E.chacoana* is very frequent there and has a wide range of distribution. Finally I reached Puerto Casado and Concepcion where *E.rhodotricha* is very frequent. In that way it transpired that *E.chacoana* is no real species at all, but only a variety of *E.rhodotricha*. The latter varies from area to area and merges into *E. chacoana*. The *E.rhodotricha* from Concepcion must be considered as the Type variety whilst *chacoana* and also *spinosior* become varieties of it.

For the pericarpel and fruit Schumann quotes red woolly hairs and dark grey woolly hairs for the tube; I have no notes on this matter for this variety. For the v.*spinosior* from Bolivia, on two flowers from different places, the hairs on the pericarpel and tube, as well as on the fruit, were white. Schütz states that the hairs on the tube of *E.chacoana* are white and chocolate brown and those of the fruit likewise white and brown. Since the observations were made from only a few flowers, it remains uncertain whether they include the range of variation. According to what I have established, the fruit on v.*rhodotricha* is red, that of v.*spinosior* dark green with red fruit flesh; Schütz quotes for the fruit of *chacoana* a chocolate brown colour.

.....from G.R.Allcock

A plant obtained as *E.rhodotricha* has flowered but the hairs on the tube (the trichomes) were dark grey, not red in accordance with the epithet! This plant carried the largest fruit that I have had on *Echinopsis*; it was approximately spherical and about 20 mm in diameter, changing in the course of ripening from green through a dark colour to scarlet. It split vertically from top to bottom, revealing a mass of white in which the black seeds were embedded

.....from M.Muse

From Schumann's account it is quite obvious that red hairs are to be found on the floral tube and fruits of his *E.rhodotricha*. The plant which I am growing as *E.rhodotricha* has flowered and there were no red hairs in the scale axils of the tube. I also took a slide of the fruit and a careful examination of that slide has also failed to reveal any red hairs.

..from H.Middleditch

All of which would still appear to leave any separation of *E.chacoana* and *E.rhodotricha* in question. And are these two sorts closely associated with *Echinopsis leucantha*?

.....from R.Mottram

My DJF174 *Echinopsis leucantha* from Las Heras, prov. Mendoza, does have a flower with the stamen insertion typical of this group of *Echinopsis*. The flower tube is externally dark brown, shading to a somewhat yellowish brown up to the base of the petals. It has a red fruit, about golf ball size, again typical of all the others in this group. The *E.chacoana* flowered by D.Metzing has a similar fruit.

.....from G.R.Allcock

I do have quite a number of plants of *E.leucantha*, which do display the fairly long, upwards curving central spines which are to be seen in the illustration Plate VII in Britton & Rose Vol.III. My own plants are quite young of course, mostly in 4.5 inch pots, and all are essentially globular as yet. There is also an *E.shoferi*, presently not distinguishable in any meaningful way from my *E.leucantha*. The Britton & Rose illustration of *E.shoferi* is a tall, columnar plant, but mine is still young and still globular.

Similar to the foregoing are my two *E.campylacantha*, which closely match the Curtis' Botanical Magazine engraving. They are also in 4.5 inch pots and are clearly already pronouncedly ovoid - with the big end at the base. The epidermis of this plant is of a somewhat glaucous grey colour, whilst the *leucantha* that I am growing tend to be a deep green.

All of these plants have upward curving central spines and where there are more than one of these per



areole, then one of them can always be clearly differentiated as longer than the others. I also have three plants of *E. spagazziniana* which are all cylindrical, the tallest now 14cm high and 8.5cm in diameter, of a greyish green body colour, with 12 ribs. These also all display upward curving spines of about 5cm long.

Whilst *Echinopsis* P.255 have been considered as *E. minuana*, my own examples of this plant, presently 6cm high and 5cm in diameter, with 8 or 11 ribs, have three or four straight spines, all radial. A photograph of *E. minuana* in the Preston-Mafham "Illustrated Dictionary of Cacti" shows a plant with 11 ribs and 6 radial spines, but no central spine. Since Spagazzini described *E. minuana* as having one straight central spine, will my P.255 really be *minuana*?

I also have two or three seed grown *E. cordobensis* in 4 inch pots. Their central spines are 2cm long and ever so slightly curved - essentially straight. These plants are quite different in their appearance from the *leucantha* and *campylacantha*. My sole *E. chacoana* has short, straight spines about 13mm long.

My *E. rhodotricha* have an erect, short cylindrical stem with 11-13 ribs, somewhat rounded on the edge, and one central spine which is very slightly curved. Their epidermis is a bluish mid-green but this colour depends on cultivation and cannot always be used as a defining feature. Somewhat similar are my LB 2246, grown from seed, which are also cylindrical with a darkish bluish-green body and 8 or 10 ribs with straight spines.

.....from G.Charles

We have paid a visit to mid-western Argentina on four occasions and found *Echinopsis leucantha* to be widespread there. We came across these plants at over sixty of our stopping places, ranging over an area between Andalgalá and Hualfín to the north, and from the western foot of the Sierra Córdoba to near Mendoza city, to the south. They were found at altitudes of between 520m near Patquía up to as high as 2170m en route from Andalgalá to Cafayate. They were almost always to be seen growing on level - or fairly level - ground of a gravelly nature, never among rocks, often in quite dry places. Almost without exception they carried fairly lengthy central spines which curved upwards and projected up over the crown of the plants.

They usually grew in company with *Larrea* bushes of one or two metres in height, together with sparse clumps of grass. It is quite possible that these *Echinopsis* preferred to grow close to bushes, where it would be more difficult for grazing animals to make a meal of them, or whose seedlings could develop with some protection. Usually these *Echinopsis* would have a single stem but sometimes they had 4 to 6 stems of varying height. Occasionally we saw plants with cylindrical stems growing up to 1 metre in height, through the branches of closely adjacent bushes. We commonly saw plants with cylindrical stems of 3 or 4 inches in diameter, but some plants made bigger heads of some 6 to 8 inches in diameter and so formed a wider clump, like those to be seen to the south of Cafayate.

Sometimes, as at GC 967 west of Schaquí, on the way from Famatina to San Blas, we found *E. leucantha* growing next to bushes on bare, stony ground. This spot was so arid that, apart from the cacti, there was no vegetation to be seen other than the bushes which grew some 3 or 4 metres apart from each other. There were also occasional clumps of *Tephrocactus articulatus* out in the open, and a few *Trichocereus strigosus* which also grew close to the bushes, forming clumps of stems up to about 30cm in height. Also a few *Gymnocalycium bodenbenderianum*, solitary plants which grew wider than tall and with a brown epidermis so that they were not very obvious. There were several localities along our route where the *Echinopsis* grew which were as arid as this spot, probably because apart from a few showers we were there before the rains.

At only a single stopping place, near Cacheuta not far west from Mendoza city, did we find these *Echinopsis* growing in a different, appanate manner, with heads which projected much less above the level of the ground than the diameter of the heads. This is probably *E. leucantha* v. *globosa* Rausch n.n. WR 874, from nearby Potrerillos.

At a great many places where we saw these *E. leucantha*, they were in flower, still in the morning, rarely more than one or two flowers on a stem, often on the tallest stem. Frequently they carried both flowers and fruit, which gave the impression that they had a long flowering season. Especially as the fruit often contained ripe seed so it was likely to have set the fruit a few weeks prior to our field trip.

Comparing these *E. leucantha* with other plants from this group, such as *E. rhodotricha*, *chacoana*, *melanopotamica*, etc., it is difficult to see any distinction between them, with the exception of *E. chacoana*, where the flowers are carried lower down the sides of the stem

.....from H.Middleditch

Could it be suggested that a distinction might be made between those *Echinopsis* which have a markedly upswept spination with fairly long central spines, which even extend above the growing point, and others which have a fairly distinctive shorter and straighter spination?

.....from W.Papsch, Cacti of Patagonia, K.u.a.S 52.9.2001

In northern Patagonia the genus *Echinopsis* is represented by *E. leucantha* which is fairly abundant on the hills between the Rio Colorado and the Rio Negro. Next to the coast, the distribution area extends beyond San Antonio West for a further 40km to the south, as far as the line of volcanic rocks of Valcheta - Minas Geotécnicas - Sierra Grande. In 1905 Spagazzini named the small globular form from the Rio Negro as *E. melanopotamica*. However, these plants attain a height of over a metre near Carmen de Patagones. These Patagonian forms are at the southernmost end of the very extensive distribution area of *Echinopsis leucantha*.

.....from G.Neuhuber

It was near San Vicente in Province Tucumán, not far from the Rio Salí, at GN 67, that we came across columnar *Echinopsis leucantha* growing among bushes of about 2m in height. These *Echinopsis* had curving, upswept central spines and grew up to about 1.7m in height.

.....from H.Middleditch

In the Britton & Rose Cactaceae Vol III, *Echinopsis shaferi* is said to be "up to 1.5 m long" and is



**Echinopsis DJF 174 from Las Heras, Mendoza**  
Photos and Collection:- R.Mottram



**Province Rio Negro, Patagonia**  
Photo:- W.Papsch KuaS 52.9.2001  
**Echinopsis leucantha**



illustrated with a picture of a columnar plant growing well above the surrounding bushes. It is recorded as growing in "sandy thickets, Trancas, Tucuman" a place which is only some 20km to the north of the GN 67 location. Does this mean that the GN 67 plants may be *E. shaferi*?

....from A.Hofacker

Yes, I would be inclined to describe the *Echinopsis* photographed by G.Neuhuber near San Vicente, as *E. shaferi*.

.....from M.Muse

I see in the 2007 Piltz seed list that he names his *Echinopsis* P.166 as *E. shaferi* from Vipos.

.....from H.Middleditch

This place, Vipos, lies only about 20km to the south of San Vicente, again not far from the Rio Sali. So it is hardly surprising to find that it is classed as *E. shaferi*. And what do plants grown from seed of P.166 look like?

.....from G.R.Allcock

My plants of *Echinopsis cordobensis* were grown from unprovenenced seed sown in 1989. They are presently 7.5cm in both height and width. In early summer of 2008 one of them produced a splendid single flower, 12cm in diameter and 19cm long. The stamen insertion pattern identifies it as belonging to the *leucantha* group of *Echinopsis*. To break down the plant's auto-immune system I liberally applied pollen from various unrelated plants - *Gymnocalycium*, *Parodia*, etc. - which happened to be in flower at the same time. Also transferring plenty of the plant's own pollen on to its stigmatic surfaces, hopefully in order to enable the sought-for self-pollination. I was indeed rewarded by a fruit being set, containing many seeds.

The length of the fruit when it initially set differed but little from that of the pericarp, as could be seen by comparison with a following flower which had withered. Initially the colour of the fruit, like the rest of the flower tube before it withered, was a darkish brown. Over some weeks during the summer, the fruit then increased slowly in girth and its colour very slowly darkened, becoming shiny and an almost pure black, attaining an ovoid shape some 3cm long and 18mm in diameter.

The fruit retained this black and ovoid appearance until about mid-September, when it started to change colour and a faint reddening became apparent. During the following two weeks it swelled up to 22mm in diameter and at this stage it took on a deep plum red colour, still somewhat shiny. Finally, at the very beginning of October, the fruit split vertically, exposing and then extruding the seeds which were embedded in a mass of stiff white pulp which proved to be entirely composed of funicular origin.

An *E. spegazzinii* produced a flower that was 19cm long by 10cm in diameter, which was also successfully encouraged to set fruit, which became black within a few weeks. Prior to splitting the fruit was 28mm long and 18mm in diameter, and still black. In addition, an *Echinopsis* HT 90 also produced a black fruit. Both these fruits remained the same length between setting and splitting.

.....from H.Middleditch

Before this *E. cordobensis* fruit described by G.R.Allcock turned red and then split, early in October, the weather was still somewhat summer-like, whereas the fruit on the *E. cordobensis* split when it was still black, late in October, in somewhat autumn-like weather, when there was less warmth and less sun. Is this difference in the colour of the fruit when they split due to nature of the weather at the time, or is it a characteristic of the respective species?

.....from R.Purslow

My DJF 358 *E. leucantha* has set fruit this year, turning a dark bluish black as it ripened, becoming about 30mm long and 20mm thick. Another *E. leucantha* also set a similar fruit but as it is now rather late in the season I would not expect either of these fruit to split until the growing season starts again next Spring.

.....from G.Slack

My *E. shaferi* MG 350, raised from seed obtained from Mesa Garden, has set fruit for the first time this year, ripening to a pear drop shape of about 40mm in length and some 30mm in diameter. As it ripened it took on a greenish black colour but by the end of October it had become a purplish black colour.

.....from The Cactaceae, Britton & Rose III.

*Echinopsis shaferi*. Fruit ovoid, 3cm long, brick red.

,,,from H.Middleditch

Is it possible that the fruit on the MG 350 would have also turned red and become ovoid if it had not stopped developing at the end of the growing season?

.....from M.Muse

Several of my *Echinopsis* within the *leucantha* group have set fruit for me. Throughout this range of plants the colour and shape of the fruit varies between species. For example, on B.29 ex Tucuman the fruit is small, about 15mm in diameter, spherical, a slate grey berry. The Piltz *E. melanopotamica* have cylindrical fruits about 30mm long by 12mm in diameter which are initially green, maturing to red. The P.255 has small spherical berries about 10mm in diameter which are an intense near-fluorescent pink. My large *E. minuana*, raised from seed collected by A.M.Friedrich, has a near spherical berry about 20mm in diameter and the colour of old gold whereas my *E. minuana* originating from Toba, also raised from A.M.Friedrich collected seed, has a similar sized berry which is the rich purple of a Victoria plum.

.....from G.Hole

My own P.255 *E. minuana* has set fruit this year, producing a small berry of about half an inch in diameter.

.....from J.Piltz

I have had fruit set on my own cultivated plants of P.255 which are up to 5cm long and 4cm in diameter when they are ripe, and of a red colour.



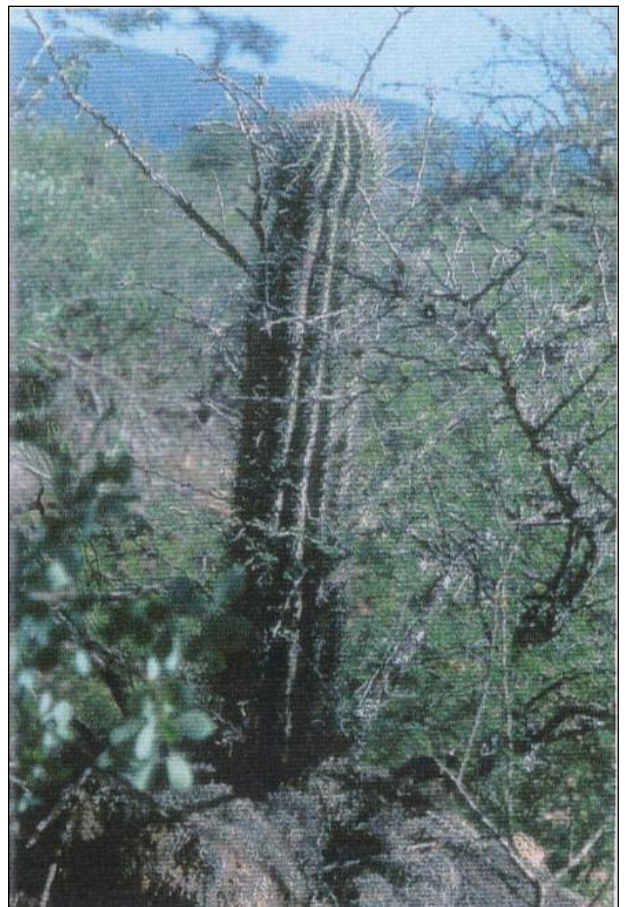
*Echinopsis leucantha* growing close to bushes in arid surroundings.  
Near Schaqui (west of the Sierra Velasco)

Photo:- G.Charles

## *Echinopsis shaferi*



Collection & Photo:- G.Slack



Near San Vincente Photo:- G.Neuhuber



.....from H.Middleditch

These fruit sizes observed on *E.minuana* in cultivation are quite different to one another. Perhaps it would be advisable to bear in mind the observations on the fruit of *Gymnocalycium buenekeri* in Chileans No.44, where a fruit of considerable size was included in the description of this species, but only fruits of distinctly smaller size had been reported in cultivation. It was only when G.Hole pollinated a flower on his *G.buenekeri* using liberal amounts of foreign pollen that a fruit was obtained of a size which was a good match to the original description. In other words, when most of the ovules in the ovary were fertilised and set seed. Would there be a comparable situation in regard to reported fruit sizes between various species of *Echinopsis* in the *leucantha* group? And would the differences in fruit colour seen at the time of dehiscence in cultivation be due to differences in ambient warmth and sunlight at that time, rather than be characteristic for the species concerned?

#### **NOT REALLY SOEHRENSIA KORETHROIDES? From J.Lambert**

You may not be aware that the picture which appeared on the inside front cover of Chileans No.65 entitled *Soehrensia korethroides* is certainly not this plant at all.

....from H.Middleditch

When this comment was received my first thought was that it was possibly the flower which was considered to be un-characteristic for this plant, At that particular time my own un-named *Soehrensia*, which will be about four to five inches across the body, was showing signs of producing a bud. So I waited until the flower opened in order to see how it compared with the picture in question. And when the flower did open wide, the petals were all laid flat like a plate, resting against the tips of the spines. This flower was followed two or three weeks later by another two on my *Soehrensia* R.129 *rosarioana*, which were yellow in colour but otherwise almost identical in form to the flower on the *S.korethroides* grown by J.Arnold.

.....from C.Hukeler

Travelling along the upper reaches of the Quebrada del Toro, before we reached the pass over to San Antonio de los Cobres, we came across a population of *Soehrensia* in flower. Many of the flowers were barely as long as the surrounding spines which consequently prevented the petals opening fully - they were only just upright.

.....from G.R.Allcock

Recently I had the good fortune to see both *S.bruchii* and *S.rosarioana* in flower in my own collection. These flowers last several days, opening during the day and closing up during the night. On my *Soehrensia bruchii* the red flowers only opened to a goblet shape, no matter how hot the sun. The flowers extended above the spines so that the spines certainly did not restrict the degree to which the flowers opened.

.....from R.Ferryman

During our various trips to Argentina we have seen *Soehrensias* at quite a number of places in habitat, often in flower. But I cannot recall seeing any of these *Soehrensias* where the flower petals were restricted from opening by the spination. Even the tall *Soehrensia formosas* hold their flowers above the spines. My own *Soehrensia* in the greenhouse also carry their flowers above the spines, like the picture taken by J.Arnold of his own plant.

.....from H.Middleditch

So it does not appear to be the flower that was in question, so what particular feature was considered by J.Lambert to be atypical for that particular *Soehrensia korethroides*?

.....from J.Lambert

I am rather surprised by your question about the picture of the *Soehrensia korethroides*, because anyone who has seen this plant in the field would immediately discard your photograph as representing it. For one thing, the spination is quite different. And an even more precise feature is the number of ribs, which I counted from 25 to 35 on *S.korethroides* in habitat, whereas the plant shown in your picture must have a maximum of only about 15 ribs.

....from G.R.Allcock

I have a number of plants of *Soehrensia korethroides*, from two sowings. From the first sowing, two plants of 8.5cm in diameter with 13 and 14 ribs. From the second sowing, five plants between 6cm and 8cm in diameter, with 12, 13, and 16 ribs. These plants are fairly small and therefore one might expect more ribs to come later. The spination is similar to that on the plant of *S.koethroides* being grown by J.Arnold.

.....from H.Middleditch

So do more ribs appear on older plants? And if more ribs do come later, presumably appearing from the crown of the plant, it may be possible to see an increase on rib count from the base to the crown of a plant?

.....from C.Norton

In my own collection I have three *Soehrensia korethroides* which are 4, 5, and 7 inches across with respectively 11, 18, and 21 ribs, As with most plants, as they grow larger the rib count increases but as each plant is an individual there are bound to be differences in rib count even at maturity. The smallest plant of these three has much broader ribs than the other two plants whilst the largest plant is showing extra ribs near the growing point.

.....from R.Purslow

I have roughly thirty plants of *Soehrensia*, of which the oldest is probably a *S.bruchii* which I obtained from J.Donald, that had been collected by Blossfeld. It is now 25cm in diameter with 38 ribs and produces

reddish orange flowers. Other *S.bruchii* include a couple of PM 354, one with 13 ribs near the base and 21 ribs near the crown, the other with 15 and 24 ribs respectively, and a ZJ 119 with 13 and 17 ribs respectively. Of my larger *S.korethroides*, there are DJF, RK, and WR plants with 17 & 25 ribs, 14 and 20 ribs, and 18 and 21 ribs respectively at the bottom and top, also smaller plants of RK and MS 43 origin with 15 and 22, and 9 and 12 ribs respectively. Obviously these plants all detect their rate of growth and the ribs start to split and divide when their normal width of rib has been reached.

.....from R.E.Senior.

My main interest lies in growing succulents and quasi-hardy plants in the open garden. Once planted out, they do not have any protection from cold or wet. New cactus plantings might have a plastic bell jar over them for a few winter weeks, for a few years. Tourists regard Cornwall as subtropical (if not tropical) but it is not quite either. In my first five years here I dutifully recorded the daily maximum and minimum temperatures and the rainfall. Broadly, winters then gave 8-10 lows of 24°F and 20-35 lows of 30-32°F. In recent years, temperatures have risen with only 4-5 readings of ca.27°F and 10 to 15 around freezing point. Rainfall has increased - in 2006 we had over 50 inches whereas the previous 50 year average was 40 inches per year. During severe winters there are losses; over the 1966-67 winter the *Weberbauerocereus*, a *Trichocereus* and an *Oreocereus* were lost but the *Soehrensias* came through without any scars.

The substrate for these plants is artificial, with 2 feet deep having 50% gravel and the top 2 inches is pure gravel. The *Soehrensias* were largely grown from NCSS seed ca. 25-30 years ago, augmented by a few bought-in plants to be planted with *Opuntias*, *Denmoza*, *Oreocereus*, *Trichocereus*, *Rebutia*, etc. The largest *Soehrensia bruchii* is procumbent, 24 inches long and 15 inches diameter, with a rib count of 35 and multiple basal offsets. The smallest is about 10 inches in diameter and height, with a rib count of 31. The basal offsets root spontaneously. The smaller ones, not yet in contact with the soil, are about one inch across with 14 ribs and the large ones are up to 5 inches diameter with 18 ribs. The larger ones flower with 2-3 blooms, at the same time as those on the main body, which may have 18 flowers open at one time.

The ribs probably increase in number from the growing point but that only becomes obvious at about one or two inches from the growing point. At several places near the shoulder it is possible to see where one individual rib has divided itself into two ribs.

.....from R.Purslow

Given the ample amount of water which those *Soehrensias* grown out of doors must receive, it is quite understandable that they would be inclined to grow more elongate, even when they are globular in habitat. One only needs think of *Rebutia*, which are solitary heads growing in crevices in a rock face in habitat, but they produce a clump of heads when given far less onerous growing conditions in cultivation.

.....from H.Middleditch

Does this mean that the elongated *Soehrensia* being grown by R.Senior are not really typical of the mode of growth to be met with in habitat?

.....from R.Ferryman

When we were travelling south from Cafayate we took the road off towards Tafi del Valle. The road climbs to the Abra del Infierno and then follows a somewhat undulating path for several kms before starting to descend. Approaching the Abra del Infierno we saw some yellow spined *Soehrensia* with yellow flowers and once over the pass the red flowering *S.bruchii* were abundant several of them badly affected by grass burnings. The populations of *Soehrensia formosa* that stay within the Andes proper from Mendoza to Jaque can reach over five feet in height.

.....from M.Lowry.

On our first field trip to western Argentina we were climbing up from Tafi del Valle in province Tucuman towards the Abra Infiernillo, when at about 3000m altitude we came across some *Soehrensia bruchii* which were primarily solitary together with a few clumping plants. They were growing in a sandy soil, among dry rocks, on a gently sloping hillside in company with plants of *Lobivia stilowiana*, together with a few bushes but with quite a lot of grasses and herbs. Once across the pass and a short way down the gentle descent on the western side, there were some scattered *Trichocereus pasacana* to be seen growing over a wide area of more or less level sandy ground. Stopping to look round we found some orange flowering *Soehrensia 'amaichensis'* as well as some *Acanthocalycium variiflorum*. Most of the mature plants were not globular, but grew wider than tall.

Further on - down into the valley of the Rio Santa Maria, we turned south to head for Cuesta Capillitas and Andalgalá. A short way past Capillitas at about 3200m altitude, with surroundings similar to those seen at either side of the Abra Infiernillo, we came across some *Soehrensia ingens* which grew distinctly appanate, the largest plants perhaps only 18 inches tall but three feet across. Then, not far to the south side of the pass, we saw some *Soehrensia formosa* growing on a steep cliff close to the road, several of them appreciably taller than thick. Ripe fruits were collected at both these last two locations.

On a subsequent field trip to Argentina we stopped overnight in Chilecito (not far from Famatina) and the next day we set off on the road leading via Alto Carrizal towards La Mejicana. At several of the stops along this road we climbed up the adjacent hillside where *Soehrensia formosa* was to be seen. At our stop at 2,400m altitude, some of these *Soehrensias* were columnar, a good six feet high, and had as many as two dozen fruits on their crowns. Some plants have been raised from seed collected there. Some of these *S.formosas* sown in 2001 are now one to two inches across with between 7 and 12 ribs, whilst older plants of this species of up to one foot in diameter have 15 ribs. The *S.rosarioana* will flower when they have about 10 ribs and *S.bruchii* will flower when they have about 12 to 15 ribs. On some plants it is quite clear that some ribs are dividing near the shoulder of the plant.

When climbing steadily up the Quebrada Humahuaca, we turned off towards Abra de Pives and the

Salinas Grandes. Above Purmamarca, at about 3800m altitude, the vegetation was very low growing with few herbs and grasses and much bare ground covered with small stones and some rocks. Here on a gentle slope we came across some *Soehrensia korethroides* in flower where these plants were only about 25cm in diameter and 20cm tall. To the north of Cachi approaching the Abra de Acay at about 3500m, we saw some *S.korethroides* which were only about 8 inches in diameter, growing on steep rocky cliffs., The following year we went up Quebrada Escoipe, then after crossing Cachi Pampa we turned north over the Pampa Tintin for some way before taking a road running east to the Cumbre Obispo towards Cerro Negra de Tiroa. As we started the climb up the Cumbre Obispo there, the *Soehrensia korethroides* there were about 1m tall and 30cm in diameter. Both here and near Purmamarca their flowers were a deep red.

When in southern Bolivia we were travelling north from Iscayache heading for the Paichu valley, across relatively level terrain of the altiplano. We came to the edge of the Paichu valley where the fairly arid, level ground gave way abruptly to drop into the deep valley below. Here we found *Soehrensia randallii* growing over the first 50m or so down from the uppermost edge of the valley but we did not see any more of these plants as we went further down the hillside into the valley. There were tall *Trichocereus tacaquirensis* scattered from top to bottom over the hillside to be joined by *Trichocereus werdermannianus* on the lower slopes near the valley floor as well as by *Cleistocactus hyalacanthus* and *Oreocereus celsianus*. Here and there among the low shrubs, grass tussocks and herbs, we came across both *Parodia maxima* and *P.suprema*.

Some of the *Soehrensia randallii* we saw here were more or less globular but others were taller than broad, generally up to 1m tall. We did however see one plant that was perhaps one metre tall and 30 to 40cm in body thickness, with offsets round the base. On a later field trip we revisited this site but none of these plants were to be seen in bud, flower or fruit on either occasion.

From the plants that I have seen in habitat it would be possible to regard them as variations of the single species of *S.formosa*, but on the other hand by using the different species names that we are accustomed to it does mean that we all do know which species we are talking about when we are discussing these plants. In general terms, it is *S.korethroides* which is to be found at the highest altitudes, whilst *S.bruchii* tends to grow at intermediate altitudes, and *S.formosa* occurs at lower altitudes, mostly in the provinces of Mendoza, San Juan, and La Rioja.

.....from H.Middleditch

One might reasonably expect that the name of any plant will convey some indication of its identity, whereas lumping various genera or species under an all-embracing name does mean that a name ceases to convey any useful information to anyone interested in growing and discussing plants. There must surely be a happy mean between the splitting approach which was adopted by Backeberg and the meaningless uniformity of recent proposals to combine many genera together.

.....from T.Blazkowski

On our field trip to southern Bolivia we took the road from Iscayache to Paichu where we wanted to look for *Parodia occulta* and *Lobivia pugionacantha v.cornuta* with its red flowers. We stopped several times on the way to Paichu, including the spot where the road starts the descent into the Paichu valley, at about 3500m altitude. Here we came across *Parodia maxima*, a form of *Rebutia pygmaea*, the *Lobivia* we wanted to see, and also *Soehrensia randallii*. These *Soehrensias* grew only higher than 3000m - they were all solitary, between 30 to 40cm tall and 30cm in diameter, typically growing between rocks on flat patches. Down in Paichu itself we found *Gymnocalycium armatum* only a few metres from the road.

.....from R.Purslow

I do indeed have a few plants of *S.randallii*, all RBC 363. These plants do tend to have a sharper and straighter rib than my other sorts of *Soehrensia*. Only one of them has flowered, with a dark magenta flower, distinctive by the fact that the upper outer tube and sepals are of the same colour. I am not certain as to the relationship of *randallii* to the other species of *formosa*, as for example it may have associations with *Trichocereus tarijensis*.

.....from G.R.Allcock

My affection for *Soehrensias* goes back to the time when this strange and unfamiliar genus first appeared on a seed list of Denis Sargent. The plants were listed as sp. nov., of two sorts which turned out to be principally *S.formosa* and *S.grandis*. Other *Soehrensias* were subsequently acquired from many sources. I find that *S.ingens* is distinguishable from *S.korethroides* even as a small seedling. whereas *S.nivalis* and *S.korethroides* are indistinguishable as 2-4 year old seedlings. I also have several *S.bruchii* and at a similar age *S.bruchii* is quite different from *S.nivalis*,

.....from R.Purslow.

The feature which I find distinguishes *S.korethroides* is that the ribs have a distinct hump between the areoles, a characteristic which they share with *S.bruchii*. On the other hand, the ribs on *S.formosa* display a slight dip between adjacent areoles.

.....from G.R.Allcock

One of the flowers on my *S.bruchii* was cut up in order to be able to examine the precise details of the stamen and style. The stamens are arranged in two separate groups. Firstly, there is a ring of stamens which, at a superficial glance, appear to spring from the hymen ring at the junction of the throat and the petals. On closer examination, however, it can be seen that this ring of stamens actually continue downwards but are fused onto the inner wall of the tube for some 1.5 cm, at which depth they disappear into a more fleshy inner lining which extends thence down to the base of the tube.

The second set of stamens arise from this more fleshy lining, namely at all depths from the base of the tube up to the depth at which the fused ring of stamens disappear into the fleshy material.

I can positively assure you that the flowers on both my *Soehrensia bruchii* and *S.rosarioana* have quite





*Soehrensia randallii* Road to Paichu, Prov. Mendez, Bolivia Photo:- T.Blaczkowski



*Soehrensia rosarioana* WR 129

Collection:- M.Lowry

*Soehrensia formosa*  
near Villa Vicencio,  
Prov. Mendoza, Argentina

Photo:- K.Gilmer





the same pattern of stamen insertion as may be seen in other representatives of *Echinopsis*, *Lobivia*, and *Trichocereus*, namely that they display an upper ring of stamens, a gap, and then the set of stamens along the depth of the tube.

.....from C.Webb

My *Soehrensia grandis* is 9 inches in diameter and 7.5 inches high. It has 16 ribs and two more are forming near the crown. The flowers are about 4 inches high and I have made a section of one of them. It has one complete ring of stamens at the base of the petals. Below them, there is a gap with no stamens inserted into the wall of the tube for about half the depth of the tube. There are stamens inserted evenly throughout the lower part of the tube, all similar in length so forming graded ranks of anthers at the top.

.....from R. Mottram

It will be quite a number of years ago now that I took some sections of the flowers that appeared on my *Soehrensia*. On *S.bruchii* there was a throat circle of stamens at the base of the petals and below them there was a gap without any stamen insertions for about half the depth of the wall of the tube, with the lower half of the tube occupied by inserted stamens. But on *S.formosa*, most of the tube wall was occupied by stamens with a gap of only 2-3mm between the uppermost of these lower set of stamens and the throat-circle.

.....from R.Ferryman

During our visit to western Argentina we went to Famatina and from there we took the route leading towards the summit which lies at 3600m. There were tall plants of *Soehrensia formosa* to be seen on the hillsides at about 2000m but these gradually gave way to smaller clump forming plants which we saw at about 3500m. We are planning another visit to western Argentina about the turn of the year and if we are so fortunate as to come across any *Soehrensia formosa* in flower then we will certainly take a look at the stamen insertion pattern.

.....from G.Charles.

We are planning to make a field trip to Argentina shortly but I expect that we are only likely to see a few *Soehrensia formosa* along our planned route. But if we do find any in flower, a flower section will be made.

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

*Trichocereus randallii*. This species was discovered by me in December 1962. I had already made a manuscript to publish this as *T.superbus* when this species was published by Cardenas in 1963 as *T.randallii*. Body up to about 27cm in diameter, becoming columnar with age but rarely over one metre high. .... Stamens inserted down to the base of the tube, with an insertion gap 13-20mm long.

.....from H.Middleditch

The original description of *Lobivia (Soehrensia) walteri* in Hickenia 1.1.1976, included a drawing with sketches of a multi-headed plant, a flower and a flower section. This showed very clearly that the stamens were inserted over the full depth of the tube, without any gap.

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

But in his "Cactus of Argentina", J. Lambert gives in his description of *S.walteri* "stamens in two series. Primary filaments greenish, yellow tipped, secondary filaments yellow". I fear that this sketch in the original description of *S.walteri* has not been drawn from real life, but from memory. In the text it is stated that this species has more or less 11 ribs, but on the drawing of this plant which accompanies the original description, it has a number of heads and I see there are rib counts that appear to be 16, 15, 13, and 12 ribs on various heads! Could it be the Type plant that had 11 ribs?

.....from H.Middleditch

But the "Cactus of Argentina" phrase of "stamens in two series" may simply distinguish between a ring of stamens at the base of the petals and the general body of the stamen insertion and not imply a gap between the two.

.....from R.Purslow

I also have a few plants of *S.walteri*, ranging from pre-description plants to later acquisitions. They tend to start clumping up before the main head becomes particularly large. Most of them do have about 11 ribs.

.....from J.Arnold

My own plant of *S.walteri* WR 12 is only in a 10 inch pot but it has offset profusely and has a score of heads, with bright orange-yellow spines, but it has not yet flowered. In appearance it is rather similar to the plant pictured in Lambert's "Cactus of Argentina" and also to Fig.22 in the article by Font and Picca in the 19 (1) BCSJ in which they describe finding this species. Even small offsets such as a head of 3 inches in diameter, of which there are several, has 13 ribs but there are at least two heads with 11 ribs.

.....from G.R.Allcock

My ex-Sargent seed of *Soehrensia* sp. nov. de Oro was sown in 1963 and may now be identified as *S.rosarioana*. The stems are now short-cylindrical, of a dull and slightly bluish-green colour, with 14 ribs. Three of these plants flower yellow and one flowers orange. A plant of *S.rosarioana* v. *rubriflora* obtained from J.Hopkins in 1986 is quite the same as the Sp. de Oro plants, but flowers red. Also relevant here are some plants obtained from sowings of *S.grandis* v. *aureiflora* in 1982. These plants have stems which are depressed globular or globular even though of flowering maturity for some years now. Their epidermis lacks the bluish tint of my *S.rosarioana*, the spines are stronger and of a more variable colour. The flowers are slightly larger than those on the "sp.nov. de Oro". But I think that these are also forms of *S.rosarioana*, the very minor differences merely exemplifying the variation to be expected within a wild species possibly as we go from one locality to another.

.....from J.Lambert

We came across *S.korethroides* all along the Cachipampa above Qu. Escoipe, but never in dense formations. It was also found when climbing out of the Qu.Humahuaca towards the Abra de Poterillo. In any

one population, the colour of the spines may vary from white to yellow or red.

.....from R.Ferryman

Making a visit to Argentina in the month of January, we came across many *Soehrensia* growing at various places in the foothills of the Andes. Quite a number of these plants were carrying ripe fruit - near Uspallata in province Mendoza, near Famatina in province La Rioja, near Jague in province San Juan, and on the approach to the Abra de Acay (to the north of Cachi) in Salta province.

The fruit on *Soehrensia* is initially green in colour and becomes dark red as ripening proceeds, but then as the fruit increases in size the same amount of red colouring probably becomes spread over the larger surface area of the fruit and is then more of a pale orange-red. The fruit is more or less globular and about three-quarters of an inch in diameter although it was slightly smaller on the *Soehrensias* seen near Famatina, possibly because the plants themselves were smaller than those seen elsewhere which carried ripe fruit.

In several instances the fruit was observed to split vertically and thus expose the filling of a white mushy pulp which carried the black seeds, rather like the fruit on *Cleistocactus*. My own plants in cultivation - of RMF 513 and RMF 681 - do set fruit which ripens and splits in the same way.

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

On my *Soehrensia* sp. *nove de Oro* plants the fruit is a colourful juicy berry before it dehisces. At the present time it carries a fat shiny reddish pink juicy berry much reminiscent of a ripe gooseberry and of a diameter of 3cm. In shape it is globular.

.....from M.Muse

It is many years ago that I acquired a plant of *Soehrensia* at a local Branch meeting which must have been grown in clay as I had to break this off with the ball end of a hammer when I took the plant out of its pot. This plant has a basically red flower but the petal tips have a bluish sheen as referred to in the Lexikon. It does set fruit which split lengthways and a black tarry substance oozes out.

.....from H.Middleditch

Is this "black tarry substance" typical of *Soehrensia* fruit? Or is it another as yet unexplained peculiarity like the presence or absence of a gap in the stamen insertion in the upper part of the flower tube?

.....from R.Hillmann

I have seen or collected a lot of fruits of *Soehrensia* in habitat, and a few at home. The fruit is very similar to those on *Trichocereus* and other bigger *Lobivias* like *L.chrysochete*. The fruit looks like a Kiwi fruit, the fruit flesh being white, speckled with the black, very small, seeds. It is good to eat, but when the fruit has become over-ripe, the fruit flesh will lose a lot of the sweet fruit sugar and smells like caramel or burned sugar. The size of the fruit will grow as the fruit ripens, starting at about 4cm in diameter and growing up to 6 or 7cm. At first the skin is green and it can change into a pale yellow with a hint of red.

.....from H.Middleditch

Which would appear to explain the change in the colour and nature of the fruit filling. But this still leaves the unexplained variation in the stamen insertion pattern.

.....from R.Purslow

I have reservations about regarding my *walteri* as a *Soehrensia*, as I am not certain whether it may be a stabilised natural hybrid.

.....from G.Charles.

Considering the supposed *S.walteri* seen in habitat, it seems to be quite possible that this is really a hybrid.

.....from H.Middleditch

Taking one of the flowers off my *Soehrensia* and cutting it in two, the first impression was that there was no obvious gap between the hymen ring of stamens and those fused to the inner wall of the tube. Only with difficulty was it possible to turn down the lower set of stamens, when the gap became visible. By taking a thin slice out of the flower, rather than the usual flower section, it became much easier to recognise the existence of the gap between the two sets of stamens.

....from M.Lowry

There are six of my plants of *Soehrensia* which have now reached a sufficient size to flower and do so regularly. When my *S.rosarioana* WR 129 was in flower I removed a flower in order to take a half section of it. I was a little surprised to see that there were stamens apparently inserted along the whole length of the flower tube. But a closer look revealed that there were in fact still two series. The upper one originated from from the upper edge of the receptacle, just about where the petals start, as is to be expected in most *Echinopsis*, and has very short filaments. The insertion of the lower series appears to be more spread out from just above the nectar chamber to just below the receptacle rim. There is still a small gap between the two series, but it is quite difficult to see. Even when I have cut a thin section, including the style and stigma, out of the middle of the flower in order to photograph it, it is still difficult to find the gap between the two series of stamens. I will certainly try and look at flowers on *formosa*, *randallii*, *bruchii* and *korethroides* to see whether they have a more obvious stamen gap below the nectar ring.

.....from H.Middleditch

In the picture taken by M.Lowry of the thin section through the centre of the *Soehrensia* flower, it is clear that the stamens are all of similar length and stand more or less upright within the funnel shaped flower. Is this disposition and attitude of the stamens typical of all forms of *Soehrensias*?



## TRICHOCEREUS PASACANA IN HABITAT. From R.M.Ferryman

We set off from Salta to travel up the Quebrada del Toro and shortly before reaching El Alisal, at about km35, we started to see some tall *Trichocereus*. Their pale spines were not numerous and the ribs were spaced fairly well apart so that the dark green body was clearly exposed to view. By the time we had reached Golgota, another 20km or so up the valley, these tall *Trichocereus* displayed a quite different appearance. The lower section of the main stem - and often the lowermost part of the lowest branches - now displayed a coat of strong, dark spines, whilst the upper lengths of the main stem and branches appeared to lack any substantial spination, but displayed a coat of fairly short, white woolly hairs.

The lower parts of the Quebrada del Toro, around El Alisal, have the benefit of a fairly good summer rainfall, but this effect does not reach as far up the valley as Golgota, which is much drier with far more barren surroundings. In the length of the Quebrada del Toro lying between El Alisal and Golgota where his change of climate takes place, we were able to see the tall *Trichocereus* change almost imperceptibly from the *T.terscheckii* to be seen in the moister parts to the *T.pasacana* in the drier zone. I did have a fairly long discussion with Roberto Kiesling on the specific features which distinguish these two species, but I have to admit that I find it difficult to relate that data to what could be seen in the field.

The southernmost location for these *Trichocereus*, where they are normally logged as *T.terscheckii*, is where we saw them to the NW of San Jose de Jachal, which is at the southern end of the Sierra Famatina. They are also to be seen just to the west of Cuesta Miranda, on the Sierra Famatina, in the area known as Piedra Pintada. From there, they are to be seen on the ascent of the Cuesta Miranda up to an altitude of 3000m.

At the northern limits of their occurrence, the *Trichocereus pasacana* are to be found on the road from Cachi to the Abra de Acay, where they are to be seen just to the north of the tiny hamlet of La Poma, which lies at 3000m, where they grow on the lower slopes but not on the higher ones. As the road carries on north beyond La Poma, the land drops away to the west and this is the last spot where I remember seeing them. There were a few very scattered individual plants to be seen as the road climbed higher up the valley, but in general terms I think that they stopped at no more than 100m higher than La Poma.

In the Quebrada del Toro they do not extend quite as far up the valley as Las Cuevas which lies at about 3400m. To the north-east, they stop just to the north of Humahuaca.

.....from U.Eggl

We travelled the road from Cachi towards the Abra de Acay, but no further than La Poma, where we sighted *Trichocereus atacamensis*. As far as I recall, they were growing in company with *Tunilla soehrensii*, *Cumulopuntia boliviana*, and *Soehrensia formosa*.

.....from G.Charles

Travelling up the Quebrada Humahuaca, our last sighting of *T.pasacana* was near the abandoned railway line not far to the south of Iturbe. My recollection of these plants is that they were not as tall as many of those that we had seen elsewhere, in the Quebrada del Toro, for example.

.....from H.Middleditch

In 1901 a lengthy field trip was made by the botanist Fries, which involved leaving Salta and riding up the Quebrada del Toro. For nearly two centuries, this had been an important mule track, when salt was being extracted from the Salinas Grandes in order to supply blocks of salt to the cattle ranches in the Argentine lowlands for use as cattle licks, where salt was otherwise unobtainable. The blocks of salt were transported on muleback from the southeast corner of the Salinas Grandes basin, via Tres Morros, El Moreno, then over the Abra de Palomar and down into the valley of the Rio Toro, to Salta. The published account of Fries' field trip shows that he followed this mule trail from Salta to Tres Morros.

His account also includes pictures of "*Cereus*" *pasacana* seen at Golgota in the lower reaches of the Quebrada del Toro, then at Ojo de Agua, and also at "El Moreno at ca. 3800m". The location of Ojo de Agua is now uncertain, but this "spring of water" would have been of no small significance for the mules and the accompanying horse riders when they were going to and from the Salinas Grandes, on whose margins water would be virtually unobtainable.

.....from U.Eggl

The place named Ojo de Agua by Fries will be difficult to locate, as it is a very frequent name throughout Latin America. From the photograph taken by Fries it is obvious that the place has been used/cultivated/inhabited at some stage, to judge by the stone wall to be seen in the medium background of the picture.

.....from J.Lambert

I am convinced that there are no *Trichocereus pasacana* to be seen anywhere above 3500m so that the tall *Cereus* found by Fries must be some other species. The type of biotope that Fries describes - steep hillsides - is not the sort of location usually occupied by *T.pasacana*, which is generally encountered on flat ground or on slight slopes.

.....from F.Kasinger

Travelling from Abra de Infiernillo to Amaicha del Valle, in Tucuman province, we passed through the Parque de Los Cardones - almost a forest of *Trichocereus pasacana*. The Abra de Infiernillo is at about 3000m high and Amaicha del Valle lies at about 2000m so that the ground has quite a positive slope. The other Parque de Los Cardones on the Pampa Tintin, between Cachi and Escoipe, is not much more extensive, but is very much flatter.

.....from G.Charles

Going up the Quebrada del Toro above Puerta Tastil, we found appreciable numbers of *T.pasacana*





At the Salar de Coipasa, northern Chile

Photo:- R.Schulz



Collection & Photo:- W.Maechler



Near Socaire, Chile Photo:- A.W.Craig

## Trichocereus atacamensis



growing on the slopes at either side of the road. These slopes could well have been inclined at an angle of about 45°

.....from J.Lambert

As for *T.pasacana* growing on such slopes, these are what I would call “regular slopes”, but they are not as steep as on the picture taken by Fries near Cochino, which would suggest a kind of cliff which it was impossible to climb in order to have a close look at the plants.

.....from H.Middleditch

In Britton & Rose “The Cactaceae” II, on page 132, there is a picture of *T.pasacana* growing on a rocky cliff that is so steep that it would appear to be impossible to climb in order to take a closer look at these plants.

.....from K.Gilmer

We came across *Trichocereus pasacana* at quite a few places in the course of our visits to northern Argentina, not infrequently seeing what seemed to be hundreds of these plants over a hillside. Along a side road going off the Calchaquies valley to Brealito, between Molinos and Cachi, we came to a spot where a stream issued out of a steep hillside, running in a gulley with nearly vertical cliff sides. We could see an odd *T.pasacana* or two which had managed to find a foothold on these rocky sides - plants apparently several metres tall.

.....from J.Lambert

Brealito is where I collected some *Parodia auriecentra* v. *albifusca* and I would agree that some *T.pasacana* do grow on a cliff face there, or on its very steep top, as in the picture taken by K.Gilmer. I would say that *T.pasacana* only occasionally adapts itself to this situation

The photograph of the “*T.pasacana*” on the front cover of Chileans No.64 really does puzzle me. This picture may have been taken on the Cerro Lagunita or the Cerro Huancar i.e. at an altitude of probably more than 3500m. I had been struck at first sight by the fact that this plant did not show any white wool, in spite of its respectable size. So that one may doubt if this plant is actually *T.pasacana*.

.....from H.Middleditch

On the map which I have available there are spot heights marked on the southern margin of the Salinas Grandes of 3375m, 3385m, and then 3390m at Tres Morros. It seems to be quite possible that the ridge on which the *Trichocereus* on the front cover of Chileans No.64 was photographed may have been growing at about 3450m. altitude.

.....from R.Ferryman

Yes indeed, the *Trichocereus pasacana* which we saw at our stop on the edge of the Salinas Grandes (picture on the front cover of Chileans No.64) was certainly very spiny for the full height of the stem. But it was only some 2.5m (about 8 feet) tall, so it may have been carrying only the spination to be seen on such relatively young plants. There were not a great many of these *Trichocereus* to be seen here and most of them were less than about 2m tall, so a fairly young population. They were growing in company with *Parodia maassii*, *Lobivia ferox*, *Tephrocactus hypogaea*, and *T. bolivianus*.

.....from J.Lambert

But that still leaves in question the picture of *Cereus pasacana* taken by Fries, supposedly at 3800m near El Moreno.

.....from U.Eggl

We have seen *Trichocereus pasacana/atacamensis* at 3450m below the access road to Caspana in Chile, and at 3220m at a place 23 km to the east of San Pedro de Atacama. From observations made from the road, it seemed to be likely that the species extends up to about 3600m in that region. On the Argentine side of the Andes, the uppermost record that I have is 3280m near La Poma. I have looked at the original plates in my copy of the paper published by Fries, and I am fairly sure that all the photographs in question do show *Trichocereus atacamensis*.

.....from J.Lambert

I did make one visit to El Moreno some years ago, in a vain quest for Puna subterranea, (which I did find later near Yavi.) The place appeared to me to be very uninteresting as it was in the middle of a featureless flat sandy plain.

.....from R.Ferryman

On reaching Tres Morros we turned south and went to El Moreno, a place which might have had as many as half a dozen inhabitants. It is now a very impoverished village with little to support habitation. A sign welcomes visitors but we were clearly a subject of interest rather than being welcomed. It lies at 3880m in the middle of a wide, barren plain which supports little else other than *Tephrocactus hypogaea* and *Pyrrhocactus umadeave*. The mountains seemed to be quite a considerable distance away to the south but as the old mule trail is no longer fit for vehicles it was not possible to drive any further to the south.

We occupied almost a whole day in making a trek going in a generally southward direction from El Moreno. Eventually, after about 5km, our long trek did bring us to the foot of the mountain slopes, where we found some *Echinopsis*, but no *Pyrrhocactus*, as well as some *Trichocereus* which were rather similar to those on the front cover of Chileans No.64. But as we climbed further up the slopes, these *Trichocereus* became taller, up to about 3 or 4m high, all solitary, displaying the typical white hairs in the upper part of the stems, just like those pictured by Fries “near El Moreno at 3800m.”

...from H.Middleditch

These observations are most valuable as they would evidently confirm the existence of the *T.pasacana* seen by Fries at “El Moreno at 3800m”. Since the only named location which Fries could use in that area of the mountains would be the habitation of El Moreno, it would not be expected that the *T.pasacana* which he saw and photographed there were necessarily close to that village.



.....from R.Ferryman

Close to El Moreno there is a narrow quebrada which runs off in a more or less southerly direction and we were able to drive that way along what were only dirt tracks. It is possible that these would be used by local inhabitants going into the mountains to chop down and collect firewood, as the one we followed did eventually peter out. But not before we came across some more *Trichocereus pasacana* growing on the mountainsides.

From El Moreno we then went further north through Tres Morros in order to take the road going over the Abra de Pives to Purmamarca and the Quebrada Humahuaca. At Tres Morros, close to the border of the Salinas Grandes, we were on the Altiplano so that it was no great climb to reach the pass. There were no *Trichocereus* to be seen on the mountain sides in the course of this ascent, but they did start to appear once again as we were driving down from the pass towards Purmamarca.

.....from H.Middleditch

The possible location for the *Cochinoca* named by Fries, has escaped me for quite some time. However, it has now become clear that this will be the place of that name which lies some 20km or so to the west of Abra Pampa, where the present day well used route from the Quebrada Humahuaca to the Bolivian border (at La Quiaca), comes out on to the Puna. According to the map which accompanies his published travelogue, this *Cochinoca* would lie on the route taken by Fries from El Moreno northwards to the Bolivian border. Sightings of *Trichocereus pasacana* appear to cease well to the south of *Cochinoca*, whereas *Trichocereus tarijensis* was seen by K.Gilmer on the Sierra *Cochinoca* (Chileans No.61 ). So it does seem to be very likely that the picture of two solitary tall columnar cacti seen by Fries near *Cochinoca* were in fact *Trichocereus tarijensis*.

.....from Förster-Rümpler, Handbuch der Cacteenkunde 1886

*Pilocereus pasacana*. (Detailed description). The plant utilised for the diagnosis of this species is a four year old seedling of 6cm in height and 5cm in diameter. In habitat the stem reaches a height of 10, or even 20m, and has only few branches, which in their lower part is furnished with spines and the upper part with hairs. To this species belongs both the dead stems which were in the 1878 Paris Exhibition of the products of the Argentine Republic

.....from Phillippi, Flora Atacamensis 1860

*Cereus atacamensis*. Mostly solitary, columnar, 6m or more in height.

.....from H.Middleditch

When the first description for *T.atacamensis* was published, the sightings of these plants in habitat would have been on a relatively insignificant number of occasions and at very few places. In comparison with the reports which are now to hand, the understanding of these plants at that time would be very limited. Are all *T.atacamensis* really solitary? And are all mature *T.pasacana* really branched?.

.....from R.Ferryman

My own impression of *T.atacamensis* is that it is not native to Chile, but has been introduced to the country, as I have always seen it when travelling along the old established trade routes.

.....from K.Gilmer

Our very first field trip took us to Argentina, starting off from Salta. We travelled south through the Quebrada del Rio de las Conchas as far as Cafayate, where we turned north to follow the Rio Calchaqui. Just after passing through Molinos, when we were at 2,050m altitude, we saw our first *Trichocereus pasacana*. We were on the flat floor of the valley which would be perhaps one km. wide here, where there was a great deal of bare, stony ground with scattered bushes that ranged from knee high to some 2m in height, far enough apart from one another to make it fairly easy to walk between them. Groups of the tall columnar *Trichocereus* stood out above the bushes, some in groups of about perhaps a dozen plants, others of perhaps a hundred plants. Between these groups there were just the bushes, but no *Trichocereus*. The *Trichocereus* in each group might be anything from one or two, to several metres between each other. Most of these *Trichocereus* appeared to be solitary columns but there was also a fair number of branching plants, the branches rising up parallel to the main stem.

A little further to the north, still following the Rio Calchaqui, we stopped when we were west of Seclantes. At the foot of the somewhat less precipitous slopes, there were more *T.pasacana*, including one which must have been over 4m high, with flowers not only on the taller main stem but also on three of the long branches running vertically quite close to the main stem. Here again, as at our two previous stops, we had to exercise some care when walking round in order to avoid getting attached to any pads of the *Opuntia sulphurea*.

Our route now took us along the Quebrada del Toro. We were well beyond the more moist lower reaches of this quebrada when we stopped at a point about 12km before we reached Puerta Tastil, at an altitude of 2,600m. The gently sloping sides of the valley carried a great many *T.pasacana*, most of them solitary columns, but there were also a few of them starting to form branches from part way up the stem.

This was not our last encounter with these tall *Trichocereus*, as we saw them again near Volcan and elsewhere in the Quebrada Humahuaca. During this particular field trip the tallest specimens of *T.pasacana* that we saw would be about 8 to 10m high but most of them were smaller than this.

.....from H.Middleditch.

Evidently these *Trichocereus* may appear as either solitary or branching specimens in habitat.

...from G.Charles

We came across *Trichocereus terscheckii* on the eastern flanks of the Sierra Famatina, in the vicinity of Palo Pintada, and on the Cuesta Miranda. But going north from there, the first *Trichocereus pasacana* that we sighted were some 10km out of Andalgalá. Here, as well as at many other places in Argentina and in Chile where we saw these *Trichocereus*, it was evident that the lower part of the main stem carried fine spines, fairly

long and either white or pale brown in colour. We did get the impression that the upper parts of the stems on these *Trichocereus* had relatively coarse spines at lower altitudes, but that as we went to higher altitudes, the upper part of their stems displayed softer white spines. These plants frequently attain a height of 6 to 7m, but those we saw on the ridge near the southern end of the Salinas Grandes in northern Argentina were only about half that height.

.....from W.Maechler

In my own collection I have a plant of *Trichocereus atacamensis* which was grown from KK seed and is now about 1.5m tall. It has not yet flowered.

.....from A.W.Craig

The photograph from W.Maechler is not of *Trichocereus atacamensis* as I know it. The spination is much too long and strong for this species.

.....from H.Middleditch

My own plant of *Trichocereus atacamensis* RMF 95 will be only about 8 or 9 inches tall, but it has a golden-brown spination which appears to be similar to that on the plant grown by W.Maechler. The main central spines are some 1.5 inches long (or longer) right from the base, the newest ones at the shoulder now being some 2 inches long.

.....from R.Mottram

My own plant of *Trichocereus atacamensis* will now be twenty years old or more, but it is only about 17 inches tall, possibly because it has never been moved out of the shallow seed-tray. The spination is much more closely packed than on the photograph of the Maechler plant, but the golden-brown colour is somewhat similar. In the upper part of the plant the central spines are approaching three inches in length.

.....from G.Hole

The picture from W.Maechler is quite close to the appearance of the younger plants of *T.atacamensis*. The spines on the cultivated plant are not quite as dense as they are in habitat, but that is hardly surprising. Also the spines on the cultivated plant are a little more of a reddish brown, compared with the orange-brown seen in habitat. If the cultivated plant is about one metre tall, then the stem is only about half as thick as it would be in habitat, but again that is not surprising.

.....from K.Gilmer

Having now been able to pay a visit to the collection of W.Maechler in Switzerland, I have seen for myself the plant of *Trichocereus atacamensis*, which he grew from seed received from K.Knize. This plant is about 1.5 m tall. It is being grown in a pot and when I saw it in the month of March it was standing under a canopy, sheltered from the rain but otherwise exposed to the open air. We were given to understand that this plant was taken inside over the course of the winter months.

.....from C.Sherrah

The photograph from W.Maechler of a *T.atacamensis* has the same spine formation, number of spines, areoles, and body colour, as my own plants grown from Ramirez habitat collected seed which was planted October 1995. At present my plants are 6 cm tall and have 11 ribs; they have straw yellow spines. The spine colour on the plant in the photograph matches a plant we saw at San Pedro de Atacama, but most of the plants we saw in Bolivia, in Argentina, and in Chile have straw yellow spines. My photographs of these plants taken near Uyuni and on the Isla de Pescadoes show the areoles being adjacent to each other resulting in a very dense spination - too dense to count. The major difference between the plant in the photograph compared with habitat plants is the depth of the ribs and the lesser number of ribs. The photographed plant may have about 16 ribs compared to a 10 cm high plant at Uyuni with 22 ribs. My own opinion is that these differences can be explained by the difference between conditions in habitat compared with in cultivation - because my own plants are similar to that in the picture and are grown from habitat collected seed.

.....from H.Middleditch

In the picture of *Trichocereus atacamensis* taken near Salar de Coipasa by R.Schultz, it is just possible to see two short - and presumably comparatively young - plants which may be between one and two meters tall. They appear to have relatively long and apparently rigid spines, of a brownish yellow colour. In Chileans No.64 there are two pictures of *T.pasacana* in flower, which were both taken in habitat in northern Argentina. There is a remarkable difference in the hair-like spination on one plant and the robust spination on the other. So possibly plants in cultivation may also display differences in spination, arising either from the geographical origin of the material from which they have been propagated, or from differences in warmth, exposure to sunlight, and watering, in the greenhouse.

## THE FLOCCOSE AUSTROCYLINDROPUNTIA - A BARBED STORY.

...from K.Schumann, Gesamtbeschreibung der Kakteen 1903

***Opuntia floccosa* S-D.** .... Areoles furnished with white wool from which white glochids project and up to 3.5 cm long white woolly hairs. Spines 1-3 barely conspicuous, white, up to 7 mm long (5 cm long in habitat)

***Opuntia lagopus* K.Sch.** .... Areoles furnished with yellowish white wool 1-1.5 cm long so thickly that neither leaves nor areoles are visible. In addition to the wool the areoles usually carry an almost 2 cm long, white, more or less glassy, very slender rough spine, basally thickened, which is painfully sharp and in addition equally long, slim, white bristles which take the place of glochids.

Obs. Each areole carries only one spine. ... It is covered extraordinarily densely with wool. An especially peculiar feature is that in correlation with the dense covering, the glochids, which remain only slim, extend up

to 1.5 cm long.

.....from H.Middleditch

In the latter diagnosis, the reference to fine white bristles is followed by “welche die Stelle der Glochiden vertreten” whilst under “Obs.”, the German reads “die Glochiden... bis zu 1.5 cm verlängert sind”. There appears to be no doubt that Schumann first states that the bristles take the place of glochids, and then nine lines later effectively suggests that this species does possess glochids. This is hardly a clear and unambiguous description.

.....from W.Weingart, Kakteenkunde 4;1933

**Opuntia udonis** Areoles .... with some short, fairly strong, brown glochids which project 1 to 1.5 mm out of the wool. The hair is not real hair, but slim bristle-like spines.

*Opuntia lagopus* K.Sch. has ... very long slender glochids with barbed surface cells....; bristle-like spines and glochids are of similar morphology.

**Opuntia verticosa** Areoles ... have no glochids. The hair is not real hair but slim bristle like spines.

.....from H.Middleditch

All floccose Tephrocacti from Peru and northernmost Bolivia are placed by Ritter under three individual species. These are: *A.floccosa*, *A.lagopus*, and *A.malyana*, this last-named being “closely related to *A.lagopus*”. All other names are placed as synonyms or varieties of the first two species, viz:-

.....from F.Ritter Kakteen in Südamerika Vol.4 1981

**Austrocylindropuntia lagopus** Syn: *Tephrocactus rauhii* Backbg.

The essential distinguishing feature of this species are the glochids, which are normally never absent, but are more or less transformed into being like hairs, porrect, elongated, and of 10-15 mm in length; they are placed between the spines and the hairs in the upper margin of the areoles where the real glochids would otherwise stand.

**Austrocylindropuntia floccosa** Syn; *Opuntia udonis* Wgt. *O.verticosa* Wgt. etc.

The essential difference from *A.lagopus* lies in the hairlike glochids having been fully transformed into hairs in *A.floccosa*. The relationship between the two species is extraordinarily close so that no difference is to be seen between them in, for example, fruit and seed. The hair can be short or up to about 6 cm long, rarely straight and porrect, usually curved and following the body contour, often very curly; usually they are white, often yellow, occasionally brown. In respect of other features.....

.....from H.Middleditch

In his description of *O. lagopus*, Schumann says that there are some 2 cm long slim white bristles which have taken the place of glochids; immediately after that statement he appears to follow a long-standing practice of adding supplementary observations to the description, saying that “the glochids remain very slim and extend up to 1.5 cm long”. He appears to call the same feature firstly a bristle, and then a glochid. This apparent contradiction over the terminology is very puzzling. One explanation is offered by Weingart when he says that “bristle-like spines [stacheln] and glochids are of similar morphology”. So does it not matter if the terms glochid and bristle-like spine are used interchangeably? Do not glochids project straight out of the areole, and are barbed, whereas bristle-like spines may be anywhere between radial and porrect, and are not normally barbed?

It was stated by Weingart in his respective descriptions that *Opuntia udonis* displayed glochids in the areoles whereas *O.verticosa* lacked glochids. Nevertheless Ritter places both these species as synonyms of *A.floccosa*. It is only by inference that one can read from Ritter that *A.floccosa* is completely lacking in glochids - there is no specific statement to this effect. If this inference from Ritter is correctly understood, then there are really only two sorts of floccose Tephrocacti, those with glochids, and those without. Can we see this difference on plants in cultivation?

.....from A.Hill

Although I have had a good look at my floccose Tephrocacti, on none of them do I find any glochids at the areoles.

.....from R.K.Hughes.

Most of my floccose Tephrocacti have been raised from seed that I collected myself in Peru. This seed did not all come from one place, but from a number of widely separated locations. There do not seem to be any glochids on any of my plants.

...from J.Iliff

Your Chileans colleagues must, in effect, have been looking at glochids without recognising them. Weingart saw the point long ago. In his publication of *O.udonis* and *O.verticosa* he put his finger on the essential distinction of *O.lagopus* - and so far as I am aware he is the only person to have done so - in that *O.lagopus* has true hair. The essential *lagopus/floccosa* division can be confirmed from material at Kew.

In point of fact, Weingart found glochids on one of his species and not the other, but this can also be confirmed from the wide range of floccose material at Kew and the B.M. One must not get an over-rigid idea of what constitutes a glochid. Buxbaum has shown that glochids and spines are essentially homologous. There are intermediates on *O.molinensis* and doubtless Ritter's half-glochids come into the same category.

.....from H.Middleditch

In that case, what is a glochid supposed to be?

.....from Marshall & Bock Glossary of succulent plant terms 1945

Glochid - a barbed hair or bristle

Glochidiate - bearing barbed hairs

.....from R.B. Ivimey-Cook - Succulents, a Glossary of terms and descriptions 1974

Glochid - a barbed hair or bristle

Bristle - a stiff hair

.....from H.Middleditch

This would appear to suggest that the only basis of distinction between a glochid and a hair or a bristle is the existence of barbs on a glochid.

An article written by Weingart in Z.f.S. 1.1924 is supported by a sketch of a glochid, which is reproduced (foreshortened) in Buxbaum's 'Morphology of Cacti'. From the base of the glochid all the way to the tip the whole surface is covered with minute, sharp, backward-pointing projections which form barbs. "The epidermis consists entirely of scaly cells", presumably with one end of the scale - the end nearer the base of the glochid - partly detached and curling up to form a barb. Does this again suggest that it is the existence of these barbed cells which distinguish a glochid from a spine or from a hair?

.....from F.Buxbaum, Morphology of Cacti

The nature of spines must be clarified. Because spines arise from areoles, and areoles have been shown to be buds, it would seem that spines are modified leaves, as is the case with many dicot plants. This was first postulated by Zuccarini, Abh. Math-physikalischen classe der Kon. Bay. Akad. Wiss. 2.1837, whilst Leinfellner, Beitr. zur Kenntnis der Cactaceen Areolen, Ost. Bot. Zietsch. 86,1937, found vascular strands leading to the base of each spine in areoles of *Selenicereus macdonaldiae*. In *Pereskia grandiflora*, *P.bleo*, and *Opuntia monacantha*, vascular strands occur in the lower parts of the spine. Inasmuch as trichomes never possess vascular strands unless they are glandular, it appears that spines are modified leaves. Weingart, Monat. der Deutsch. Kak. Ges. 4, 1932, also found vascular strands in some spines. Earlier he correctly stated that the spines and glochids arise directly from the growing point of the areole, and that hairs arise from the epidermis. .... each glochid is a modified leaf, even though they are formed in such large numbers.

.....from H.Middleditch

We do not seem to have any problem in distinguishing between various sorts of flower parts, such as petals, stamens, etc., even though these are all modified leaves. Scales on the tube certainly transform by gradual degrees into petals so no rigid dividing line is possible there. A flower is basically a shoot with a system of vascular bundles, with a vascular strand to each individual flower part. There is one vascular strand to each petal, to each filament, etc. A leaf has a vascular strand linking it to the main vascular system of the plant as a whole. As modified leaves, do spines and glochids have a vascular bundle? Or a vascular strand? Is there anything except the barbs on the glochids which distinguish between the two?

Weingart also provides an interesting sketch of a greatly enlarged section of an areole, showing that the vascular strands do not extend to the surface layers of the base of the areole, or even to the subsurface layers. Do vascular strands arise from this layer and extend to and into the spines?

.....from F.Ritter, Kakteen in Südamerika Vol.1

The expression 'spine' in relation to cacti is an old established one, but one which nowadays is often replaced by the expression 'thorn'. The use of the term 'spine' should be restricted to a cuticular, needle-like form, whereas the concept of a thorn in contrast is an analogous term for an axial growth. A cactus thorn is certainly very different from a shoot-thorn, like that of a hawthorn bush for example, because in the first place, it has been supposed that it genetically has its origin as an elementary leaf, although proof of this inference is difficult, and secondly it is markedly distinct from a thorn. If one replaces the term 'spine' with 'thorn', then one must also describe the hairs on cactus flowers, for example, as thorns, because they are of a homologous growth, only being much thinner, as are also the hairs on the areoles of the body. On the other hand, one does not describe the the felty hair of the areoles as spines, (although they are also of cuticular growth), since they are morphologically not spines; and cactus thorns are also not morphologically, or morphogenetically, identical to the shoot thorns of the hawthorn bush. They differ from the latter to such an extent that even Rümpler in his handbook of 1886 (page 203) writes: "... all (spines) have their origin solely from the outermost tissue of the body and are consequently genuine spines and not thorns, which being on a woody body and in their formation bear them no relation as, for example, those of the hawthorn bush". One needs here not to be caught out by a morphogenetical trifle, so I have retained the old established terms of spines, bristles, and hairs for cacti.

...from H.Middleditch

There must be some distinction between shoot-thorns and spines, but Ritter's explanation of the difference is far from clear to me.

.....from Strasburgers Textbook of Botany 1970

A leaf starts to grow by extra cells being produced by the outermost layer of epidermal cells, initially without any vascular tissue branching off to the focal point of growth of the new leaf. The growth of leaves from that primordial stage is, with rare exceptions, limited and is apical usually only for a short time. The activity of the apical meristem i.e. the site at which new growth is being generated, dies away rapidly and is replaced by a basal meristematic zone, or by meristematic zones at points where the vascular strands branch off. The strands in the interior of the fully-grown leaf represent the vascular bundles. The structure of the vascular bundles in the leaf corresponds to that of the stem.

Thorns are derived from leaves or leaflets in e.g. Cactaceae and *Berberis*, and from shoots in e.g. *Crataegus* sp (Hawthorn) and *Prunus spinosa* (Blackthorn). The xylem of the thorn arises directly from that of the branch bearing it.

.....from H.Middleditch

It would appear that a distinction is being drawn by Strasburger between a leaf, which has a determinate growth right from its initiation, and a shoot, which arises from the node or angle between leaf foot and stem, and has (within limits) an indeterminate growth. Once a leaf has been produced, it will remain indefinitely



(evergreens) or be shed after a season (deciduous) without a replacement ever arising again from the same point. Flower parts, being modified leaves, have a determinate growth, and are deciduous. But they arise from the areole, which is the node, and not from the leaf base. The areole retains its facility to function as a point of growth even when a flower has been shed; a second, or third flower, may arise subsequently from the same areole in the same, or following season (*Weingartia*, *Rhipsalis*). Several plants in my greenhouse have had an areole removed by misadventure, such as near the base of my six-foot tall *Trichocereus*, and have subsequently grown a replacement spine cluster.

If the areole wool is a trichome and grows from the very surface layer of cells of the epidermis, then this epidermal layer must have been repaired before my *Trichocereus* produced new areole wool. Or else it grew from the lower layer of cells exposed by the damage due to the complete spine clump being broken off. If the spines grew from the lower layer of cells, then the spine/wool assembly must have broken off below the point at which the spine was completely ossified and had ceased to grow. Or alternatively, the dormant growing point under the surface of the areole reactivated to produce another spine/wool assembly. Just as it sometimes produces another flower, or, possibly many seasons later, produces an offset or branch.

In just the same way that the node may generate a branch that will produce stems, leaves, and flowers, a node will also generate a flower that will in turn generate petals, stamens, etc. Apparently it will also generate, or re-generate, a wool/spine assembly which can differentiate into wool, glochids, hairs, bristles, and spines. Do bristles change by degrees into spines in the same way that sepals on the flower tube change by degrees into petals? Is there any real distinction between them, apart from the convenience of terminology?

.....from Strasburgers Textbook of Botany 1970

Glochidia are outgrowths from surface cells i.e. trichomes or hairs. Hairs are outgrowths from surface cells, which originate exclusively from centres of growth on the epidermis. Hairs may be unicellular or multicellular. By vigorous external growth, followed by cell division, it can give rise to a large multicellular structure. The single-celled bristle-like stinging hairs of species of *Urtica* and *Loasa* have a very peculiar construction. The foot of the hair is very thin-walled; the tip of the hair is silicified and the remaining parts of the wall, except the foot, are calcified.

.....from H.Middleditch

There is no reference in this publication to the existence of a vascular strand in a glochid or in a trichome. Since a leaf has a vascular strand, and spines (not Hawthorn thorns) are modified leaves, then presumably spines have a vascular strand. As with leaves, this will run to the point of active growth, and no further. Do spines grow from the top outwards, or do they only add to their length by growing at the base?

.....from Buxbaum Morphology of Cacti

Wetterwald in *Nova Acta Kais. Leop-Carol. Deutsch. Akad. Naturf.* 53,1889 showed that spines enlarge by a basal meristem, as do leaves. The top of the spine becomes hardened when the spine is first seen in the areole and is still lengthening. After attaining maturity the base of the spine also becomes hard.

.....from H.Middleditch

Here it is stated that the spine lengthens by adding growth at the base. Hence the vascular strand would only need to run as far as the site of active growth (meristem) at the base of the spine, so that a cross section of a spine at a point anywhere above the short basal section would not show a vascular bundle.

.....from G.J.Swales

From the S.E.M. photographs which I have taken of cross sections of spines, I cannot see any structure which resembles a vascular bundle.

...from H.Middleditch

Does that mean that hairs (trichomes) have no vascular bundles, and are not barbed; that glochids have no vascular bundles, but are barbed; that spines do have vascular strands to their base but not along their length? Is this how to differentiate these three features? Are spines ever barbed?

.....from Buxbaum Morphology of Cacti

Weingart first accurately described the structure of spines; at the top of the spine of *Opuntia rhodantha* the epidermal cells become scaled with barbed hooks.

...from Kiesling, *Maihueniopsis* and *Tephrocactus*

In the spines of *Tephrocactus sensu Kiesling*, the epidermal cells separate from the body of the spines from their distal end i.e the end most distant from the point of attachment of the spine to the body, which is very rare in *Opuntioideae*.

.....from H.Middleditch

This article by Kiesling was accompanied by some very informative S.E.M. photographs of epidermal scale cells on spines of *Tephrocactus* and *Maihueniopsis*, a facility not available to Weingart. Taking the remarks of Buxbaum and Kiesling together, it would suggest that in *Opuntioideae* it is common to find spines with epidermal cells partially detached at the basal end i.e nearest the point of attachment of the spine to the body. This detached portion of cell curves away slightly from the general body of the spine, forming a surface like a rasp or file. The projections could be described as barbs.

.....from R.Ferryman

When we were out in Chile, if you walked anywhere near plants of *Tephrocactus berterii* the individual segments would jump up and attach themselves by their barbed spines to your boots or your trouser bottoms.

.....from H.Middleditch

So if spines can also possess barbs, formed of individual surface cells, do glochids have surface cells with a barbed trichome, or do they have slightly curled-up rectilinear surface cells which function as barbs?

.....from Buxbaum, Morphology of Cacti

Each glochid is a modified leaf ... above the base the epidermis consists entirely of scaly cells.

...from H.Middleditch

Do we therefore have a hair or trichome arising from the epidermis, without barbs; a glochid which is merely a bristle-like spine, barbed by semi-detached cuticle cells as in certain *Opuntioideae*; and spines, which in certain cases may be barbed? Was Rümpler right in 1886, “they appear now as spines, now as bristles, now as hairy spines or hair-bristles”? Is the differentiation merely a matter of convenience for descriptive purposes and there is no such thing as “real hairs” or “real glochids” except in the eye of the beholder? It would be nice to have some S.E.M. study done on both glochids and spines of an *Opuntia* or two, in order to find out whether the nature of the barbed surface is similar or not.

.....from Schill, Barthlott & Ehler, *Micromorphology of cactus spines. Tropische und subtropische Pflanzenwelt* 6. 1973.

The central spines of *Tephrocactus rauhii* display a typical glochidoid structure, just like real glochids. Also the long wool-hairs are to be regarded as modified spines, whose glochidoid character at the tip may be clearly discerned at high magnification. .... The *Opuntioideae* all follow the same glochidoid surface form. On the spines the lower part of the epidermal cells project and are thus barbed; at least each spine tip is more or less covered in this manner. The completely modified “paper spines” of *T.articulatus* v.*papyracanthus* for example follow the same surface form as the microscopic glochids of this same species.

.....from H.Robinson, S.E.M. studies of spines and glochids of *Opuntioideae*, *Amer.J.Bot.* 61(3) 1974

The spines of the *Opuntioideae* have little variation in surface structure. Most spines are simply retrorsely scabrous by the projecting lower ends of the surface cells. The glochids of the *Opuntioideae* have the same basic surface structure as the spines. They are in this respect only small spines and the two kinds of structures intergrade. The base of the glochid is the primary distinction, being easily detached because of an unsclerified zone not found in the spines.

.....from H.Middleditch

In the above article by Schill, Barthlott, & Ehler there is an SEM picture of the barbed tip of a hair from *T.rauhii*. The magnification is x500 and barely half a dozen barbs can be seen, so that this feature can hardly be described as prominent. If this is typical of the *lagopus* group (sensu Ritter) and forms the basis of separation from the *floccosus* group, then it is a very fine division indeed. Is this belief supported or contradicted by any more studies on the barbed hairs of these plants?

.....from W.Barthlott

We have looked at very little material of *Tephrocactus* and thus I do not feel competent to comment on your question.

.....from H.Middleditch

From the foregoing abstracts it might appear that the various authors are not entirely of one common mind when it comes to defining precisely what is a hair, a glochid, and a spine.

## CARDENAS - THE FACTS AND THE FABLES

Several abstracts from the autobiography of M.Cardenas were quoted in *Chileans* No.54, where there was a clear discrepancy between the year of an event as quoted by Cardenas and the year of the same event identified from other sources. There are further events noted in the Cardenas autobiography where it may be possible to establish the accuracy or otherwise of Cardenas' record.

.....from *Memoirs of a Naturalist*, by M. Cardenas.

In the course of 1949 I did not go outside Bolivia and was able to concentrate upon my botanical collecting work within the Republic. During the month of January we met up in Colomi with Miss Winifred Brooke who was collecting plants for the British Museum and H.Gandarillas. Our main objective was to search for potatoes and cacti.

.....from *The Natural History Museum*

Miss Brooke collected plants in Bolivia from December 1948 to November 1950. For further information see *Brit. Fern Gaz.* 9, 1967 and *Proc. Lond. Entom. Nat. Hist. Soc.* 1951-2.

.....from *Memoirs of a Naturalist*, by M.Cardenas

In March of 1963 there arrived in Cochabamba both K.Dodds and W.A.Simmonds of the John Innes Institute of England, in order to collect “weed” and wild potatoes, utilising a grant from the Rockefeller Foundation. Their first trip was to the Cordillera Tunari, ... their second to Jatun Pino, branching from Monte Punco.

.....from John Innes Institute

Enclosed is a copy of the 1963 Annual Report and also a copy of the report submitted after the Bolivia expedition, dated 26 June 1963. [Which latter reads] ....We arrived in Lima 25 February 1963 and left 23 April. .... In Cochabamba we soon learned of a potato-like plant known under the name of ‘aparuma’ that occurred in the maize fields but whose tubers were not eaten. .... Whilst in Cochabamba Prof. M.Cardenas told us that weed potatoes were used for food in the Sorata valley when crops were poor. .... This is a narrow valley whose precipitous sides are used mainly for maize growing. Prof. Cardenas' story proved to be true in principle and we collected samples of white and coloured potatoes under the name ‘lilicoya’ among the maize.

**Annual Report 1963** Introductions were made to the Commonwealth Potato Collection during the year, of which the great majority were the products of the visit made to Bolivia by Dr.Dodds and Mr. Simmonds. This visit which was made with the aid of a grant from the Rockefeller Foundation, the months of March and April 1963 being spent in Bolivia and Peru. The wild potatoes occur as weeds in the maize fields, up to 10,000 ft., at which level the maize disappears.

.....from Memories of a Naturalist, by M.Cardenas

In June of 1963 a plane flight took me via Lima and Miami to St.Louis in Missouri, where I saw Hugh and Marian Cutler. Thence by train to Kansas city and then by air to San Francisco, to meet Paul C.Hutchison at Berkley Botanic Garden. After spending some time sight-seeing in California, I took a flight to Paris. Whilst in Paris I visited the Museum d'Histoire Naturelle to examine in the Herbarium the specimens of *Chincona* collected by Hugh Algernon Weddell in Bolivia in the first half of the last century. Whilst in Paris I was contacted by Luis Vatrican President of the I.o.S who was making preparations for the fourth international congress of this association ... which I was invited to join on 25 August in Vienna.

From Paris I went to Spain .... whilst in Madrid I paid a call on the Bolivian Ambassador Dr. Hernan Siles Zuazo, a former student of mine at the American Institute of La Paz and ex-President of Bolivia. This same day I went with Dr. Siles to a pavement cafe on the Gran Via and whilst we were in conversation who should pass by but my ex-student from the Agronomia faculty, Ing. Leandro Rojo. .... Whilst in Barcelona I visited Riviere de Caralt at Pinya del Rosa. After returning to Paris .... a visit was made to Uhlig at Rommelhausen ... and to H.Krainz at the Zurich Cactus & Succulent Garden .... before going on to Vienna for the I.o.S. Congress. Visits were made to Venice and Rome before leaving Naples by sea on 19 September 1963, reaching Buenos Aires on 6 October. ... and finally returning to Cochabamba by air.

.....from R.Mottram

The seventh Congress of the I.O.S. was held in Vienna in August 1963, a report of the event being published in K.u.a.S. for February 1964.

.....from H.Middleditch

This appears to provide three instances where the year for an event quoted in the Cardenas autobiography does match other written records.

## **PARODIAS IN ABUNDANCE From J.Brickwood**

This year I have had a remarkable show from my collection of plants of the *Parodia microsperma* group, now in excess of 500 plants. Some flowers have even appeared on two year old plants as small as 1 cm across. Even two plants of JL 254a from Chileans' seed flowered this year, one with a reddish flower, one orange. The JL 251 *P.weberiana* flowered mostly deep yellow, with a couple of plants having golden orange flowers. The JL 295 *P.rubelliamata* flowered blood-red to orange-red. There is now no doubt in my mind that *P.amblayensis* and *P.rubelliamata* are forms of a single taxon; likewise *P.mercedesiana* and *P.rubristaminea*, as well as *P.malyana* and *P.minuscula*. Incidentally these three pairs of taxon can be added to the growing list of *Parodias* with flower colours which vary from yellow to red. Two plants of P.158 *P.rubriflora* (= *P.sanguiniflora*), came out with yellowish-orange flowers, whilst as the name indicates they would normally flower a deep red colour.

## **RUDOLF AMANDUS PHILIPPI By Karl Reiche**

**Translated and abstracted by H.Middleditch from Ber. Deutsch. Bot. Ges. Vol.22 1904**

Rudolf Amandus Philippi was born in Charlottenburg on 14 September 1808. He attended the Pestalozzi institute in Switzerland and then went to grammar school in Berlin. In 1825 he enrolled at the Berlin High School as a medical student, where his thesis for his Doctorate was concerned with a zoological theme. Among his tutors was Alexander von Humboldt, whose lectures inspired in him a pursuit of natural history. After an abode in Italy, during which he spent over a year collecting in Sicily, Philippi was appointed as a lecturer in Zoology and Botany at a school in Kassel.

Falling victim to influenza, he had to leave Kassel and sojourn once more in Italy to improve his health; returning to lecturing in Kassel in 1840. In 1848 he became active in striving after his lifelong ambition for a constitutional monarchy. The reaction against that movement gained the upper hand and Philippi lost his position as Director of the Kassel school. He sailed from Hamburg in December 1851 in order to join his brother who was by now resident in Chile, at Valdivia. After the death of his brother in 1852 at the hands of rebellious Patagonians, R.A.Philippi inherited his brother's extensive estate of San Juan which lay in the province of Valdivia.

The results of his collecting activities from Valdivia, including an ascent of the Orsono Volcano, so impressed I.Domeyko, Professor of minerology at Santiago University, that R.A.Philippi was shortly afterwards - in 1853 - appointed as Professor of Zoology and Botany at the University, and Director of the Santiago Natural History Museum. This institution, which had been originally founded by Claude Gay, after whose departure in 1840 the accumulated collections had not only not been enhanced, but in the following 13 years had dwindled to almost nothing. Some herbarium material of Berteros from the year 1828, some plants collected by Gay, and a small collection of birds, would have been the only remnants. Consequently R.A.Philippi found himself in 1853 just about where Gay stood in 1830, that is, he had to restock the Museum afresh. This institution was to become the principal interest of his life. To the procurement of materials he contributed some important excursions.

In the summer of 1853/54 he undertook a richly productive trip to the region of Atacama, which crosses Chile from 27 to 23 degrees latitude. He brought back from there a comprehensive account of the Orography, Hydrography, Geology, Palaentology, Flora and Fauna pertaining to this completely unknown region. The province Valdivia has naturally been studied in fullness of detail - in 1858 and then again in 1860 he visited



Ranco lake. From Santiago he undertook further trips into the neighbouring cordilleras, to the baths at Colina, the Cordillera of Rancagua, as well as the territory between the capital and Valparaiso. Further visits were made at intervals to the Chillan valley, the Province Concepcion, and that of Araucana, which he still visited as an octogenarian. He became acquainted with Juan Fernandez in 1864.

In 1897 he resigned the Directorate of the Museum and retired into private life; he died in 1904. Philippi's publications were numerous and wide ranging. In regard to Philippi's systematic descriptions, the number of different species so described may exceed 3000. Certainly these "species" are of very diverse validity; in addition to numerous well-founded ones, there are, chiefly among those created in his later years, very many which are undoubtedly superfluous. This can be accounted for principally by the personal preferences of the authors in recognising smaller and smaller species-distinguishing characters. Moreover, in his early years he had not made use of the earlier relevant literature such as the Flora Antarctica. Just as little can he be spared the blame for establishing species on quite inadequate, fragmentary, or immature examples. Among the immense number of the newly described species, he gradually lost an overall view and he himself latterly described and published once again an existing species under a new name.

## FINDING TEPHROCACTUS LAGOPUS IN BOLIVIA From J.Carr

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

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

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

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

.....from M.Lowry

During the course of a field trip made to Peru in 2002, we were travelling in the high Cordillera to the north of Lake Titicaca. It was here that we came across *Austrocylindropuntia lagopus*. We were quite some distance from the frontier with Bolivia but it seemed to be quite possible that this *A.lagopus* might also be found on the Bolivian side of the border. We did indeed find it there in 2003 at an altitude of nearly 4,500m, at no great distance from the border with Peru. There were no other cacti to be seen in the immediate surroundings, nor were there any bushes or shrubs. The vegetation consisted of herbs and grasses which had been heavily grazed by sheep and llamas.

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

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

.....from H.Middleditch

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

The Cordillera Apolobamba and the Cordillera Real represent one section of the high ridge which bounds the eastern side of the Andes, facing the low-lying Amazonia. The gap between these two Cordillera would originally have been occupied by a similar barrier ridge, but the headwaters of the tributaries to the Rio Consata, with the advantage of the steep drop down to the Amazon basin, have cut that portion of the

Cordillera into numerous isolated blocks. These valleys are so deep in relation to their surrounding heights that the only practical means of access to them is to strike north from Escoma and follow the high pampa towards Charazani, turning into the head of the required valley. Even then, access to the lower part of the valley can involve “a thousand metres descent of numerous hairpins”, as Ritter found when visiting Ayata [Chileans No.49 p.10]. Not too surprising, then, that when Rausch tried a short cut, he was defeated by the depth and precipitous nature of the valley sides. {Chileans No.61 p.26}.

The location for *T.lagopus* found by J.Carr and M.Lowry on the slopes of Cordillera Apolobamba are clearly a continuation of the populations in the adjoining part of Peru. However, the observations by Cardena, Ritter, and Rausch, would suggest that *T.lagopus* extends further south-east, probably in isolated populations on the higher parts of the desiccated ridge of the Cordillera which lies to the south-east of the Cordillera Apolobabmba.

### THE CHILEANS GYMNOCALYCIUM SLIDES From G.Slack

At present I am in the process of scanning the Gymnocalycium slides that are in the Chileans Library and putting them on to a CD, but it will be some months before this is complete. If any members have slides of Gymnocalycium which can be spared for the Library, especially if they are of flowers, flower sections, or fruit, they would be very welcome.

### ACCOUNTS, CHILEANS VOLUME 20 Nos. 64 to 66

Income		
Balance brought forward	4,544.63	
Subscriptitons	2,227.35	
Sales of Back Numbers	369.50	
Sales of other publications	70.00	
Sundry Income	45.18	
Bank Interest	300.44	
	<hr/>	
	£7,557.10	£7,557.10
Expenditure		
Printing	1,259.30	
Postage, stationaey, etc	1,209.31	
Bank Charges	20.00	
	<hr/>	
	£2,488.71	£2,488.71
Balance carried forward		<u>£5,068.39</u>

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### Slide and CD Library Holders and Particular Interests

Austrocactus	A.Johnston, 11 Malvern Road, Scunthorpe DN17 1EL	
Cereanae	G.J.Charles, Briars Bank, Fosters Bridge, Ketton, Stamford PE9 3UU	graham.charles@btinternet.com
\$ Cleistocactus	T.Lavender, Kalanchoe, Market Place, Tetney DN36 5NN	
Echinopsis	M.Muse, 32 Fielding Road, Birstall, Leicester LE4 3AJ	
\$ Frailea	R.Gillman, Oddyns Farm, High Cross Lane, Little Canfield CM6 1TF	rickgillman@btinternet.com
\$ Gymnocalycium	S.G.Slack, 50 Sunnyside, Edenthorpe DN3 2PH	grahamandirene@slack2830.freeserve.co.uk
Haageocereus	J.Arnold, Suffolk House, 2 Oak Hill, Washingbrough LN4 1BA	john_joan.arnold@2oakhill.freeserve.co.uk
\$ Islaya	M.Williams, 40, Long Lane, Harrishead, Stoke on Trent, ST7 4LQ	maurice.williams@talktalk.net
Lobivia	J.R.Kirtley, 11 Fire Station Houses, Alwick NE66 2PB	jim@kirtley7.fsnet.co.uk
\$ Matucana	P.Hoxey, 34 Stonehill Road, Great Shelford CB2 5JL	paul@hoxey.com
Neoporterianae	R.Moreton, 91 Umberslade Road, Selly Oak, Birmingham B29 7SB	
\$ Notocactus	P.Moor, 60 Milton Hall Road, Gravesend DA12 1QW	philip.moor@blueyonder.co.uk
\$ Parodia	J.Brickwood, 48 Haselworth Drive, Gosport PO12 2UH	john@jbrickwood.freeserve.co.uk
\$ Sulcorebutia	J.Cooke, Orchard End, Chipperfield Road, Bovingdon HP3 OJR	julian@cactusorchard.freeserve.co.uk
Tephrocactus	R.K.Hughes, 16 Ashbourne Avenue, Bootle L30 3SF	
\$ Weingartia	A.Glen, 5 Hall Grove, Macclesfield SK10 2HQ	aglen@tinyworld.co.uk

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

### The Chileans

Hon. Organiser	H.Middleditch, 5 Lyons Ave., Hetton-le-Hole DH5 OHS
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